# NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult and Pediatrics)

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Appendix 1 – Change Request Form
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Introduction

The original Clinical Practice Guidelines for Nurses in Primary Care (FNIHB, July 2000) contain information on common health problems and common emergency conditions seen in the adult population. We acknowledge the work of the First Nations and Inuit Health Branch of Health Canada in developing the clinical guidelines and appreciate their permission to use their guidelines, review and update them again and revise them specifically for the NWT.

The adult guidelines consist of 15 sections. Each one includes an assessment (history and physical examination) of the body system in question, along with clinical practice guidelines on common disease entities and emergency situations seen in that system. The most current resources available have been used in the revision and are referenced where possible.

The adult and pediatric guidelines are intended to be used together and are consequently published in one binder for the NWT.

These guidelines are intended for use, in conjunction with the NWT Health Centre Formulary (July 2003) as well as the Community Health Nursing Program Standards and Protocols (March 2003) along with the reference sources from each of these manuals and Clinical Practice Information Notices as they are issued by the GNWT Department of Health and Social Services.

All drugs referenced in these guidelines are in the NWT Health Centre Formulary (July 2003), with the exception of some drugs which have been used as examples of possible physician prescriptions. There are a few situations where A or C class drugs should be prescribed by a physician only - in these cases the classification will remain A or C but the text will clarify that these drugs in this circumstance should be prescribed by a physician only (e.g. salicylates in treatment of rheumatic fever)

NWT Health Centre Formulary (July 2003) classifications have been used.

A class drug - RN initiated, based on nurse assessment of patient, no limitation on duration of treatment
B class drug - Physician initiated, based on consultation with MD, duration/frequency to be specified by MD
C class drug - RN may initiate 1 course. A course is defined as several successive doses of medication over time. The time is the period that the specific drug is expected to produce therapeutic effects. A course may not exceed 2 weeks without consulting a physician. If the condition does not resolve, the expectation is that the nurse will consult a physician. If further medication is needed, a physician order is required.
D class drug - RN one dose - reassess patient, contact MD if further treatment is required

You will find that many drugs have been reclassified to a C classification. This is to emphasize the point that if a patient returns with no resolution of the problem the RN should consult with a physician rather than continue to treat ineffectively
Acknowledgments

We wish to acknowledge the generous time and effort made by:

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in helping to review and revise these guidelines

Preface

These Clinical Practice Guidelines are intended primarily for use by registered nurses working in health centers located in the Northwest Territories.

All nurses are encouraged to use other current resources, text or internet, to supplement the information in these guidelines. All nurses are reminded that this manual is a "guideline", however, nurses are encouraged to base their practice on this guideline whenever possible.

It is also important to note that the guidelines contain useful information but are not intended to be exhaustive. Consequently, the manual is to be used for reference and educational purposes only and should not be used under any circumstances as a substitute for clinical judgment, independent research or the seeking of appropriate advice from a qualified healthcare professional.

Nurses must consult with a physician whenever a situation warrants. Appropriate medical advice is to be obtained by telephone in cases where the condition of the client is at all serious or in cases where the condition of the client is beyond the scope of practice and expertise of the nurse to manage autonomously.

Although every effort has been made to ensure that the information contained in the guidelines is accurate and reflective of existing healthcare standards, it should be understood that the field of medical science is in constant evolution. Consequently, the reader is encouraged to consult other publications or manuals. In particular, all drug dosages, indications, contraindications and possible side effects should be verified and confirmed by use of the current edition of the Compendium of Pharmaceuticals and Specialties (CPS) or the manufacturer's drug insert.

These guidelines will be available on the GNWT intranet website. In the printed version you will notice adequate white space between subjects. This is partly for ease of future revisions, but also to encourage you to make your own notes (e.g. mnemonics for remembering things, recent reference sources, cross references to other DHSS GNWT documents), as needed, if you have your own copy of the guidelines.

Every effort will be made to keep these Clinical Practice Guidelines current. Appendix 1 provides the opportunity for the Guidelines Users to submit suggested changes and so assist with the Guidelines update process.
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Note: The Eye Clinic in Yellowknife may be used as a resource at any time. Phone number: 1-867-873-3577
Assessment Of The Eyes

History Of Present Illness And Review Of System

General
The following characteristics of each symptom should be elicited and explored:
• Onset (sudden or gradual)
• Chronology
• Current situation (improving or deteriorating)
• Location
• Radiation
• Quality
• Timing (frequency, duration)
• Severity
• Precipitating and aggravating factors
• Relieving factors
• Associated symptoms
• Effects on daily activities
• Previous diagnosis of similar episodes
• Previous treatments
• Efficacy of previous treatments

Cardinal Symptoms
In addition to the general characteristics outlined above, additional characteristics of specific symptoms should be elicited, as follows.

Vision
• Recent changes
• Blurring
• Halos
• Floaters
• Corrective measures (glasses, contact lenses)

Other Associated Symptoms
• Pain
• Irritation
• Foreign-body sensation
• Photophobia
• Diplopia
• Lacrimation

• Itching
• Discharge
• Ear pain
• Nasal discharge
• Sore throat
• Cough
• Nausea or vomiting
• Urethral, vaginal or rectal discharge
• Pain or inflammation of the joints (or both)

Medical History (Specific To Eyes)
• Eye diseases or injuries
• Eye surgery
• Use of corrective eyeglasses or contact lenses
• Concurrent infection of the upper respiratory tract
• Sexually transmitted infections
• Immunocompromise
• Exposure to eye irritants (environmental or occupational)
• Allergies (especially seasonal)
• Current medications
• Systemic inflammatory disease (inflammatory bowel disease, Reiter's syndrome)
• Diabetes mellitus
• Hypertension
• Chronic renal disease
• Bleeding disorders

Personal And Social History (Specific To Eyes)
• Occupational exposure to irritants
• Use of protective eyewear
• Housing and sanitation conditions
• School or daycare exposure to contagious organisms (e.g. pinkeye)
General Physical Examination

Eye
Examine the bony orbit, lids, lacrimal apparatus, conjunctiva, sclera, cornea, iris, pupil, lens and fundi. Note the following:
• Visual acuity (which is decreased in keratitis, uveitis and acute glaucoma)
• Swelling
• Discharge or crusting
• Discoloration (erythema, bruising or hemorrhage)
• Lipid deposits
• Arcus senilis (white circle) around iris
• Position and alignment of eyes
• Reaction of pupil and its accommodation to light
• Extraocular movements (which are associated with pain in uveitis)
• Visual field by confrontation
• Corneal clarity, abrasions and lacerations
• Corneal light reflex
• Lens opacities (cataracts)
• Red reflex (which indicates intact retina)
• Hemorrhage or exudate
• Optic disk and retinal vasculature

Palpate the bony orbit, eyebrows, lacrimal apparatus and pre-auricular lymph nodes for tenderness, swelling or masses.

Apply fluorescein stain (to test for corneal integrity).

Measure intraocular pressure (by Schiotz tonometry) (10 to 20 mm Hg is normal).

The ear, nose and throat should also be examined if there are symptoms of an upper respiratory tract infection or if sexually transmitted infection (e.g. gonorrhea) is suspected.

Lymphatic System
Assess the lymph nodes of the head and neck if a systemic condition, such as a viral infection of the upper respiratory tract or a sexually transmitted infection, is suspected.

Assess for pre-auricular adenopathy, which might indicate chlamydial, viral or invasive bacterial infection of the eye (e.g. gonorrhea).

Abdomen
Assess liver for tenderness and enlargement if eye symptoms are associated with symptoms of a sexually transmitted infection (e.g. disseminated gonorrhea) (see chapter 5, "Gastrointestinal System," for details of abdominal exam).

Genitourinary System And Rectal Area
Assess for urethral, cervical or vaginal discharge if eye symptoms are associated with symptoms of a sexually transmitted infection (e.g. disseminated gonorrhea) (see chapter 6, "Urinary and Male Genital Systems," and chapter 12, "Obstetrics," for details of these exams).

Musculoskeletal System And Extremities
Examine the joints to assess for warmth, redness, pain or swelling if eye symptoms are associated with joint symptoms (e.g. disseminated gonorrhea) (see chapter 7, "Musculoskeletal System," for details of exam).
Differential Diagnosis Of Eye Symptoms Or Ocular Pain

- Hordeolum
- Chalazion
- Acute dacryocystitis
- Exposure to irritants
- Conjunctival infection
- Corneal abrasion
- Foreign-body irritation
- Corneal ulcers

- Ingrown lashes
- Abuse of contact lens
- Scleritis
- Acute angle-closure glaucoma
- Uveitis (iritis)
- Referred pain from extraocular sources such as sinusitis, tooth abscess, tension headache, temporal arteritis or prodrome of herpes zoster
Common Problems Of The Eye

Red Eye

Red eye is common in a wide variety of ocular conditions (Table 1), some of which are a serious threat to vision and require immediate referral to an ophthalmologist.

Causes

- Infection: conjunctivitis, keratitis (bacterial, viral [herpetic or non-herpetic] or other)
- Ocular inflammation: uveitis, iritis, episcleritis, scleritis
- Dry eyes
- Blepharitis with secondary conjunctivitis or keratitis (or both)
- Allergy (e.g. allergic conjunctivitis)
- Glaucoma (e.g. acute angle-closure glaucoma)
- Toxic, chemical or other irritants such as topical eye drugs, contact lens solution, acids or alkalis, smoke, wind or ultraviolet rays
- Traumatic injury (e.g. corneal abrasion, foreign-body irritation, hyphema, subconjunctival hemorrhage)
- Pterygium or inflamed pinguecula

- Infection of lacrimal system (e.g. dacryocystitis)

Features Of Dangerous Red Eye

The first step is to differentiate major or serious causes of red eye from minor causes. The following danger signs call for referral to an ophthalmologist.

- Severe ocular pain (especially if unilateral)
- Photophobia
- Persistent blurring of the vision
- Proptosis (exophthalmos)
- Reduced ocular movement
- Ciliary flush
- Irregular corneal reflection of light
- Corneal epithelial defect or opacity
- Pupil unreactive to direct light
- Worsening of signs after 3 days of pharmacologic treatment for conjunctivitis
- Compromised host (e.g. neonate, immunosuppressed patient, user of soft contact lenses)

Table 1: Partial Differential Diagnosis of Red Eye

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<th>Glaucoma</th>
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<tr>
<td>Vision</td>
<td>Normal</td>
<td>Reduced or very reduced</td>
<td>Reduced</td>
<td>Very reduced</td>
</tr>
<tr>
<td>Pain</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Photophobia</td>
<td>+/-</td>
<td>-</td>
<td>+</td>
<td>-</td>
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<td>Foreign body sensation</td>
<td>+/-</td>
<td>-</td>
<td>+</td>
<td>-</td>
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<tr>
<td>Itch</td>
<td>+/-</td>
<td>+</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Tearing Discharge</td>
<td>+</td>
<td>Mucopurulent</td>
<td>+</td>
<td>+</td>
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<tr>
<td>Pre-auricular adenopathy</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Pupils</td>
<td>Normal</td>
<td>Normal or small</td>
<td>Small</td>
<td>Moderately dilated or fixed</td>
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<td>Conjunctival hyperemia</td>
<td>Diffuse</td>
<td>Diffuse with ciliary flush</td>
<td>Ciliary flush</td>
<td>Diffuse with ciliary flush</td>
</tr>
<tr>
<td>Cornea</td>
<td>Clear</td>
<td>Sometimes faint punctate staining or infiltrates</td>
<td>Clear</td>
<td>Depends on disorder</td>
</tr>
<tr>
<td>Intraocular pressure</td>
<td>Normal</td>
<td>Normal</td>
<td>Reduced, normal or absent</td>
<td>Increased</td>
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+, present (to various degrees); -, absent; +/-, may be present

*Hyperthyroidism may cause conjunctival injection.
Blepharitis

Definition
Inflammation of the eyelid margins.

Causes
• Seborrhea or bacterial infection (with Staphylococcus aureus); both may be present in some people (mixed form)
• Lice infestation of the lashes

History
• Burning, itching or irritation of lid margin
• Condition commonly chronic, with frequent exacerbations
• Usually bilateral
• History of seborrhea (of the scalp, brows or ears)
• Loss of lashes

Physical Findings
• Lid margin red, scaly
• Crusting may be present
• Visual acuity normal
• PERRLA
• Conjunctival redness may be present

Bacterial Form
• Dry scales
• Lid margin red
• Ulceration may be present
• Lashes tend to fall out

Seborrheic Form
• Greasy scales
• Lid margins less red
• No ulceration

Mixed Form
• Dry and greasy scales
• Lid margins red
• Ulceration may be present

Differential Diagnosis
• Allergic blepharitis
• Hordeolum (stye)
• Chalazion
• Conjunctivitis

• Skin cancer (unilateral) (e.g. sebaceous-cell carcinoma)

Complications
• Secondary bacterial infection common in seborrheic form
• Recurrence

Diagnostic Tests
• Swab exudate for culture and sensitivity prn

Management

Goals of Treatment
• Keep lid margin clean and free of scaly buildup
• Prevent infection

Appropriate Consultation
Consult a physician if the inflammation or infection is extensive (i.e. includes more than the lid margins), as in orbital cellulitis.

Treat for several weeks, until the blepharitis is completely gone, to reduce chance of recurrence.

Nonpharmacologic Interventions
Lid Hygiene (to be performed twice daily). First, apply warm compresses for 5 minutes to soften the scales and crusts. Next, scrub the eyelid margin and the bases of the eyelashes with a solution of water and baby shampoo (90 mL [3 oz] water and 3 drops of shampoo). Rinse with clear water and then remove lid debris with a dry, cotton-tipped applicator.

Client Education
• Counsel client about appropriate use of medications (dose, frequency, application)
• Instruct client in proper hygiene of eyelids
• Recommend that client avoid rubbing or irritating eyelids
• Recommend avoidance of cosmetics, wind, smoke and other irritants
Pharmacologic Interventions
Apply a topical antibiotic eye ointment to the lid margins and into the lower conjunctival sac:

polysporin ointment (A class drug), bid for 1-2 months,
or
erythromycin ointment (B class drug), bid for 1-2 months

Identify and manage underlying seborrhea (scalp, eyebrows or other skin areas).

Monitoring and Follow-Up
Follow up in 10-14 days.

Referral
Usually not necessary unless there is no response to therapy or if infection becomes more extensive (e.g. orbital cellulitis).
**Conjunctivitis**

**Definition**
Inflammation of the conjunctiva.

**Causes**
Conjunctivitis is usually one of three types:
- **Bacterial:** *Chlamydia, Hemophilus influenzae, Neisseria gonorrhoeae, Staphylococcus aureus, Streptococcus pneumoniae*
- **Viral:** adenovirus, coxsackie virus, ECHO virus
- **Allergic:** seasonal pollens or environmental exposure

Predisposing factors: contact with another person who has conjunctivitis, exposure to a sexually transmitted infection, other atopic (allergic) conditions.

**History**

**Bacterial Conjunctivitis**
- Acute redness and purulent discharge
- Burning, gritty sensation in eyes
- Recent contact with others with similar symptoms

**Viral Conjunctivitis**
- Acute onset of redness
- Watery discharge
- Foreign-body sensation
- Lasts 1-4 days; infectious for up to 2 weeks
- Systemic symptoms (e.g. sneezing, runny nose, sore throat)
- Recent contact with others with similar symptoms

**Allergic Conjunctivitis**
- History of seasonal allergies, eczema, asthma, urticaria
- Watery, red, itchy eyes, without purulent drainage

**Physical Findings**
- Vital signs normal (unless associated with systemic illness)
- Visual acuity usually normal
- PERRLA; extraocular eye movements normal
- Unilateral or bilateral diffuse conjunctival redness
- Discharge: purulent, thin and watery, or thick and stringy
- Crusts on lashes in viral and bacterial forms
- Eyelids red or edematous
- Pre-auricular adenopathy present in gonococcal conjunctivitis and viral

**Differential Diagnosis**
- Blepharitis
- Corneal abrasion
- Uveitis (iritis)
- Herpetic keratoconjunctivitis

**Complications**
- Spread of infection to other eye structures
- Spread of infection to other household members

**Diagnostic Tests**
- Measure visual acuity
- Swab and culture exude

**Management**

**Goals of Treatment**
- Rule out more serious infections such as gonorrhea or chlamydial infection
- Prevent household spread
- Chronic (>3 weeks) recurrent or atypical conjunctivitis may be diagnosed as
  - blepharitis
  - dry eye
  - chlamydial

**Appropriate Consultation**
Consult a physician if any of the following pertain:
- Significant associated eye pain
- Any loss in visual acuity
- Suspicion of kerato conjunctivitis or other more serious cause of red eye
- Client has periorbital cellulitis
- No improvement with treatment in 48-72 hours
- Client wears contact lenses (and would thus be at high risk for *Pseudomonas* conjunctivitis and keratitis)
• Suspicion of gonorrhea or chlamydial conjunctivitis, either of which requires systemic antibiotics (refer to current version of Canadian STD Guidelines [Health Canada]).


**Nonpharmacologic Interventions**
Apply cool compresses to eyes, lids and lashes as frequently as possible.

**Client Education**
• Counsel client about appropriate use of medications (dose, frequency, instillation)
• Advise client to avoid contamination of tube or bottle of medication with infecting organisms
• Suggest ways to prevent spread of infection to other household members and school or daycare contacts
• Instruct client about proper hygiene of hands and eyes
• For allergic form: recommend that client avoid going outside when pollen count is high and that protective glasses be worn to prevent pollen from entering the eyes
• Do not allow client to use an eye patch

**Pharmacologic Interventions**
Never use steroid or steroid-and-antibiotic combination eye drops, because the infection may progress or a corneal ulcer may rapidly form and cause perforation.

**Bacterial Conjunctivitis**
Topical antibiotic eye drop:
- sulfacetamide 10% (*C class drug*), 2 or 3 drops q2h for 3 days followed by gradual tapering over the next 4 days
- polymyxin B gramicidin eye drops (*C class drug*), 2 or 3 drops qid for 5-7 days if the infection is mild

An antibiotic eye ointment may be used at bedtime in addition to the antibiotic eye drops prn:
- gentamicin (*C class drug*), hs
- erythromycin 0.5% (*B class drug*), hs

**Viral Conjunctivitis**
Boric acid washes often provide excellent symptomatic relief (antibiotics are not helpful and are not indicated). May cause irritation. Cool compresses only/vasoconstrictive drops.

**Allergic Conjunctivitis**
Topical antihistamine eye drops are recommended if symptoms are not controlled by oral medications.
- Vasocon A eye drops (*A class drug*)
Consult a physician for any others.

**Monitoring and Follow-Up**
Clients with moderate or severe symptoms should be seen for follow-up at 24 and 48 hours.

**Referral**
Refer to a physician if condition deteriorates, if symptoms persist despite treatment, or if symptoms recur.
Hordeolum Or Stye

Definition
Acute infection of a hair follicle of an eyelash, a Zeis (sebaceous) gland or a Moll (apocrine sweat) gland of the eyelid.

Cause
Bacterial infection (*Staphylococcus aureus*).

History
- Pain
- Swelling of eyelid
- Redness of eyelid
- Vision not affected
- Similar eyelid infection in the past

Physical Findings
- Localized redness and swelling of eyelid
- Mild conjunctival injection
- Possible purulent drainage along the lid margin
- Acutely tender

Differential Diagnosis
- Chalazion
- Blepharitis
- Dacryocystitis
- Orbital cellulitis

Complications
- Conjunctivitis

Diagnostic Tests
- Swab any drainage for culture and sensitivity

Management

Goals Of Treatment
- Relieve symptoms
- Prevent spread of infection to other eye structures

Appropriate Consultation
Usually not necessary for simple stye.

Nonpharmacologic Interventions
Apply warm, moist compresses qid.

Client Education
- Stress importance of not squeezing the hordeolum
- Teach the client eyelid hygiene: wash lid with mild soap and water; use a separate area of washcloth for each eye
- Stress importance of washing hands to prevent spread of infection
- Recommend avoidance of cosmetics during acute phase (current eye cosmetics should be discarded because they may harbor bacteria and cause recurrent infection)
- Client should not wear contact lenses until infection clears
- Counsel client about appropriate use of medications (dose, frequency, application)
- Stress importance of follow-up if symptoms do not improve with treatment or if inflammation extends to involve the periorbital tissues

Pharmacologic Interventions
*gentamicin ointment (C class drug), qid for 10 days*

Antibiotic eye drops can be used, but they require more frequent dosing, every 3-4 hours, and are generally less effective.

Monitoring and Follow-Up
Follow up in 3-4 days if symptoms do not respond; follow up sooner if infection spreads.

Referral
Consult a physician if the lesion does not respond to therapy or if there is evidence of infection of the periorbital soft tissue.
Chalazion

Definition
Chronic inflammatory lipogranuloma of a meibomian gland. It occurs deeper within the lid than a stye.

Cause
Results from obstruction of the meibomian gland duct. Secondary bacterial infection from Staphylococcus aureus may develop. Rare cause - chemical cellulitis (e.g. make-up).

History
- Lump on the eyelid area
- Redness, swelling and pain, if secondary infection develops
- Blurry vision if chalazion is large (pressure on the eye globe may cause astigmatism)
- Conjunctival injection (if associated with conjunctivitis)
- Tearing may be present (if conjunctiva irritated)

Physical Findings
- Hard, non-tender nodule (tender if acute) on the middle portion of the tarsus, away from the lid border; may be pointing to the inner surface of tarsus and causing pressure on the globe
- Inflammation of the lids and conjunctiva may be seen if secondary infection present

Differential Diagnosis
- Hordeolum (stye)
- Blepharitis
- Sebaceous-cell carcinoma (rare)

Complications
- Secondary infection
- Astigmatism

Diagnostic Tests
None.

Management

Goals of Treatment
- Prevent infection and visual disturbances.

A small asymptomatic chalazion does not require treatment and usually resolves spontaneously in a few months. If the chalazion is large or if there is secondary infection, treatment is needed.

Nonpharmacologic Interventions
Apply warm moist compresses qid for 15 minutes.

Client Education
- Stress importance of not squeezing the chalazion
- Teach the client eyelid hygiene: wash lid with mild soap and water; use a separate area of washcloth for each eye
- Stress importance of washing hands to prevent spread if infection occurs
- Recommend avoidance of cosmetics during acute phase (current eye cosmetics should be discarded because they may harbor bacteria and cause recurrent infection)
- Client should not wear contact lenses until infection clears
- Counsel client about appropriate use of medications (dose, frequency, application)
- Stress importance of follow-up if symptoms do not improve with treatment

Pharmacologic Interventions
- gentamicin ointment (C class drug), qid for 7 days

Antibiotic eye drops can be used, but they require more frequent dosing, every 3-4 hours, and are generally less effective.

Monitoring and Follow-Up
Follow up in 1-2 weeks.

Referral
Refer to a physician if a large chalazion does not respond to medical therapy. Incision and drainage with excision may be necessary if the chalazion does not resolve spontaneously within 2 or 3 months.
**Pterygium**

**Definition**
A triangular winglike growth of tissue that is a proliferation of the nasal or (rarely) the temporal bulbar conjunctiva. It grows toward the cornea and over its surface.

**Causes**
Chronic irritation of the eye from ultraviolet light, dust, sand or wind.

**History**
- Usually painless
- Blurred vision if pterygium extends over cornea
- Usually occurs in people who spend a lot of time outdoors

**Physical Findings**
- Visual acuity normal
- Bilateral or unilateral lesions may be present
- A mounded, injected triangular mass of conjunctival tissue arising from either canthus and possibly extending across cornea
- Blood vessels may present within the tissue

**Differential Diagnosis**
- Pinguecula (inflamed)

**Complications**
- Recurrent conjunctivitis

**Diagnostic Tests**
- Measure visual acuity

**Management**

**Goals of Treatment**
- Identify asymptomatic lesions
- Prevent further growth

**Appropriate Consultation**
Arrange a non-urgent consultation with the physician.

**Client Education**
- Stress importance of preventing chronic irritation
- Educate those at high risk
- Recommend use of protective eyewear in both summer and winter
- Explain course of disease and expected outcome
- Ask client to return to the clinic for reassessment when signs of conjunctivitis are noticed or if lesion interferes with vision

**Monitoring and Follow-Up**
- Follow annually; note any changes in size
- Test central and peripheral vision

**Referral**
Referral for definitive treatment (surgical removal) by an ophthalmologist may be necessary if lesion interferes with vision.
Cataracts

Definition
A decrease in the transparency of the crystalline lens to the degree that vision is impaired.

Causes
Protein coagulates in opaque areas in the lens for unknown reasons. Ninety-five percent of people over age 65 have some degree of lens opacity. Most cases (90%) occur as a natural process of aging. Other cases are metabolic, congenital or drug-induced, or are the result of ocular trauma or an ocular condition such as chronic anterior uveitis.

Factors that influence the risk of cataract development include exposure to ultraviolet B radiation; diabetes mellitus; use of alcohol; use of medications such as major tranquilizers, diuretics and systemic corticosteroids; and lack of antioxidant vitamins.

History
• Diminished vision
• Increased perception of glare from lamps or sun or when driving at night
• Altered perception of colour (loss of contrast sensitivity)
• Presence of risk factors (see "Causes," above)

Physical Findings
• Visual acuity may be decreased in affected eye
• Funduscopic exam reveals opacities of the lens (view red reflex through dilated pupil at 2-3 feet with appropriate focus)

Differential Diagnosis
• Macular degeneration
• Diabetic retinopathy

Complications
• Risks associated with loss of vision (e.g. falls, trauma)

Diagnostic Tests
None.

Management

Goals of Treatment
• Maintain optimal vision
• Prevent accidents (e.g. falls)

Appropriate Consultation
Consult a physician on a non-urgent basis, unless vision is significantly diminished and there is risk of visual impairment, or cataract is related to ocular trauma or other eye disease process.

Nonpharmacologic Interventions
Non-surgical management includes changing lens prescription and using strong bifocal eyeglasses, magnification and appropriate illumination.

Client Education
• Counsel client that progression of cataract formation may be slowed by decreasing sun exposure, quitting smoking or increasing ingestion of antioxidant vitamins (if diet is deemed deficient in this area)
• Teach client how to prevent falls and accidents in the home
• Recommend use of magnification and appropriate illumination

Monitoring and Follow-Up
Follow-up (by eye team) should be done at least annually.

Referral
Referral to an ophthalmologist for evaluation is necessary if client experiences increasing functional impairment. Decision concerning surgery is based on the degree of functional impairment.

Follow-Up After Cataract Surgery

Goals of Care
• Control inflammation
• Prevent infection
• Maintain eye comfort
• Promote early visual rehabilitation
**History**
- Post-operative pain is usually minimal, with mild foreign-body sensation
- Increased pain may be due to inadvertent trauma, infection or increased intracranial pressure
- Itchy red eye
- Changes in vision: darkening or loss of detail (any significant post-operative change could indicate hemorrhage, retinal detachment, acute glaucoma or infection)
- Visual phenomena such as flashing lights or dark shadows require investigation

**Eye Examination**
- Redness or swelling of the conjunctiva or lids suggests infection or allergic response to medications
- Red reflex (confirm with ophthalmoscopy)
- Corneal opacity
- Hyphema (blood in the anterior chamber)

**Post-Operative Medication Review**
- Antibiotics are used to prevent infection
- Anti-inflammatory agents such as steroid, ketorolac or diclofenac drops are used to reduce post-operative inflammation

Analgesic agents are used for discomfort:
*acetaminophen (A class drug), 500 mg, 1 or 2 tabs q4h prn*

No changes to eye medications should be made without consulting the treating ophthalmologist.

**Client Education**
- Counsel client about appropriate use of medication and side effects
- Patient may engage in activity as tolerated, except no lifting, bending or other activities that strain the intra-abdominal muscles

**Monitoring and Follow-Up**
Client should be seen by ophthalmologist in 6 weeks.
Chronic Open-Angle Glaucoma

Acute angle-closure glaucoma usually presents with acute symptoms and is a medical emergency (see "Emergency Problems of the Eye," below, this chapter).

Definition
Glaucoma is a disease usually related to increased intraocular pressure, which may result in damage to the optic nerve that can lead to loss of vision. A complete understanding of the pathogenesis of glaucoma remains unknown; some people with high intraocular pressure do not have glaucoma, whereas others have glaucoma without elevated intraocular pressure.

Causes
• In chronic open-angle glaucoma, the secretion of aqueous humor and its flow between the lens and the iris through the pupil into the anterior chamber is normal; however, the trabecular meshwork does not allow rapid enough drainage of aqueous humor, with a resultant elevation in pressure
• Prevalence is about 1% of people over age 40, increasing to 3% among people older than 70 years; affects men and women equally

Risk Factors

Primary
• Elevated intraocular pressure
• Advanced age
• Family history of condition
• Myopia
• Diabetes mellitus
• Systemic hypertension
• African heritage

Secondary (Acquired)
• Blunt or penetrating trauma
• Previous intraocular surgery
• Previous intraocular inflammation
• Corticosteroid use
• Drugs that cause or worsen glaucoma: corticosteroids (commonly); antihistamines, decongestants, antispasmodics, antidepressants (rarely)

Congenital
• Family history of condition

History
Symptoms do not arise until disease is very advanced.
• Loss of vision (gradual and painless)
• Peripheral vision affected first
• Halos around lights (not open-angle)
• Presence of risk factors

Physical Findings
• Peripheral field of vision decreased
• Central visual acuity decreased, in late stages
• Cupping of the optic disk

Differential Diagnosis
Vascular occlusive disease of the eye.

Complications
Blindness.

Diagnostic Tests
• Measure visual acuity
• Determine extent of peripheral fields
• Measure intraocular pressure with Schiotz tonometry; if pressure > 21 mm Hg, investigations should be initiated, especially if patient is symptomatic

Eighty-five percent of patients with intraocular pressure > 21 mm Hg do not have glaucoma and will not develop this condition in the next 5 years. Unless tonometry is performed frequently and accurately with precise instruments, the results may be inaccurate; therefore the screening value of tonometry has been challenged. The detection of glaucoma may be more appropriately based on the periodic screening of high-risk individuals with a thorough ophthalmological assessment.

Management

Goals of Treatment
• Prevent, slow or stop progressive vision loss
• Preserve a healthy optic nerve
• Early detection of those at risk
Appropriate Consultation
Consult a physician if new-onset glaucoma is suspected or symptoms of previously diagnosed glaucoma have worsened. Refer to traveling eye clinic.

Nonpharmacologic Interventions
For early detection of glaucoma in the general population, the Canadian Task Force on the Periodic Health Examination (1994) (now the Canadian Task Force on Preventive Health Care) http://www.ctfphc.org/ gave funduscopic exam and tonometry a C recommendation (i.e. poor or insufficient research evidence to include or exclude from the periodic health examination). The Task Force prudently recommended that anyone with risk factors for glaucoma undergo periodic assessment by an ophthalmologist:

- People > 40 years of age should be assessed every 3-5 years
- People > 65 years of age should be assessed annually

No lifestyle modifications have proven helpful either before or after the use of drug therapy. Surgical and laser procedures are options if drug therapy fails.

Pharmacologic Interventions
Drug treatment for glaucoma is prescribed by an ophthalmologist. The main aim of all drug therapy is to reduce intraocular pressure. Any visual loss is usually irreversible.

Monitoring and Follow-Up
Ensure regular follow-up by a physician at least annually when stable.

Referral
Refer back to the ophthalmologist annually or sooner if symptoms progress.
Emergency Problems Of The Eye

Corneal Abrasion

Definition
Superficial corneal defect due to scraping or rubbing of the corneal epithelium.

Causes
Usually trauma or a foreign body in the eye.

History
• Foreign-body sensation
• Sudden unilateral eye pain (sharp or worse with blinking)
• Moderate to profuse tearing
• Mild photophobia
• Mild blurred vision (due to tearing) may be present

Physical Findings
• Vital signs normal
• Visual acuity may be slightly blurred in affected eye
• Diffuse conjunctival injection
• Pupils react briskly to light
• Fluorescein staining will reveal area of abrasion
• Presence of a foreign body under the upper or lower eyelid must be ruled out

Differential Diagnosis
Rule out other causes of red eye (see Table 1, in "Red Eye," above, this chapter).

Complications
• Corneal ulceration
• Secondary bacterial infection
• Corneal scarring if abrasion recurs
• Uveitis (iritis)

Diagnostic Tests
• Measure visual acuity
• Apply fluorescein stain: corneal cells that have been damaged or lost will stain green; cobalt blue light allows easier visualization of the abrasion

Management
Goals of Treatment
• Prevent secondary bacterial infection
• Prevent development of corneal ulceration

Appropriate Consultation
Consult a physician if there is a large or central corneal abrasion or if a penetrating corneal ulcer is found on initial examination, if pain is severe, if the abrasion does not respond to therapy after 48 hours or if a residual rust ring is evident.

Nonpharmacologic Intervention
Firm, comfortable double-patching of the eye may relieve pain associated with larger abrasions. One day is usually sufficient.

Patching is contraindicated if abrasion is associated with wearing contact lenses.

Client Education
• Advise client that daily follow-up is important to ensure proper healing
• Counsel client about appropriate use of medications (type, dose, frequency, side effects)
• Instruct client to return to clinic immediately if pain increases or vision decreases before 24-hour follow-up
• Suggest that client wear protective glasses while working to help prevent similar incidents in future

Pharmacologic Interventions
Instill topical anesthetic eye drop: tetracaine 0.5% eye solution (A class drug), 2 drops

Complaints of irritation and foreign-body sensation should resolve in 1 or 2 minutes. Instill a generous amount of antibiotic eye ointment in the lower conjunctival sac: sulfacetamide 10% eye ointment (C class drug)
**Monitoring and Follow-Up**

- Follow-up at 24 hours to assess healing is imperative
- If no symptoms or signs, patient can be sent home with advice on preventing corneal abrasions
- If client is still symptomatic but improving, the eye should be re-treated as above with antibiotic ointment or drops and re-examined daily with fluorescein. The uptake of dye should be less than on the previous day. Re-examine daily until the abrasion has healed completely.

**Referral**

Referral to an ophthalmologist is required within 24 hours for large or central defects and in 48-72 hours if there is no response to therapy.
Corneal Ulcer

Definition
An infection of the cornea results in breakdown of the protective epithelial barrier. The ulcer may be central or marginal.

Causes
• Bacterial, viral or fungal invasion
• Common bacteria include *Pseudomonas, Staphylococcus, Streptococcus*
• Common virus is herpes simplex
• Risk factors include any abrasive corneal injury, wearing of soft contact lenses, dry eyes, thyroid disease, diabetes mellitus, immunosuppressive conditions, long-term topical use of eye steroid medication

History
• Eye pain
• Blurred vision
• Foreign-body sensation
• Photophobia
• Red eye

Physical Findings
• Conjunctiva inflamed
• Eyelid may be inflamed
• Mucopurulent discharge
• Ulcer visible on cornea, but usually only after fluorescein staining (whitening of cornea)

Differential Diagnosis
• Corneal abrasion
• Conjunctivitis

• Blepharitis
• Keratitis

Complications
• Scarring of cornea
• Permanent loss of vision
• Extension of infection to other ocular structures

Diagnostic Tests
• Measure visual acuity
• Apply fluorescein stain

Management
Goals of Treatment
• Alleviate infection
• Prevent permanent loss of vision

Appropriate Consultation
Consult a physician immediately if an ulcer is detected.

Nonpharmacologic Interventions
• Explain diagnosis and disease process
• Provide reassurance and support

Pharmacologic Interventions
Apply a generous amount of an antibiotic drops in the lower conjunctival sac: *gentamicin (C class drug) qid*

Referral
Urgent; refer to an ophthalmologist within 24 hours.
Conjunctival, Corneal Or Intraocular Foreign Bodies

Definition
- Presence of a foreign object on the conjunctiva or cornea or intraocularly (within the globe)
- May be organic or inorganic

Cause
Improper protection of eyes.

History
Get an accurate description of the material and the circumstances under which it entered the eye (slow speed or high velocity); a rapidly moving projectile object may penetrate the globe of the eye. This typically occurs when metal is hammered upon metal.

With a penetrating eye injury, the eye may appear deceptively normal.
- Sudden onset of unilateral eye pain
- Irritation (foreign-body sensation)
- Tearing
- Photophobia
- Visual disturbance may be present

Physical Findings
- Visual acuity usually normal
- PERRLA
- Tearing
- Foreign body will be found in lower conjunctival sac or under the upper lid; may need to evert upper lid to find object
- Fluorescein stain may reveal associated corneal abrasion
- If foreign body is metallic, look for a rust ring around material

Differential Diagnosis
- Other causes of red eye (see Table 1, in "Red Eye," above, this chapter)
- Intraocular foreign body

Complications
- Corneal ulcer
- Secondary infection

Diagnostic Tests
- Measure visual acuity of both eyes
- Apply sterile fluorescein stain to identify any associated corneal defect

Management
Goals of Treatment
- Remove foreign body
- Identify associated corneal abrasion
- Identify residual corneal rust ring
- Identify embedded corneal foreign body

Appropriate Consultation
Consult a physician immediately if the foreign body cannot be dislodged with your treatment, if there is suspicion of an intraocular foreign body or if there is continued foreign-body sensation (lasting 24 hours or longer) when no foreign body has been detected.

Nonpharmacologic Interventions
Remove a superficial, non-embedded conjunctival foreign body by gently irrigating with normal saline or by gently wiping with a sterile cotton-tipped applicator moistened with a topical anesthetic or sterile saline.

Do not try to remove an obviously embedded foreign body, because it may have penetrated more deeply than expected.

After removing the superficial foreign body, use fluorescein stain to detect any remaining fragments, a rust ring or corneal abrasion.

Client Education
- Suggest that client wear protective glasses while working to help prevent similar incidents in future
- Stress that close follow-up is very important to ensure proper healing

Pharmacologic Interventions
Instill a topical anesthetic eye drop: 
tetracaine 0.5% (A class drug), 2 drops only for removal.

gentamycin ungt (C class drug), qhs
**Monitoring and Follow-Up**
Follow up in 24 hours to ensure resolution of symptoms.

**Referral**
Refer immediately any client with a foreign body that cannot be dislodged with your treatment, if there is a large or central corneal abrasion or if there is any concern that the globe has been penetrated by a high-speed object.

Refer within 24 hours any client who continues to experience a foreign-body sensation even though no foreign body is detected.
Acute Angle-Closure Glaucoma

Definition
A sudden increase in intraocular pressure due to blockage of drainage tissue by the iris

Causes
• Pre-existing narrow angle of anterior chamber
• Spontaneous dilatation of pupil by drugs or darkened environment
• Complication of penetrating intraocular foreign body

History
• Sudden onset of severe unilateral eye pain
• Vision blurred, reduced or absent
• Nausea and vomiting may be present
• Tearing
• Coloured halos

Physical Findings
• Heart rate may be elevated
• Blood pressure may be elevated
• Client may be in acute distress (from pain or fear)
• Visual acuity reduced in affected eye
• Conjunctiva diffusely injected red
• Perilimbal flush may be present
• Cornea appears steamy/cloudy
• Pupil mid-dilated and non-reactive to light
• Funduscopic exam of affected eye may reveal increased cupping of the disk (cannot see acutely)
• Peripheral field of vision decreased in affected eye
• Intraocular pressure elevated on tonometry (normal range is 10-20 mm Hg)
• Globe of eye is hard

Differential Diagnosis
• Rule out other causes of red eye
• Uveitis (iritis)
• Macular degeneration

Complications
• Loss of vision, loss of eye
• Development of glaucoma in other eye

Diagnostic Tests
• Measure central and peripheral visual acuity
• Measure intraocular pressure with Schiøtz tonometry (normal range is 10-20 mm Hg); if pressure > 21 mm Hg, investigations should be initiated, especially if patient is symptomatic

Management
Goals of Treatment
• Identify condition quickly
• Relieve pain
• Preserve vision by reducing intraocular pressure

If the intraocular pressure is not reduced, glaucoma may develop in the unaffected eye because of a sympathetic response.

Appropriate Consultation
Consult a physician immediately.

Nonpharmacologic Interventions
• Keep client at rest
• Support and reassure client to minimize anxiety
• Explain disease process and management

Pharmacologic Interventions
For nausea and vomiting: dimenhydrinate (A class drug), 25-50 mg IM stat
For pain: meperidine (D class drug), 50-100 mg IM stat
To decrease pressure: mannitol (B class drug) 1-1.5mg/kg IV
To constrict the pupil: pilocarpine 2% (B class drug), 2 drops q15min for 1 h, then 2 drops q30-60min for 4 h, then 1 drop q4h

When pilocarpine is applied topically at frequent intervals over a short period, there is a possibility of systemic toxic side effects (sweating, retching, salivation and muscle tremors).

Referral
Call ophthalmologist. Medevac as soon as possible to ophthalmologist, after reducing pressure; this problem needs surgical intervention. May need pressurized aircraft.
Keratitis (Snow Blindness)

Definition
Inflammation of the cornea due to ultraviolet damage.

Causes
• Prolonged, unprotected exposure to ultraviolet light (e.g. welders not using protective eyewear, people suffering from snow blindness)

History
• Symptoms range from moderate to severe
  • Vision blurred
  • Periocular pain
  • Foreign-body sensation
  • Severe photophobia
  • Lid spasm may be present

Physical Findings
• Moderate to acute distress
• Various degrees of lid edema, spasm
• Tearing may be present
• Conjunctiva injected red, may have ciliary flush
• Pupils equal and reactive to light
• Visual acuity should be normal, although it may be blurred
• Fragmented corneal-light reflex
• Punctate roughening of cornea seen with fluorescein staining

Differential Diagnosis
• Conjunctivitis
• Uveitis (iritis)
• Corneal abrasion
• Corneal foreign-body irritation

Diagnostic Tests
• Measure visual acuity of both eyes
• Stain tear film with sterile fluorescein strips or drops
• Determine the amount of uptake of the dye on the cornea (an indicator of the degree of corneal involvement); usually the cornea will have a punctate pattern of dye uptake across the lower half

Management
Goals of Treatment
• Relieve discomfort
• Prevent recurrence

Appropriate Consultation
Consult a physician if this disorder is suspected.

Nonpharmacologic Interventions
Double-patch the eyes firmly but comfortably (remember, the client cannot see anything with both eyes patched; provide reassurance and assistance with all movements).

Client Education
Advise client that condition can be prevented by wearing protective eyewear while outside, especially on sunny winter days, or when using welding equipment.

Pharmacologic Interventions
Instill a topical anesthetic eye drop to relieve discomfort for diagnosis only:
  tetracaine 0.5% (A class drug), 2 drops

Instill a generous amount of a topical antibiotic eye ointment into the lower conjunctival sac:
  gentamicin (C class drug), qid

Manage pain with simple analgesics:
  acetaminophen (A class drug), 500 mg 1-2 tabs
  PO q4h prn

Referral
Daily follow-up.
Herpetic Keratitis

**Definition**
Viral infection of the cornea with ulcer formation.

**Cause**
Herpes simplex or herpes zoster.

**History**
- May be first episode or latest of series of episodes
- Often preceded by upper respiratory tract infection with fever
- Acute onset with severe unilateral pain
- With recurrence, pain becomes less severe
- Mild photophobia
- Blurred vision
- Tearing

**Physical Findings**
- Heart rate may be mildly elevated
- Mild to moderate distress
- Visual acuity normal
- Diffuse redness of eye
- Perilimbal flush may be present
- Pupils react briskly to light
- Dendritic ulcer visible with fluorescein staining

**Differential Diagnosis**
- Rule out other causes of red eye (see Table 1, in "Red Eye," above, this chapter).

**Complications**
- Chronic scarring of the cornea with reduced vision
- Recurrent exacerbations
- Uveitis (iritis)
- Perforation of cornea

**Diagnostic Tests**
- Measure visual acuity
- Apply fluorescein stain to confirm dendritic ulcer on cornea (the key physical clue to the diagnosis)

**Management**

**Goals of Treatment**
- Identify or prevent associated iritis or uveitis
- Relieve symptoms
- Preserve corneal function

**Pharmacologic Interventions**
Instill a topical anesthetic eye drop to relieve discomfort, for diagnosis only:
*tetracaine 0.5% (D class drug), 2 drops*

Manage pain with simple analgesics:
*acetaminophen (A class drug), 500 mg, 1-2 tabs PO q4h prn*

**Referral**
Call immediately to ophthalmologist because diagnosis is complex, and expedient, specific treatment is imperative to prevent loss of vision.
Chemical Burns

Definition
Ocular injury from acidic or alkaline liquids or powders.

Alkali burns can be more serious because tiny particles may be left behind even after the agent has been removed; these residues can cause progressive damage to the eye.

Cause
Improper protection of the eyes while working with these materials.

History
Institute first-aid treatment immediately upon learning that a chemical has come in contact with the eye. The detailed history can be obtained later.
- Name of the material (alkaline burns are more serious than acidic burns)
- Time when accident occurred (as accurate as possible)
- Was irrigation attempted? For how long?
- Was exposure bilateral or unilateral?
- Did material enter the eye or was it only splashed on the lids?
- Severe pain and burning of the eye (there may be no pain if burn is severe)
- Lid spasm
- Photophobia
- Reduced vision
- If the client inhaled or swallowed any of the substance, assess other body systems (e.g. gastrointestinal, respiratory)

Physical Findings
- Heart rate may be elevated (because of pain or fear)
- Blood pressure may be elevated (because of pain or fear)
- Client may be in acute distress

Mild Injury
- Haziness of cornea
- Injection of conjunctiva
- Intraocular pressure normal

Moderate Injury
- Corneal opacity
- Blurring of iris detail
- Minimal ischemic necrosis of conjunctiva and sclera (partial blanching)
- Intraocular pressure may become elevated

Severe Injury
- Marked corneal edema and haze
- Blurring of pupillary outline
- Blanching of conjunctiva and sclera (marked whitening of the external eye)
- Intraocular pressure elevated

With alkaline burns, there is often an immediate, rapid rise in intraocular pressure.

Complications
- Various degrees of permanent loss of vision
- Loss of eye

Diagnostic Tests
- Measure visual acuity of both eyes
- Apply fluorescein stain

Management
Goals of Treatment
- Dilute the toxic chemical immediately
- Minimize corneal damage

Appropriate Consultation
Consult physician about further care once emergency first-aid irrigation has diluted the chemical.

Nonpharmacologic Interventions
- Irrigate the eye immediately with large amounts of normal saline IV solution; continue irrigation for 20 minutes. Drip gently into the conjunctival sac
- Have client shift gaze so that the entire cul-de-sac can be flushed
- After the eye has been well irrigated, inspect it for any residual chemical particles (e.g. small pieces of lime in the conjunctival sacs); try to remove these with further irrigation or with a moistened cotton-tipped applicator
• If a corneal defect is noted on examination, double-patch the eye with sterile eye pad and protect with an eye shield.

**Pharmacologic Interventions**

It may be necessary to instill a topical eye anesthetic if lid spasm is severe. Do not force lid open or instill any drops if there is concern of a ruptured globe:

- tetracaine 0.5% (*A class drug*), 2 drops

To control pain:

- acetaminophen (*A class drug*), 325 or 500 mg, 1-2 tabs PO q4h prn
- or

- acetaminophen with codeine 30mg (*C class drug*), 1-2 tabs PO q4h prn if pain moderate or severe

**Monitoring and Follow-Up**

Monitor for the development of post-burn glaucoma, usually within 25 hours.

**Referral**

Refer to an ophthalmologist immediately after emergency treatment if you find one or more of the following:

- Acid or alkali burn
- Subnormal visual acuity
- Severe conjunctival swelling
- Corneal clouding
Blunt Or Lacerating Ocular Trauma

Definition
Traumatic injury to the eye or surrounding structures.

Causes
Blunt or lacerating trauma may cause a variety of injuries to the eye and its surrounding structures. Blunt trauma associated with fights, sports injuries or motor vehicle crashes can also result in serious damage. Most often, blunt trauma causes a contusion, but a strong impact may cause tissues to be torn.

There are 6 types of injuries:
• Contusion of globe and/or orbital tissues
• Orbital fracture (contusions limited to the orbital tissues and fractures of the orbits are much less threatening to vision but may be associated with significant coincident facial and intracranial injuries)
• Laceration of the ocular adnexa or globe, one of the more serious injuries (a ruptured globe is the most dangerous outcome of either blunt or lacerating trauma)
• Intraocular hemorrhage
• Retinal detachment
• Complicated eyelid lacerations (less dangerous but potentially serious)

Lacerations of the globe may be hard to find. Presume rupture of the globe if it has occurred before or if there is evidence of severe forceful trauma.

History
• Note mechanism of injury: What hit the eye? Where did it hit (eye, forehead or cheek)?
• How hard was the blow? When did it occur?
• Determine whether a penetrating injury is possible or whether the injury is limited to the structures around eye
• Swelling and pain around eye
• Pain deep in the eye may be present
• Reduced vision due to lid edema, retinal damage, corneal damage, dislocated lens, ruptured globe

Physical Findings
Inspect only. Do not palpate the globe. It may be difficult or impossible to examine the globe because of associated swelling. Do not force the lid open. Avoid putting direct pressure on globe and bony structures.
• Moderate to severe distress
• Pulse may be elevated
• Blood pressure may be elevated
• Swelling and bruising around the eye
• Deformity of the bone may be present
• Visual acuity may be diminished (do not test if doing so requires forcing the lid open or instilling drops)
• Conjunctival ecchymosis and swelling
• Pupil reaction to light should be normal; suspect globe damage if it is abnormal
• Red reflex should be present; suspect retinal detachment or lens damage if it is abnormal
• Note presence of hyphema (blood in the anterior chamber)
• Extraocular movement should be normal; suspect a fracture of the floor of the bony orbit if there is some limitation of the upward gaze of the affected eye
• Tenderness of bony structures

Complications
• Loss of vision
• Retinal detachment
• Dislocation of lens
• Acute angle-closure glaucoma
• Rupture of globe
• Hyphema
• Fracture of orbital bone
• Laceration of eyelid

Diagnostic Tests
Measure visual acuity in both eyes (but do not perform this test if doing so requires forcing open the lid or use of anesthetic drops).
Management

Goals of Treatment
- Identify serious injuries to the eye or orbital bone
- Protect the eye from further damage

Appropriate Consultation
Consult a physician immediately if serious injuries are identified or suspected.

Nonpharmacologic Interventions
- Cover the eye loosely with a sterile gauze and apply an eye shield to prevent further injury; do not instill any medications into the eye
- Keep the client at rest in a half-sitting position

Referral
Call eye team first. Medevac to the care of an ophthalmologist if any of the following are suspected or confirmed after inspection:
- Severe pain
- Subnormal visual acuity
- Severe conjunctival ecchymosis
- Hyphema (blood in the anterior chamber)
- Irregular pupil
- Corneal or scleral laceration
- Deformation or laceration of globe
- Laceration of lid
Minor Soft-Tissue Contusion

If serious injuries to the eyeball, eyelids or orbit have been ruled out, swelling or bruising of the soft tissues around the eye is not considered serious.

Management

Goals of Treatment
- Symptomatic care
- Prevent further injury

Nonpharmacologic Interventions
- Cold compresses several times daily to reduce the swelling
- Eye shield for 1-2 days to protect eye from further injury

Pharmacologic Interventions
Analgesia to control discomfort:
- acetaminophen (A class drug), 325 or 500 mg, 1-2 tabs PO q4h prn
- or
- ibuprofen (A class drug), 200 mg, 1-2 tabs PO q4h prn

Monitoring and Follow-Up
See client in 2 or 3 days, once swelling goes down, to re-examine the eye thoroughly for injury.

• Use of protective eyewear when engaged in high-risk activities or occupations such as contact sports, carpentry or sheet-metal work.
Uveitis (Iritis)

Definition
Inflammation of the uveal tract (iris, ciliary body or choroid). This may involve one or all three portions of the uveal tract. The most frequent form is acute anterior uveitis (iritis).

Causes
Usually idiopathic, but may be associated with systemic disease (Reiter's syndrome, ankylosing spondylitis, sarcoidosis, juvenile arthritis, herpes simplex, herpes zoster) or may be a complication of ocular trauma such as corneal abrasion.

History
- Acute onset with moderate to severe unilateral periocular pain
- Photophobia
- Tearing
- Vision blurred and may be decreased
- Possible history of similar previous episodes
- History of other associated systemic disease

Physical Findings
- Patient may appear to be in acute distress
- Heart rate may be elevated
- Visual acuity reduced in affected eye
- Conjunctiva reddened
- Perilimbal (ciliary) flush present
- Cornea clear with white precipitates
- Border of iris may be blurred
- Pupil small, possibly irregular in shape and poorly reactive to light
- Hypopyon (pus in the anterior chamber) may be present

Differential Diagnosis
- Rule out other causes of red eye (see Table 1, in "Red Eye," above, this chapter).

Complications
- Acute angle-closure glaucoma
- Posterior adhesions (synechiae)
- Reduced vision

Diagnostic Tests
Measure visual acuity, if possible.

Management
Goals of Treatment
Early identification.

Appropriate Consultation
Consult a physician immediately for a management plan.

Nonpharmacologic Interventions
- Explain disease process and management plan
- Support and reassure client to reduce anxiety
- Do not put any pressure on the eyeball
- Client should wear sunglasses if a shield is unavailable

Pharmacologic Interventions
Initial management usually consists of a fast-acting topical eye drop to dilate the pupil. This relieves pain (caused by spasm of ciliary and iris muscles) and prevents formation of a scar between the pupillary border and the anterior lens capsule (posterior synechia):

- atropine 1% (*B class drug*), 1 drop q12h
- tropicamide 1% (*B class drug*), 1 drop q6h

The dilating and antispasmodic effects are maximal in 30-60 minutes, and usually last from 3 to 6 hours.

Steroids may be prescribed by ophthalmologist.

Referral
Call eye team re: management plan
Chapter 2 - Ears, Nose And Throat (ENT)

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Assessment Of The Ears, Nose And Throat

History Of Present Illness And Review Of System

General
The following characteristics of each symptom should be elicited and explored:
- Onset (sudden or gradual)
- Chronology
- Current situation (improving or deteriorating)
- Location
- Radiation
- Quality
- Timing (frequency, duration)
- Severity
- Precipitating and aggravating factors
- Relieving factors
- Associated symptoms
- Effects on daily activities
- Previous diagnosis of similar episodes
- Previous treatments
- Efficacy of previous treatments

Mouth and Throat
- Dental status
- Oral lesions
- Bleeding gums
- Sore throat
- Dysphagia (difficulty swallowing, solids vs. liquids, pain on swallowing)
- Hoarseness or recent voice change

Neck
- Pain, swelling, enlarged glands

Other Associated Symptoms
- Fever
- Malaise
- Nausea or vomiting

Medical History (Specific To ENT)
- Frequent ear or throat infections
- Sinusitis
- Trauma to head or ENT area
- ENT surgery
- Audiometric screening results indicating hearing loss
- Allergies
- Prescription or over-the-counter medications used regularly
- Smoking, chewing tobacco, alcohol use

Family History (Specific To ENT)
- Others at home with similar symptoms
- Seasonal allergies
- Asthma
- Hearing loss
- Ménière's disease
- ENT cancer
Personal And Social History (Specific To ENT)
• Frequent water exposure (swimmer's ear)
• Use of foreign object to clean ear
• Crowded living conditions
• Dental hygiene habits

• Exposure to smoke or other respiratory toxins
• Recent air travel
• Occupational exposure to toxins or loud noises

Examination Of The Ears, Nose And Throat

General Appearance
• Apparent state of health
• Degree of comfort or distress
• Colour (flushed or pale)
• Nutritional status (obese or emaciated)
• Match between appearance and stated age
• Difficulty with gait or balance

Ears

Inspection
• Pinna: lesions, abnormal appearance or position
• Canal: discharge, swelling, redness, wax, foreign bodies
• Ear drum: colour, landmarks, bulging or retraction, perforation, scarring, air bubbles, fluid level
• Estimate hearing with a watch or whisper test; perform screening audiometry or tympanometry (if equipment available).

Palpation
• Tenderness over tragus or mastoid process
• Tenderness on manipulation of the pinna
• Pre- or post-auricular nodes

Nose/Sinuses

Inspection
• External: inflammation, deformity, discharge, bleeding
• Internal: colour of mucosa, edema, deviated septum, polyps, bleeding points
• Transilluminate sinuses for dulling facial swelling

• Sinus and nasal tenderness.

Percussion
• Sinus and nasal tenderness.

Mouth And Throat

Inspection
• Lips: colour, lesions, symmetry
• Oral cavity: breath odor, colour, lesions of buccal mucosa
• Teeth and gums: redness, swelling, caries
• Tongue: colour, texture, lesions, tenderness of floor of mouth
• Throat: colour, tonsillar enlargement, exudate

Neck

Inspection
• Symmetry
• Swelling
• Masses
• Redness
• Thyroid enlargement

Palpation
• Tenderness, enlargement, mobility, contour and consistency of nodes and masses
• Thyroid: size, consistency, contour, position, tenderness
Common Problems Of The Ears And Nose

Otitis Externa

**Definition**
Infection or inflammation of the ear canal.

**Mild otitis externa**
Inflammation confined to the canal. No significant narrowing of the canal. May or may not be purulent.

**Moderate otitis externa**
Significant narrowing of the canal and significant swelling of soft tissue.

**Severe otitis externa**
Significant obstruction, due to inflammation and swelling, of the canal. Invasion of soft tissues, especially along the floor of the canal and extending medially, as is often seen in malignant otitis externa.

**Causes**
- Gram-negative rods: *Proteus, Pseudomonas*
- Gram-positive cocci (less common): *Staphylococcus, Streptococcus*
- Fungal infection (e.g. candidiasis, aspergillosis)
- Predisposing factors: hearing aids, narrow ear canal, use of cotton-tipped applicators, use of ear plugs, swimming
- Risk factors: immunocompromise (e.g. in patients with diabetes or cancer and those who have undergone transplantation, or have had head and neck radiotherapy), use of systemic steroid medication

**History**
- Ear pain (otalgia)
- Pruritis or irritation
- Purulent discharge from canal (cheesy white, greenish blue or gray)
- Recent exposure to water or mechanical trauma
- Reduced hearing or feelings of fullness in ear may be present
- Will not have all of them all of the time

**Physical Findings**
- Usually afebrile but temperature may be elevated
- Redness and edema of ear canal and occasionally the pinna
- May have purulent exudate or debris in canal
- Tympanic membrane may be slightly reddened or thickened
- If edema and debris are severe, it may be impossible to visualize the tympanic membrane
- Manipulation of pinna or pressure on tragus causes pain in acute otitis externa
- Peri-auricular and anterior cervical nodes may be enlarged and tender

**Differential Diagnosis**
- Acute otitis media with perforation
- Skin condition involving the ear
- Mastoiditis
- Furuncle in canal
- Foreign-body irritation

**Complications**
- Severe otitis externa with closure of canal
- Cellulitis of the external ear and face

**Diagnostic Tests**
Swab for culture and sensitivity if there is any exudate (so that antimicrobial therapy can be tailored to the organism, should initial treatment fail).

**Management**

**Goals of Treatment**
- Relieve pain
- Prevent recurrence
- Prevent extension of infection

**Appropriate Consultation**
Consultation usually not needed, unless cellulitis of the external ear or face is present, the problem is recurrent or the client is immunocompromised, or significant debris in canal that cannot be safely removed.
Client Education

- Counsel client about appropriate use of medications (if possible, have another family member instill drops and clean the ear)
- Counsel client about proper ear hygiene before instilling medications
- Advise client about preventing recurrent irritation (e.g. client should not use cotton-tipped applicators in the ears)
- Recommend proper drying of ears after swimming or use of ear plugs while swimming
- Counsel client about proper hygiene of hearing aids and ear plugs

For recurrent episodes, start the client on prophylactic measures:
hydrogen peroxide 1/2 strength (A class drug), 2 or 3 drops tid or qid

Pharmacologic Interventions

Manage pain with simple analgesics:
acetaminophen (A class drug), 325 or 500 mg, 1-2 tabs PO q4-6h prn

Mild Otitis Externa

If condition very mild (i.e. no exudate and only mild inflammation), consider topical antiseptic:
hydrogen peroxide 1/2 strength (A class drug), 2 or 3 drops tid or qid
or
vinegar/sterile water/hydrogen peroxide 1:1:1

Some studies show no difference in clinical outcome between topical antiseptic and topical gentamicin antibiotic drops.

Moderate Otitis Externa

If inflammation and purulence are more significant, or if therapy described above has failed, start ear drops consisting of a combination of an antibiotic and an anti-inflammatory agent (steroid):
hydrocortisone/neomycin/polymyxin B (C class drug), 3-4 drops tid or qid for 7-10 days

If perforation of the tympanic membrane is suspected, use of aminoglycosides such as gentamicin, should be avoided, because of the risk of ototoxicity if used for more than 7 days in the presence of such perforation.

Severe Otitis Externa

See "Referral," below.

Monitoring and Follow-Up

- Follow up in 1-3 days (instruct client to return sooner if pain increases, or if fever develops despite therapy)
- Follow up 10 days after course of therapy is complete

Referral

- Immediately refer cases of severe otitis externa
- Debriding the canal requires urgent referral
- Consult a physician for clients with recurrent episodes of otitis externa, regardless of cause
Acute Otitis Media

For further information see web sites
http://icarus.med.utoronto.ca/carr/manual/otitisatlas.html

Definition
Infection of the middle ear.

Causes
- Viral forms (found in up to 48% of middle ear fluid) due to human rhinovirus, RSV and coronavirus
- Bacterial forms (absent in up to 38% of middle ear fluid) due to Hemophilus influenzae, Moraxella catarrhalis, Staphylococcus aureus, Streptococcus pneumoniae, Streptococcus pyogenes (Pitkaranta A et al, 1998, Detection of Rhinovirus.... Pediatrics: 102:291-6)
- **Active or passive smoking is a predisposing factor.**

History
- General malaise and fever
- Ear pain (throbbing) (may be sharp needle pain)
- Sensation of fullness
- Hearing decreased
- Tinnitus or roaring in ear, vertigo (rare)
- Purulent discharge if drum perforated
- Infection of the upper respiratory tract may be present concurrently or may precede the otitis media
- Cigarette smoking
- Allergies

Physical Findings
- Temperature may be elevated
- Client may be mildly or moderately ill
- Tympanic membrane red, dull, bulging
- Bony landmarks obscured or absent
- Possible perforation and purulent discharge in canal
- Decreased mobility of tympanic membrane
- Bullae seen on tympanic membrane (but only in cases of mycoplasm infection)

Differential Diagnosis
- Acute otitis externa
- Transient middle-ear effusion (non-infection)
- Mastoiditis
- Trauma or foreign-body irritation
- Referred ear pain from dental abscess or temporomandibular joint dysfunction

Complications
- Reduced hearing
- Serous otitis media
- Mastoiditis
- Chronic otitis media
- Meningitis
- Epidural abscess

Diagnostic Tests
- Swab any drainage for culture and sensitivity

Management
**Goals of Treatment**
- Relieve pain
- Prevent complications

**Appropriate Consultation**
Usually not necessary if condition is uncomplicated.

**Client Education**
- Recommend increased rest in the acute febrile phase
- Counsel client about appropriate use of medications (dosage, compliance, follow-up)
- Explain disease course and expected outcome (serous otitis media may persist for several weeks)
- Recommend avoidance of flying until symptoms have resolved
Pharmacologic Interventions
To relieve pain and fever:
acetaminophen (A class drug), 325 or 500 mg, 1-2 tabs PO q4-6h prn

Antibiotic therapy:
amoxicillin (C class drug), 250 mg PO tid for 10 days
or
cotrimoxazole (C class drug), 800/160 mg PO bid for 10 days

Monitoring and Follow-Up
• Instruct client to return in 3 days if symptoms do not improve, or if symptoms progress despite therapy
• Follow up in 10-14 days: look for development of serous otitis media

Referral
Not necessary if condition is uncomplicated.
Chronic Otitis Media (Purulent Draining Ear)

Definition
Chronic tympanic perforation with non-resolving or recurrent low-grade infection of the middle ear.

Causes
- *Proteus, Pseudomonas or Staphylococcus*
- Water contamination of the middle ear

History
- Hearing decreased
- Continuous foul-smelling discharge from the ear
- Tinnitus
- Usually no pain
- No fever

Physical Findings
- Client appears generally well
- Foul-smelling purulent drainage from ear canal
- Perforation of tympanic membrane

Differential Diagnosis
- Chronic otitis externa
- Subacute otitis media

Complications
- Permanent, severe hearing loss
- Mastoiditis
- Cholesteatoma
- Meningitis
- Brain abscess
- Epi/subdural abscess

Diagnostic Tests
- Swab any drainage for culture and sensitivity, before treatment

Management
**Goals of Treatment**
- Prevent complications
- Avoid unnecessary use of antibiotics

**Appropriate Consultation**
Consult a physician if symptoms do not respond to therapy.

**Client Education**
- Explain disease process and expected course
- Counsel client about appropriate use of medications (including compliance)
- Counsel client about ear hygiene: ear canal should be cleaned with 3% hydrogen peroxide or half strength vinegar solution, before instilling medication to remove any exudate or debris (demonstrate the procedure to a family member and have this person perform the routine as instructed)
- No swimming
- Counsel client about proper hygiene of hearing aids and ear plugs
- To prevent recurrence, recommend that ear canal be cleaned with hydrogen peroxide 1/2 strength, or a solution of half vinegar and half sterile water, 4-6 drops in the ear after exposure to water

**Pharmacologic Interventions**
Mild and moderate chronic otitis media
Topical antibiotic ear drop alone is sufficient.

If there is significant soft-tissue involvement, systemic antibiotics are indicated, culture prior to systemic antibiotics:

- **cotrimoxazole (C class drug)**, 800/160 mg PO bid for 14 days
  or
- **amoxicillin/clavulanate (B class drug)**, 250 mg PO tid for 14 days

Oral antibiotics should be used in combination with consistent cleansing of the canal and topical administration of antibiotic otic drops as described for mild chronic otitis media, above. Long-standing drainage implies need for culture and appropriate treatment.

**Monitoring and Follow-Up**
Follow up in 7-14 days.

**Referral**
Referral to ENT specialist may be necessary if treatment fails or complications develop. Surgical intervention is sometimes required.
Serous Otitis Media (Otitis Media With Effusion)

Definition
Presence of non-infective fluid in the middle ear without symptoms or signs of acute infection, with intact tympanic membrane.

Causes
- Dysfunction of eustachian tube
- Predisposing factors: viral infection of the upper respiratory tract, allergies, barotrauma, enlargement of adenoids, recent acute otitis media

History
- Exposure to one of the predisposing factors
- Reduced hearing in affected ear
- Sensation of fullness in ear
- Nose and ears may be itchy
- Pain mild or absent
- Fever absent

Physical Findings
- Tympanic membrane dull, retracted, hypomobile or normal position
- Presence of fluid, air bubbles or air-fluid level behind the tympanic membrane
- Bony landmarks usually accentuated because of retraction of the tympanic membrane
- Audiometric screening may show a decrease in hearing
- Abnormal hearing test results (conductive loss)

Differential Diagnosis
- Dysfunction of eustachian tube
- Nasopharyngeal tumor (if problem longstanding)

Complications
- Secondary infection (purulent acute otitis media)
- Chronic serous otitis media
- Hearing loss

Diagnostic Tests
Tympanometry if available

Management

Goals of Treatment
- Identify underlying cause
- Relieve symptoms
- Prevent hearing loss

Appropriate Consultation
Consult a physician if effusion with significant hearing loss (more than 20 dB) persists for more than 2-3 months.

Client Education
- Explain disease process and expected outcomes
- Offer support and reassurance, as symptoms can last a long time (2-3 months)
- Counsel client about appropriate use of medications (dosage and compliance)
- Recommend avoidance of flying until signs and symptoms have resolved
- Discuss signs and symptoms of purulent otitis media; advise client to return to clinic if they occur
- Instruct client to gently try to equalize pressure between middle ear and throat, using a simple maneuver (e.g. yawning, chewing gum, plugging nose and blowing)

Pharmacological Interventions
Most studies indicate that antihistamines and decongestants are ineffective.

Monitoring and Follow-Up
Monitor any improvement in hearing or decrease in tinnitus.

Reassess hearing, preferably with screening audiometry (if available).

Referral
Refer to an ENT physician if effusion persists after 3 months.
Cerumenosis (Impacted Cerumen)

Definition
Obstruction of the ear canal by cerumen (ear wax).

Causes
Cerumen is produced naturally by the ear canal and is normally cleared by the body's own mechanisms. Occasionally, cerumen is produced in excessive amounts and partially or totally occludes the ear canal.

History
- Ear pain
- Sensation of fullness
- Itching
- Conductive hearing loss

Physical Findings
- Hardened wax blocks canal
- Canal may be reddened and swollen

Differential Diagnosis
- Foreign-body irritation
- Otitis media
- Otitis externa

Complications
- Hearing loss
- Otitis externa

Diagnostic Tests
- None

Management
Goals of Treatment
- Remove wax
- Treat any underlying irritation of the canal

Appropriate Consultation
Consulting a physician is usually not necessary.

Nonpharmacologic Interventions
- Ensure no tympanic membrane perforation - Inject lukewarm water with an ear syringe until wax is cleared
- Sometimes it is helpful to soften the wax with a few drops of slightly warmed olive oil or Auralgan (A class drug) before attempting to irrigate the ear
- To prevent cerumenosis, anyone who produces large amounts of cerumen can periodically (once or twice weekly) instill 3 drops of a 1:1 solution of hydrogen peroxide and water into each ear to decrease the likelihood of impaction. One or two drops of baby oil once or twice weekly will help to keep wax soft.

Monitoring and Follow-Up
Advise client to return as necessary if symptoms recur.
Labyrinthitis

Definition
Disorder of the vestibular labyrinth in the inner ear.

Causes
- Viral infection
- Mismatch of vestibular, visual and somatosensory systems, triggered by an external stimulus, such as a stop after whirling turns or motion sickness
- Tumors within the vestibular pathways
- Ototoxic drugs, especially aminoglycosides
- Head injury
- Neuritis
- Vasculitis

History
- Vertigo (most prominent symptom) with sudden movement
- Dizziness
- Nausea and vomiting
- Fluctuating hearing loss
- Tinnitus
- Malaise
- Perspiration
- Recent respiratory tract infection (mostly upper)

Physical Findings
- Diaphoresis
- Increased salivation
- Nystagmus

Differential Diagnosis
- Benign positional vertigo
- Menière's disease
- Chronic bacterial mastoiditis
- Drug-induced damage to the vestibular labyrinth
- Acoustic neuroma
- Multiple sclerosis
- Temporal-lobe epilepsy

Complications
- Permanent hearing loss
- Falls potentially leading to injury

Diagnostic Tests
- Vestibular maneuvers may be helpful in diagnosis of the syndrome.
- Nylen-Bárány maneuver: While the patient is seated at the end of the examining table, quickly lay back and carefully hyperextend the patient onto the back, while support is provided to the head.
- First, turn the head toward one shoulder.
- Repeat the maneuver; however, the second time, turn the head toward the other shoulder.
- Hallpike maneuver: While the patient is seated in the middle of the examination table, carefully provide support to the head and neck while quickly laying the patient on one side and then the other.
- Repeat the maneuvers several times in a period of 5-10 minutes, as tolerated by the patient.
- Note the reproducibility of the vestibular symptoms, including vertigo, nausea, and malaise.

http://www.emedicine.com/EMERG/topic290.htm#target1

Management
Goals of Treatment
- Identify and treat underlying disorder if anything other than viral labyrinthitis is suspected
- Supportive treatment of symptoms only

Appropriate Consultation
Consult a physician if the client's symptoms persist for more than 1 week with therapy or if anything other than a simple viral illness is suspected.

Nonpharmacologic Interventions
Advise client to rest in a darkened room with eyes closed during acute attacks (otherwise activity as tolerated).

Pharmacologic Interventions
Treat nausea and vomiting:
dimenhydrinate (A class drug), 50-75 mg q6h prn
Monitoring and Follow-Up
Follow up in 1 or 2 days to monitor symptom control. Ensure that the client remains hydrated if nausea or vomiting is significant.

Referral
Refer to a physician if anything other than viral labyrinthitis is suspected, especially if attacks are severe or recurrent. A neurology consult may be necessary to identify and treat underlying disorder.
Menière's Disease

Definition
An inner-ear disorder involving an increase in volume and pressure of the innermost fluid in the middle ear, which results in recurrent attacks of a cluster of symptoms.

Causes
- Unknown, but the best theory suggests that it is an inner-ear response to an injury (e.g. reduced inner ear pressure, allergy, endocrine disease, lipid disorder, vascular disorder, viral infection)
- A more recent theory suggests that it results from intracranial compression of a balancing nerve by a blood vessel

Risk Factors
- Caucasian heritage
- Stress
- Allergy
- High salt intake
- Exposure to noise

History
- Occurs as attacks with intervening periods of remission
- Fluctuating loss of low-frequency hearing
- Vertigo (spontaneous attacks lasting from 20 minutes to several hours)
- Sensation of fullness in the ear
- Nausea, vomiting
- Falling
- Prostration (inability to stand up because motion increases symptoms)

Physical Findings
- Pallor
- Sweating
- Distress, prostration
- May be some measure of dehydration if vomiting is severe
- Audiometry testing with pure tones may show low-frequency sensorineural nerve loss and impaired speech distinction
- Tuning fork tests (Weber and Rinne) confirm validity of the audiometry results

Differential Diagnosis
- Viral labyrinthitis
- Benign positional vertigo
- Acoustic tumor
- Syphilis
- Multiple sclerosis
- Vertebrobasilar disease

Complications
- Hearing loss
- Injury from falls during attacks
- Inability to work
- Failure to diagnose acoustic neuroma

Diagnostic Tests
- None

Management
Goals of Treatment
- Control symptoms
- Ascertain underlying cause

Appropriate Consultation
Consult physician for help with diagnosis (not urgent so long as client is stable and symptoms are controlled with treatment).

Client Education
Counsel client about prevention of attacks: stress-reduction strategies, avoidance of excessive salt intake, smoking cessation, avoidance of prolonged exposure to noise (client should use ear protectors), avoidance of ototoxic medications.

Pharmacologic Interventions
For acute attack, control nausea and vomiting: *dimenhydrinate (A class drug), 50 mg IM or PO q4h prn*

Monitoring and Follow-Up
Assess hearing at least annually in clients with stable symptoms.

Referral
Refer to a physician if symptoms are not controlled or if hearing loss is evident. A neurology consult may be necessary to identify and treat underlying disorder.
**Rhinitis**

There are 3 types of rhinitis to consider in the differential diagnosis of nasal congestion and rhinorrhea (runny nose).

**Definition**

*Allergic rhinitis*: Reactive inflammation of the nasal mucosa.

*Vasomotor rhinitis*: Perennial inflammation of the nasal mucosa, which represents a hyper reactive state of the nasal mucosa (nonallergic).

*Viral rhinitis (infection of upper respiratory tract)*: Viral infection confined to the upper respiratory tract. Usually mild and self-limiting.

**Causes**

*Allergic Rhinitis*

Sensitivity to inhaled allergens (pollens, grasses, ragweed, dust, molds, animal dander, smoke).

*Vasomotor Rhinitis*

- Unknown; symptoms do not correlate with exposure to specific allergens
- Attacks may be triggered by abrupt changes in temperature or barometric pressure, odors or emotional stress.

*Viral Rhinitis (Infection of Upper Respiratory Tract)*

Numerous viral agents.

**History**

*Allergic Rhinitis*

- Seasonal or perennial symptoms
- History of familial allergies
- Asthma or eczema may be present
- Paroxysmal sneezing
- Itchy nose
- Nasal congestion
- Excessive, continuous, clear, watery nasal discharge
- Eyes may be itchy or watery
- Ears may be itchy
- General malaise and headache may be present
- Symptoms worst in the morning and least during the day, worsening again during the night
- Postnasal drip
- Breathing through the mouth

*Vasomotor Rhinitis*

- Nasal turbinates may be enlarged
- Throat may be slightly reddened because of irritation from postnasal drip

*Viral Rhinitis (Infection of Upper Respiratory Tract)*

- Temperature may be slightly elevated
- Client appears mildly ill
- Clear nasal discharge
- Skin around nares slightly irritated
- Ears normal
- Throat normal, mild erythema
- Sinuses may feel tender

Differential Diagnosis (All Types)
- Acute or chronic sinusitis
- Abuse of nose drops
- Abuse of drugs or solvents (e.g. cocaine, gas, glue)
- Foreign body in nares
- Nasal polyps
- Deviated septum
- Hypothyroidism as a cause of the nasal congestion
- Nasal congestion induced by pregnancy or use of oral contraceptives

Complications (All Types)
- Otitis media
- Nasal polyps
- Epistaxis
- Enlargement of tonsils and adenoids
- Sinusitis

Diagnostic Tests (All Types)
- Consider skin testing for allergies

Management (All Types)
Goals of Treatment
- Relieve and suppress symptoms
- Identify the underlying allergen(s)
- Prevent complications

Nonpharmacologic Interventions
Environmental control is important. Eliminate or reduce known allergen(s) in the environment wherever possible, or avoid them altogether.

Client Education
- Recommend frequent hand-washing, appropriate disposal of used facial tissues, and covering of mouth and nose when coughing or sneezing
- Recommend increasing fluid intake to improve hydration
- Counsel client about appropriate use of medications (dose, frequency, side effects, avoidance of overuse)
- Recommend avoidance of caffeine

Pharmacologic Interventions

Allergic and Vasomotor Rhinitis
Normal saline nasal drops, prn, to wash out mucus and any inhaled allergen.

Oral antihistamines to treat acute symptoms of runny nose, sneezing, itch, and conjunctival symptoms (but these will not help nasal congestion):

\[ \text{cetirizine (A class drug), 10 mg od} \]

Antihistamines can cause drowsiness, dry mouth and urinary retention, and have additive effects with sedative drugs. Use with caution in elderly patients.

Topical nasal steroids are the mainstay of therapy for chronic allergic rhinitis and chronic vasomotor rhinitis and for maintenance and prophylactic treatment of these conditions. They can be used alone or in combination with the antihistamine and decongestant regimen.

Consult a physician about the use of inhaled nasal steroids if antihistamines and decongestants are not effective.

\[ \text{fluticasone (B class drug), 50 µg/spray, 2 sprays/nostril daily} \] may be prescribed.

Viral Rhinitis
The first step in relieving symptoms is to use a nasal decongestant for 3 or 4 days - consult a physician.

\[ \text{Salinex nasal spray (A class drug) may be of benefit} \]

Antihistamines have little proven benefit in the treatment of the common cold.

Do not prescribe decongestants for elderly clients, for people with hypertension, heart disease, peripheral vascular disease, hyperthyroidism, previous acute angle-closure...
glaucoma or previous urinary retention, or for anyone taking monoamine oxidase inhibitors or antidepressants.

Manage fever:
acetaminophen (A class drug), 325 or 500 mg, 1-2 tabs PO q4-6h prn

**Monitoring and Follow-Up**
Instruct client to return for further assessment if fever develops, or if symptoms have not resolved within 14 days.

**Referral**
Refer to a physician if symptoms of rhinitis are not controlled with initial treatment. Allergy testing, sinus radiography or other medications may be required.
Anterior Epistaxis

Definition
Localized bleeding from the anterior portion of the nasal septum.

Causes
- Raised blood pressure
- Trauma and irritation
- Foreign-body irritation
- Neoplasm (rare)
- Predisposing factors: allergic rhinitis, deviated nasal septum, infection of the upper respiratory tract, local vascular lesions
- Dry air

History
- Exposure to one or more of the predisposing factors
- Usually unilateral
- Profuse bleeding or blood-streaked nasal discharge
- Determine duration, amount and frequency of bleeding
- Use of anticoagulants, ASA products or other medications
- History of easy bruising or bleeding elsewhere (e.g. melena, heavy menstrual periods)
- Family history of bleeding disorders (e.g. von Willebrand's disease)
- Inhaled substance abuse (e.g. cocaine, gas)

Physical Findings
Examine client sitting up and leaning forward so that the blood will flow forward.
- Blood pressure normal unless bleeding is severe enough to cause loss of volume
- Heart rate may be elevated because of fear or if bleeding is severe enough to cause loss of volume
- Obvious deformity or displacement may be present
- Bleeding from anterior portion of septum may be present
- Inspect throat for posterior bleeding
- Sinuses may feel tender
- Septum may be deviated

Differential Diagnosis
- Mild infection of nasal mucosa
- Dryness and irritation of nasal mucosa
- Nasal fracture
- Foreign body
- Malignant lesion
- Blood dyscrasias
- Hypertension

Diagnostic Tests
- None

Management
Goals of Treatment
- Stop loss of blood
- Prevent further episodes

Appropriate Consultation
Usually not necessary unless complications arise or serious underlying pathology is a concern.

Nonpharmacologic Interventions
Most bleeding will be stopped by application of pressure to both sides of the nose, with firm pressure against the nasal septum for 5-15 minutes.

Client Education
- Recommend increasing room humidity (client should keep a pot of water on the stove at all times, especially in winter)
- Counsel client about appropriate use of medications (dosage and side effects; avoidance of overuse)
- Recommend avoidance of known irritants and local trauma (nose-picking, forceful nose-blowing)
- Instruct client about first-aid control of recurrent epistaxis (sitting up and leaning forward; applying firm, direct pressure to nasal septum)
- Recommend use of ice packs to control acute bleeding
- Recommend liberal use of lubricants such as Vaseline® in the nares to promote hydration of the nasal mucosa
- Advise client not to pick nose
- Advise BP control, if appropriate
Note: for management of posterior epistaxis, refer to Emergency Problems of Ears, Nose and Throat

**Pharmacologic Interventions**
If direct pressure alone is insufficient to stop the bleeding:

*Merocel nasal pack*

Next, apply a silver nitrate stick firmly, for 1-2 minutes, to the site of bleeding. Cauterize as small an area as possible. Do not cauterize both sides of septum at the same time. Promote healing and prevent further bleeding by applying a nasal lubricant (petroleum jelly) in both nostrils tid or qid.

**Monitoring and Follow-Up**
Follow up as necessary if problem is recurrent or there is concern about a serious underlying problem.

**Referral**
Refer to a physician to rule out other pathologies if the problem is recurrent or if the client is older.

If there has been trauma (e.g. a fist fight), it is important to rule out septal hematoma. Management of hematoma of the nasal septum is surgical, and medevac is necessary.
**Acute Sinusitis**

**Definition**
Infection of the sinuses.

**Causes**
- Common: *Hemophilus influenzae*, *Moraxella catarrhalis*, *Streptococcus pneumoniae*
- Less common: *Chlamydia pneumoniae*, *Streptococcus pyogenes*, viruses, fungi
- Predisposing factors: common cold, allergies, deviated nasal septum, smoking, adenoidal hypertrophy, dental abscess, nasal polyps, trauma, foreign body, diving or swimming, neoplasms, cystic fibrosis

**History**
- Exposure to one or more of the predisposing factors
- Headache
- Facial pain
- Pressure over involved sinuses increases when bending forward
- Purulent nasal discharge, which may be tinged with blood
- Dental pain, especially of upper incisor and canine teeth
- General malaise may be present
- Fever may be present

**Physical Findings**
- Temperature may be mildly elevated
- Client appears mildly to moderately ill
- Irritation of skin around nares
- Swollen nasal mucosa may be pale or dull red
- Nasal polyp may be present
- Dental abscess may be present
- Tenderness over involved sinuses
- Tenderness over a tooth
- Anterior cervical nodes may be enlarged and tender

**Differential Diagnosis**
- Dental abscess
- Nasal polyp(s)
- Tumor
- Presence of foreign bodies
- Periorbital cellulitis

- Infection of upper respiratory tract
- Allergic rhinitis
- Vasomotor rhinitis
- Cluster headache
- Migraine headache

**Complications**
- Contiguous spread of infection to intraorbital or intracranial structures
- Chronic sinusitis
- Periorbital cellulitis

**Diagnostic Tests**
- None

**Management**

**Goals of Treatment**
- Identify predisposing factors
- Identify underlying dental abscess
- Relieve symptoms

**Nonpharmacologic Interventions**
- Apply moist heat (such as with steam inhalation or warm compresses) to sinuses to help relieve pressure by loosening and liquefying thickened secretions. Normal saline nasal irrigation also helps to do this.

**Client Education**
- Recommend increased rest during acute phase
- Recommend increasing hydration (8-10 glasses of fluid per day)
- Counsel client about appropriate use of medications (dose, frequency, side effects)
- Recommend protection of sinuses from changes in temperature
- Recommend avoidance of irritants (e.g. smoke)
- Recommend avoidance of swimming, diving or flying during acute phase

**Pharmacologic Interventions**
Nasal decongestant sprays or drops may be used for the first 24-48 hours if congestion is marked. Topical decongestants are more effective than oral ones. Consult physician.
Client should not use antihistamines (unless there is an allergic component to the symptoms), because these dry and thicken the secretions.

Salinex nasal spray (A class drug) may be helpful

It is very important to limit the use of a nasal decongestant spray to a period of 4 days to avoid development of "rebound" nasal congestion when the nasal spray is withdrawn (a complication called rhinitis medicamentosa).

Manage pain and fever with simple analgesics: acetaminophen (A class drug), 325 or 500 mg, 1-2 tabs PO q4h prn or ibuprofen (A class drug), 200 mg, 1-2 tabs PO q4h prn

Oral antibiotics:
amoxicillin (C class drug), 500 mg PO tid for 10 days
or
cotrimoxazole (C class drug), 800/160 mg PO bid for 10 days

**Monitoring and Follow-Up**
Follow up in 10-14 days. Instruct client to return sooner if symptoms progress despite therapy or if symptoms fail to respond to therapy.
Chronic Sinusitis

Definition
Non-resolving inflammation of the sinuses.

Causes
- Polymicrobial infection (bacterial anaerobes, *Staphylococcus aureus*, viruses)
- Structural abnormalities

History
- Prolonged nasal congestion (more than 30 days)
- Nasal discharge, intermittently purulent
- Postnasal drip may be present
- Early-morning hoarseness may be present
- Sinus pain across the middle of the face
- Headache may be present
- Popping of ears
- Eye pain
- Halitosis
- Chronic cough
- Fatigue
- No fever
- History of allergies may be present
- Smoking

Physical Findings
- Client appears well
- Nasal mucous membranes may appear pale and "boggy"
- Poor transillumination of sinuses
- Tenderness may be present over sinuses

Differential Diagnosis
- Allergic rhinitis
- Vasomotor rhinitis
- Nasal polyp
- Infection of upper respiratory tract
- Tumor
- Migraine headache
- Cluster headache
- Dental abscess

Complications
- Recurrent acute sinusitis
- Spread of infection to the intraorbital or intracranial structures

Diagnostic Tests
- None initially
- Consider referral to physician for further diagnostic tests such as sinus x-ray or CT scan of sinuses if initial therapy fails.

Management

Goals of Treatment
- Relieve symptoms
- Identify predisposing or underlying factors
- Prevent spread of infection to other structures

Client Education
- Recommend increasing hydration (8-10 glasses of fluid per day)
- Recommend inhalation of steam or warm compresses to relieve pressure on sinuses
- Counsel client about appropriate use of medications (dosage and side effects)
- Recommend avoidance of irritants (e.g. smoke) and allergens
- Recommend avoidance of diving, swimming or flying if symptoms are acute

Pharmacologic Interventions

Individuals with chronic sinusitis may need a longer course of oral antibiotic therapy. Consult with a physician for appropriate treatment.

Monitoring and Follow-Up
Follow up in 2 weeks.

Referral

Refer to a physician for all acute episodes for management, to rule out underlying pathology (e.g. nasal polyps, deviated nasal septum, chronic allergies). Refer to a dentist if underlying dental disease is suspected.
Common Problems Of The Mouth And Throat

Dental Abscess

**Definition**
Infection of the soft tissue surrounding a dead tooth.

**Causes**
- Progressive dental decay causing pulpitis from *gram-positive anaerobes* and *Bacteroides*
- Predisposing factors: deep caries, poor dental hygiene, dental trauma

**History**
- Localized tooth pain
- Constant, deep, throbbing pain
- Pain worsens with mastication or exposure to extreme temperatures
- Tooth may be mobile
- Gingival or facial swelling (or both) may be present

**Physical Findings**
- Fever (rare but possible)
- Facial swelling may be present
- Carious tooth
- Gingival edema and erythema
- Tooth may be loose
- Localized tenderness over affected area of jaw
- Anterior cervical nodes enlarged and tender
- Localized tooth pain

**Differential Diagnosis**
- Disease of the salivary gland (e.g. mumps)
- Sinusitis
- Cellulitis

**Complications**
- Cellulitis
- Recurrent abscess formation

**Diagnostic Tests**
- None

**Management**

**Goals of Treatment**
- Relieve symptoms
- Prevent spread of infection

**Appropriate Consultation**
Consult a physician if a large fluctuant abscess is present, if client is acutely ill or if the infection has spread to the soft tissues of the neck.

**Nonpharmacologic Interventions**
Warm saline oral rinses qid.

**Client Education**
- Counsel client about appropriate use of medications (dosage and side effects)
- Recommend dietary modifications (liquids or soft diet)
- Recommend improvements to dental hygiene

**Pharmacologic Interventions**

*Oral antibiotics:*
- *penicillin V potassium* (*C class drug*), 300-600 mg PO qid for 7-10 days

For clients with penicillin allergy:
- *erythromycin* (*C class drug*), 250 mg PO qid for 10 days

Simple analgesics for mild to moderate dental pain:
- *ibuprofen* (*A class drug*), 300 mg, 1tab PO q4h prn x 72 hr (not with history of gastric problems) or
- *acetaminophen* (*A class drug*), 325 or 500 mg, 1-2 tabs PO q4-6h prn

For moderately severe pain:
- *acetaminophen with codeine phosphate*, 30 mg (*C class drug*), 1-2 tabs PO q4-6h prn (maximum 15 tabs)

**Monitoring and Follow-Up**
Follow up in 48-72 hours.

**Referral**
Refer to a dentist for definitive therapy.
Laryngitis

Definition
Inflammation of the mucosa of the larynx and vocal cords.

Causes
- Viral infection (common cold)
- Bacterial infection (*Streptococcus*)
- Chronic mouth breathing
- Overuse of voice
- Chronic sinusitis
- Excessive smoking (or exposure to secondhand smoke)
- Aspiration of caustic chemical
- Gastroesophageal reflux
- Changes due to aging (e.g. muscle atrophy, bowing of cords)
- Alcohol abuse
- Long-term exposure to dust or other irritants

History
- Presence of risk factors (see "Causes," above)
- Concurrent infection of the upper respiratory tract may be present
- Hoarseness or loss of voice, abnormal-sounding voice
- Throat pain, tickle or rawness
- Aphonia
- Dysphagia (trouble swallowing)
- Cough
- Fever
- Malaise

Physical Findings
- Temperature may be elevated
- Client appears mildly ill
- Throat may be mildly to moderately injected
- No exudate
- Lymph nodes may be enlarged

Differential Diagnosis
- Cancer of the throat or larynx (if condition prolonged or recurrent)
- Polyps of vocal cords

Diagnostic Tests
- None

Management
Goals of Treatment
- Relieve symptoms
- Identify and remove contributing factors (e.g. smoking)

Appropriate Consultation
Consult a physician immediately if client has stridor and shortness of breath.

Nonpharmacologic Interventions
- Voice rest is the mainstay of treatment
- Removal of contributing factors (e.g. smoking and alcohol) is also important
- Increase humidity of room air
- Increase fluid intake if febrile
- Increase rest until any fever settles

Client Education
- Explain disease course and expected outcomes
- Counsel client about appropriate use of medications (dosage and side effects)
- Stress importance of follow-up if not resolved in 3 weeks

Pharmacologic Interventions
Usually none.

Monitoring and Follow-Up
Follow up in 3 weeks if not resolved.

Referral
Refer to a physician if symptoms persist for longer than 3 weeks.
Pharyngitis (Sore Throat)

Definition
Inflammation or infection of mucous membranes of pharynx (may also affect the palatine tonsils).

Causes

Infectious
- Viruses (e.g. rhinovirus, adenovirus, parainfluenza, coxsackievirus, Epstein-Barr virus, herpes virus)
- Bacteria (e.g. group A β-hemolytic Streptococcus [most common], Chlamydia, Corynebacterium diphtheriae, Hemophilus influenzae, Neisseria gonorrhoeae
- Fungi (e.g. Candida); rare except in immunocompromised people (e.g. those with HIV or AIDS)

Non-infectious
- Allergic rhinitis
- Sinusitis with postnasal drip
- Mouth breathing
- Trauma
- Gastroesophageal reflux disease
- Risk factors: contact with a person with group A streptococcal infection, crowded living quarters, immunosuppression (e.g. HIV/AIDS), fatigue, smoking, excess consumption of alcohol, oral sex, diabetes mellitus or use of steroids (oral or inhaled)

History

Bacterial
- Abrupt onset of sore throat
- Pain on swallowing
- Fever or chills
- Malaise
- Skin rash may be present
- Headache
- Anorexia

Viral
- Slow, progressive onset of sore throat
- Mild malaise
- Nasal congestion

Non-infectious
- Slow, progressive onset of sore throat
- Mild malaise
- Persistent, recurrent
- Pain on swallowing

Physical Findings

Bacterial
- Temperature elevated
- Pulse elevated
- Client appears acutely ill
- Posterior pharynx red and swollen
- Tonsils enlarged
- Purulent exudate may be present
- Tonsillar and anterior cervical nodes enlarged and tender
- Rash (scarlatina form in group A streptococcal infection)

Viral
- Temperature may be elevated
- Posterior pharynx red and swollen
- Purulent exudate may be present
- Tonsillar and cervical nodes may be enlarged and tender
- Petechiae on palate (in mononucleosis)
- Vesicles (in herpes)

Non-infectious
- Posterior pharynx red and swollen
- Tonsillar and anterior cervical nodes may be enlarged and tender
- Exudate may be present

Differential Diagnosis
- Distinguish bacterial from viral infection
- Infectious mononucleosis
- Sexually transmitted infection (for chronic pharyngitis, investigate sexual practices)
- Vincent's angina (necrotic tonsillar ulcers)
- Distinguish reactive inflammation from an underlying disorder (see "Causes," above)
Complications
• Rheumatic fever (*group A Streptococcus only*)
• Glomerulonephritis (*group A Streptococcus only*)
• Peritonsillar abscess

Diagnostic Tests
• CBC
• Monospot
• Swab the throat for culture and sensitivity (see Appendix 1, this chapter, for indications to swab)
• Rapid Strep A testing

Management
Goals of Treatment
• Relieve symptoms
• Prevent complications
• Prevent spread of group A Streptococcus to contacts

Appropriate Consultation
Consult a physician if the client has significant dysphagia or dyspnea (signalling obstruction of the upper airways) or if there is concern about an underlying pathology such as HIV.

Nonpharmacologic Interventions
• Bed rest during febrile phase
• Adequate oral intake of fluids (8-10 glasses of fluid per day)
• Avoidance of irritants (e.g. smoke)
• Gargling with warm saline qid

Pharmacologic Interventions
For pain and fever:
acetaminophen (*A class drug*), 325 or 500 mg, 1-2 tabs PO q4h prn
or
ibuprofen (*A class drug*), 200 mg, 1-2 tabs q4h prn

Treat with antibiotics if streptococcal disease is suspected:
penicillin V potassium (*C class drug*), 300 mg PO qid for 10 days

For clients with penicillin allergy:
erthyromycin (*C class drug*), 250 mg PO qid for 10 days

Do not use ampicillin or amoxicillin, because these drugs may cause a generalized red "drug rash" if infectious mononucleosis is present.

Monitoring and Follow-Up
Instruct client to return to clinic for reassessment if symptoms do not improve in 48-72 hours.

Referral
Referral may be necessary if condition is recurrent or persistent or an undiagnosed underlying pathology is suspected.
Emergency Problems Of The Ears, Nose And Throat

Mastoiditis

Definition
Acute suppurative inflammation of mastoid antrum and air cells.

Causes
- Complication of inadequately treated acute otitis media, cholesteatoma or blockage of outflow tract of mastoid air cells
- Most common organisms: Hemophilus influenzae, group A Streptococcus, Streptococcus pneumoniae

Risk Factors
- Recurrent otitis
- Cholesteatoma
- Immunocompromise

History
- Ear pain
- Non-resolving otitis media
- Spiking fever
- Post-auricular redness, swelling and pain
- Tinnitus
- Otorrhea if ear drum is perforated

Physical Findings
- Temperature moderately to severely elevated
- Client appears moderately ill
- Post-auricular swelling and erythema
- Pinna may be displaced anteriorly if edema severe
- Manipulation of pinna and otoscopic exam of the ear causes acute pain
- Purulent drainage if tympanic membrane ruptured
- Post-auricular warmth
- Tenderness over mastoid process
- Anterior cervical and peri-auricular nodes enlarged and tender

Differential Diagnosis
- Severe otitis externa
- Post-auricular cellulitis
- Benign or malignant neoplasm
- Infection of deep neck space (Ludwig's angina)
- Post-auricular lymph node

Complications
- Residual hearing loss
- Meningitis
- Intracraniial abscess
- Subperiosteal abscess

Diagnostic Tests
Swab for culture and sensitivity if ear is draining.

Management

Goals of Treatment
- Relieve pain and swelling
- Prevent spread of infection

Appropriate Consultation
Consult a physician concerning IV antibiotic therapy.

Adjuvant Therapy
Start IV therapy with normal saline. Adjust rate according to state of hydration.

Pharmacologic Interventions
IV antibiotics:
- ampicillin (C class drug), 1.0-2.0 g IV q6h
- clindamycin (B class drug) 300mg IV q6h
- cefuroxime (B class drug), 750 mg IV q8h

For clients with penicillin allergy:
- Analgesics for pain and fever:
  - acetaminophen (A class drug), 325 or 500 mg, 1-2 tabs PO q4-6h

Referral
Medevac to hospital as soon as possible; client may need several days of IV drug therapy and surgery.
Posterior Epistaxis

Definition
Bleeding from the posterior portion of the nose (usually occurs in the elderly).

Causes
• Idiopathic (cause unknown)
• Hypertension
• Vascular abnormalities (hereditary hemorrhagic telangiectasia)
• Trauma: deviation or perforation of the septum
• Infection (e.g. chronic sinusitis)
• Neoplasm (rare)

History
• Sudden onset of brisk, bright bleeding from nose
• May be unilateral or bilateral
• Blood running down back of throat
• May be a history of hematemesis if client has swallowed a large quantity of blood
• History of easy bruising, bleeding elsewhere (e.g. melena, heavy menses), family history of bleeding tendencies, use of anticoagulants, use of ASA products

Physical Findings
• Heart rate elevated
• Blood pressure may be reduced if loss of blood is significant
• Client appears anxious
• Client may be pale, sweaty if loss of blood is significant
• Bright red bleeding from nares (unilateral or bilateral)
• Bleeding site not visible
• Blood observed in pharynx
• Sinuses may feel tender

Differential Diagnosis
• Hypertension
• Trauma
• Vascular abnormalities (e.g. hereditary hemorrhagic telangiectasia)
• Deviation of the septum
• Perforation of the septum
• Infection (e.g. chronic sinusitis)
• Neoplasm (rare)

Complications
• Hypotension or shock (hypovolemic)
• Anemia

Diagnostic Tests
• None

Management

Goals of Treatment
• Stop bleeding
• Maintain circulating blood volume

Appropriate Consultation
Consult a physician if initial management fails to control bleeding or there is significant potential of underlying pathology.

Adjuvant Therapy
• Start IV therapy with normal saline or Ringer's lactate solution; adjust IV rate according to pulse and blood pressure response and rate of bleeding

Nonpharmacologic Interventions
• Keep client at rest with head at a 90° angle
• Apply pressure to the nose
• Insert a posterior nasal pack; use a posterior nasal pack balloon system if available
• An effective alternative is to use a 10-14 Fr. Foley catheter system using water in the balloon.
• Bilateral packing is sometimes required to achieve adequate compression. The bleeding should stop after the nasal packs are in place.

Monitoring and Follow-Up
• Monitor vital signs and loss of blood closely
• Remove packs and balloons in 48-72 hours

Referral
Medevac to hospital.
Peritonsillar Abscess

Definition
Abscess that forms behind the tonsil in the posterolateral pharyngeal wall as a complication of bacterial tonsillitis.

Causes
Bacterial infection, usually related to group A Streptococcus pyogenes.

History
• Recent episode of pharyngitis
• Gradually increasing unilateral ear and throat pain
• Fever
• Malaise
• Dysphagia (difficulty swallowing)
• Dysphonia
• Drooling
• Trismus (difficulty opening mouth)

Physical Findings
• Fever
• Heart rate increased
• Client may appear acutely ill or distressed
• Diaphoretic; flushed if feverish
• Affected tonsil grossly swollen medially and reddened
• Tonsil may displace uvula and soft palate to the opposite side of pharynx
• Swelling and redness of the soft palate
• Trismus (difficulty opening mouth)
• Tonsillar lymph nodes enlarged and very tender

Differential Diagnosis
• Epiglottitis
• Gonococcal pharyngitis

Complications
• Obstruction of the airways
• Sepsis
• Deep neck infection

Diagnostic Tests
Swab for culture and sensitivity of any exudate if the client is being treated as an outpatient (mild to moderate symptoms).

Management Of Mild-To-Moderate Condition
Treat on an outpatient basis.

Goals of treatment
• Relieve symptoms
• Prevent complications

Client Education
• Advise client to return immediately if pain becomes worse, or if drooling, difficulty swallowing, difficulty breathing or inability to open mouth develops
• Recommend increased fluid intake
• Recommend increased rest until fever settles
• Recommend frequent gargling with warm saline for 48 hours

Pharmacologic Interventions
Antibiotics:
penicillin V potassium (C class drug), 300 mg PO qid for 10 days
or
penicillin G (B class drug), 1.2 million units IM

For clients with penicillin allergy:
cloxacillin (B class drug), 300 mg PO qid for 10 days

Analgesics for pain and fever:
acetaminophen (A class drug), 325 or 500 mg, 1-2 tabs PO q4h prn
or
ibuprofen (A class drug), 200 mg, 1-2 tabs PO q4h prn

Monitoring and Follow-Up
Follow up if no improvement in 48-72 hours.

Management Of Moderate-To-Severe Condition
Client appears acutely ill and has difficulty swallowing.

Goals of Treatment
• Relieve symptoms
• Prevent complications
**Appropriate Consultation**
Consult a physician if the abscess is significant in size and the client appears acutely ill; immediate referral to hospital and examination by an ENT specialist are in order. Consult with a physician concerning choices for IV antibiotic treatment.

**Adjuvant Therapy**
- Start IV therapy with normal saline; adjust rate according to age and state of hydration

**Nonpharmacologic Interventions**
- Bed rest at high Fowler’s position
- Give sips of cold liquids only
- Give nothing by mouth if drooling

**Pharmacologic Interventions**
Antibiotics:
- **penicillin G sodium** (*B class drug*), 500 000 to 2 million units IV q6h
  
  For clients with penicillin allergy:
- **clindamycin** (*B class drug*), 600mg IV q8h

**Monitoring and Follow-Up**
Monitor client to ensure adequate airway is maintained.

**Referral**
Medevac to hospital; client may require surgical incision to drain abscess.
Appendix 1

An Alternative Approach To Sore Throat Management: The Sore Throat Score

In 1994, a group of community-based family physicians and general practitioners from Stratford, Ontario, began a joint project with researchers from the Institute for Clinical Evaluative Sciences in Toronto, Ontario, to improve the accuracy of identifying people with Group A streptococcal pharyngitis and thus reduce the number of antibiotic prescriptions. They identified a "sore throat score" that had been tested in trials and seemed practical for an office-based setting.

The score was originally developed by a group of US emergency physicians. Using a mathematical model, the physicians identified 4 clinical characteristics that could be used to assess the likelihood of group A streptococcal pharyngitis:

• exudate
• swollen tonsillar anterior cervical nodes
• a history of a fever of more than 38ºC
• lack of cough

Using the Sore Throat in Clinical Practice

<table>
<thead>
<tr>
<th>No of characteristics present</th>
<th>% of patients with Group A Streptococcus</th>
<th>% of sore throats seen in a practice setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>2.5</td>
<td>15</td>
</tr>
<tr>
<td>One</td>
<td>6-7</td>
<td>30</td>
</tr>
<tr>
<td>Two</td>
<td>14-17</td>
<td>25</td>
</tr>
<tr>
<td>Three</td>
<td>30-34</td>
<td>20</td>
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<tr>
<td>Four</td>
<td>56</td>
<td>10</td>
</tr>
</tbody>
</table>

Among people who have no or only one clinical finding, fewer than 10% will have a group A streptococcal infection. Because a routine throat culture will miss 10% of cases of group A streptococcal infection, this is a reasonable cut-off for stating that these people do not need a throat culture and should not receive an antibiotic.

Among patients with two or three clinical findings, it is suggested that a throat sample be taken for culture but that antibiotics not be prescribed until the culture result is available.

There are three reasons for this recommendation:

1. The risk of rheumatic fever is not increased if antibiotics are delayed 48-72 hours.
2. The results of culture will be negative for most patients in this group, so symptom relief may be adequate with ASA or acetaminophen.
3. Early antibiotic treatment may predispose a person to further group A streptococcal pharyngitic infections.

Using this approach should substantially reduce the use of antibiotics for disease not caused by group A Streptococcus.

Patients with all four clinical findings are likely to be sicker and have the highest chance of having group A streptococcal pharyngitis, although those with this type of infection constitute only about 10% of cases of sore throat. For these patients, it is suggested that a throat swab be taken for culture and that a decision to institute
antibiotics be made on clinical grounds, as the relief of symptoms may be greatest for this group. However, anyone who has been ill for 3 days before seeking care is likely past the point at which antibiotics will provide symptom relief.

Until further validation is done for pediatric populations, this rule should be applied to adult populations only (defined as those 15 years of age or older).

The score is invalid in any community in which an outbreak or epidemic of group A streptococcal pharyngitis is occurring and should not be applied in this type of situation.

**Sources**
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Assessment Of The Respiratory System

History Of Present Illness And Review Of System

General
The following characteristics of each symptom should be elicited and explored:
- Onset (sudden or gradual)
- Chronology
- Current situation (improving or deteriorating)
- Timing (frequency, duration)
- Severity
- Precipitating and aggravating factors
- Relieving factors
- Associated symptoms
- Effects on daily activities
- Previous diagnosis of similar episodes
- Previous treatments
- Efficacy of previous treatments

Chest Pain
- Onset (sudden or gradual)
- Location
- Radiation
- Quality
- Timing
- Severity
- Aggravating and relieving factors
- Associated symptoms

Wheeze
- Timing (e.g. at rest, at night, with exercise)

Other Associated Symptoms
- Fever
- Malaise
- Fatigue
- Night sweats
- Weight loss

Medical History (Specific To Respiratory System)
- Frequency of colds or asthma and treatment used
- Other respiratory illnesses (e.g. nasal polyps, chronic sinusitis)
- Bronchitis, pneumonia, chronic obstructive pulmonary disease (COPD), tuberculosis (TB) (disease or exposure), cancer, cystic fibrosis
- Seasonal allergies or allergies to drugs such as acetylsalicylic acid (ASA)
- Medications such as angiotensin-converting enzyme (ACE) inhibitors, β-blockers, ASA, steroids, nasal sprays, antihistamines
- Alternative therapies (e.g. herbal, traditional medicine)
- Admissions to hospital for respiratory illness
- Date and result of last Mantoux test and chest x-ray
- Vaccination history (e.g. pneumococcal, annual influenza)

Cough
- Quality (e.g. dry, hacking, loose, productive)
- Severity
- Timing (e.g. at night, with exercise)

Sputum
- Color
- Amount
- Consistency

Hemoptysis
- Amount of blood (frank vs. streaking)
- Association with leg pain, chest pain, shortness of breath, epistaxis

Shortness of Breath
- Exercise tolerance (number of stairs client can climb or distance client can walk)
- Orthopnea (number of pillows used for sleeping)
- Association with paroxysmal nocturnal dyspnea (waking up out of sleep acutely short of breath; attack resolves within 20 to 30 minutes of sitting or standing up)
Family History (Specific To Respiratory System)
• Allergies, atopy
• Asthma, lung cancer, TB, cystic fibrosis
• Heart disease
• COPD

Personal And Social History (Specific To Respiratory System)
• Smoking history (number of packages/day, number of years)
• Alcohol abuse
• HIV risks
• Exposure to secondhand smoke
• Occupational or environmental exposure to respiratory irritants
• Exposure to pets
• Crowded living conditions
• Personal or environmental cleanliness
• Institutional living
• Injection drug use
Examination Of The Respiratory System

Examination of the ear, nose, throat and cardiovascular system should also be carried out because of the interrelatedness between these systems and structures and the functioning of the lower respiratory tract (see chapter 2, "Ears, Nose and Throat," and chapter 4, "Cardiovascular System," for details of these examinations).

General Appearance
- Acutely or chronically ill
- Degree of comfort or distress
- Degree of sweatiness
- Ability to speak a normal-length sentence without stopping to take a breath
- Color (e.g. flushed, pale, cyanotic)
- Nutritional status (obese or emaciated)
- Hydration status

Vital Signs
- Temperature
- Pulse
- Pulse oximetry
- Respiratory rate
- Blood pressure

Inspection
- Color (e.g. central cyanosis)
- Shape of chest (e.g. barrel-shaped, spinal deformities)
- Movement of chest (symmetry)
- Rate, rhythm and depth of respiration
- Use of accessory muscles (sternocleidomastoid muscles)
- Intercostal indrawing
- Evidence of trauma
- Chest wall scars
- Clubbing of the fingers

Palpation
- Tracheal position (midline)
- Chest wall tenderness
- Chest expansion
- Tactile fremitus
- Spinal abnormality
- Nodes (axillary, supraclavicular, cervical)
- Masses
- Subcutaneous emphysema

Percussion
- Resonance (dull or hyperresonance)
- Location and excursion of the diaphragm

Auscultation
- Assist client to breathe effectively
- Listen for sounds of normal air entry before trying to identify abnormal sounds

Breath Sounds
- Degree of air entry throughout the chest (should be equal)
- Quality of breath sounds (e.g. bronchial, bronchovesicular, vesicular)
- Length of inspiration and expiration

Adventitious Sounds
- Wheezes: continuous sounds, ranging from a low-pitched snoring quality to a high-pitched musical quality, may clear with coughing
- Crackles: discrete, crackling sounds heard on inspiration
- Pleural rub: a creaking sound from pleural irritation, heard on inspiration or expiration
Differential Diagnosis Of Respiratory Symptoms

**Acute Cough**
- Infection: viral or bacterial, upper or lower respiratory tract
- Lung abscess
- Asthma
- Exacerbations of chronic bronchitis
- Bronchogenic carcinoma
- Foreign-body inhalation
- Esophageal reflux with aspiration
- Left-sided heart failure

**Dyspnea**
- Asthma
- COPD
- Pneumothorax
- Pneumonia
- Interstitial lung disease (e.g. sarcoidosis)
- Lung cancer
- Pulmonary emboli or infarction
- Cardiac failure, congestive heart failure
- Anxiety with hyperventilation

**Chronic Cough**

**Common Causes**
- Smoking
- Exposure to environmental irritants (second hand smoke)
- Postnasal drip
- Asthma
- COPD or chronic bronchitis
- Gastroesophageal reflux with aspiration
- Lung tumors
- Mitral valve prolapse

**Less Common Causes**
- Carcinoma of the upper or lower respiratory tract
- Interstitial lung disease
- Medications (e.g. ACE inhibitors)
- Chronic lung infections (e.g. bronchiectasis, cystic fibrosis, TB)
- Occult left heart failure
- Disorders of the pleura, pericardium, diaphragm, stomach
- Idiopathic (e.g. psychogenic)
- Pressure from an external mass (e.g. goitre, aortic aneurysm)

**Hemoptysis**
- Bronchitis
- Bronchiectasis
- TB
- Bronchogenic cancer
- Lung abscess
- Pneumonia, necrotizing form (e.g. caused by *Klebsiella*)
- Pulmonary contusion
- Pulmonary embolism
- Primary pulmonary hypertension
- Mitral stenosis
- Cardiac failure, congestive heart failure
- Vascular anomalies (e.g. aneurysm)
- Chest trauma
- Inhalation of toxic material
- Bleeding disorders

**Wheeze**
- Acute bronchitis
- COPD
- Asthma
- Bronchopneumonia (due to aspiration)
- Lung neoplasm obstructing a bronchus
- Pulmonary emboli
- Foreign-body aspiration

**Cough And Sputum Production**
- Acute bronchitis
- Pneumonia
- Asthma
- TB
- COPD
- Bronchiectasis
- Lung abscess
- Lung cancer

**Chest Pain (Pleuritic)**

**Diseases of the Lungs or Pleura**
- Pneumonia
- Pleurisy
- Pleuritis associated with connective tissue diseases
- Pneumothorax
• Hemothorax
• Empyema
• Pulmonary infarction
• Lung cancer
• TB

Diseases of the Pericardium
• Pericarditis
• Trauma

Diseases of the Chest Wall Muscle, Bone, Nerves, Skin
• Chest wall contusion
• Fractures of ribs, sternum
• Inflammation of chest wall muscles (costochondritis)
• Herpes zoster neuropathies
• Bone tumor

Gastrointestinal Diseases
• Liver abscess
• Pancreatitits
• Subdiaphragmatic abscess

Other Diseases
• Psychoneurosis

Chest Pain (Nonpleuritic)

Diseases of the Pulmonary Vessels
• Pulmonary embolism
• Primary pulmonary hypertension
• Disease of the aorta
• Dissecting aortic aneurysm

Diseases of the Myocardium
• Myocardial infarction
• Angina

Referred Pain from Gastrointestinal Structures
• Reflux esophagitis, ulceration
• Esophageal motility disorders (e.g. achalasia)
• Esophageal perforation or rupture
• Esophageal spasm
• Esophageal neoplasm
• Esophageal diverticula
• Gastric or duodenal ulcer
• Cholelithiasis, cholecystitis
• Pancreatitis, pancreatic neoplasm
Common Problems Of The Respiratory System

Chronic Asthma
For further reading on asthma and current guidelines please refer to: www.asthmaguidelines.com www.pulsus.com/Respir/08_02/guide-ed.htm where Boulet et al (1999) Canadian Asthma Consensus Guidelines, updates and treatment flowcharts and checklists can be found.

Definition
A disorder of the airways characterized by paroxysmal or persistent symptoms (including dyspnea, chest tightness, wheeze, sputum production and cough) with variable airflow limitation and a variable degree of airway hyperresponsiveness to a variety of stimuli.

Airway inflammation and its consequences are the important features in the pathogenesis of asthma (Boulet et al, 1999).

Table 1: Characteristics of various forms of asthma

<table>
<thead>
<tr>
<th>Mild Asthma</th>
<th>Moderate Asthma</th>
<th>Severe Asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory symptoms (wheeze, cough, dyspnea) up to 2 times weekly and/or respiratory symptoms lasting less than 30 minutes with activity</td>
<td>Respiratory symptoms &gt; 2 times weekly, with exacerbations affecting sleep and activity and often lasting several days</td>
<td>Respiratory symptoms so frequent that they interfere with activities of daily living</td>
</tr>
<tr>
<td>Minimal or no shortness of breath at rest; exercise increases cough or wheeze and usually causes shortness of breath; nighttime cough, worse in early predawn hours</td>
<td>Shortness of breath at rest or with mild exertion; tightness in the chest; wheezing at rest; increased cough at night or with exercise</td>
<td>Daily symptoms and frequent nighttime symptoms</td>
</tr>
<tr>
<td>Able to do usual tasks without difficulty</td>
<td>Some difficulty speaking and sleeping</td>
<td>Occurrence of a prior near-fatal episode (intubation needed)</td>
</tr>
<tr>
<td>PEFR and FEV\textsubscript{1} &gt;80% of predicted</td>
<td>PEFR 60% to 80% of predicted</td>
<td>PEFR &lt;60% of predicted</td>
</tr>
<tr>
<td>Asymptomatic between exacerbations</td>
<td>Occasional visits to emergency department</td>
<td>Frequent admissions to hospital or visits to emergency department</td>
</tr>
<tr>
<td></td>
<td>Intermittent use of $\beta_2$-agonist inhaler</td>
<td>Need for inhaled $\beta_2$-agonists several times per day or at night. Use of more than one inhaler in 2 week period</td>
</tr>
</tbody>
</table>

PEFR = peak expiratory flow rate  FEV\textsubscript{1} = forced expiratory volume in the first second
Note: cough at night or during times of emotional stress or physical activity may be the only sign of asthma.

Causes
- Unknown in many cases
- Allergic airway hyperreactivity to airborne pollens, molds, house dust mites, animal dander, feather pillows
- Nonallergic asthma triggered by drugs (such as ASA, nonsteroidal anti-inflammatory drugs, NSAIDs], tartrates, $\beta$-blockers and ACE inhibitors), smoke and other occupational, industrial and environmental substances
- Common trigger factors: intercurrent gastroesophageal reflux disease (GERD)
**Risk Factors**
- Positive family history
- Frequent, severe viral infections of the lower respiratory tract in infancy, respiratory tract infections, cold air, exercise, emotional stress, sinusitis.

**Determining Severity**
The severity of asthma is determined by the frequency and chronicity of symptoms, the presence of persistent airflow limitations and the medication needed to maintain control of the condition.

Severity is best evaluated after an aggressive trial of therapy with inhaled corticosteroids (see Table 1 above).

**Differential Diagnosis**
- Mechanical airway obstruction (foreign body)
- Severe allergic reaction
- COPD with chest infection
- Congestive heart failure
- Pulmonary edema
- Inhalation of toxic material
- Inspiratory stridor
- Cough secondary to drugs such as ACE-inhibitors, β-blockers

**Complications**
- Severe acute attack: hypoxia, respiratory failure, atelectasis, pneumothorax, death
- Chronic: interference with activities of daily living, COPD

**Diagnostic Tests**
Objective measurements are needed to confirm a diagnosis of asthma and to assess severity in all but the most minimally symptomatic clients.
- Determine peak expiratory flow rate (PEFR)
- Arrange baseline pulmonary function tests

Referral to physician for consideration of the following tests:
- Methacholine challenge test
- Allergy testing (Canadian Asthma Consensus Conference guidelines [Boulet et al, 1999])

**Management**

**Goals of Treatment**
- Maintain normal activity
- Prevent symptoms
- Maintain normal pulmonary function
- Prevent exacerbations
- Avoid side effects of therapy (given that side effects may lead to poor adherence to treatment plan)

The five most important aspects of asthma care are considered to be:
1. Achievement of acceptable control of the disease as the main goal of treatment
2. Control of the environment
3. Asthma education, favouring self-management and the use of an action plan
4. Inhaled glucocorticosteroids as the first-line anti-inflammatory therapy for all ages
5. Additional therapy (e.g. long-acting β2-agonists, leukotrienes-receptor antagonists [LTRAs] etc.) can be added to moderate doses of glucocorticosteroids if acceptable asthma control is not obtained

*(Boulet et al, 1999)*

**Appropriate Consultation**
Consult a physician to discuss appropriate medication therapy at first diagnosis and as necessary thereafter until symptoms have stabilized.

**Adjuvant Therapy**
- Administer annual influenza vaccine
- Administer pneumococcal vaccine

**Nonpharmacologic Interventions**
- Recommend that client avoid known precipitating factors such as environmental allergens and occupational irritants
Client Education

- Offer counseling for smoking cessation (if applicable) to client and family
- Recommend that client avoid NSAIDs and ASA products (if allergic)

**Table 2: Measures to minimize environmental factors contributing to asthma**

<table>
<thead>
<tr>
<th>Avoid respiratory irritants, particularly tobacco smoke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimize exposure to relevant allergens, particularly indoor allergens</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Household dust mites</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain relative humidity below 50%</td>
<td></td>
</tr>
<tr>
<td>Encase mattress, box spring and pillows in mite and mite allergen impermeable covers</td>
<td></td>
</tr>
<tr>
<td>Launder bed linens in hot (55°C) water</td>
<td></td>
</tr>
<tr>
<td>Remove carpeting, where possible</td>
<td></td>
</tr>
</tbody>
</table>

Note: air filters do not affect reservoir levels of household dust-mite allergen

<table>
<thead>
<tr>
<th>Pet allergens</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal of pet from the home is the most effective approach</td>
<td></td>
</tr>
<tr>
<td>Exclude pet from the bedroom</td>
<td></td>
</tr>
<tr>
<td>Use HEPA room air cleaner</td>
<td></td>
</tr>
<tr>
<td>Use mattress and pillow covers</td>
<td></td>
</tr>
<tr>
<td>Remove carpeting</td>
<td></td>
</tr>
<tr>
<td>Vacuum upholstered furniture with a HEPA-filtered vacuum frequently</td>
<td></td>
</tr>
<tr>
<td>Washing the pet may temporarily reduced allergen load, but this must not be done by the allergic person</td>
<td></td>
</tr>
</tbody>
</table>

(Boulet et al, 1999)

Pharmacologic interventions

Medications used to treat asthma are classified as controllers and relievers. Except in cases of emergency treatment all asthma medications will be prescribed by a physician.
Table 3: Asthma medication categories

<table>
<thead>
<tr>
<th>Relievers (for intermittent symptoms)</th>
<th>Controllers (for maintenance therapy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>short acting β₂-agonists</td>
<td>Anti-inflammatory medications</td>
</tr>
<tr>
<td>ipatroprium (rarely)</td>
<td>Steroidal - inhaled (and oral) glucocorticosteroids</td>
</tr>
<tr>
<td></td>
<td>Non-steroidal - leukotriene receptor antagonists</td>
</tr>
<tr>
<td></td>
<td>Anti-allergic agents – cromoglycate and nedocromil</td>
</tr>
<tr>
<td></td>
<td>Bronchodilators - long-acting inhaled β₂-agonists (salmeterol, formoterol B class drugs)</td>
</tr>
<tr>
<td></td>
<td>Theophylline</td>
</tr>
<tr>
<td></td>
<td>Ipatroprium</td>
</tr>
</tbody>
</table>

(Boulet et al, 1999)

Inhaled Corticosteroids

Inhaled corticosteroids are the best agents for bringing and keeping asthma under control, and their use may improve the overall prognosis for clients with this condition.

Initial recommended doses of inhaled corticosteroid for mild to moderate asthma:
- fluticasone (B class drug), 100-500 mcg bid
- budesonide (B class drug), 40 mcg bid

Once best results are achieved (i.e. symptoms are controlled), the dose of inhaled steroid is reduced to identify the minimum dose required to maintain control.

Inhaled steroids are safe for use during pregnancy and lactation, but the lowest dose possible to maintain control of asthma is recommended.

Short-Acting β₂-Agonists

Short-acting β₂-agonists are the drugs of choice to relieve asthma symptoms that break through maintenance therapy. They are most effective for preventing and treating exercise-induced bronchospasm. Their use should be limited to rescue medication and they should be used less than 3 times a week. 

salbutamol (C class drug), 100 mcg, 1 or 2 puffs q4h prn

Long-Acting β2-Agonists

The long-acting β₂-agonists (e.g. salmeterol, formoterol B class drug) can be used as an additional treatment for people whose asthma is not adequately controlled with optimum inhaled steroids, particularly when there are nocturnal symptoms. These drugs should never be used to rescue patients with significant symptoms of an acute asthma attack.

Leukotriene Receptor Antagonists (LTRA)

LTRAs have been developed recently as it has been recognized that leukotrienes play a significant role in the inflammatory pathophysiology of asthma. Their use at present, however, is limited to add-on therapy to inhaled glucocorticosteroids, until more is known about their long-term effects on disease modification. They should not be used as first line therapy.

Anticholinergics

The anticholinergic drugs (e.g. ipratropium bromide C class drug) act more gradually than β₂-agonists to offer modest bronchodilation in stable asthma patients. They are of greatest value in treating older patients and patients with a combination of asthma and COPD. During acute exacerbations they are used as an adjunct to optimal doses of short-acting β₂-agonists.

Monitoring and Follow-Up

- Follow up every 3-6 months once stabilized
- Assess adherence to the medication regimen
- Review inhaler technique periodically
- Watch for complicating conditions such as GERD, sinusitis, nasal polyps
- Carefully monitor clients taking more than 2000 mcg daily of inhaled steroids to watch for long-term effects on bone metabolism (osteoporosis)
- Review strategies to reduce environmental allergens if applicable
Referral

Referral to a specialist is recommended for adults when more than 1000 mcg daily of inhaled beclomethasone or its equivalent is required on an ongoing basis. Ideally, a physician should review the client at least annually if stable and more often if symptoms are not well controlled.

Consider referral for respiratory assessment (if available) for clients whose activities of daily living are significantly compromised by poorly controlled symptoms despite adequate therapy and adequate compliance with the treatment plan.
Acute Asthma Exacerbation

Exacerbations should be treated promptly to reverse the symptoms and prevent them from becoming severe. The findings depend on the acuteness and severity of the attack, which can range from mild to very severe.

Table 4: Signs, symptoms and management of mild, moderate and severe asthma attacks.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>History</td>
<td>• Exertional dyspnea</td>
<td>• Dyspnea at rest</td>
<td>• Acute respiratory distress</td>
</tr>
<tr>
<td></td>
<td>• No acute distress</td>
<td>• Congested cough</td>
<td>• Agitated, diaphoretic</td>
</tr>
<tr>
<td></td>
<td>• Cough</td>
<td>• Tightness of chest</td>
<td>• Difficulty speaking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Nocturnal symptoms</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• β2-agonists needed &gt; q4h</td>
<td></td>
</tr>
<tr>
<td>Physical findings</td>
<td>• RR normal or minimally elevated</td>
<td>• Appears short of breath</td>
<td>• Heart rate &gt; 110 bpm</td>
</tr>
<tr>
<td></td>
<td>• Heart rate &lt; 100 bpm</td>
<td>• RR elevated</td>
<td>• Marked use of accessory muscles of respiration</td>
</tr>
<tr>
<td></td>
<td>• Low-pitched wheezes, inspiratory, expiratory or both</td>
<td>• Heart rate &gt; 100 bpm</td>
<td>• Blood pressure elevated</td>
</tr>
<tr>
<td></td>
<td>• FEV₁ and PEFR &gt; 60% predicted or best</td>
<td>• Some use of accessory muscles of respiration</td>
<td>• Breath sounds decreased in intensity</td>
</tr>
<tr>
<td></td>
<td>• PEFR &gt; 300 L/min</td>
<td>• Audible wheeze</td>
<td>• Diffuse, high-pitched wheezes, inspiratory, expiratory or both</td>
</tr>
<tr>
<td></td>
<td>• Good response to short-acting β₂-agonists</td>
<td>• High-pitched wheezes in all lung fields, inspiratory, expiratory or both</td>
<td>• FEV₁ and PEFR: unable to perform test or &lt; 40% predicted or best</td>
</tr>
<tr>
<td>Management</td>
<td>Consult a physician if client is not already taking inhaled steroids</td>
<td>Consult a physician</td>
<td>Consult a physician as soon as possible</td>
</tr>
<tr>
<td>Adjuvant therapy</td>
<td>None</td>
<td>Oxygen to keep saturation ≥ 97%</td>
<td>• Oxygen to keep saturation ≥ 97%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Start IV therapy with normal saline, adjust rate to maintain hydration</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Aggressive fluid administration can help liquefy bronchial secretions unless otherwise contraindicated (e.g. pulmonary edema)</td>
</tr>
</tbody>
</table>
### Pharmacologic Interventions

- If client on inhaled steroids increase to 2-4 times usual dose.
- If has not been taking medications recently, restart usual dose.
- Bronchodilators prn for bronchospasm.

**salbutamol (C class drug)** by MDI 1-2 puffs q4h prn, to a maximum of 2-4 puffs q4h

**Salbutamol (C class drug) by MDI and Aerochamber, 100 mcg/puff, 4-8 puffs q15-20min, 3 times; then increase to 1 puff q30-60s (for 4-20 puffs) prn or salbutamol solution (C class drug) by nebulizer, 5.0 mg (1 mL in 3 mL normal saline) q15-20min, 3 times, continuous if necessary ± ipratropium bromide (C class drug) by MDI and Aerochamber, 20 mcg /puff, 4-8 puffs q15-20min, 3 times; then increase to 1 puff q30-60s (for 4-20 puffs) prn or ipratropium bromide (C class drug) by nebulizer, 0.25-0.50 mcg (1-2 mL in 3 mL normal saline) q15-20min, 3 times, continuous if necessary (may be mixed with salbutamol; decrease in recovery phase) ± prednisone (B class drug), 1 mg/kg (40-60 mg) PO od or bid for 5-7 days.

People with steroid-dependent asthma and those who are already receiving inhaled steroids should also receive oral steroid therapy.

**Salbutamol (C class drug) by nebulizer, 2.5-5.0 mg (0.5-1.0 mL in 3 mL normal saline) q15-20min, 3 times, continuous if necessary; + titrate to client response + ipratropium bromide (C class drug) by nebulizer, 0.25-0.50 mcg (1 mL in 3 mL normal saline) q15-20min, 3 times, continuous if necessary (may be mixed with salbutamol; decrease salbutamol during recovery phase) ± methylprednisolone sodium succinate (B class drug) IV.

---

### Monitoring and Follow-up

Advise follow-up in 24 hours if symptoms not controlled.

For exercise or cold-induced asthma:

**salbutamol (C class drug)** 1-2 puffs 15 minutes before exercising or going out in the cold air

- PEFR and FEV₁ should be checked frequently to evaluate response to bronchodilator therapy.
- Client may be discharged after initial emergency treatment if there is good response and there has been no attack within the previous 24 hours.

Assess response to medication by continuously monitoring oxygen saturation and by measuring PEFR and vital signs frequently.

Monitor heart rate for tachycardia.

### Referral

As needed

Medevac after treatment if FEV₁ is < 60% predicted value or there has been another attack within the previous 24 hours.

Medevac as soon as possible.
### Patients at risk of relapse

- Previous near death episode
- Recent emergency room visit for acute exacerbation
- Frequent admissions to hospital
- Dependent on steroids and recent use of oral steroids
- History of sudden attacks
- Allergic or anaphylactic triggers
- Recent attack of prolonged duration
- Poor understanding of illness and poor adherence to therapy
- No removal of environmental triggers

*MDI – metered dose inhaler  RR – respiratory rate*
**Chronic Obstructive Pulmonary Disease (COPD)**

**Definition**
A functional disorder of the lung characterized by progressive and incompletely reversible airflow obstruction and actual destruction of lung tissue. The clinical presentation depends on which of the following pathophysiologic processes are prominent:

- Inflammatory narrowing of the bronchioles
- Proteolytic digestion of the connective tissue framework of the lung, resulting in decreased parenchymal tethering of the airways
- Loss of alveolar surface area and capillary bed
- Lung hyperinflation caused by loss of elastic recoil
- Increased pulmonary vascular resistance caused by vasoconstriction and loss of capillary bed

Source: Guidelines for the Assessment and Management of Chronic Obstructive Pulmonary Disease (Canadian Thoracic Society Workshop Group 1992)

**Causes**
- Usually a combination of factors

**Risk Factors**
- Smoking
- Secondhand smoke
- Severe viral pneumonia early in life
- Aging
- Genetic predisposition
- Air pollution
- Occupational exposure to respiratory irritants

**Former Classification**
Most clients with COPD have a combination of chronic bronchitis and emphysema. However, one pattern is predominant: people with COPD either tend to have more cough and sputum production and less shortness of breath (chronic bronchitis) or tend to have more shortness of breath and less cough and sputum production (emphysema).

**Chronic Bronchitis**
Chronic productive cough that is present for at least 3 months each year, for 2 years in a row. Initially, cough and sputum are present only in the morning (especially in the winter). Eventually the symptoms are present throughout the day and throughout the year. There are frequent episodes of acute chest infections superimposed on the chronic condition.

**Emphysema**
Chronic shortness of breath, initially with exercise. Cough is only a minor problem and sputum production is limited. The shortness of breath gradually becomes worse until the person is short of breath even at rest.

**History**
- Client almost always a smoker
- 40 years of age or older
- Frequent chest infections
- Weight loss and fatigue (in the advanced stages)
- Shortness of breath
- Cough with sputum (clear, white, yellow-green)
- Wheeze

**Physical Findings**
Physical findings vary, depending on extent of disease and whether exacerbation is acute.

The upper respiratory tract (e.g. ears, nose and throat) (see chapter 2) and the cardiovascular system (see chapter 4) should be examined, and neuromental status should be determined (to check for hypoxia) (see chapter 8).

- Temperature may be elevated with superimposed infection
- Heart rate may be elevated
- Respiratory rate elevated, depth of respiration may be decreased
- Expiratory phase is prolonged
- Oxygen saturation may be reduced
- Client may appear thin or wasted
- Degree of respiratory distress varies
- May be using accessory muscles of respiration
- Cyanosis may occur
- Clubbing of fingers may be present
- Chest diameter is usually increased ("barrel chest")
- Breathing may be pursed-lipped
• If hypoxia is significant, confusion, irritability and diminished level of consciousness may result
• Tactile fremitus decreased
• Chest excursion decreased
• Hyperresonance
• Decreased diaphragmatic excursion (chronically hyperinflated lungs)
• Air entry reduced
• Breath sounds distant (if barrel chest is present)
• Scattered wheezes and crackles may be present
• Decreased FEV1 on peak flow testing

Client Education
• Early public education about the hazards of smoking can prevent COPD
• Counsel client about smoking cessation (if applicable)
• Recommend adequate hydration (8-10 glasses of fluid per day; there is no evidence that drinking more than this quantity is of any benefit)
• Increase humidity in the air (kettle, humidifier or pot of water on the stove)
• Recommend adequate nutrition: small, frequent meals high in protein and calories
• Recommend an exercise program (e.g. walking) to improve general fitness and sense of well-being
• Recommend a weight-loss program (if applicable)
• Discuss natural history, expected course and prognosis of disease
• Counsel client about appropriate use of medications (purpose, dose, frequency, side effects)
• Counsel client about proper use of inhaler
• Perform chest physiotherapy if increased sputum production (deep breathing and coughing, pursed-lip breathing, abdominal breathing and postural drainage)
• Teach client symptoms and signs of exacerbation and acute infection to encourage self-monitoring and early presentation when condition deteriorates
• Counsel client to avoid travel at high altitudes; when air travel cannot be avoided, the client should have access to oxygen (especially when traveling in an unpressurized aircraft)

Complications
• Acute bronchitis
• Pneumonia
• Pulmonary hypertension
• Cor pulmonale (right heart failure)
• Respiratory failure
• Polycythemia (abnormally high hemoglobin) due to hypoxemia

Diagnostic Tests
• If productive cough >3 weeks sputa for AFB and C&S.
• Arrange for baseline pulmonary function testing at some point and baseline CXR

Management
Goals of Treatment
• Reduce or eliminate dyspnea
• Reduce sputum production
• Maintain exercise tolerance
• Prevent progression of disease
• Reduce frequency of exacerbations
• Keep oxygen saturation > 90%

Appropriate Consultation
Consult a physician for previously undiagnosed clients, those whose symptoms are not controlled with their current therapy and those with an acute exacerbation.

Differential Diagnosis
• Bronchitis (acute)
• Bronchiectasis
• Asthma
• Bronchogenic carcinoma

Adjuvant Therapy
• Give yearly influenza vaccine
• Give pneumococcal vaccine
• Consider home oxygen therapy for clients with advanced disease (it can increase lifespan by 6 to 7 years [Canadian Thoracic Society Workshop Group 1992]).
**Pharmacologic Interventions**

Fig 2: Recommended Drug Treatment for Chronic COPD (Source: Therapeutic Choices. Gray 1998, 2003)

- **Salbutamol (D class drug)** by MDI and AeroChamber, 100 mcg, 1 or 2 puffs q4h prn
- **Improvement?**
  - yes: Continue therapy
  - suboptimal: Add ipratropium bromide (B class drug) by MDI with spacer, 40 mcg tid or qid
- **Improvement?**
  - yes: Continue therapy
  - suboptimal: Add a long-acting theophylline (B class drug)
- **Improvement?**
  - yes: Continue therapy
  - suboptimal: Add trial of oral corticosteroids (B class drug)
- **Improvement (> 20% in FEV)**
  - yes: Add inhaled steroid, reduce oral drugs to minimum possible
  - no: Discontinue corticosteroids
- Discontinue ipratropium
- Discontinue theophylline

**Monitoring and Follow-Up**

- For clients using oral theophylline medications, measure serum levels of drug every 3-6 months and teach client the symptoms and signs of toxic effects
- Follow-up every 6 months if stable
- Follow-up monthly if symptoms poorly controlled

**Referral**

The physician should assess the client at least annually if condition is stable, and as soon as feasible if symptoms are not controlled.
Acute COPD Exacerbation

Definition
Recent deterioration of the patient's clinical and functional state due to a worsening of his or her COPD.

History
• Worsening dyspnea, sometimes at rest
• Increased cough
• Increased sputum production, often with change in character from mucoid to purulent
• Development of or increase in wheezing
• Loss of energy
• Loss of appetite

Physical Findings
• Fever (superimposed infection)
• Anxiety level
• Increase in respiratory rate
• Tachycardia
• Increase in cyanosis
• Use of accessory muscles
• Peripheral edema
• Loss of alertness
• Worsening of airflow obstruction, as indicated by FEV1 or PEFR
• Worsening of oxygen saturation, as indicated by pulse oximetry

Evidence Of Severe Exacerbation
Loss of alertness or a combination of two of the other typical symptoms and signs of COPD exacerbation (see above) suggests severe exacerbation and a need for referral to the emergency department. These criteria are not intended to replace a healthcare provider's judgment about the need for referral.

Management
The decision as to whether to manage a client at home or to refer him or her for evaluation depends on many factors: the severity of the exacerbation; the severity of the underlying COPD; comorbid conditions; the medical sophistication, judgment and reliability of the client and caregivers; and the distance the client lives from the health center or clinic.

Exacerbations should be treated with appropriate supplemental oxygen, aggressive bronchodilator therapy, corticosteroids and antibiotics.

Appropriate Consultation
Consult a physician as soon as possible.

Adjuvant Therapy
• Oxygen 4-6 L/min or more prn; keep oxygen saturation at 90% to 92%
• Start IV therapy with normal saline; adjust IV rate according to state of hydration

Pharmacologic Interventions
The choice of medications and dosages (Fig. 3) depends on the current drug regimen and the client's compliance with it, as well as the severity of the exacerbation (particularly the degree of respiratory distress).

The maximal effective doses of short-acting β2-agonists (e.g. salbutamol) and long-acting β2-agonists (e.g. ipratropium bromide) in COPD exacerbation are unknown.

For severe exacerbation, the American Thoracic Society (1995) recommends 6-8 puffs every 2 hours.

Monitoring and Follow-Up
Monitor vital signs, oxygen saturation and PEFR frequently to assess response to bronchodilator therapy.

Referral
Medevac any client who shows moderate to severe signs of respiratory distress.
Fig 3: Recommended Drug Treatment for Acute Exacerbation of COPD

<table>
<thead>
<tr>
<th>Category</th>
<th>Drug</th>
<th>Dose/Route</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bronchodilators</strong></td>
<td><em>salbutamol (C class drug)</em></td>
<td>3 or 4 puffs q4h prn; may increase to 6-8 puffs q2h in severe exacerbation</td>
</tr>
<tr>
<td></td>
<td><em>ipratropium bromide (C class drug)</em></td>
<td>3 or 4 puffs q4h prn; may increase to 6-8 puffs q2h in severe exacerbation</td>
</tr>
<tr>
<td><strong>Anticholinergics</strong></td>
<td><em>prednisone (B class drug)</em></td>
<td>40-60mg PO od for 2 weeks</td>
</tr>
<tr>
<td></td>
<td><em>methylprednisolone (B class drug)</em></td>
<td>125mg IV q8h</td>
</tr>
<tr>
<td><strong>Oral steroids</strong></td>
<td><em>amoxicillin (C class drug)</em></td>
<td>500mg PO tid for 10 days</td>
</tr>
<tr>
<td></td>
<td><em>cotrimoxazole (C class drug)</em></td>
<td>800/160 mg, PO bid for 10 days</td>
</tr>
<tr>
<td></td>
<td><em>clarithromycin (B class drug)</em></td>
<td>500mg PO bid</td>
</tr>
<tr>
<td><strong>Oral antibiotics</strong></td>
<td><em>ampicillin (C class drug)</em></td>
<td>500-1000mg IV q6h</td>
</tr>
<tr>
<td></td>
<td><em>cefuroxime (B class drug)</em></td>
<td>750mg IV q8h</td>
</tr>
</tbody>
</table>

For clients with penicillin allergy use
*erythromycin (C class drug)* 500mg IV q6h

Sources: Guidelines for the Assessment and Management of Chronic Obstructive Pulmonary Disease (Canadian Thoracic Society Workshop Group 1992), Breathing to Live (Chapman and Tames 1991, 1994)
Acute Bronchitis

Definition
Inflammation of trachea and bronchi (larger airways).

Causes
- Acute bronchitis is almost exclusively viral in etiology
- Viral infection: influenza A or B, adenovirus, rhinovirus, parainfluenza
- Bacterial infection: *Hemophilus influenzae*, *Moraxella catarrhalis*, *Mycoplasma*, *Streptococcus pneumoniae*

Risk Factors
- Chronic sinusitis
- COPD
- Bronchiectasis
- Immunosuppression
- Smoking
- Secondhand smoke
- Air pollutants
- Alcoholism
- GERD

History
- Previous infection of upper respiratory tract
- General malaise
- Fever
- Cough; initially dry, later productive of white, yellow or green sputum
- Muscular aching in the chest wall or discomfort with coughing
- Wheezing may be present

Physical Findings
The presentation of acute bronchitis and pneumonia are often similar. In general, clients with pneumonia are sicker and usually have more chest abnormalities. The organisms that cause bronchitis can also cause pneumonia. The difference is in where the infection lies anatomically. Bronchitis involves the larger airways, whereas pneumonia involves the smaller airways and air sacs.

- Temperature may be mildly to moderately elevated

- Heart rate may be mildly elevated if febrile
- Respiratory rate may be slightly elevated
- Spasmodic cough
- Rhinitis may be present
- Expiratory phase may be slightly prolonged
- Wheezes (scattered, low pitched) may be present

Differential Diagnosis
- Influenza
- Acute sinusitis
- Pneumonia
- Acute exacerbation of chronic bronchitis
- Asthma
- Inhaled or aspirated chemical irritants
- TB or lung cancer (if recurrent)
- Pertussis
- Allergies

Complications
- Pneumonia
- Postbronchitis cough

Diagnostic Tests
Nasopharyngeal swab

Management
Goals of Treatment
- Relieve symptoms
- Prevent pneumonia

Appropriate Consultation
Consultation is usually not necessary if the person is otherwise healthy.

Nonpharmacologic Interventions
- Increased rest (especially if febrile)
- Adequate hydration (8-10 glasses of fluid per day)
- Increased humidity in the environment
- Avoidance of pulmonary irritants (e.g. stop or decrease smoking)

Client Education
Recommend hand washing to prevent spread of infection throughout a household.
Pharmacologic Interventions
For fever or pain:
acetaminophen (A class drug),
325 or 500 mg, 1 tab q4h prn
Clients who have been unwell for more than 5-7 days and have purulent sputum, or those with underlying health concerns (e.g. asthma) may require a course of antibiotics.

Use the following:
erthromycin (C class drug), 250 mg PO qid for 7 days
or
tetracycline (C class drug), 250 mg PO qid for 7 days
or
cotrimoxazole (C class drug), 800/160 mg PO bid for 7 days

If bronchospasm is significant, short-acting β2-agonist bronchodilators can be used until acute symptoms resolve:
salbutamol (C class drug), 1 or 2 puffs q4h prn

Monitoring and Follow-Up
Arrange for follow-up in 5-7 days if not resolving.

Referral
Usually not necessary.
Pneumonia

Definition
Infection of the distal airways, air sacs or both.

Causes
In the past, cases of pneumonia were divided into two categories, bacterial or atypical. In community-based practices, the following classification of community-acquired pneumonia is now commonly used.

- If the patient was previously well or is under 65 years of age (or both): Streptococcus pneumoniae (pneumococcal) and Mycoplasma are the most common causes in younger healthy adults; also, less frequently, Chlamydia pneumoniae and Hemophilus influenzae, mycobacterium tuberculosis
- If the patient has comorbid illness or is 65 years of age or older (or both): Hemophilus influenzae, Klebsiella pneumoniae, Legionella pneumophila, Moraxella catarrhalis, Mycobacterium tuberculosis, Staphylococcus aureus and, less commonly, Streptococcus pneumoniae
- Viral pneumonia uncommon except in outbreaks of influenza A and respiratory syncytial virus or as a complication of atypical measles
- Cytomegalovirus and herpes simplex viruses are treatable causes of pneumonia in immunocompromised patients
- Pneumocystis carinii pneumonia may occur in immunocompromised patients, especially those with HIV or AIDS
- Aspiration of oral pharyngeal secretions, gastric contents or chemicals may predispose a patient to bacterial pneumonia. Those at risk for this problem include alcoholic people, elderly people, those who have difficulty swallowing, those with motility or neuromuscular disorders, and stroke victims
- No cause is identified in approximately one-third to one-half of all cases

History
There is considerable overlap in the symptoms of the various types of pneumonias.

- Fever, chills
- Cough
- Sputum may be yellow, green, blood-tinged
- Chest pain: sharp, localized pleuritic chest pain is seen in acute lobar type only
- Shortness of breath may be present

In elderly or chronically ill clients, the symptoms may not be as acute or as obvious. These clients may present with only confusion or a deterioration of pre-existing medical problems.

As a general rule, pneumonia caused by Mycoplasma, Chlamydia, viruses and P. carinii have a slower, more insidious onset. The client may not appear as acutely ill and may have a lower fever, dry cough and scanty sputum production.

Physical Findings

- Temperature elevated
- Heart rate elevated
- Respiratory rate increased
- Oxygen saturation decreased
- May or may not appear acutely ill
- Flushed, diaphoretic if fever is high
- May "splint" the affected side if there is pleuritic pain
- Variable level of respiratory distress
- Dullness on percussion if there is consolidation
- Air entry may be decreased
- Inspiratory crackles
- Wheezes may be present
- Bronchial breathing
- Pleural rub may be present (rarely)

In elderly clients, the clinical presentation of the various types of pneumonias is often atypical or obscured. Overt respiratory signs may be absent. They may present with changes in level of consciousness, confusion, functional impairment such as loss of energy, a decrease in appetite or vomiting. These clients are at increased risk of death from bacterial pneumococcal disease.

Differential Diagnosis

- TB
- COPD
- Acute bronchitis
- Underlying lung cancer
• Aspiration pneumonia
• Lung abscess
• Atelectasis

Complications
• Decompensation of other medical problems
• Respiratory failure from hypoxia
• Sepsis (bacteremia)
• Metastatic infection such as meningitis, endocarditis, pericarditis, empyema
• Cardiac failure

Diagnostic Tests
• Chest x-ray (postero-anterior and lateral) always
• Sputum for AFB if history of cough >3 weeks or history of previous TB infection
• Sputum for C&S if cough is productive

Management
Goals of Treatment
• Relieve symptoms
• Improve or prevent respiratory distress
• Prevent complications

Appropriate Consultation
Consult a physician for any client with severe symptoms (e.g. appears acutely ill or has hemoptysis, significant respiratory distress or a significant comorbid condition such as diabetes mellitus, heart disease, renal disease or cancer) or for any client who has not responded to initial oral treatment and whose condition is worsening.

Nonpharmacologic Interventions
• Increased bed rest
• Adequate fluid intake (8-10 glasses of fluid per day)
• Increased humidity in the air (kettle, humidifier or pot of water on the stove)

Client Education
• Explain diagnosis and expected course of illness
• Counsel client about appropriate use of medications (dose, frequency, side effects)

Pharmacologic Interventions
Client < 65 years of age with no comorbid conditions and mild-to-moderate pneumonia

For fever, pain and muscle ache:
acetaminophen (A class drug), 325 or 500 mg, 1-2 tabs PO q4-6h prn

Antibiotics:
erthyromycin (C class drug), 500 mg PO bid or 250 mg qid for 10 days
or
clarithromycin (B class drug), 500 mg PO qid for 10 days

Client ≥ 65 years of age with comorbid illness and mild-to-moderate pneumonia
cotrimoxazole (C class drug), 800/160 mg PO bid for 10 days
or
amoxicillin/clavulanate (B class drug) if there is contraindication to sulpha

Monitoring and Follow-Up
Arrange follow-up within 24-48 hours for reassessment if shortness of breath develops and again after the course of antibiotics is completed.

Referral
Usually not necessary for patients with mild to moderate symptoms unless their condition is worsening, complications occur or they have significant comorbid conditions.

Management Of Severe Pneumonia
Appropriate Consultation
Consult a physician for any client with severe symptoms (e.g. appears acutely ill or has hemoptysis, significant respiratory distress or a significant comorbid condition such as diabetes mellitus, heart disease, renal disease or cancer) or for any client who has not responded to initial oral treatment and whose condition is worsening.

Adjuvant Therapy
• Oxygen to keep saturation > 97%
• Start IV therapy with normal saline; adjust the rate to maintain hydration

Pharmacologic Interventions
IV antibiotics of choice:
cefuroxime (B class drug), 750 mg q8h
or
clarithromycin (B class drug) 500 mg bid
**Monitoring and Follow-Up**
Monitor oxygen saturation (with pulse oximeter if available) and vital signs closely.

**Referral**
Medevac to hospital.
Emergencies Of The Respiratory System

Pneumothorax

Definition
Pneumothorax is partial or complete collapse of a lung because of the presence of air in the pleural space. There are 2 categories: spontaneous and traumatic.

There are 3 mechanisms: closed, open and tension. Closed pneumothorax: Air from the lung itself leaks into the pleural space through a tear in the lung tissue (e.g. when a fractured rib end tears the lung), causing the lung to collapse.

Open pneumothorax (a sucking chest wound): Air from the outside enters the pleural space through a hole in the chest wall (such as a knife wound), causing the lung to collapse.

Tension pneumothorax: This is a special form of closed pneumothorax, and it is life threatening. Air is trapped under pressure in the pleural space. It collapses the lung, then pushes on the heart and the opposite lung. If the pressure is not quickly released, the client will become hypotensive and die.

Causes
• Perforation of the visceral pleura and entry of air from the lung
• Penetration of the chest wall, diaphragm, mediastinum or esophagus
• Idiopathic (cause unknown, a spontaneous occurrence)

Risk Factors
• COPD (rupture of an emphysematous bulla or bleb)
• TB
• Cystic fibrosis
• Asthma
• Lung neoplasm
• Flying
• Diving
• Spontaneous vigorous exercise
• Smoking

• Penetrating chest trauma (e.g. knife or gunshot wound)
• Blunt chest trauma (e.g. rib fracture)

History
• Recent trauma
• Known COPD
• Young, tall, healthy, thin, male, 20-40 years of age (idiopathic)
• Smoking
• Sudden onset of one-sided chest or shoulder pain
• Shortness of breath
• Symptoms may develop more slowly if the collapse is gradual and the person is able to partially compensate.

Physical Findings
Physical findings vary, depending on the extent of the lung tissue that has collapsed and the mechanism of the pneumothorax.

• Heart rate elevated
• Respiratory rate elevated
• Blood pressure variable: normal to hypotensive
• Mild to severe respiratory distress, oxygen saturation decreased
• Movement of air may be felt over an open chest wound
• Hyperresonance (hollow) over the pneumothorax
• Breath sound decreased or absent over the pneumothorax
• Cyanosis (late feature of hypoxia)
• Decreasing level of consciousness with progression
• Loss of radial pulse on affected side

Late sign: The trachea deviates toward the side of an open or a closed pneumothorax, but away from the side of a tension pneumothorax; the mediastinum (apex of the heart) shifts in the same direction as the trachea.

Reference: BTLS
**Differential Diagnosis**
- Pleurisy
- Pericarditis
- Pulmonary embolism
- Myocardial infarction
- Dissecting aneurysm

**Diagnostic Tests**
- Chest x-ray

**Management**

**Goals of Treatment**
- Relieve pressure in the pleural space (tension pneumothorax)
- Improve oxygenation
- Re-expand the collapsed lung

**Appropriate Consultation**
Consult a physician as soon as possible.

**Adjuvant Therapy**
- Oxygen to keep saturation > 97%
- Ventilatory assistance as needed with Ambu bag or mask
- Start IV therapy with normal saline to keep the vein open; if there has been trauma, start 2 IVs. Volume replacement. *(See "Shock" in chapter 14, "General Emergencies and Major Trauma.")*

**Nonpharmacologic Interventions**

**Tension Pneumothorax**
This condition is life threatening. The pressure build-up must be released immediately by needle decompression of the affected side.

- Locate the puncture site. The second or third intercostal space in the midclavicular line on the same side as the pneumothorax is recommended as the site of approach. An alternate site is the fourth intercostal space midaxillary line.
- Prepare the area with an antiseptic such as povidone-iodine (Betadine)
- Make a one-way valve by inserting a 13- or 14-gauge angiocatheter through a condom
- Insert the catheter into the skin over the third rib and direct it over the top of the rib into the interspace (if using the alternate site go over the top of the fifth rib)
- Can use a Fisherman’s Chest Seal® over the decompression needle, which provides an ongoing valve.

**Open Pneumothorax**
- Cover the hole in the chest with loose sterile gauze taped on three sides
- If a foreign body (e.g. a knife) is protruding from the chest wall, do not remove it; stabilize it and leave it in place

**Monitoring and Follow-Up**
- Place client on bed rest
- Monitor ABC (airway, breathing, circulation) and lung sounds frequently

**Referral**
Medevac as soon as possible in a pressurized aircraft.
**Acute Foreign-Body Obstruction Of An Airway**

**Definition**
Complete or partial blockage of the airway with a foreign body.

**Causes**
Aspiration (due to eating too quickly, eating and talking at the same time, neurological disorders, motility disorders of the esophagus, esophageal stricture).

**History And Physical Findings**

**Partial Airway Obstruction**
- Clear history of sudden aspiration
- Symptoms of respiratory distress
- Air entry variable, ranging from adequate to poor
- With poor air entry, client has limited ability to breathe, talk and cough; cough is weak and ineffective; severe respiratory distress is present
- With adequate air entry the client can cough forcefully, talk and breathe; frequently there is wheezing between coughs; severe respiratory distress is not present.

**Complete Airway Obstruction**
- Client unable to speak or breathe
- Severe respiratory distress
- The hands are usually put around the throat in a classic choking signal
- Loss of consciousness will occur if the obstruction is not quickly relieved
- The victim may be unconscious
- Cyanosis

**Differential Diagnosis**
- Anaphylaxis with laryngeal edema (acute allergy)
- Airway trauma
- Acute asthmatic attack
- Any condition that can cause sudden respiratory failure (e.g. stroke, epilepsy, myocardial infarction, drug overdose)

**Complications**
- Retention of fragment of foreign material
- Fracture of ribs or internal injury as a result of abdominal thrusts
- Decompensation of pre-existing medical conditions
- Death

**Management**

**Goals of Treatment**
- Dislodge and remove the foreign body
- Improve oxygenation

**Nonpharmacologic Interventions**
- Perform abdominal thrusts to dislodge foreign body (Basic CPR guidelines)
- Do not use abdominal thrusts when the person is able to cough forcefully, breathe and speak (which indicates partial obstruction with adequate air entry); allow the person to clear his or her own airway with spontaneous coughing and breathing

**Adjuvant Therapy**
- Assist ventilation as necessary with Ambu bag or mask once the obstruction has been removed
- Administer oxygen as necessary once the obstruction has been removed
- Start IV therapy with normal saline to keep vein open if client shows evidence of continuing respiratory distress

**Monitoring and Follow-Up**
Monitor the client for development of respiratory distress (which may indicate retention of fragment of the foreign body).

**Appropriate Consultation**
Consult a physician if the client shows evidence of continuing respiratory distress (which may indicate retention of fragment of the foreign body).

**Referral**
Medevac as required for further investigation and management of continuing respiratory distress.
Pulmonary Embolism

Definition
Sudden obstruction of pulmonary circulation.

Causes
• Blood clot embolizing from deep pelvic or leg veins
• Fat embolus (related to fractured femur or pelvis),
• Air embolus

Risk Factors
• Prolonged bed rest
• Advanced age
• Obesity
• Lower limb trauma
• Oral contraceptives
• Recent surgery
• Stroke
• Pregnancy
• Congestive heart failure
• Malignant disease

History
Symptoms vary greatly in severity. Pulmonary embolus may present as three different syndromes.

Acute cor pulmonale (right-sided heart failure) is due to massive embolus obstructing 60% to 75% of the pulmonary circulation.

Pulmonary infarction occurs in patients with massive embolism and complete obstruction of a distal branch of the pulmonary circulation.

Acute unexplained shortness of breath occurs in patients who do not have cor pulmonale or infarction.

• Sudden onset of shortness of breath (may be the only symptom)
• Pleuritic chest pain with infarction
• Cough (rare)
• Hemoptyisis may be present in infarction
• Syncope (faintness) may be present in cor pulmonale
• Leg pain (infrequent)
• Anxiety

Older clients may present with increasing shortness of breath, confusion and restlessness (which indicate hypoxia).

Physical Findings
The physical findings, like the history, are variable. The results of the examination can be deceptively normal or obviously abnormal. Consider pulmonary embolism in any person with unexplained dyspnea.

• Heart rate elevated
• Respiratory rate elevated
• Blood pressure normal, elevated or low (corpulmonale)
• Mild-to-severe respiratory distress, oxygen saturation decreased
• Anxiety
• Sweating, pallor and cyanosis may be present
• Distension of neck veins with cor pulmonale
• Swelling, redness of calf infrequently present
• Calf tenderness may be present
• Peripheral pitting edema may be present
• Dullness to percussion may be present (with infarction and if associated with pleural effusion)
• Air entry may be reduced in affected area
• Crackles and wheezes may be present (with infarction)
• S3 (gallop rhythm) may be present with corpulmonale
• Loud second heart sound may be present where not expected

Differential Diagnosis
• Acute congestive heart failure
• Myocardial infarction
• Pneumonia
• Viral pleuritis
• Pericarditis

Complications
• Pulmonary infarction
• Cor pulmonale (right heart failure)
• Left heart failure with pulmonary edema
• Recurrent emboli
• Death
Diagnostic Tests
• Electrocardiography; results are often normal, except for tachycardia, but can help rule out myocardial ischemia
• Chest X-ray

Management
Goals of Treatment
• Prevent death
• Prevent recurrent embolization

Appropriate Consultation
Consult a physician as soon as possible.

Adjuvant Therapy
• Oxygen to keep saturation > 97%
• Start IV therapy with normal saline; adjust rate according to state of hydration

• If hypotension is present, resuscitate with appropriate fluid volumes (see "Shock" in chapter 14, "General Emergencies and Major Trauma")

Nonpharmacologic Interventions
Bed rest.

Monitoring and Follow-Up
• Monitor ABC and vital signs frequently if abnormal
• Assess lung sounds periodically for signs of cardiac failure

Referral
Medevac as soon as possible.
If the client has evidence of pulmonary edema, refer to "Pulmonary Edema" in chapter 4, "Cardiovascular System."
Inhalation Of Toxic Materials

Definition
Inhalation of gases, fumes or particulate matter.

Causes
- Household or industrial fires
- Leaky vehicle muffler
- Suicide attempt
- Chemical exposure in the work place
- Agents: toxic gases, toxic byproducts from the burning of plastics

History
- Exposure to any of the agents listed above
- Cough and sputum (which may be black)
- Shortness of breath
- Sore throat, hoarseness
- Altered consciousness or confusion before admission

Physical Findings
- Heart rate elevated
- Respiratory rate increased
- Blood pressure may be elevated
- Oxygen saturation with pulse oximeter is not accurate for carbon monoxide poisoning
- Level of consciousness variable
- Degree of respiratory distress variable
- Facial burns, singed eyebrows and nasal hair
- Soot around or in the nose
- Mucosal irritation or thermal injury of the mouth with erythema and carbon deposits (soot)
- Other cutaneous burns
- Irritation of the mucous membranes (eyes)
- Air entry may be reduced
- Stridor or wheeze may be heard
- A flushed face and rosy red cheeks are characteristic of carbon monoxide poisoning

Differential Diagnosis
- Drug overdose
- Alcohol intoxication
- Asthma
- Bronchitis
- Acid reflux

Complications
- Bronchospasm
- Pulmonary edema
- Acute laryngeal edema
- Obstruction of the upper airway
- Deterioration of pre-existing heart or lung disease
- Death

Diagnostic Tests
- Chest x-ray
- Baseline blood work (CBC, liver enzymes)
- NB: time and date on requisitions

Management
Goals of Treatment
- Improve oxygenation
- Identify associated injuries to underlying lung

Appropriate Consultation
Consult a physician.

Adjuvant Therapy
- Oxygen 10-12 L/min or more by mask
- Higher-flow oxygen is needed for carbon monoxide poisoning -- consult physician
- Start IV therapy with normal saline; adjust the rate according to the state of hydration

Pharmacologic Interventions
Bronchospasm is treated with inhaled salbutamol (See sections on management of asthma, above, this chapter, for details.)

Monitoring and Follow-Up
Monitor ABC and lung sounds closely.

Referral
Medevac as soon as possible, if indicated
Chapter 4 - Cardiovascular System

Assessment Of The Cardiovascular System

History Of Present Illness And Review Of System
Examination Of The Cardiovascular System
Differential Diagnosis Of Cardinal Cardiovascular Symptoms

Common Problems Of The Cardiovascular System
Dyslipidemia (Hyperlipidemia)
Angina Pectoris
Congestive Heart Failure
Deep Vein Thrombosis
Hypertension
Dysrhythmias
Atrial Fibrillation
Acute Pericarditis
Arterial Peripheral Vascular Disease
Venous Insufficiency (Chronic)
Aortic Aneurysm (Pulsatile Abdominal Mass)

Emergencies Of The Cardiovascular System
Myocardial Infarction
Pulmonary Edema
Acute Arterial Occlusion Of A Major Peripheral Artery
Assessment Of The Cardiovascular System

History Of Present Illness And Review Of System

General
The following characteristics of each symptom should be elicited and explored:
- Onset (sudden or gradual)
- Chronology
- Current situation (improving or deteriorating)
- Location
- Radiation
- Timing (frequency, duration)
- Quality
- Severity
- Precipitating and aggravating factors
- Relieving factors
- Associated symptoms
- Effects on daily activities
- Previous diagnosis or history of similar episodes
- Efficacy of previous treatments

Cardinal Symptoms
In addition to the general characteristics outlined above, additional characteristics of specific symptoms should be elicited, as follows.

Chest Pain
- Associated symptoms (e.g. faintness, shortness of breath)
- Relation to effort, exercise, meals, bending over

Shortness of Breath
- Relation to exercise (level ground, uphill, stairs)
- Relation to posture
- Orthopnea (number of pillows used for sleeping)
- Paroxysmal nocturnal dyspnea
- Associated swelling of ankles or recent weight gain

Fainting or Syncope
- Weakness, lightheadedness, loss of consciousness
- Associated symptoms (e.g. pain, palpitations, shortness of breath, lightheadedness, nausea, sweating)
- Relation to postural changes, vertigo or neurologic symptoms

Palpitations
- Description: fast or slow, irregular or regular
- Relation to exercise

Sputum
- Colour (white/pink)
- Consistency (e.g. frothy)

Cyanosis
- Observation of blue colour of the lips or fingers (under what circumstances, when first noted, recent change in this characteristic)

Extremities
- Site of edema (e.g. in dependent body parts)
- Relation of edema to activity or time of day
- Intermittent claudication (exercise-induced leg pain)
- Distance client can walk before onset of pain related to claudication
- Time needed to rest to relieve claudication
- Temperature of affected tissue (warm, cool or cold)
- Tingling
- Leg cramps or pain at rest
- Presence of varicose veins

Other Associated Symptoms
- Sweating
- Nausea
- Vomiting

Medical History (Specific To Cardiovascular System)
- Age
- Increased cholesterol level
- Hypertension
- Coronary artery disease (angina)
- Myocardial infarction
• Cardiac murmurs
• Rheumatic fever
• Valvular heart disease
• Diabetes mellitus
• Thyroid disease
• Chronic renal disease
• Chronic obstructive pulmonary disease (COPD)
• Systemic lupus erythematosus
• Recent viral illness (e.g. viral cardiomyopathy)

Family History (Specific To Cardiovascular System)
• Diabetes mellitus
• Hypertension
• Coronary artery disease (ischemic)
• Heart disease

• Myocardial infarction (especially in family members < 50 years of age)
• Sudden death from cardiac disease
• Hypercholesterolemia
• Hypertrophic cardiomyopathy
• Rheumatic fever

Personal And Social History (Specific To Cardiovascular System)
• Smoking
• Exposure to secondhand smoke
• Obesity
• High stress levels (personal or occupational)
• Chronic abuse of cocaine, amphetamines, anabolic steroids
• Alcohol abuse
• Diet - caffeine intake
Examination Of The Cardiovascular System

An examination of the cardiovascular system involves more than just examining the heart. The examination generally covers two systems: the central cardiovascular system (head, neck and precordium [anterior chest]) and the peripheral vascular system (extremities). Examination of the cardiovascular system must also include a full assessment of the lungs and neuromental status (for signs of confusion, irritability or stupor).

Vital Signs
- Temperature
- Pulse
- Respiratory rate
- Oxygen saturation
- Blood pressure (lying and standing, in both arms)

Head And Neck
- Central cyanosis
- Colour of conjunctiva
- Jugular venous pressure
- Carotid bruits

Inspection Of Precordium (Anterior Chest)
- Look for visible pulsations of the chest wall

Palpation
- Location of apical beat (point of maximum impulse [PMI])
- Quality and intensity of apical beat (normal, diffuse, weak, forceful)
- Heave (abnormally forceful PMI)
- Thrill (a palpable murmur that feels like a purr)
- Identify and assess pulsations and thrill in aortic, pulmonic, mitral and tricuspid areas, along left and right sternal borders, in epigastrium and along left anterior axillary line

Auscultation
- Listen to normal heart sounds before trying to identify murmurs
- Use diaphragm of stethoscope first, then bell of stethoscope, when listening to the heart
- Listen at apex, in aortic and pulmonic areas, and along left sternal border

Heart Sounds
- Determine rate and rhythm
- Determine if there is an underlying rhythm or if rhythm is completely irregular
- Identify and describe intensity of first and second heart sounds
- Identify extra sounds (S3, S4, splitting of second sound, rubs)

Murmurs
- Timing (in relation to the cardiac cycle)
- Quality
- Intensity (loudness)
- Location where murmurs sound loudest
- Radiation
- Pitch

Bruit
- Carotid
- Abdominal
- Iliac
- Femoral

Extremities

Hands
- Colour of skin, nail beds
- Nicotine stains
- Clubbing of fingers
- Temperature
- Equality of pulses (brachial, radial)
- Synchrony of radial and femoral pulses
- Capillary refill time

Legs
- Colour (pigmentation, discoloration), distribution of hair
- Temperature, texture
- Capillary refill time
- Changes in foot colour with changes in leg position (e.g. blanching with elevation, rubor with dependency)
- Ulcers, varicose veins, edema (check sacrum if client is bedridden)
- Presence and equality of pulses (femoral, popliteal, posterior tibial, dorsalis pedis)
**Other Assessments**
For a client whose condition is not of an urgent nature, assess the following:
- Evidence of hypertensive or diabetic retinopathies (funduscopic exam)
- Colour, temperature, rashes, lesions, xanthoma of skin
- Abdominal bruits, enlargement of liver, tenderness in right upper quadrant of abdomen
## Differential Diagnosis Of Cardinal Cardiovascular Symptoms

### Chest Pain

Table 1: Differential Diagnosis of Chest Pain

<table>
<thead>
<tr>
<th>Characteristic of chest pain</th>
<th>Myocardial infarction or acute coronary insufficiency</th>
<th>Angina</th>
<th>Unstable Angina</th>
<th>Pneumonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset</td>
<td>Sudden, patient at rest</td>
<td>With exertion</td>
<td>New onset, or changing pattern</td>
<td>Gradual or sudden</td>
</tr>
<tr>
<td>Location</td>
<td>Retrosternal, anterior chest</td>
<td>Retrosternal, anterior chest</td>
<td></td>
<td>Anterior, lateral and/or posterior lung field(s)</td>
</tr>
<tr>
<td>Radiation</td>
<td>Left arm, left shoulder, neck, jaw, back, upper abdomen</td>
<td>Left arm, left shoulder, neck, jaw, back, upper abdomen</td>
<td></td>
<td>Anterior chest, shoulder, neck</td>
</tr>
<tr>
<td>Duration</td>
<td>&gt;20min</td>
<td>Usually 1-2 min</td>
<td>Increasing</td>
<td>Hours</td>
</tr>
<tr>
<td>Intensity</td>
<td>Severe</td>
<td>Mild to moderate</td>
<td>Increasing</td>
<td>Moderate</td>
</tr>
<tr>
<td>Quality</td>
<td>Sensation of squeezing, pressure</td>
<td>Sensation of tightness, pressure</td>
<td></td>
<td>Constant ache, with intermittent knife-like pain</td>
</tr>
<tr>
<td>Relief</td>
<td>None</td>
<td>Rapid relief with rest and/or sublingual nitroglycerin</td>
<td>Not relieved by rest or sublingual nitroglycerin</td>
<td>None</td>
</tr>
<tr>
<td>Precipitating or aggravating factors</td>
<td>None may be obvious</td>
<td>Exertion, heavy meal, walking uphill against a cold wind</td>
<td></td>
<td>Increased pain with coughing or deep inspiration; recently ill with a cold</td>
</tr>
<tr>
<td>Associated signs and symptoms</td>
<td>Nausea, sweating, shortness of breath, anxiety, palpitations</td>
<td>Typically none</td>
<td></td>
<td>Fever, cough, sputum, shortness of breath</td>
</tr>
<tr>
<td>Characteristic of Chest Pain</td>
<td>Pulmonary embolism*</td>
<td>Pericarditis</td>
<td>Musculoskeletal disorder</td>
<td>Esophageal, gastric or duodenal disorder</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------</td>
<td>--------------</td>
<td>--------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Onset</td>
<td>Sudden</td>
<td>Gradual or sudden</td>
<td>Gradual or sudden</td>
<td>Gradual or sudden</td>
</tr>
<tr>
<td>Location</td>
<td>Retrosternal, anterior chest, lateral chest</td>
<td>Retrosternal, anterior chest</td>
<td>Anterior, lateral and/or posterior chest wall</td>
<td>Retrosternal, epigastric, left chest, left or right upper quadrant</td>
</tr>
<tr>
<td>Radiation</td>
<td>Variable</td>
<td>Variable; shoulder tip, neck</td>
<td>Arm, shoulder, neck, back, abdomen</td>
<td>May be felt in back or arm</td>
</tr>
<tr>
<td>Duration</td>
<td>Variable</td>
<td>Hours to days</td>
<td>Minutes or hours</td>
<td>Minutes or hours</td>
</tr>
<tr>
<td>Intensity</td>
<td>Absent or mild to moderate</td>
<td>Usually moderate, but may be severe</td>
<td>Mild to moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Quality</td>
<td>Dull ache; knife-like pain may also be present</td>
<td>Sharp</td>
<td>Dull ache; sharp pain may also be present</td>
<td>Burning (usually), tightness</td>
</tr>
<tr>
<td>Relief</td>
<td>None</td>
<td>Sitting up and leaning forward often helps; other position may alter the pain</td>
<td>Rest, mild analgesics</td>
<td>Antacids, milk, sitting up or standing up</td>
</tr>
<tr>
<td>Precipitating or aggravating factors</td>
<td>Immobilization; none may be obvious; pain may be worse with deep inspiration or coughing</td>
<td>Previous infection of upper respiratory tract; pain worse with deep inspiration or coughing</td>
<td>History of unaccustomed physical work; pain worse with arm action</td>
<td>Certain foods, a large meal, bending over; pain may awaken person from sleep and may occur when stomach is empty</td>
</tr>
<tr>
<td>Associated signs and symptoms</td>
<td>Shortness of breath, sweating, hemoptysis, leg pain (rare)</td>
<td>Symptoms of infection of upper respiratory tract may be present; malaise; usually occurs in younger adults</td>
<td>Localized chest-wall tenderness, tender costochondral area</td>
<td>Regurgitation of acid in mouth, belching, difficulty swallowing, sticking sensation when food swallowed, cough (rare); test of stool for occult blood may be positive</td>
</tr>
</tbody>
</table>

*Chest pain may be absent in pulmonary embolism*
Dyspnea

Cardiac Causes
• Congestive heart failure (right, left or biventricular)
• Coronary artery disease
• Myocardial infarction (recent or past history)
• Cardiomyopathy
• Valvular dysfunction
• Left ventricular hypertrophy
• Asymmetric septal hypertrophy
• Pericarditis
• Arrhythmias

Pulmonary Causes
• COPD
• Asthma
• Restrictive lung disorders
• Hereditary lung disorders
• Pneumothorax

Mixed Cardiac and Pulmonary Causes
• COPD with pulmonary hypertension and cor pulmonale
• Deconditioning
• Chronic pulmonary emboli
• Trauma

Noncardiac or Nonpulmonary Causes
• Metabolic conditions (e.g. acidosis)
• Pain
• Neuromuscular disorders
• Otorhinolaryngeal disorders

Functional Causes
• Anxiety
• Panic disorders
• Hyperventilation
• Exertion

Faintness And Syncope
Faintness is characterized by transient symptoms of lack of strength associated with an impending sense of loss of consciousness. Syncope is characterized by transient symptoms of generalized weakness associated with loss of consciousness and loss of muscle tone. Symptoms are due to a temporary impairment of cerebral function and are usually precipitated by a reduction in cerebral perfusion.

Vascular Causes
• Vasovagal hypotension (common faint)
• Postural hypotension
• Cerebrovascular disease (transient ischemic attack, stroke, vertebral-basilar insufficiency, carotid insufficiency)

Neurological Causes
• Seizure
• Head trauma

Cardiac Causes
• Abnormally slow heart rate and rhythm
• Abnormally rapid heart rate and rhythm
• Reduced cardiac output
• Acute blood loss (gastrointestinal hemorrhage)
• Valvular heart disease (aortic or pulmonic stenosis)
• Pulmonary hypertension

Other Causes
• Hyperventilation (syncope rare, faintness common)
• Hypoxia

Palpitations
Primary Arrhythmic Causes
• Sinus tachycardia or arrhythmia
• Premature supraventricular or ventricular ectopic contractions
• Bradycardia-tachycardia syndrome ("sick sinus syndrome")
• Supraventricular tachycardia
• Multifocal atrial tachycardia
• Atrial fibrillation, flutter or tachycardia
• Atrioventricular nodal re-entrant tachycardia
• Atrioventricular reciprocating tachycardia (Wolff-Parkinson-White syndrome)
• Accelerated junctional rhythm
• Ventricular tachycardia
• Bradycardia due to advanced atrioventricular block or sinus node dysfunction
Extracardiac Causes
- Changes in contractility, heart rate or stroke volume
- Fever
- Hypovolemia
- Anemia
- Hypoglycemia
- Pulmonary disease
- Pheochromocytoma
- Thyrotoxicosis
- Vasovagal episodes

Drug-Related Causes
- Vasodilators
- Substance abuse (e.g. cocaine, alcohol, tobacco, caffeine)
- Digoxin
- Phenothiazine
- Theophylline

Psychiatric Causes
- Panic attack
- Hyperventilation

Other Cardiac Causes
- Changes in contractility or stroke volume
- Valvular disease such as aortic insufficiency or stenosis
- Atrial or ventricular septal defect
- Congestive heart failure
- Cardiomyopathy
- Congenital heart disease
- Pericarditis
- Pacemaker-mediated tachycardia
- Pacemaker syndrome

Leg Edema
Table 2: Differential Diagnosis of Leg Edema

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Disease or syndrome</th>
<th>Usual clinical features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased capillary pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obstruction of inferior vena cava</td>
<td>Thrombosis, malignancy</td>
<td>Bilateral, severe (may be mild if partial obstruction)</td>
</tr>
<tr>
<td>Deep venous obstruction in leg</td>
<td>Thrombosis, extrinsic compression</td>
<td>Unilateral, mild</td>
</tr>
<tr>
<td>Reduced venous channels or venous valve</td>
<td>Coronary bypass grafting, stroke, varicosities</td>
<td>Unilateral or bilateral, mild</td>
</tr>
<tr>
<td>incompetence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right atrial hypertension</td>
<td>Left ventricular dysfunction</td>
<td>Bilateral</td>
</tr>
<tr>
<td></td>
<td>Pulmonary disease</td>
<td>Bilateral</td>
</tr>
<tr>
<td></td>
<td>Valve disease</td>
<td>Bilateral</td>
</tr>
<tr>
<td></td>
<td>Renal dysfunction</td>
<td>Bilateral, mild</td>
</tr>
<tr>
<td>Reduced lymphatic clearance</td>
<td>Lymphadenopathy, filariasis</td>
<td>Unilateral or bilateral</td>
</tr>
<tr>
<td>(lymphatic obstruction)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreased capillary oncotic pressure</td>
<td>Severe malnutrition; liver, renal, gastrointestinal disease</td>
<td>Bilateral, mild or severe, generalized, poor prognosis</td>
</tr>
<tr>
<td>(hypoalbuminemia)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased capillary permeability</td>
<td>Calcium-channel blockers</td>
<td>Bilateral, mild</td>
</tr>
<tr>
<td></td>
<td>Idiopathic cyclic edema</td>
<td>Bilateral, mild, premenstrual female</td>
</tr>
</tbody>
</table>
Common Problems Of The Cardiovascular System

Dyslipidemia (Hyperlipidemia)

Definition
Cholesterol has three clinically significant components: high-density lipoprotein (HDL), low-density lipoprotein (LDL) and very-low-density lipoprotein (VLDL). Elevation in serum lipoproteins are a major risk factor for coronary artery disease.

The two main lipids in blood are cholesterol and triglyceride. Triglyceride is found in VLDL particles, but its role in atherosclerosis is not clear. A high level of triglycerides (> 11.0 mmol/L) carries a risk for pancreatitis.

Dyslipidemia is one of the primary causes of atherosclerotic plaque. Up to 75% of patients with coronary artery disease have dyslipidemia. Normalization of lipid values will both lower the rate of symptomatic coronary artery disease and improve overall survival. Dyslipidemia is strongly associated with recurrence of symptomatic coronary artery disease.

Causes
Primary Hyperlipidemia
Primary (genetic) single-gene disorders are transmitted by simple dominant or recessive mechanism.

Secondary Hyperlipidemia
Secondary hyperlipidemia occurs as part of a constellation of abnormalities in certain metabolic pathways.
• Hypothyroidism
• Pregnancy
• Excess weight
• Excess alcohol intake
• Obstructive liver disease
• Nephrotic syndrome
• Medications (e.g. thiazide diuretics, some β-blockers, oral contraceptives, corticosteroids)

History
• Ask about risk factors and possible causes of secondary hyperlipidemia.

• Previously identified hypercholesterolemia (total cholesterol > 6.2 mmol/L)
• Previously identified low levels of HDL cholesterol (< 0.9 mmol/L)
• Smoking
• Hypertension: blood pressure of 140/90 mm Hg confirmed on repeated determinations or while client is taking antihypertension medication
• Antecedent cardiovascular disease or family history of premature myocardial infarction (in people < 55 years of age)
• Endocrine disease (diabetes mellitus or secondary causes, including hypothyroidism, renal disease or medications)
• Men > 45 years of age are at greater risk
• Postmenopausal women (> 55 years of age) and younger women with artificial menopause and no hormonal replacement are at greater risk

Physical Findings
• Blood pressure may be elevated if hypertensive
• Arcus corneae (significant in a younger person)
• Retinopathies (seen on funduscopy)
• Xanthomas (lipid deposits)
• Arterial bruits may develop if atherosclerosis is present
• Peripheral pulses may be diminished if atherosclerosis is present
• Obesity

Complications
• Cardiac disease or atherosclerosis (e.g. angina, myocardial infarction)
• Pancreatitis (hypertriglyceridemia)

Diagnostic Tests
Guidelines for Lipid Testing
Screening for dyslipidemia by means of a fasting lipid profile (total cholesterol, HDL cholesterol, triglycerides and LDL cholesterol) is suggested for the following groups.

Patients with atherosclerotic vascular disease:
Every 1-3 years, as clinically indicated, up to age 75
Patients with xanthomas or a family history of atherosclerotic vascular disease:
One-time measurement when young. If previous test results are normal, repeat at age 30 and resume testing every 5 years from age 40 for men and age 50 for women

Patients with diabetes mellitus:
Every 1-3 years, as clinically indicated

Men 40-70 years of age, women 50-70 years of age, even those with no other risk factors:
Every 5 years
Lipid test results should be interpreted in light of other risk factors for coronary artery disease.

Management
Goals of Treatment
• Decrease cardiovascular disease by modifying serum cholesterol
• Prevent pancreatitis from severe hypertriglyceridemia

Primary prevention is aimed at identifying dyslipidemia before complications occur
Target: LDL cholesterol < 4.1 mmol/L if client has < 2 cardiovascular risk factors
Target: LDL cholesterol < 3.4 mmol/L if client has ≥ 2 cardiovascular risk factors

Secondary prevention is directed at reducing the impact of dyslipidemia for people with previous cardiovascular disease. These targets are aimed specifically at high-risk patients and are more stringent than those recommended for the general population.
Target: LDL cholesterol < 2.6 mmol/L

Nonpharmacologic Interventions
• Dietary modification aimed at lowering lipid levels should always be the first approach to treating dyslipidemias (a 6-month dietary trial is mandatory before medications are prescribed)
• During dietary modification, repeat lipid measurements 2 or 3 times
• Weight reduction
• Smoking cessation
• Increased physical activity

Optimal Control of Other Diseases Related to the Development of Heart Disease
• For hypertension, target blood pressure: systolic < 140 mm Hg, diastolic < 90 mm Hg
• For diabetes mellitus, aim for optimal, realistic blood glucose level
• Diet and lifestyle modification
• Appropriate pharmacologic agents

Pharmacologic Interventions
• Refer to physician
• Fibrates (e.g. gemfibrozil)
• HMGCoA reductase inhibitors ("statins," e.g. lovastatin, simvastatin, pravastatin)
• Bile acid sequestrants (e.g. cholestyramine)
• Nicotinic acid (niacin)

Combinations of several drugs can be used, and it is safe to use resins in all combinations. However, combinations of statins with fibrates or niacin should be used with caution because of an increased frequency of more severe muscle and liver complications.

Monitoring and Follow-Up
Follow-up is important; check the response to treatment within 6 weeks (safety blood tests should be carried out early) and, if the results are satisfactory, continue follow-up at regular intervals thereafter (every 3-12 months).

Monitor liver function, cytokinase, complete blood count and creatinine 3, 6 and 12 months after initiation of lipid-lowering drugs and annually thereafter.
Frequency of testing to monitor treatment of dyslipidemia:

Patients on diet therapy only:
Initiation: Every 3-6 months to 1 year
Maintenance: Every 6-12 months

Patients on diet and drug therapy:
Initiation of drug therapy: Every 6-8 weeks to 6 months, depending on severity
Maintenance: Every 3 months in the first year, every 6-12 months thereafter

Referral
Refer all clients diagnosed with hyperlipidemia to a physician for evaluation and to determine whether lipid-lowering medications are needed.
Angina Pectoris

Definition
Heart disease that occurs as a result of inadequate oxygen and blood supply to the myocardium.

Types

Stable Angina
Predictable pattern of exertional pressure sensation in the anterior chest relieved by rest or nitroglycerin. No change in frequency, severity or duration of angina episodes during the preceding 6 weeks.

Unstable Angina
Angina that is of new onset, or is changing, so that it is occurring with increasing severity, frequency or duration or is occurring at rest.

Myocardial Infarction
For details of this type of angina, refer to "Emergencies of the Cardiovascular System," below, this chapter.

Causes
Angina pectoris is the result of myocardial ischemia, which occurs when the cardiac workload and myocardial oxygen demands exceed the ability of the coronary arteries to supply oxygenated blood. It is the main clinical expression of coronary artery disease (subintimal deposition of atheromas in the large and medium-sized arteries serving the heart).

Risk Factors
• Hypertension
• Hyperlipidemia
• Diabetes mellitus
• Cigarette smoking
• Family history of premature coronary artery disease (e.g. father died of coronary artery disease before reaching 60 years of age)
• Use of oral contraceptives
• Sedentary lifestyle
• Obesity (particularly with a truncal distribution)

History

Stable Angina
Chest pain described as tightness, pressure or aching that is typically located in the substernal area, radiating down one or both arms for 5 minutes or less, precipitated by exercise or emotional stress and relieved by rest or nitroglycerin.

Unstable Angina
More severe anginal pain that lasts more than 30 minutes or that occurs during rest and is not relieved by rest or sublingual nitroglycerin.

Associated Symptoms
• Dyspnea
• Nausea or vomiting
• Sweating
• Weakness
• Palpitations

Physical Findings
• Diaphoresis
• Apprehension
• Oxygen saturation (may be normal or abnormal in myocardial infarction)
• Blood pressure (may be elevated or reduced in myocardial infarction)
• Tachycardia
• S4 gallop

These findings are transient in stable angina and disappear when the pain resolves. People with stable angina are usually seen in a clinic after an attack because of the mild, short, episodic nature of the discomfort. After an episode there are usually no significant physical findings.

Differential Diagnosis
• Chest-wall pain
• Other musculoskeletal discomfort
• Peptic ulcer disease
• Gastroesophageal reflux
• Esophageal spasm
• Indigestion
• Anxiety attack
• Pulmonary emboli
• Pericarditis
• Aortic dissection
• Pneumothorax (spontaneous)
Complications
• Unstable angina
• Future myocardial infarction

Diagnostic Tests
• Electrocardiogram (ECG) changes (depression of ST segment, inversion of T wave)
• Compare current ECG tracing with previous one, if available; look for signs of ischemia (depression of ST segment, inversion of T wave, new changes)
• Obtain complete blood count, and determine blood glucose, creatinine and cholesterol levels

Management Of Stable Angina
Goals of Treatment
• Decrease or prevent recurrence of pain
• Identify and manage risk factors
• Improve exercise tolerance
• Prevent complications

Appropriate Consultation
Consult a physician as soon as possible for help with diagnosis and treatment options.

Client Education
• Ensure that client understands disease process
• Encourage client to make lifestyle changes (e.g. dietary modifications to reduce fat and cholesterol)
• Encourage client to reduce weight, stop smoking, avoid strenuous exercise but increase moderate exercise (e.g. walking)

Pharmacologic Interventions
For prophylaxis against thrombus formation: enteric-coated acetylsalicylic acid (ASA) (A class drug), 325 mg od, if not contraindicated and client is not already using

For acute episodes of angina:
nitroglycerin (C class drug), 0.3- to 0.6-mg SL tabs or lingual spray (0.4 mg) prn

For long-term prophylaxis: according to physician order.

Monitoring and Follow-Up
• Follow up every 6 months once client's symptoms are stable
• Monitor symptoms and identify any changes, especially increases
• Monitor weight and smoking
• Monitor blood pressure and pulse
• Obtain regular blood work as directed
• Monitor adherence and response to long-term lifestyle modifications and medications (e.g. β-blockers)

Referral
Refer all previously undiagnosed clients and any clients whose symptoms are not controlled on current therapy to a physician for a thorough evaluation. Once the condition has been stabilized, the client should be assessed by a physician at least annually.

Management Of Unstable Angina
For anyone who has pain on presentation at the clinic, anyone with a history of angina of recent onset or anginal symptoms at rest, and anyone with known heart disease and an increase or change in anginal pattern and ECG changes.

Appropriate Consultation
Consult a physician as soon possible.

Adjuvant Therapy
• Oxygen to keep saturation > 97%
• Start IV therapy with normal saline to keep vein open

Nonpharmacologic Interventions
Bed rest for clients experiencing pain on presentation.

Pharmacologic Interventions
nitroglycerin (C class drug), 0.3-mg SL tab stat; repeat dose twice, q5min

If the client is hypotensive or has bradycardia on presentation, do not give nitroglycerin without first consulting a physician. If pain is not relieved, treat as myocardial infarction (see "Myocardial Infarction," this chapter).
**Monitoring and Follow-Up**
Continue to closely monitor pain, vital signs (including oxygen saturation), heart and lung sounds, and ECG results.

**Referral**
Medevac as soon as possible.

Coronary artery bypass surgery or angioplasty may be indicated for any client who continues to have significant symptoms despite maximal medical therapy.
**Congestive Heart Failure**

**Definition**
A clinical syndrome caused by an accumulation of fluid peripherally (right ventricular failure) or in the lungs (left ventricular failure), or both, from inadequate functioning of the heart. Congestive heart failure is a complication of an underlying disease process.

Systolic heart failure (the more common form) is due to impaired systolic pumping action of the heart. Diastolic heart failure occurs when the systolic function is normal but the filling of the heart is impaired.

**Causes (Precipitating Factors In Acute Heart Failure)**

*Increased Myocardial Demand*
- Stress (physical, environmental or emotional)
- Infection or fever
- Anemia
- Hyperthyroidism
- Hypertension
- Pregnancy
- Renal disease

*Compliance and Lifestyle*
- Inadequate or improper medication intake (i.e. NSAIDs)
- Dietary indiscretion (e.g. excess consumption of salt or water)
- Heavy alcohol consumption

*Decreased Pump Function of the Ventricles*
- Negative inotropic medications: β-blockers, calcium-channel blockers, antiarrhythmics, chemotherapeutic agents
- Arrhythmias
- Ischemia or infarction
- Pulmonary embolism
- Radiation treatment

**History**
- Shortness of breath (initially induced by exercise)
- Later progression to orthopnea, paroxysmal nocturnal dyspnea and dyspnea at rest
- Chronic, nonproductive cough, worse at night or when lying down
- Ankle edema
- Recent weight gain
- Nocturia
- Chronic fatigue
- Palpitations
- Symptoms of intercurrent illness (e.g. pneumonia)
- Anxiety may aggravate condition
- Alterations of mental status in elderly clients may be present as chronic heart failure progresses
- Increased number of pillows to sleep (orthopnea)

**Physical Findings**
There is a broad range in severity of findings.
- Heart rate elevated
- Respiratory rate increased
- Blood pressure may be normal, elevated or low
- Weight increased (reflecting fluid retention)
- Minimal to extreme distress when client lies down
- Jugular venous distension may be present
- Jugular venous pressure elevated (> 3 cm)
- Edema may be present (pedal, ankle or tibial; sacral if bedridden)
- Hepatomegaly
- Hepatojugular reflux
- Ascites (rare)
- Lung bases may be dull (pleural effusion) bilaterally, but only rarely
- Fine crackles in the bases of lungs
- S3, S4 or gallop rhythm may be present; murmurs may be present if there is associated valvular dysfunction

**Differential Diagnosis**
- See "Causes," above.
- Acute bronchitis in COPD or asthma
- Other causes of edema (renal disease, liver disease, local venous stasis, lymphedema)
- Pulmonary embolism
Complications
• Arrhythmias
• Hepatomegaly (ascites)
• Acute pulmonary edema
• Hypokalemia from use of diuretics
• Angina
• Decreased renal function, decreased renal clearance of drugs (digoxin toxicity)
• Pulmonary embolism
• Side effects of medication

Diagnostic Tests
• Perform ECG and compare with any previous tracings
• Look for signs of ischemia (depression of ST segment, inversion of T wave), atrial fibrillation, bradycardia

Do the following diagnostic tests only if the person is not ill enough to require hospitalization:
• Complete blood count
• Blood glucose level
• Thyroid function
• Liver function
• Ferritin level
• Creatinine level
• Electrolyte levels
• Digoxin level (if applicable) and if not determined recently (within past 3 months)
• Chest x-ray (for cardiomegaly, pulmonary edema, pleural effusions), if available

Management Of Chronic Heart Failure
Goals of Treatment
• Control symptoms
• Identify and manage underlying cause
• Limit factors that precipitate or aggravate condition
• Prevent progression
• Improve quality of life and survival

Because there is a broad range of severity, assessment of severity will help guide management. Definitive and precise medical management depends on whether the failure is due to systolic or diastolic dysfunction and the underlying or precipitating cause (e.g. atrial fibrillation).

Appropriate Consultation
Consult a physician as soon as possible.

Client Education
• Ensure client understands disease process and outcome (progressive, can be controlled but not cured)
• Recommend dietary modifications: reduce sodium, increase dietary potassium (if renal function has been adequate in the past), reduce fat and cholesterol
• Recommend limited fluid intake to 1.2-2.0 L/day
• Recommend restriction of alcohol use
• Recommend weight loss, if applicable
• Recommend that client monitor weight at home, and see the nurse if he or she gains more than 1.5 kg (3 lb) in a day
• Recommend rest after meals
• Encourage client to start an exercise program (walking) to improve exercise tolerance
• Stress the importance of long-term follow-up (every 3-6 months when stable)
• Counsel client about appropriate use of medications (dose, frequency, compliance, side effects)
• Teach clients taking digoxin, or family member, to monitor pulse

Adjuvant Therapy
• Pneumococcal vaccine
• Influenza vaccine annually

Pharmacologic Interventions
Four classes of drugs are currently recommended to manage congestive heart failure: angiotensin-converting enzyme (ACE) inhibitors, diuretics, cardiac glycosides, and nitrates or direct vasodilators, prescribed by physician.

Nitrates
A long-acting nitroglycerin preparation to reduce the workload of the heart is often recommended to reduce symptoms and improve exercise tolerance in clients who cannot tolerate ACE inhibitors or who remain symptomatic despite maximal therapy.
with ACE inhibitors, diuretics and digoxin or if there is myocardial ischemia (i.e. systolic blood pressure > 100 mm Hg).

**Vasodilators**
Vasodilators such as hydralazine may also be used in combination with nitrates in clients with refractory symptoms despite use of ACE inhibitors, diuretics and digoxin or those who cannot tolerate ACE inhibitors.

**β-Blockers**
β-Blockers such as metoprolol can be used in clients with chronic congestive heart failure to preserve or improve ventricular function. They can be used to control symptoms of ischemia in clients with congestive heart failure and angina.

β-Blockers should be avoided in clients with low cardiac output and should be used only with extreme caution in clients with obstructive lung disease (e.g. asthma).

**Calcium-Channel Blockers**
Calcium-channel blockers may be used in clients with diastolic congestive heart failure to control arterial blood pressure and to help induce regression of myocardial hypertrophy. They are also useful in client with hypertrophic cardiomyopathy.

Calcium-channel blockers are generally contraindicated in systolic heart failure and in clients who have had myocardial infarction with left ventricular dysfunction.

**Antiarrhythmic Drugs**
Antiarrhythmic drugs are generally used for symptomatic clients with sustained ventricular arrhythmias or to help maintain sinus rhythm in atrial fibrillation.

**Anticoagulation**
Anticoagulation is strongly recommended for all clients with heart failure and associated atrial fibrillation.

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**Long-Term Monitoring and Follow-Up**
- Review cardiac and respiratory systems for symptoms
- Weigh client and chart weight every visit (client weight chart)
- Review current medications for use, dosage, frequency, compliance, side effects, drugs with sodium-retaining effects (e.g. NSAIDs)
- Instruct client to return to clinic if symptoms worsen or chest pain develops
- Laboratory tests every 3-6 months: complete blood count, creatinine level, electrolyte levels, uric acid level (if taking a thiazide diuretic), urinalysis for proteinuria, digoxin level

**Referral**
Refer client to a physician for a thorough evaluation and tailoring of drug therapy regimen.

**Management Of Acute Decompensated Heart Failure**

**Appropriate Consultation**
Consult a physician as soon as possible.

**Adjuvant Therapy**
- Oxygen to keep saturation > 97%
- Start IV therapy with normal saline to keep vein open

**Nonpharmacologic Interventions**
Bed rest with head elevated.

**Pharmacologic Interventions**
Diuretics: *furosemide (D class drug), 40-80 mg IV*

The dose may have to be higher in a person who is already taking this drug on a maintenance basis for congestive heart failure; one guideline is to double the client's usual maintenance dose. Adjust the diuretic dose according to client's response. Look for improvement in respiratory status.

Nitrates (long-acting) to reduce the workload of the heart: *topical nitroglycerin (B class drug), 1.25-2.5 cm q6-8h, provided systolic blood pressure > 100 mm Hg*
Monitoring and Follow-Up

• Monitor vital signs, pulse oximetry
• Airway, breathing and circulation (ABC)
• Level of consciousness
• Listen to heart and lung sounds

• Record intake and urinary output
• Monitor response to therapy

Referral

Medevac as soon as possible.
Deep Vein Thrombosis

Definition
Acute formation of a blood clot or thrombus within a vein resulting in obstruction of venous return.

Causes
Unknown, but the triad of venous stasis, injury to vessel intima and altered blood coagulability are central to the process.

Risk Factors
• Prolonged bed rest/decreased activity for any reason
• Paralysis
• Malignant disease
• Childbirth
• Pregnancy
• Use of oral contraceptives
• Leg trauma
• Major surgery
• Infection after orthopedic surgery
• Acute myocardial infarction
• Stroke
• Old age (related to decreased activity)

History
• Symptoms may be subtle, variable or vague
• Usually occurs in leg or deep pelvic veins (popliteal, femoral, iliac)
• Presence of one or more risk factors (see above)
• Recent leg injury
• Leg pain may be mild or absent
• Pain described as a dull ache or tightness, rarely severe
• Leg discomfort worse when walking
• Swelling of lower leg
• Fever

Symptoms may be absent or minimal until shortness of breath and other pulmonary complaints appear because of embolism to the lungs. The risk of pulmonary emboli is low when only the calf veins are involved but increases to 40% when the thigh veins are involved.

Physical Findings
• Variable; depend on size and location of clot and severity of venous obstruction
• Heart rate may be elevated
• Minimal to moderate distress
• Difficulty walking
• Minimal to marked swelling of lower leg
• Redness of affected calf or leg may be present
• Superficial leg veins may be distended
• Mild to moderate calf tenderness: flexion of the ankle may increase pain
• Localized warmth may be present
• Peripheral pulses (compare sides for symmetry)

Differential Diagnosis
• Calf-muscle strain
• Trauma with hematoma
• Cellulitis
• Ruptured Baker's cyst (popliteal cyst)

Complications
• Pulmonary embolism
• Chronic venous insufficiency

Diagnostic Tests
None.

Management
Goals of Treatment
• Early detection
• Prevent complications

Appropriate Consultation
Consult a physician immediately if you have any suspicion of this disorder.

Nonpharmacologic Interventions for Acute Symptoms
• Bed rest
• Elevation of leg above level of the heart
• Anti-embolic stockings
• Monitor vital signs closely
Nonpharmacologic Interventions over the Long Term

Client Education
- Counsel client about appropriate use of medications (dose, frequency, side effects)
- Recommend use of anti-embolic stockings
- Recommend avoidance of restrictive clothing around knees (e.g. socks, garters)
- Ensure bedridden clients are turned and repositioned frequently (q2h)
- Recommend active or passive leg exercises while in bed

Pharmacologic Interventions
Heparin therapy may be instituted on advice of physician before transfer.

Monitoring and Follow-Up

Acute Symptoms
Observe client for shortness of breath or unexplained tachycardia (signs of pulmonary embolism).

Long Term
- Follow up every 3-6 months when stable
- Review prevention strategies, medication use, side effects

Referral
Medevac the acutely symptomatic client as soon as possible.
Hypertension

Definition
Persistently elevated blood pressure from increased peripheral arterial resistance related to salt or water retention or endogenous pressure activity.

Causes
Cause of essential hypertension (which accounts for 90% of cases of hypertension) is unknown.

Risk Factors for Primary (Essential) Hypertension
- Heredity
- Obesity
- High salt intake
- Smoking
- High alcohol consumption
- Chronic stress
- Age
- Hyperlipidemia

Risk Factors for Secondary Hypertension (10% of Cases)
- Renal disease
- Polycystic kidneys
- Renal vascular disease
- Estrogen use
- Pregnancy
- Hyperthyroidism (Cushing's syndrome)
- Primary hyperaldosteronism
- Pheochromocytoma
- Coarctation of aorta
- Use of oral contraceptives
- Chronic alcohol abuse

History
- Presence of one of the risk factors (see above)
- Client usually > 35 years of age
- Condition usually discovered on routine screening of blood pressure; the Canadian Task Force on Preventive Health Care (1994) suggests screening everyone between 21 and 64 years of age at every office visit (B recommendation; i.e., good evidence to include in the periodic health examination)
  www.ctfphc.org (last accessed August 2003)

- Usually asymptomatic
- Headache on rising in the morning gradually subsiding during the day (rare)
- Fatigue
- Transient ischemic attack
- Nausea or vomiting
- Altered level of consciousness
- Palpitations
- Angina
- Symptoms of cardiac failure
- Epistaxis

Physical Findings

Diastolic Blood Pressure Readings
- High-normal diastolic pressure (85-89 mm Hg)
- Mild diastolic hypertension (90-99 mm Hg)
- Moderate diastolic hypertension (100-109 mm Hg)
- Severe diastolic hypertension (110-119 mm Hg)
- Very severe hypertension (> 120 mm Hg)

Systolic Blood Pressure Readings
- Normal systolic pressure (< 140 mm Hg)
- Mild systolic hypertension (140-159 mm Hg), if diastolic readings are within normal range
- Moderate systolic hypertension (160-179 mm Hg)
- Severe systolic hypertension (180-209 mm Hg)
- Very severe hypertension (> 210 mm Hg)
- Isolated systolic hypertension (> 160 mm Hg), if diastolic readings are within normal range

Other Findings
- Ocular funduscopic exam may reveal retinal changes
- Enlarged heart (left ventricular hypertrophy)
- Bruits (carotid, abdominal aortic, renal and femoral)

Differential Diagnosis
- Essential hypertension
- Secondary hypertension
General Clues to Secondary Hypertension

- Severity of high blood pressure: severe hypertension is more likely secondary to a specific underlying cause
- Speed of onset: if hypertension develops rapidly, it should be considered secondary until proven otherwise
- Age at onset: rapid onset in people younger than 25 years or older than 55 years should suggest secondary hypertension
- The presence of hypertension in an individual in whom an abdominal bruit is heard suggests stenosis of the renal arteries

Complications

- Congestive heart failure
- Angina
- Stroke or transient ischemic attacks
- Hypertensive crisis
- Kidney disease
- Retinal disease
- Peripheral disease
- Complications related to therapy (e.g. thiazide diuretics increase risk of gout, poor response)

Diagnostic Tests

- Urinalysis (routine and for microalbuminuria in diabetic clients)
- Complete blood count
- Blood glucose, cholesterol and triglyceride levels (while fasting)
- Creatinine and electrolyte levels
- Baseline ECG and chest x-ray if > 50 years of age

Management

Goals of Treatment

- Decrease morbidity and mortality associated with high blood pressure
- Control symptoms with an effective, well-tolerated treatment regimen

Appropriate Consultation

Consult a physician if there is a need to treat hypertension with medications.

Nonpharmacologic Interventions

Lifestyle modifications are first-line therapy for mild elevation of blood pressure.

Client Education

- Ensure that client understands disease process and prognosis
- Encourage client to lose weight if appropriate
- Recommend dietary modifications (e.g. reduce salt to < 150 mmol/day, reduce cholesterol, and reduce intake of stimulant substances and caffeine)
- Recommend smoking cessation (refer for treatment)
- Recommend restriction of alcohol consumption
- Recommend regular exercise
- Counsel client about appropriate use of medications (dose, frequency, side effects and importance of compliance)
- Ask client to return to clinic if any unusual symptoms occur or there is a change in status

Pharmacologic Interventions in Moderate to Severe Hypertension

Anti-hypertensive medications should be started. The physician will determine the therapy of choice (which depends on the person's age and the presence of other medical problems) and will include drugs from the classes described below.

β-Blockers

A β-blocker is the drug of first choice to lower blood pressure in patients with angina pectoris. Although evidence is lacking, it also seems reasonable to use a β-blocker as the drug of first choice in clients for whom the drug can be used to treat more than hypertension, e.g. those with frequent recurrent migraine, sympathetic hyperactivity, resting tachycardia or palpitations.

β-Blockers should not be used in clients with asthma or other forms of obstructive airways disease.

ACE Inhibitors

ACE inhibitors have been clearly shown to prolong survival in patients with congestive heart failure. Watch for patients with non-productive cough. They are therefore the obvious first choice for patients with hypertension and congestive heart
failure. It has not yet been established whether ACE inhibitors have a unique renal protective effect in diabetic nephropathy. A recent study suggests that ACE inhibitors increase the risk of hypoglycemia in treated diabetic patients. There are no proven therapeutic differences among ACE inhibitors.

**Calcium-Channel Blockers**

**Monitoring and Follow-Up**
Follow up three or four times yearly if hypertension is well controlled or more frequently if client's condition warrants. Encourage self-monitoring and recording of blood pressure.

**Routine Follow-up Assessment Related to Hypertension**
Determine history related to the following:
- Headaches
- Dizziness
- Angina
- Congestive heart failure/non-productive cough
- Transient ischemic attack
- Stroke
- Nausea and vomiting
- Vision changes
- Medication compliance
- Drug side effects

The physical examination should include the following:
- Blood pressure (supine and standing)
- Neck examination (carotid artery for bruits, JVP [jugular venous pressure] for congestive heart failure)
- Cardiovascular examination
- Respiratory examination
- ECG (annually)
- Chest X-ray (annually)
- Ophthalmologic exam
- Blood work q3-6months: complete blood count, blood glucose level, creatinine level, electrolyte levels, uric acid level (if client is taking thiazide diuretics)
- Urinalysis (for protein)

**Referral**
Arrange follow-up with physician at least yearly if the client's hypertension is stable or as soon as possible if poorly controlled.

Repeat physician consultation is necessary for chronically hypertensive clients if any of the following situations apply:
- Client not responding to therapy
- Target organ damage caused by poorly controlled blood pressure
- Symptoms and signs of complications
Dysrhythmias

Definition
Abnormal heart rhythm. The most common types are as follows:

Sinus arrhythmia
A cyclic increase in heart rate associated with inspiration and decrease in heart rate with expiration. No clinical significance and is common in the elderly and children. (Current Medical Diagnosis and Treatment, 38th edition, 1999, p389)

Sinus Bradycardia
Heart rate < 60 bpm; impulse originates in SA node, but is slowed through the AV node. Usually bradycardia is an accidental finding and can be normal for the young or for athletes. Severe bradycardia can be an indication of sinus node pathology, such as sick sinus syndrome or heart block, wherein the SA node does not generate or transmit a signal to the atria (Livingston, M., 2001, eMedecine Journal, 2:7)

Sinus Tachycardia
Heart rate >100-160 bpm; is caused by rapid impulse formation from the SA node (Current Medical Diagnosis and Treatment, 38th edition, 1999, p389)

Narrow QRS Complex Tachycardias:
Paroxysmal Supraventricular Tachycardia (PSVT)
The most commonly occurring paroxysmal tachycardia. Episodes may last from seconds to hours. Rate is usually 160-220 bpm and are regular even with exercise and position changes.

Supraventricular Tachycardia (SVT)
Accessory pathways between atria and ventricles allow an avoidance of the delay at the AV node, thus predisposing the heart to re-entry tachycardia. The QRS is usually narrow and the P wave occurs after the QRS (the PR interval is greater than the RP interval) (1999, The Merck Manual, Sec. 16, p205)

Atrial Fibrillation (A.Fib)
This is the commonest arrhythmia. There are three classifications of A.Fib.
1. Paroxysmal - which is self-terminating
2. Persistent - which can be converted to sinus rhythm
3. Chronic

Atrial Fib. is the only common arrhythmia in which the ventricular rate is rapid and the rhythm is highly irregular. The atrial rate can be > 350 bpm, most are not conducted through the AV node. The ventricular rate can be normal or > 150 bpm and there is usually a difference between the radial rate and the apical rate (Rosenthal, R., 2002. Atrial Fibrillation, eMedecine Journal, 3:1)

Atrial Flutter
This is less common than A.Fib and is most often associated with COPD. Atrial rates can be as high as 250-300 bpm with transmission of every second impulse through the AV node, which gives a ventricular rate of about 150 bpm. Ventricular rate is usually regular and the P waves have a distinct saw-tooth appearance, especially in leads II, III and AVF. (Ganz, L., Ahluwalia, M., 2002, eMedecine Journal, 3:1)

Wide QRS Complex Tachycardias:
Premature Ventricular Contractions
These beats have a wide QRS complex, are not usually preceded by a P wave, usually there is a pause before the next normal beat. Bigeminy and trigeminy are rhythms in which every second or third beat is a PVC. Usually benign in patients without heart disease.

Ventricular Tachycardia (VT)
Three or more consecutive ventricular premature beats. The rate is > 100 bpm (usually 150-200) and is moderately regular. The complexes are wide and there is AV dissociation. There are also fusion beats. It is either sustained - lasting > 30 seconds, or unsustainable - lasting < 30 seconds. VT may be asymptomatic or can be associated with syncope, dizziness, diaphoresis or nausea. VT can quickly deteriorate into ventricular fibrillation. (Ernoehazy, W. Jnr., 2001, eMedecine Journal, 2:12)
**Torsades de Pointes**
This is a variant of VT. The complexes are wide and bizarre and look like the axis is changing (QRS from positive to negative and back). Usually associated with drugs or conditions that increase the QT interval. (Ernoeazhy, W. Jnr., 2001, eMedicine Journal, 2:12)

**Ventricular fibrillation (VF)**
VF is a pulseless arrhythmia that is irregular and chaotic. The heart can no longer pump blood around the body. VF is the primary cause of sudden cardiac death. VF is most commonly seen following an MI. VF can be coarse or fine. The heart rate is irregular, usually > 300 bpm, and a waveform that resembles a squiggle that fades to a flat line. (Kazzi, A., 2001 eMedicine Journal, 2:8)

**Pulseless Electrical Activity (PEA)**
A clinical condition "characterized by loss of palpable pulse (or ventricular contraction) in the presence of recordable cardiac electrical activity." ECG recording may show myocardial infarction, signs of hyperkalemia, prolonged QT interval related to tricyclic drug overdose. PEA is caused by an inability to generate a strong contraction in spite of adequate electrical impulse. "PEA is always caused by a profound global cardiac insult." (Verma, S., Marks, D., 2001, Pulseless Electrical Activity, eMedicine Journal 2:9

**Predisposing Factors**

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<tr>
<th>Bradycardia</th>
<th>PSVT</th>
<th>Ventricular Fibrillation</th>
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<tr>
<td>• Increased vagal tone</td>
<td>• Gender (more common in females)</td>
<td>• Severe coronary artery disease</td>
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<td>• Decreased sympathetic drive</td>
<td>• Rheumatic heart disease</td>
<td>• Acute myocardial infarction with shock</td>
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<td>• Ischemia to sinoatrial node</td>
<td>• Pericarditis</td>
<td>• Myocardial reperfusion after thrombolysis</td>
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<td>• Drug use: digoxin, beta blockers</td>
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<td>• Athletic activity (normal variant in athletes)</td>
<td>• Mitral valve prolapse</td>
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<td>• Injury or other insult</td>
<td>• Preexcitation syndrome</td>
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<th>Tachycardia</th>
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<td>• Decreased vagal tone</td>
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<td>• Myocardial infarction</td>
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<td>• Hypoxia</td>
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<td>• Hypovolemia</td>
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<th>Supraventricular tachycardia</th>
<th>Atrial Flutter</th>
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<td>• Digoxin toxicity</td>
<td>• Chronic hypertension</td>
<td>• Severe CHF</td>
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<td>• Catecholamines</td>
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<td>• Caffeine</td>
<td>• Left ventricular hypertrophy</td>
<td>• Hypothermia</td>
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<td>• Coronary artery disease</td>
<td>• Drug ingestion (TCA, digoxin, calcium and beta blocker in overdosage)</td>
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<td>• Diabetes</td>
<td>• Post defibrillation PEA</td>
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**History**
- Not all symptoms may be present
- Client may note irregular heartbeat
- Palpitations
- Chest discomfort
- Shortness of breath
- Dizziness
- Diaphoresis
- Weakness
- Syncope
- Nausea

**Physical Findings**

*Sinus bradycardia*: ECG normal, heart rate < 60 bpm. A heart rate below 40 bpm is usually a junctional rhythm originating in the ventricle. Look for irregular PR intervals to determine heart block or sick sinus syndrome.

*Sinus tachycardia*: ECG normal, heart rate > 100 bpm, blood pressure constant

*PSVT (Atrioventricular nodal re-entrant tachycardia)*: ECG abnormal - rhythm regular, fast, atrioventricular block usual as seen by a prolonged PR interval, systolic BP constant, electrical alternans rare

*SVT (Orthodromic atrioventricular re-entrant tachycardia)*: ECG abnormal - rhythm regular, atrioventricular block not present, systolic BP constant, electrical alternans common especially at high heart rates

*Atrial fibrillation*: ECG abnormal, rhythm irregular, P waves not visible, systolic BP changing. At high rates there is risk of developing Wolfe-Parkinson-White syndrome in some individuals - look for delta waves on the Q wave (slurred QRS)

*Atrial flutter*: ECG abnormal, ventricular rhythm is usually regular, P waves have a well defined saw-tooth pattern. If rate is < 120 bpm, there may be no symptoms, if > 120 bpm, there may be hemodynamic instability

*Premature ventricular contractions (PVC)*: ECG normal with occasional wide and bizarre QRS complexes. Pulse volume is diminished or absent during PVC

*Ventricular tachycardia*: ECG abnormal, rhythm may be regular or irregular. There are no comprehensive ECG criteria for diagnosing VT, but the presence of a rate > 150 bpm, wide and bizarre QRS complexes, atrioventricular dissociation and presence of fusion beats, suggest ventricular tachycardia. Hypotension, dyspnea, diaphoresis may also be present.

*Torsades de pointe*: ECG abnormal, rhythm regular or irregular. QRS complexes appear to change appearance and size, looks like they are twisting. Hypotension, dyspnea, diaphoresis may also be present.

*Ventricular fibrillation*: ECG abnormal, unintelligible, no identifiable waves, complexes or rhythms. No heart rate detectable, hemodynamically very unstable.

**Differential Diagnosis**
- Multifocal atrial tachycardia
- Sinus tachycardia with multiple premature atrial contractions
- Sick sinus syndrome
- Wolfe-Parkinson-White syndrome
- Atrioventricular block

**Complications**
- Heart failure
- Myocardial infarction
- Cerebrovascular accident
- Thromboembolism
- Wolff-Parkinson-White syndrome
- Cardiac arrest

**Diagnostic Tests**
- 12 lead ECG
- Arrange for 24-hour Holter monitoring
- Bloodwork - TSH, CBC, INR, PTT CK, Troponin T
Management

**Goals of Treatment**
- Convert to sinus rhythm
- Relieve symptoms
- Prevent recurrence
- Prevent complications (e.g. CHF, MI, life-threatening dysrhythmias)

**Appropriate Consultation**
Consult a physician if client has abnormal ECG pattern, refractory atrial fibrillation, suspicion of Wolff-Parkinson-White or "sick sinus" syndrome.

**Nonpharmacologic Interventions**
Identify and remove any contributing factors.

**Client Education**
- Teach client and family members the signs of hemodynamic compromise, including rapid heart rate, unexplained weight gain, worsening dyspnea on exertion or in the night, decreased exercise tolerance
- Teach client about long-term medication and its side effects

**Pharmacologic Interventions**
Initial treatment prescribed only by a physician.

Selection of treatment modality should be based on underlying pathophysiology.

Chronic atrial fibrillation is also treated with anticoagulants such as warfarin.

Therapy is started as soon as possible if there is a history of underlying heart disease.

**Monitoring and Follow-Up**
- For clients taking antiarrhythmic agents, liver enzyme levels should be measured during first 4-8 weeks of therapy
- Clients with risk factors for cardiac complications of therapy should undergo ECG during first weeks of therapy and every 3-6 months thereafter
- Clients taking digoxin should be monitored carefully for toxic effects
- Evaluate INR on a regular basis to monitor therapeutic response to warfarin

**Referral**
Medevac clients with hemodynamic instability.
Atrial Fibrillation

Definition
Atrial fibrillation is a cardiac arrhythmia in which chaotic electrical activity replaces the orderly activation sequence of normal sinus rhythm.

Associated Conditions
- Hypertensive heart disease
- Valvular or rheumatic heart disease
- Coronary artery disease
- Acute myocardial infarction
- Pulmonary embolus
- Cardiomyopathy
- Congestive heart failure
- Pericarditis
- Increased thyroid hormone
- Misuse of street drugs, alcohol

History
- Palpitations
- Lightheadedness, poor capacity for exercise
- Fatigue
- Dyspnea
- Angina
- Syncope or near syncope
- Stroke
- Arterial embolization

Physical Findings
Do a complete cardiovascular and respiratory examination. Also assess the eyes for lid lag (hyperthyroid sign) and the neck for thyroid enlargement.
- Irregular pulse
- Tachycardia
- Possible heart failure (see page 16)
- Hypotension
- ECG shows rapid, irregular atrial rate and no P waves

Differential Diagnosis
- Multifocal atrial tachycardia
- Sinus tachycardia with frequent atrial premature beats
- Atrial flutter

Complications
- Angina
- CHF
- Embolic stroke
- Peripheral arterial embolization
- Bradycardiac arrhythmias due to pharmacologic therapy
- Inherent risk of bleeding with anticoagulation

Diagnostic Tests
For asymptomatic people:
- ECG
- TSH
- INR and PTT
- Chest x-ray

Management
Goals of Treatment
- Search for and treat all predisposing factors (see "Associated Conditions," above)
- Reduce symptoms
- Prevent complications

Appropriate Consultation
Consult a physician

Client Education
- Ensure that client understands disease process and prognosis
- Counsel client about appropriate medication use, including side effects
- Teach client signs and symptoms of complications that require immediate follow-up (rapid heart rate, palpitations, edema, shortness of breath on exertion, chest pain)
- Recommend avoidance of alcohol, caffeine
- Recommend referral to smoking cessation (if applicable)
- Counsel client to avoid sleep deprivation

Pharmacologic Interventions
- Drug therapy is directed at

1. Correcting the atrial arrhythmia: examples of antiarrhythmic agents are quinidine, procainamide and disopyramide.
2. Slowing the ventricular rate: β-Blockers, such as amiodarone, and calcium-channel blockers, such as diltiazem and verapamil, are used to control ventricular rate.

3. Effecting anticoagulation - warfarin therapy is recommended to prevent stroke and other embolic complications.

**Monitoring and Follow-Up**

- Clients with stable atrial fibrillation should be followed regularly to assess for symptoms and signs of recurrence, complications, compliance with therapy and side effects of medication
- ECG should be done every 3-6 months
- Clients on anticoagulation must have INR levels monitored regularly, q1w x 1 month, q2w x 3 months, then q1m if stable

**Referral**

Medevac clients who are hemodynamically unstable. Electrical cardioversion is sometimes necessary if symptoms are severe.

Refer stable symptomatic clients to a physician for thorough evaluation and initiation of therapy as soon as possible.
Acute Pericarditis

Definition
An inflammatory process of the pericardium with many causes, occurring with or without effusion. The most common cause is idiopathic or non-specific pericarditis.

Causes
- Idiopathic (unknown)
- Viral infection (e.g. coxsackievirus, ECHOvirus, adenovirus, Epstein-Barr virus, mumps, HIV)
- Bacterial infection: Hemophilus influenzae (especially children), Meningococcus, Pneumococcus, Salmonella, Staphylococcus, PCP related to AIDS
- Fungal infection: Aspergillus, Candida, Histoplasmosis, Nocardia
- Mycobacterial infection: Mycobacterium tuberculosis
- Neoplasm: breast, lung, lymphoma
- Drug-induced: procainamide, hydralazine, phenytoin and others
- Connective-tissue disease: systemic lupus erythematosus, rheumatoid arthritis, scleroderma, acute rheumatic fever
- Radiation therapy
- Post-myocardial infarction (Dressler's syndrome)
- Chest trauma
- Uremia
- Myxedema
- Aortic dissection
- Sarcoidosis
- Pancreatitis

History
- Chest pain, typically sharp; retrosternal with radiation to the trapezial ridge
- Pain frequently sudden in onset
- Pain reduced by leaning forward and sitting up
- Splinted breathing
- Pain on swallowing
- Fever

Physical Findings
- Low-grade fever
- Respiration fast and shallow

Differential Diagnosis
- Acute myocardial infarction
- Pneumonia with pleurisy
- Pulmonary emboli
- Aortic dissection
- Pneumothorax
- Mediastinal emphysema

Complications
- Pericardial tamponade
- Recurrence of pericarditis
- Noncompressive effusion
- Chronic constrictive pericarditis

Diagnostic Tests
- ECG
- Chest x-ray (if available), to rule out complications such as pericardial effusion or enlarged heart

Management
Goals of Treatment
- Prevent complications
- Identify and treat underlying causes

Appropriate Consultation
Consult a physician if you suspect this diagnosis.

The otherwise healthy client is safely treated on an outpatient basis.

Client Education
- Ensure that client understands disease process and prognosis
• Counsel client about appropriate medication use and side effects
• Recommend avoidance of heavy physical labor
• Teach client about symptoms and signs of complications, and instruct client to report any that occur
• Stress the importance of follow up

**Pharmacologic Interventions**
Anti-inflammatory medication for at least two weeks:
ASA (*A class drug*), 650 mg q4h
or
ibuprofen (*A class drug*), 200 mg, 2-3 tabs q6h

In some clients, the condition becomes refractory and corticosteroids or pericardectomy may be required.

**Monitoring and Follow-Up**
• Follow up in 2 or 3 days, to make sure no complications develop, and then again in 2 weeks
• Repeat ECG and chest x-ray should be considered at about 4 weeks
• In most clients complete resolution occurs after 2 weeks of therapy
Arterial Peripheral Vascular Disease

Definition
Chronic decrease in blood flow to one or more extremities, caused by atherosclerotic narrowing of aorta and large arteries supplying the lower limb and leading to ischemia of the leg muscles.

Causes
- Atherosclerosis, congenital lesions, trauma
- Predisposing factors: smoking, hypertension, hyperlipidemia, diabetes, obesity, genetics

History
- Warning signal that oxygen demands of the leg exceed oxygen supply
- Symptoms initially intermittent, reversible, reproducible (intermittent claudication)
- Pain, ache, cramp located in calf, instep, buttock, hip or thigh (rarely in an arm)
- Pain precipitated by exercise
- Discomfort quickly and consistently relieved with rest (in 2-5 minutes)
- Distance client can walk before experiencing claudication (should be documented)
- As disease progresses, symptoms occur with less effort and last longer
- With advanced disease, foot pain occurs at night
- Nocturnal pain relieved by placing the leg into a dependent position or by standing on a cold floor
- With severe disease the involved area becomes chronically ischemic, and pain is present at rest
- Impotence may occur
- Associated vascular disease of other target organs may be present (angina, previous stroke or transient ischemic attacks)

Physical Findings
- Blood pressure may be elevated if client is also hypertensive
- Ischemic skin changes in foot and distal limb may be present (thin, fragile skin; loss of hair on distal leg; shiny and atrophic skin; leg muscle atrophy)
- Arterial ulcers on shins, toes or feet
- Toenails may be hypertrophic
- Rubor of foot with dependency, blanching of foot with elevation
- Capillary refilling time slowed (> 2 seconds)
- Peripheral pulses decreased or absent
- Pulsating abdominal mass (aortic aneurysm)
- Arterial bruits may be present (abdominal aortic, iliac, femoral, popliteal)

Differential Diagnosis
- Acute arterial occlusion
- Raynaud's disease
- Raynaud's phenomenon
- Venous stasis
- Scleroderma
- Embolism

Complications
- Ischemic ulcer
- Infection of ischemic ulcer
- Loss of distal ischemic limb
- Acute arterial occlusion

Diagnostic Tests
- Complete blood count
- Electrolyte and creatinine levels
- Fasting blood glucose, cholesterol and triglyceride levels
- ECG (if a recent one is not available)

Management
Goals of Treatment
- Slow progression of disease
- Identify, modify and treat risk factors
- Promote formation of collateral circulation
- Prevent complications

Appropriate Consultation
Consult a physician immediately if any of the following are present: angina, ischemic ulcer, pain at rest, nocturnal pain, recent transient ischemic attack, pulsatile abdominal mass.

Client Education
- Refer for smoking cessation
- Recommend weight loss (if appropriate)
- Recommend daily exercise to improve fitness and exercise tolerance of the leg muscles, which
will also help to improve collateral circulation (walking is the best exercise)
• To reduce skin irritation, client should put sheepskin or bubble pads on the bed
• Teach proper foot care: avoid clipping nails too close to the skin, avoid tight-fitting shoes, keep feet dry and protected from injury (no slippers or bare feet, even in the house)
• For diabetic clients, teach proper foot care to a family member, if possible, so that this person can carry out the necessary tasks; alternatively, have the client attend a clinic on a monthly basis for care of nails and feet

Monitoring and Follow-Up
• Identify new symptoms or changes in existing symptoms
• Assess control of diabetes and encourage compliance with medication and diet
• Advise client to attend clinic if foot injury occurs, no matter how small
• Refer to Home Care

Referral
Refer to a physician as soon as feasible to establish whether there are indications for surgery (intolerable pain in low-risk client, pain at rest, ulcers, impending gangrene). A consult with a vascular surgeon may be necessary.
Venous Insufficiency (Chronic)

Definition
Impairment of the venous system that inhibits normal return of blood from the legs to the heart.

Causes
Incompetent valves in veins of the legs.

Risk Factors
• Familial predisposition
• Prolonged standing
• Pregnancy
• Obesity
• Constricting garments worn over a long period of time

History
• Dull aching heaviness or fatigue in legs, often occurring at the end of the day and relieved by elevation of the legs
• Mild edema at end of day
• Cramps in legs at night
• Itching may be present (due to stasis dermatitis)
• Stasis dermatitis, brownish red discoloration

Physical Findings
• Dilated, tortuous, elongated varicose veins in foot, lower leg, medial thigh or behind knee
• Varicose veins seen better when standing
• Skin changes may be present (erythema, brownish pigmentation, flaking and scaling, skin breakdown)
• Venous ulcers may be present on medial side of lower leg just above medial malleolus or on medial aspect of ankle
• Edema of foot and ankle may be present
• Dilated veins easily palpable when person is standing

Differential Diagnosis
• Chronic occlusive arterial disease with arterial ulcers
• Orthopedic problems

Complications
• Stasis dermatitis
• Cellulitis
• Stasis ulcer
• Thrombophlebitis
• Deep vein thrombosis (if deep veins involved)

Diagnostic Tests
None.

Management
Goals of Treatment
• Facilitate venous return
• Prevent complications

Client Education
• Teach client proper skin hygiene and care of lesions
• Recommend support hose or support stockings
• Recommend elevation of legs above the level of the hip when sitting
• Recommend avoidance of prolonged standing (client should sit with legs elevated whenever possible and should avoid crossing legs)
• Recommend avoidance of restrictive clothing around the knees (e.g. knee socks, garters)
• Recommend weight loss (if appropriate)
• Recommend smoking cessation (if appropriate)
• Instruct client to return to clinic if signs of skin breakdown or skin irritation occur, or if a vein becomes sore and tender
• Instruct client to do leg exercises qid in bed to prevent deep vein thrombosis

Monitoring and Follow-Up
Arrange follow-up in 1 month to assess adherence to and efficacy of interventions.

Referral
Refer to a physician if condition does not improve with conservative treatment or if complications arise.
Aortic Aneurysm (Pulsatile Abdominal Mass)

**Definition**
Weakening of the wall of the abdominal aorta. A pulsatile abdominal mass is considered and treated as an abdominal aortic aneurysm until proven otherwise. It may be asymptomatic and discovered by accident.

**History**
If an aneurysm is leaking:
• Sudden onset of pain in mid-abdomen or back (or both)
• Sudden weakness and faintness

**Physical Findings**
• Pulse rapid and weak, pulsus paradoxus
• Blood pressure low-normal to low
• Blood pressure may drop with change in posture
• Pulsating mid or upper abdominal mass

If an aneurysm has ruptured:
• Shock (hypovolemia)
• In severe distress, client may be unconscious
• Pulse diminished or absent
• Blood pressure low or cannot be determined
• A pulsating abdominal or flank mass may be palpable
• Increased abdominal girth
• Subcutaneous bruising may be present
• Death usually occurs

**Management Of Asymptomatic Client**

**Goals of Treatment**
• Identify and monitor the asymptomatic abdominal aneurysm

**Appropriate Consultation**
Consult a physician when an asymptomatic aortic aneurysm is suspected or detected.

**Monitoring and Follow-Up**
• Annual follow-up by physician
• Annual abdominal ultrasonography to measure size

**Referral**
Referral to physician for vascular surgery

**Management Of Symptomatic Client**

**Goals of Treatment**
• Replace blood loss

**Appropriate Consultation**
Consult a physician immediately.

**Adjuvant Therapy**
• Oxygen to keep oxygen saturation > 97%
• Large bore IV (14- to 16-gauge) with normal saline (or lactated Ringer's solution) x2

**Nonpharmacologic Interventions**
• Bed rest
• Maintain "nothing-by-mouth" order
• Insert a nasogastric tube (paralytic ileus is common)
• Insert a urinary catheter

**Monitoring and Follow-Up**
• Monitor ABC and vital signs closely, including oxygen saturations
• Aim for pulse < 100 bpm and systolic blood pressure >100 mm Hg
• Monitor urinary output

**Referral**
Medevac as soon as possible.
Emergencies Of The Cardiovascular System

Myocardial Infarction

Definition
Interruption of blood supply to the heart, resulting in ischemic injury and necrosis of a portion of the myocardium. As many as 15% to 25% of cases are silent or atypical in presentation.

Causes
• Atherosclerosis/blockage of coronary arteries, coronary artery spasm, hypovolemia

Risk Factors
• Smoking
• Family history of heart disease
• Hypertension
• Dyslipidemia
• Obesity
• Diabetes mellitus
• Sedentary lifestyle

History
• Acute retrosternal chest pain (heaviness, aching, squeezing)
• Pain may radiate into left arm, neck, fingers, shoulders, epigastrium, right chest, right upper quadrant, right arm or upper back, jaw, gums
• Pain usually occurs at rest, with gradual or sudden onset, and can be precipitated by stress
• Pain not relieved by nitroglycerin
• Pain lasts longer than 30 minutes
• Shortness of breath
• Nausea and vomiting
• Diaphoresis
• Weakness
• Loss of consciousness may occur

Physical Findings
• Respiration rapid and shallow
• Pulse variable (rapid or slow, regular or irregular, full volume, "thready")
• Blood pressure increased, decreased or normal
• Oxygen saturation may be abnormal if client is in shock or has congestive heart failure
• Acute distress
• Pale

• Diaphoresis
• Cyanosis (central or peripheral, or both)
• Client may be unconscious
• Skin may be cool and clammy
• Lungs are usually clear; crackles present if congestive heart failure develops
• S1, S2 normal; S3 and/or S4, murmurs, pericardial friction rub may be present if there are complications

Differential Diagnosis
• Peptic ulcer disease
• Esophageal spasm or esophagitis
• Gallbladder disease
• Large pulmonary embolism
• Indigestion
• Pancreatitis
• Acute anxiety attack
• Acute pericarditis
• Dissecting aortic aneurysm
• Spontaneous pneumothorax

Complications
• Arrhythmias and conductive disturbances
• Hypotension
• Congestive heart failure
• Pericarditis
• Thromboembolism
• Cardiogenic shock
• Cardiac arrest
• Rupture of the heart
• Death

Diagnostic Tests
• Obtain a 12-lead ECG tracing; compare with a previous tracing, if available
• Identify new changes if possible; check for Q waves, elevation of ST segment and inversion of T wave (signs of myocardial infarction)
• Check for depression of ST segment, inversion of T wave (unstable angina) or a non-Q wave MI
• If the patient has continuing or changes in pain, repeat 12-lead ECG twice more at 30-minute intervals, noting any evolving changes
• Blood may need to be drawn for baseline cardiac enzymes (troponin) before transferring client

**Management**

**Goals of Treatment**
• Improve oxygenation of myocardium
• Prevent complications
• Keep infarct from extending

**Appropriate Consultation**
Consult a physician.

**Adjuvant Therapy**
• Oxygen to keep oxygen saturation > 97%
• Start IV therapy with normal saline to keep vein open
• Urinary catheter

**Nonpharmacologic Interventions**
• Bed rest with head elevated (unless hypotensive)
• Offer support and reassurance to reduce anxiety

**Pharmacologic Interventions**
Nitrates:
* nitroglycerin *(C class drug)*, 0.3-mg SL tab or spray stat, but only if systolic blood pressure >100 mm Hg

Observe response and monitor severity of pain; if pain not relieved, repeat:
* nitroglycerin, 0.3-mg SL tab q3-5min for another 2 doses*, but only if systolic blood pressure remains >100 mm Hg

Nitroglycerin can cause hypotension.

Then give:
* uncoated ASA *(A class drug)*, 80 mg, 2 tabs stat PO, unless ASA contraindicated
If pain unrelieved by nitrates, administer analgesia:
* morphine *(D class drug)*, 2-5 mg IV; repeat dose only under the direction of a physician

Observe BP

Every client who presents with acute myocardial infarction should be considered for IV thrombolytic therapy. If onset of pain occurred within the past 6 hours there is a definite benefit to thrombolytic therapy.

**Other Pharmacologic Measures (Prescribed by a Physician)**

To reduce workload on the heart: *topical nitroglycerin (B class drug)*, 1.25-2.5 cm immediately, then q4-6h, but only if systolic blood pressure >100 mm Hg

For arrhythmias, particularly sustained bouts of ventricular tachycardia:
* lidocaine *(B class drug)*, 1 mg/kg to a maximum of 100 mg as a single IV bolus; reduce dose by 50% in people > 65 years of age

When using lidocaine, watch for disorientation, confusion, twitching, seizure
For hypotension associated with bradycardia (heart rate < 60 bpm):
* atropine sulfate *(B class drug)*, 0.4 mg IV q5min, until heart rate > 60 bpm and systolic blood pressure > 100 mm Hg (maximum dose 2 mg)

IV diuretics (only if shortness of breath and lung crackles are present, i.e., heart failure):
* furosemide *(D class drug)*, 40 mg IV bolus

**Monitoring and Follow-Up**
• Monitor vital signs (including pulseoximetry)
• Repeat ECG (to check for arrhythmias)
• Monitor lungs and heart sounds frequently for signs of heart failure
• Intake and output

**Referral**
Medevac as soon as possible.
Pulmonary Edema

Definition
Accumulation of fluid within the lungs that interferes with ventilation and oxygenation.

Causes
Acute left-heart failure, with or without right-heart failure (see "Differential Diagnosis," below)

History
• Severe shortness of breath
• Orthopnea, paroxysmal nocturnal dyspnea (left ventricular failure)
• Fluid retention peripherally and weight gain (right heart failure) may also be present
• Cough productive of frothy pink sputum

Physical Findings
• Pulse rapid and may be "thready" or weak
• Respiratory rate elevated
• Blood pressure normal, elevated or decreased
• Acute respiratory distress
• Diaphoresis
• Central cyanosis may be present
• Peripheral cyanosis with cool, mottled extremities
• Swelling of ankles may be present
• JVP may be elevated
• Hepatojugular reflux and hepatomegaly may be present
• Peripheral pitting edema may be present
• Crackles and wheezes in lower half of lung fields
• S3 gallop rhythm in the heart

Differential Diagnosis
• Chronic congestive heart failure
• Acute myocardial infarction
• Acute pulmonary embolism
• Atrial fibrillation
• Valvular heart disease
• Adult respiratory distress syndrome
• TB

Complications
• Hypotension, shock
• Respiratory failure

Diagnostic Tests
• Obtain ECG: look for signs of myocardial ischemia or infarction

Management
Goals of Treatment
• Improve oxygenation
• Promote diuresis of accumulated fluids
• Reduce venous return to the heart
• Treat any reversible precipitants (e.g. cardiac ischemia, hypertension, arrhythmia)

Appropriate Consultation
Consult a physician immediately.

Adjuvant Therapy
• Oxygen to keep oxygen saturation > 97%
• Start IV therapy with normal saline to keep vein open

Nonpharmacologic Interventions
• Bed rest with head elevated
• Insert an indwelling urinary catheter

Pharmacologic Interventions
IV diuretics:
furosemide (D class drug), 40-80 mg IV push

For any client who receives this drug regularly, a much larger dose may be required (a quick guide is to double the usual PO daily total to determine the acute IV dose).

To reduce workload on the heart (discuss with physician, preferably before administering):
morphine (D class drug), 2-5 mg IV over several minutes; this can be repeated under the direction of a physician

To reduce venous return and workload on the heart, the physician may order topical nitrates:
nitroglycerin topical (B class drug), 1.25-2.5 cm stat, then q4-6h, but only if systolic blood pressure >100 mm Hg
**Monitoring and Follow-Up**

- Monitor vital signs (watch for hypotension) and ABCs frequently, including oxygen saturation
- Monitor urine output hourly (if not diuresing, the client requires more IV diuretics)

**Referral**

Medevac as soon as possible.
Acute Arterial Occlusion Of A Major Peripheral Artery

Definition
Sudden obstruction of a peripheral artery with acute ischemia of the distal limb.

Causes
• Acute thrombosis of an artery, trauma or arterial embolus
• Predisposing factors: peripheral vascular disease, atrial fibrillation, recent myocardial infarction, prosthetic heart valve

History
• Sudden onset of severe pain in distal part of a limb
• Paresthesia, coldness and pallor in distal limb follow later
• Previous symptoms of intermittent claudication
• History of cardiac disease

Physical Findings
• Heart rate elevated
• Pulse may be irregular
• Respiratory rate normal or increased
• Blood pressure normal or increased
• Anxious, in acute distress
• Signs of longstanding peripheral vascular disease in the opposite limb
• Colour of limb normal initially, becomes pale later
• Skin temperature may be normal initially, becomes cool or cold later
• Peripheral pulses are less palpable than in opposite limb or absent altogether
• Cutaneous sensation decreased or absent
• Tenderness in calf on dorsiflexion of foot
• Arterial bruits may be present (aortic, iliac, femoral, popliteal)

The 5 P’s of acute arterial occlusion are pain, pallor, pulseless, paresthesia and paralysis.

Differential Diagnosis
• Compartment syndrome if trauma has been involved

Complications
• Ischemic muscular contracture
• Loss of limb
• Pulmonary embolism
• Sepsis

Management
Goals of Treatment
• Improve oxygenation of the limb
• Prevent injury to or loss of limb

Appropriate Consultation
Consult a physician immediately.

Nonpharmacologic Interventions
• Bed rest
• Prevent injury to limb: handle carefully, protect from pressure or injury
• Do not elevate ischemic limb (keep horizontal or slightly dependent)

Adjuvant Therapy
• Oxygen to keep saturation ≥ 97%
• Start IV therapy with normal saline to keep vein open

Pharmacologic Interventions
Analgesia for pain: morphine (D class drug), 2-5 mg IV

Give dimenhydrinate (A class drug) with morphine to prevent nausea and vomiting.

Monitoring and Follow-Up
Monitor vital signs, general condition, cardiac and respiratory status frequently.

Referral
Medevac as soon as possible. There is only a 4 to 6-hour window of opportunity to perform surgical intervention to save limb from irreparable damage.
Chapter 5 - Gastrointestinal System

Assessment Of The Gastrointestinal System

History Of Present Illness And Review Of System

Examination Of The Abdomen

Problems Of The Gastrointestinal System

Dehydration (Hypovolemia)

Anal Fissure

Hemorrhoids

Constipation

Diarrhea

Gastroesophageal Reflux Disease (GERD)

Peptic Ulcer Disease

Gallbladder Disease: Biliary Colic And Cholecystitis

Abdominal Hernia

Irritable Bowel Syndrome

Diverticulitis

Emergencies Of The Gastrointestinal System

Abdominal Pain (Acute)

Pancreatitis (Acute)

Appendicitis

Obstruction Of The Small Or Large Bowel

Gastrointestinal Bleeding (Upper And Lower)
Assessment Of The Gastrointestinal System

N.B. When assessing the GI system and there are symptoms of abdominal pain, it is important to remember that symptoms may be related to involvement of other systems.

History Of Present Illness And Review Of System

General
The following characteristics of each symptom should be elicited and explored:
• Onset (sudden or gradual)
• Chronology
• Current situation (improving or deteriorating)
• Location
• Radiation
• Quality
• Timing (frequency, duration)
• Severity
• Precipitating and aggravating factors
• Relieving factors
• Associated symptoms
• Effects on daily activities
• Previous diagnosis of similar episodes
• Previous treatments
• Efficacy of previous treatments

Cardinal Symptoms
In addition to the general characteristics outlined above, additional characteristics of specific symptoms should be elicited, as follows.

Abdominal Pain
Ask about all of the characteristics listed in the section above (see "General," above).

Nausea and Vomiting
• Frequency, severity
• Presence of blood and its colour (e.g. bright red, dark, colour of coffee grounds)
• Triggers

Bowel Habits
• Frequency, colour and consistency of stool
• Presence of blood or melena
• Pain before, during or after defecation
• Use of laxatives/enemas
• Hemorrhoids
• Belching, bloating and flatulence

Jaundice
• History of hepatitis A, hepatitis B or hepatitis C, alcohol use
• Tea-coloured urine
• Clay-coloured bowel movements
• Itchy skin

Dysphagia
• Solids or liquids, is the pattern consistent
• Site where food gets stuck

Other Associated Symptoms
• Fever
• Malaise
• Headache
• Dry skin
• Dehydration
• Dry mouth
• Diet recall, appetite and foods avoided (including reasons for avoidance), food preferences (e.g. raw foods, wild meat), nutritional supplements
• Meal pattern (e.g. small, frequent meals)
• Anorexia, bulimia, fasting
• Recent weight loss or gain that is not deliberate

Medical History (Specific To Gastrointestinal System)
• Gallbladder disease
• Diabetes mellitus
• Liver disease (hepatitis A, hepatitis B, hepatitis C or cirrhosis)
• Esophageal cancer
• Inflammatory bowel disease
• Hiatus hernia
• Irritable bowel syndrome (IBS)
• Gastroesophageal reflux disease (GERD)
• Peptic ulcer disease (PUD)
• Pancreatitis
• Diverticulosis
• Abdominal surgery
• Presence of hernia, masses
• Blood transfusion
• Past and current use of medications: over-the-counter medications (e.g. acetylsalicylic acid [ASA], acetaminophen), estrogen, progesterone, calcium-channel blockers, anticholinergics, antacids, triple therapy for peptic ulcer disease, thiazide diuretics, steroids, digoxin
• Diagnosis of H. pylori, treated and untreated

**Family History (Specific To Gastrointestinal System)**
• Alcoholism
• Household contact with hepatitis A or hepatitis B
• Household contact with gastroenteritis
• Food poisoning
• GERD
• Peptic ulcer disease
• Gallbladder disease
• Gastric or colon cancer
• Polyps
• Pancreatitis
• Metabolic disease (e.g. diabetes mellitus, porphyria)
• Cardiac disease
• Renal disease

**Personal And Social History (Specific To Gastrointestinal System)**
• Alcohol use
• Smoking
• Caffeine use
• Use of street drugs, including injection drugs
• Use of anabolic steroids
• Travel to area where infectious gastrointestinal conditions are endemic
• Body piercing or tattoos
• Stress at work, home or school
• Dietary intake of nitrates (e.g. smoked foods)
• High-fat diet
• Obesity
• Exposure to untreated drinking water
• Sanitation at home or community
• Dieting
• Abdominal trauma

**Occupational Or School Environment**
• Healthcare occupation
• Institutional environment -- workers or residents (e.g. nursing home)
• Environmental exposure
• Chemical exposure
Examination Of The Abdomen

General
- Apparent state of health
- Appearance of comfort or distress
- Colour (e.g. flushed, pale, jaundiced)
- Nutritional status (obese or emaciated)
- State of hydration (skin turgor)
- Match between appearance and stated age

Vital Signs
- Temperature and pulse
- Respiratory rate
- Blood pressure
- Weight

Abdominal Inspection
- Abdominal contour, symmetry, scars, dilatation of veins
- Movement of abdominal wall with respiration
- Visible masses, hernias, pulsations, peristalsis
- Jaundice (scleral icterus, skin)
- Spider nevi on face, neck or upper trunk
- Palmar erythema, Dupuytren's contracture (associated with chronic liver disease)
- Clubbing of fingers (late sign associated with inflammatory bowel disease)

Auscultation
Auscultation should be performed before percussion and palpation so as not to alter bowel sounds.
- Presence, character and frequency of bowel sounds
- Presence of bruits (renal, iliac or abdominal aortic)

Percussion
- Percuss from resonant to dull areas
- Liver: define upper and lower borders, measure span

- Spleen: confirm presence of normal resonance over lowest rib interspace in anterior axillary line
- Bladder: identify distension and fullness
- Identify other areas of dullness, increased resonance or tenderness

Light Palpation
- Tenderness, muscle guarding, rigidity
- Superficial organs or masses

Deep Palpation
- Tender areas, rebound tenderness
- Liver: size, tenderness, whether edge is smooth or irregular, firm or hard
- Spleen: enlargement, tenderness, consistency
- Kidney: tenderness, enlargement, tenderness of costovertebral angle
- Masses: location, size, shape, mobility, tenderness, movement with respiration, pulsation, hernias (midline, incisional, groin)
- Inguinal lymph nodes: enlargement, tenderness
- Consider GU

Rectal Examination
- For occult blood (which would indicate gastrointestinal [GI] bleeding)
- For referred pain (which occurs in appendicitis)
- For masses, hemorrhoids, anal fissures, sphincter tone, etc.
- Prostate exam
- Cervical/uterine exam

Cardiovascular And Pulmonary Examination
A cardiovascular and pulmonary exam should also be performed.
- Tachycardia, lungs (crackles)
- Abdominal pain (may be referred from the lungs in pneumonia)
- ECG
**Fig 1: Location of pain: Clues to diagnosis**

The location of pain may provide clues to common causes of abdominal pain.

**Diffuse pain or variable location:**
- gastroenteritis
- intestinal obstruction
- hemolytic crisis (sickle cell disease)
- peritonitis
- endocrinologic disorders (diabetic ketoacidosis, Addison’s disease, hyperparathyroidism)

**Right Upper Quadrant:**
- cholecystitis
- cholelithiasis
- acute hepatitis
- hepatic abscess
- subphrenic abscess
- right lower lobe pneumonia

**Right Lower Quadrant:**
- appendicitis
- cecal diverticulitis
- ectopic pregnancy
- ovarian cyst/torsion
- pelvic inflammatory disease
- Mittelschmerz
- endometriosis

**Left Upper Quadrant:**
- gastritis
- acute pancreatitis
- splenic enlargement/
- hematoma
- myocardial ischemia
- left lower lobe pneumonia

**Left Lower Quadrant:**
- all GU conditions listed under right lower quadrant
- diverticulitis

**Epigastric or Midline:**
- abdominal aortic aneurysm (may also present as back, flank, or hip pain, or as diffuse pain
- cardiac disease (may be confused with pain from reflux disease)
- peptic ulcer (gastric or duodenal)
Problems Of The Gastrointestinal System

Dehydration (Hypovolemia)

Definition
Decrease in volume of circulating plasma.

Causes
- Excessive urine production (e.g. use of diuretics, unexplained polyuria or polydipsia)
- Excessive GI losses (through vomiting, diarrhea, third spacing of fluid in the abdomen as a result of ascites or pancreatitis)
- Excessive losses through the skin (because of burns, fever, exfoliative dermatitis)
- Inadequate intake of food or fluids (because of immobility, loss of consciousness, cognitive impairment, medications that blunt the thirst response such as antipsychotics, heat, exercise)

Physical Examination
- Search for orthostatic hypotension if supine blood pressure appears normal
- Estimate volume deficit (see Table 1)

Table 1: Physical findings in association with degree of dehydration

<table>
<thead>
<tr>
<th>Clinical sign</th>
<th>Mild dehydration</th>
<th>Moderate dehydration*</th>
<th>Severe dehydration*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid loss (% of body weight)</td>
<td>&lt; 6%</td>
<td>6% to 10%</td>
<td>&gt; 10%</td>
</tr>
<tr>
<td>Radial pulse</td>
<td>Normal</td>
<td>Rapid, weak</td>
<td>Very rapid, feeble</td>
</tr>
<tr>
<td>Respiration</td>
<td>Normal</td>
<td>Deep</td>
<td>Deep, rapid</td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>Normal</td>
<td>Low</td>
<td>Very low or undetectable</td>
</tr>
<tr>
<td>Skin turgor</td>
<td>Retracts rapidly</td>
<td>Retracts slowly</td>
<td>Retracts very slowly</td>
</tr>
<tr>
<td>Eyes</td>
<td>Normal</td>
<td>Sunken</td>
<td>Very sunken</td>
</tr>
<tr>
<td>Mentation</td>
<td>Alert</td>
<td>Restless</td>
<td>Drowsy, comatose</td>
</tr>
<tr>
<td>Urine output</td>
<td>Normal</td>
<td>Scant</td>
<td>Oliguria</td>
</tr>
<tr>
<td>Voice</td>
<td>Normal</td>
<td>Hoarse</td>
<td>Inaudible</td>
</tr>
</tbody>
</table>

* If dehydration is moderate to severe, there may be associated electrolyte disturbances.

Types

Hypotonic Dehydration
- Symptomatic earlier than isotonic or hypertonic dehydration (use estimated weight loss as a guide: 3% = mild dehydration, 6% = moderate dehydration, 9% = severe dehydration)
- Usually results from replacing losses (vomiting and diarrhea) with low-solute fluids, such as dilute juice, weak tea
- Lethargy and irritability are common, and vascular collapse can occur early

Isotonic Dehydration
Symptoms less dramatic than in hypotonic dehydration (use estimated weight loss as a guide: 5% = mild dehydration, 10% = moderate dehydration, 15% = severe dehydration)

Hypertonic Dehydration
- Usually occurs as a result of using inappropriately high solute load as replacement, or because of renal concentrating defect with large free-water losses or heat exposure with large insensible losses
- Typical symptoms include thick, doughy texture to skin (tenting is uncommon), tachypnea, intense thirst
- Shock is very late manifestation

Management

Goals of Treatment
- Restore normal state of hydration
- Identify and rectify cause of dehydration

General Principles of Treatment
- Fluid composition depends upon type of dehydration
• Be sure to add ongoing losses to maintenance + deficit fluids and electrolytes
• In hypotonic or isotonic dehydration, calculate total fluids and electrolytes (maintenance + deficit replacement) for the first 24 hours, and give half this amount over the first 8 hours, and the other half over the next 16 hours
• In hypertonic dehydration, correct the fluid and electrolyte deficits slowly (over about 48 hours)
• Do not add potassium (B class drug) to IV line until urine output established (diabetic ketoacidosis may be an exception, where correction of hyperglycemia and acidosis may lead to rapid development of hypokalemia)
• Increase maintenance fluids by 12% for each degree Celsius of fever
• If GI losses continue, replace with 10 mL/kg for each diarrheal stool and 2 mL/kg for each episode of vomiting (this should approximate losses)

The search for the underlying cause of the dehydration should be concurrent with rehydration therapy to prevent the re-emergence of dehydration from ongoing fluid losses.

Pharmacologic Interventions
Oral rehydration therapy is the initial method of treatment unless the volume of the deficit and the resulting severity of symptoms or the lack of feasibility of oral intake make IV therapy necessary.

Oral rehydration fluids are effective, and rehydration should be attempted in clients with adequate blood pressure who are able to take fluids orally.

Oral rehydration fluids should contain both sodium and sugar to maximize absorption of these two components.

An oral rehydration solution can be made at home with table salt and sugar: 1/2 tsp (2.5 mL) salt, 8 tsp (40 mL) sugar, 4 cups (1 L) water. Commercially prepared solutions (e.g. Gastrolyte®, Rehydralyte® are also available.

Potassium
• For mild dehydration, potassium may not be required
• For moderate-to-severe dehydration caused by GI or renal losses, potassium replacement is usually required (B class drug)

Mild Dehydration
• Administer 50 mL/kg of oral rehydration solution over the first 4 hours of treatment; give frequently, in small amounts
• Re-evaluate at 4 hours for maintenance fluid requirements (general daily maintenance fluid requirement for an adult is 2000-2400 mL)
• Fluid intake in the first 24-48 hours should be enough to replace the initial deficit plus any ongoing loss of fluid through the GI and genitourinary tracts and the skin
• If condition unresolved consult with physician

Moderate Dehydration
• Consult with physician
• Administer 100 mL/kg of oral rehydration solution over the first 4 hours of treatment; give frequently, in small amounts
• Re-evaluate at 4 hours for maintenance fluid requirements (general daily maintenance fluid requirement for an adult is 2000-2400 mL)
• Fluid intake in the first 24-48 hours should be enough to replace the initial deficit plus any ongoing loss of fluid through the GI and genitourinary tracts and the skin

Severe Dehydration
• Consult with physician
• Start 2 large-bore IV lines (14- or 16-gauge) with normal saline
• Give 20 mL/kg IV rapidly as a bolus
• Assess for overload
• Reassess for signs of continuing hypovolemic shock
• If shock persists, continue to administer fluid in boluses and reassess
• Adjust IV rate according to clinical response (ongoing IV therapy is based on response to initial fluid resuscitation, continuing losses and underlying cause of dehydration)
• Aim for pulse rate < 100 bpm and systolic blood pressure > 90 mm Hg

Client Education, Monitoring and Follow-Up
Refer to section on diarrhea
**Anal Fissure**

**Definition**
Painful, linear tear in anal mucosa.

**Causes**
- Chronic constipation
- Trauma to anal canal

**History**
- Acute pain during and after defecation
- Spotting of bright red blood with defecation
- Bleeding tends to be minimal
- Constipation caused by fear of pain
- Tends to occur in young and middle-aged adults
- Most common cause of chronic perianal pain
- Recent childbirth

**Physical Findings**
- Firm retraction of buttocks is required for adequate visualization
- May be concealed by overlying anal mucosa
- Usually one fissure
- Usually in midline
- Digital rectal exam causes acute pain

**Differential Diagnosis**
- Thrombosed external hemorrhoids
- Perianal or perirectal abscess
- Crohn's disease or sexually transmitted infections (if fissures fail to heal)

**Complications**
- Constipation
- Chronic anal fissure

**Diagnostic Tests**
None.

**Management**

**Goals of Treatment**
- Relieve pain
- Relieve underlying constipation
- Prevent recurrence

**Nonpharmacologic Interventions**
- Most fissures are superficial and will heal spontaneously
- Sitz baths 3 or 4 times daily for 20 minutes with warm salt water

**Client Education**
- Instruct client about proper perianal hygiene and prevention of infection
- Counsel client about lifestyle and diet (e.g. dietary fiber, fluids, exercise)
- Condom use, if anal sex, also use lubricant

**Pharmacologic Interventions**
Local topical preparations without corticosteroids may be useful:
- zinc sulfate 0.5% ointment (*A class drug*), bid and after each bowel movement
An ointment is better than a suppository because it remains within the affected area.
Start stool-bulking agents and stool softeners if constipated (see "Constipation," below, *this chapter*).

**Monitoring and Follow-Up**
Follow up in 1-2 weeks.

**Referral**
Arrange consultation with a physician if fissure does not heal in 4-6 weeks.
Hemorrhoids

Definition
Blood vessels beneath the anal canal mucosa (internal) and perianal skin (external) that enlarge and protrude.

Causes
- Pregnancy and childbirth
- Chronic constipation with straining at bowel movements
- Prostatic enlargement with chronic straining to urinate
- Prolonged sitting
- Anal infection

History
Rule out bowel pathology such as inflammatory bowel disease, carcinoma.

Internal Hemorrhoid
- Sensation of something "sticking out" of rectum
- Bright red bleeding with bowel movements
- Blood on stool surface only, not mixed in with stool; often seen on toilet tissue
- Anal itching or discharge may be present
- Painless unless complications present

External Hemorrhoid (Perianal Lump)
- Soft skin tags may be present
- Discomfort or irritation frequently present
- Tendency to thrombose
- Sudden acute pain if thrombosed

Physical Findings
To examine anal area, have client lie on left side with the knees drawn up to the chest; retract the buttocks.
- Both internal and external hemorrhoids may be present
- Usually located in left lateral, right anterior and right posterior positions
- Internal hemorrhoids covered by thin, pink anal mucosa
- External hemorrhoids covered by skin (Note: a thrombosed external hemorrhoid is a bluish purple, globular, irreducible, tender lump at the edge of the anus)

- Typically 1 to 3 swellings around anal opening, the size of a finger tip; pink, purple or blue in colour
- Rectal examination may reveal concealed internal hemorrhoids
- Assess whether prolapsing hemorrhoids are easily reducible

Differential Diagnosis
- Rectal polyp or prolapse
- Skin tag
- Other causes of pruritus ani and perianal dermatitis
- Perianal or perirectal abscess
- Anal fissure
- Complicated hemorrhoid
- Tumor

Complications
- Thrombosed or strangulated internal hemorrhoid
- Thrombosed external hemorrhoid

Diagnostic Tests
- Stool may test positive for occult blood

Management
Goals of Treatment
- Relieve symptoms
- Keep anal region clean
- Promote easy passage of stool on a regular basis

Appropriate Consultation
If unable to reduce the prolapsed internal hemorrhoid, contact a physician.

Nonpharmacologic Interventions
- Gently try to reduce painful prolapsed internal hemorrhoid
- Apply a topical anesthetic (e.g. lidocaine jelly 2% A class drug), wait 15 minutes, then gently try to reduce it. Do not use force!
- Instruct client to gently reduce (push back up) painless prolapsed internal hemorrhoid(s)
- Instruct client to cleanse the perianal area after each bowel movement with plain water, salt water or medicated witch-hazel cotton pads (Tucks)
Instruct person to take Sitz baths 3 or 4 times daily for 15 to 20 minutes to cleanse the area, soothe local irritation and relax the anal sphincter.

- Manage underlying constipation (see "Constipation," below, this chapter)

**Client Education**

- Counsel client about appropriate use of medications (dose, frequency, dangers of overuse)
- Teach client proper perianal hygiene
- Instruct client to return to clinic for reassessment if severe pain or bleeding develops (incision drainage of thrombosed external hemorrhoid may be required)
- Instruct client to apply an ice pack (20 minutes on, 20 minutes off) to help reduce swelling and pain if a thrombosed hemorrhoid is suspected.

**Pharmacologic Interventions**

For mildly sore and edematous "inflamed" external hemorrhoid, treat with hemorrhoidal ointments or suppositories without steroids (ointments are better):

- **zinc sulfate 0.5% ointment or suppository (A class drug)** every morning and evening and after each bowel movement for 3-6 days

For perianal dermatitis, hemorrhoidal ointment with steroids (for anti-inflammatory properties) may be used to reduce itch and discharge (these preparations may cause local irritation if misused):

- **zinc sulfate 0.5% ointment (A class drug)** every morning and evening and after each bowel movement for 3-6 days

**Monitoring and Follow-Up**

Follow up in 1 week to determine if symptoms have improved.

**Referral**

For acute pain of recent onset (1-2 days) that is increasing despite treatment, contact a physician for advice and to rule out an abscess.
Constipation

Definition
Condition in which diminished frequency or incomplete evacuation of or stool is hard, dry, often small and round; difficult and painful to pass. Constipation is a symptom, not a diagnosis. A careful, accurate history and physical examination are mandatory to establish the underlying cause.

Causes
- Ignoring urge to defecate
- Insufficient fiber and fluid in diet
- Physical inactivity
- Pregnancy
- Side effect of medications
- Chronic abuse of laxatives
- Anal fissure
- Hemorrhoids
- Cancer of colon or rectum
- Other diseases of large bowel
- Endocrine problems
- Neurological diseases

Medications Associated with Constipation
- Aluminum antacids
- Tricyclic antidepressants
- Antipsychotics
- Anticholinergics
- Antiparkinsonian drugs
- Opiate narcotics
- Seizure medication (phenobarbital, phenytoin, carbamazepine)
- Antihypertensive medications (e.g. calcium-channel blockers)
- Iron preparations
- Sympathomimetics (e.g. pseudoephedrine)
- Terbutaline
- Bismuth products (e.g. Pepto-Bismol)

History
The consistency of the movement and the ease with which stool is passed are more important than the frequency of bowel movements.
- Duration of constipation (recent or chronic problem)

- Recent change in pattern of defecation, consistency of stool or other features
- Any associated rectal blood, melena
- Diarrhea (overflow)
- Abdominal pain, cramping and bloating
- Difficulty or pain on defecation
- Ineffective or painful straining
- Time of most recent straining
- Fluid intake
- Dietary intake
- Activity and exercise patterns
- Current medication, previous and current use of laxatives
- Stressors and psyche
- Depression
- Eating disorders
- Pregnancy (current)
- Endocrine disorders (e.g. diabetes mellitus, hypothyroidism)
- Neurological disease (e.g. Parkinson's disease, multiple sclerosis)
- Collagen vascular disease (e.g. systemic sclerosis)

Physical Findings
- Usually no distress
- Client looks well
- Abdomen may be distended
- Bowel sounds normal but may be reduced in chronic constipation
- Bowel sounds may be normal to dull in lower quadrants
- Stool may be palpable in left or right lower quadrant
- Left and right lower quadrant may be tender
- Hard, pebbly stool in rectum, or rectum may be empty
- Hemorrhoids and anal fissures may be present

Differential Diagnosis
- Irritable bowel syndrome
- Diverticular disease
- Partial bowel obstruction
- Rectal fissure
- Anal fissure or hemorrhoids
- Physical inactivity
• Side effects of medications or laxative abuse
• Cancer of colon, rectum or other organ
• Diseases of the large bowel
• Endocrine problems (e.g. hypothyroidism)
• Neurological diseases (e.g. Parkinson's disease)

Complications
• Chronic abdominal pain
• Hemorrhoids
• Anal fissure
• Fecal impaction
• Fecal and urinary incontinence
• Urinary retention
• Inguinal hernia from straining
• Intestinal obstruction

Diagnostic Tests
Test stool for occult blood.

Management

Goals of Treatment
• Establish regular bowel function
• Eliminate contributing factors
• Identify and manage underlying disease
• Prevent and treat complications (e.g. fecal impaction, hemorrhoids, anal fissures, rectal prolapse, fecal incontinence, bowel obstruction)
• Eliminate need to strain and prevent adverse effects of straining (e.g. hernia, gastroesophageal reflux, coronary and cerebral dysfunction in the elderly, vasovagal)

Nonpharmacologic Interventions
• Client should increase dietary fluids to 1.5-2.0 L/day
• Client should increase dietary fiber to 20-30 g/day: bran, whole grains, fruits and vegetables should be encouraged; prune juice, stewed prunes and figs can be tried
• Encourage physical exercise if client is able
• Discontinue medications with constipating effects if possible
• Establish regular time for toileting to help develop a conditioned reflex for bowel action (e.g. immediately after breakfast)
• Encourage relaxation exercises for the pelvic floor and external anal sphincter muscles
• Advise client that bowel retraining may take months (patience and persistence are required and dietary changes must be maintained over the long term)

Pharmacologic Interventions
To relieve initial constipation, medications may be required. Avoid starting client on a long-term course of laxatives.

Acute Constipation
Step 1: Start a bulk-forming agent: psyllium hydrophilic mucilloid (A class drug), 1 tsp (5 mL) in 8 oz (250 mL) fluid bid or tid
Step 2: If bulk-forming agent not tolerated or ineffective, add or substitute osmotic saline laxative agents for a short period (3-4 days): stimulant laxatives such as bisacodyl (A class drug), 5-15 mg hs
or senna (A class drug), 2-4 tabs hs to bid
Step 3: If no relief, consult a physician regarding orders for: electrolytes or polyethylene glycol (B class drug) or Fleet® phosphosoda (oral Fleet®)
For clients with difficulty initiating evacuation, add: glycerin suppository (A class drug), 1 or 2 prn or Fleet® enema (A class drug) prn
When fecal impaction is present, disimpact as necessary. Use enemas (e.g. Fleet®, saline, oil retention). Follow up closely until regular bowel function is achieved.

Docusate sodium, a stool softener, is better than a laxative for use in situations where straining needs to be avoided for a prescribed period.

Chronic Constipation
The following medications may be used in conjunction with nonpharmacologic approaches if these interventions are unsuccessful after a 1-month trial:
Step 1: Regular use of bulk-forming agent: psyllium hydrophilic mucilloid (A class drug), 1 tsp (5 mL) in 8 oz (250 mL) fluid bid or tid
Step 2: Intermittent use of osmotic saline laxatives for short periods (e.g. 3-4 days): magnesium hydroxide (Milk of Magnesia) (A class drug), 1.2-3.2 g (15-40 mL) od
**Monitoring and Follow-Up**
Follow up regularly every 2-4 weeks until regular bowel function is achieved. Review and adjust dose of bulking agents to obtain a soft, formed stool.

**Referral**
Refer to a physician to arrange further investigation if
- Testing of stool for occult blood is positive
- Hemoglobin is low
- There is evidence of other organic disease
- This constipation represents a new change in bowel habit in a person > 50 years of age
- The constipation is not resolving with appropriate treatment.

Severe straining at stool or a continued sensation of rectal fullness even when rectum is empty warrants a more thorough evaluation.
Diarrhea

Definition
Change in bowel habits characterized by frequent loose or liquid stool (may be of large or small volume). Diarrhea is a symptom, not a diagnosis. A careful, accurate history and physical examination are mandatory to establish the underlying cause.

Causes

Acute Diarrhea
- Viral infection (most common cause): such as rotavirus, adenovirus or (less commonly) hepatitis A
- Bacterial infection: *Campylobacter*, *Clostridium difficile*, *Escherichia coli* (0157:H7), *Salmonella*, *Shigella*, *Yersinia*
- Inflammatory bowel disease (e.g. ulcerative colitis, Crohn's disease)
- Medications (e.g. antibiotics, antacids, laxatives)
- Parasitic infection (e.g. *Giardia*, hookworm, cryptosporidium, amebiasis)

During "spring break-up" and in late summer, community outbreaks of bacterial and parasitic origin diarrhea are common if water quality is poor. *E. coli* and parasites may be involved if there has been recent travel.

Chronic Diarrhea
- Poor nutrition
- Inflammatory bowel disease (e.g. ulcerative colitis, Crohn's disease)
- Malabsorption syndromes (e.g. lactase deficiency, post-abdominal surgery)
- Endocrine conditions (e.g. hyperthyroidism, diabetes mellitus)
- AIDS
- Irritable bowel syndrome
- Acute diverticulitis
- Fecal impaction (overflow)

History
- Sudden onset of frequent, loose, watery bowel movements
- Blood, pus or mucus may be present
- Melena
- Steatorrhea (fatty, greasy, bulky stool)
- Abdominal pain, possibly crampy
- Current or recently used medications
- Recent travel
- Dietary and fluid intake in past 24 hours
- Nausea or vomiting
- Fever
- Headache
- Thirst
- Decreased urine output (may be present if diarrhea is severe or prolonged)

If the client is passing bloody diarrhea, consider infection with *Shigella* or *Salmonella*, or inflammatory or ischemic bowel disease.

Physical Findings
- Temperature may be elevated (if cause is infectious)
- Heart rate may be increased (if dehydration, fever or metabolic derangement)
- Weight loss (if chronic)
- Blood pressure low if severely dehydrated
- Postural blood pressure drop if moderately dehydrated
- Client appears mildly to severely ill (depending on cause and severity)
- Mucous membranes may be dry
- Eyes may be sunken with dark circles underneath
- Sclera or skin may be jaundiced (in hepatitis)
- Skin may feel dry, turgor may be poor
- Abdomen may be slightly distended with gas
- Bowel sounds hyperactive
- Abdomen hyperresonant if excess gas is present
- Abdomen may be mildly tender in all areas
- Abdominal mass may be present (depending on underlying cause)
- Rectal exam reveals tenderness and mass

Differential Diagnosis
- Viral infection
- Bacterial infection
- Parasitic infection
- Excess consumption of alcohol or fruit
- Antibiotic use (current or recent)
- Laxative abuse
Irritable bowel syndrome
Inflammatory bowel disease
Fecal impaction with overflow diarrhea
AIDS
Malabsorption syndrome (e.g. lactase deficiency)

Complications
Dehydration
Systemic infection (sepsis)

Diagnostic Tests
Test stool for occult blood
Test stool for culture and sensitivity, ova and parasites, and C. difficile (if recent antibiotic therapy)
Test for HIV (in chronic diarrhea or if risk behaviors present)

Management
Goals of Treatment
Establish normal bowel function
Prevent complications (e.g. dehydration)
Avoid complications of antidiarrheal medications (e.g. constipation, toxic megacolon)

Appropriate Consultation
Consult a physician if the client is moderately or severely dehydrated.

Nonpharmacologic Interventions
Dietary Adjustments
Client should avoid coffee, alcohol, most fruits, vegetables, heavily seasoned foods
Client should stop eating dairy products (except yogurt, aged cheese) for 7-10 days
Client may need to stop solid foods for a brief period (6 hours) if stool is frequent and watery or if vomiting occurs in association with diarrhea
There is evidence that early reinstitution of a lactose-free general diet will decrease the duration and severity of diarrhea
Gradually reintroduce solid foods (e.g. salted crackers, dry toast or bread), and then move on to bland foods (e.g. baked potato, poultry, baked fish, noodles)
A combination of clear broths, oral rehydration solutions and a modest amount of hypotonic fluids (e.g. water, juices, soft drinks) may be the best strategy for managing acute diarrhea

Elderly and debilitated clients in particular are at risk for dehydration, and early use of oral rehydration fluids is recommended.

Water, juices and soft drinks do not replace electrolytes because they are low in sodium. Too much of these hypotonic fluids can lead to hyponatremia.

Client Education
Teach client to recognize symptoms and signs of dehydration and advise client to return to clinic if they occur
Witch-hazel cotton pads (Tucks) may provide relief to the raw perianal area
Teach client that proper hand washing prevents the spread of infection
Teach client how to prevent recurrent diarrhea (by boiling drinking water for at least 20 minutes)

Pharmacologic Intervention
Refer to Page 7, this section, Dehydration Management
Control nausea and vomiting if significant: dimenhydrinate (A class drug), 25-50 mg IM, single dose, then 50 mg PO q4-6h prn
Avoid antidiarrheals until diagnosis confirmed and infectious disease ruled out.
Antidiarrheals may help to relieve symptoms. loperamide hydrochloride (C class drug), 4 mg to start, then 2 mg after each loose bowel movement to a maximum of 16 mg/day, then 2-4 mg bid

Monitoring and Follow-Up
Monitor hydration, general condition and vital signs frequently until stable. Follow up in 24 hours (sooner if oral intake is not keeping up with losses).
Referral
Refer any client who
• is dehydrated by more than 6% to 10%, if he or she does not respond rapidly to rehydration therapy
• is elderly and has multiple medical problems
• is unable to tolerate fluids by mouth
• in whom bowel sounds are absent
• has abdominal tenderness or rebound tenderness
• has high fever and appears acutely ill.
Gastroesophageal Reflux Disease (GERD)

Definition
Reflux of gastric contents into the esophagus, which results in esophageal irritation or inflammation.

Causes
Presence of acidic stomach contents in the esophagus due to laxity of the lower esophageal sphincter.

Predisposing Factors
• Defective esophageal clearance, such as stricture, hiatal hernia, incompetent gastric sphincter
• Obesity
• Pregnancy
• Estrogen therapy
• Medications
• Tobacco use
• Alcohol use
• Genetic factors
• Hypersecretion of gastric acid
• Delayed gastric emptying

History
• Heartburn
• Retrosternal burning sensation radiating upward (may radiate as far up as the throat)
• Acidic stomach contents may be regurgitated
• Associated with large meals, lying down and bending over
• Often awakens client during the night
• May be associated with cough, sore throat, hoarseness, painful swallowing
• Hypersalivation (water brash)
• Aggravating factors identifiable
• Relief with antacids and sitting up
• Stress makes condition worse

Physical Findings
Mild epigastric tenderness may be present.

Differential Diagnosis
• Peptic ulcer disease
• Esophageal motility disorder
• Esophageal tumor
• Cardiac chest pain

Complications
• Esophagitis
• Esophageal ulcer
• Upper GI bleeding
• Esophageal stricture
• Nocturnal aspiration
• Barrett's esophagus
• Adenocarcinoma of esophagus

Barrett's Esophagus
People who have had regular or daily heartburn for more than 5 years may be at risk for Barrett's esophagus, a condition that develops in some people with chronic GERD or inflammation of the esophagus (esophagitis). In Barrett's esophagus, the normal cells that line the esophagus, called squamous cells, change into a type of cell not usually found in humans, called specialized columnar cells. Damage to the lining of the esophagus, by acid reflux, causes these abnormal changes.

Once the cells in the lining of the esophagus have become columnar cells, they will not revert to normal. The goal of treatment is to prevent further damage by stopping any acid reflux from the stomach.

An increase in cancer of the esophagus occurs. Because of the risk of cancer, people with Barrett's esophagus should be screened regularly for esophageal cancer.

Diagnostic Tests
• Stool for occult blood
• Hemoglobin level
• Refer to physician for test for Helicobacter pylori (by serology or breath test)

Management
Goals of Treatment
• Relieve symptoms
• Promote healing of the esophagus
• Prevent complications such as stricture, bleeding, Barrett's esophagus
• Prevent recurrence
Appropriate Consultation
Consult a physician if the following are detected:
• Weight loss due to severity or duration of symptoms
• Difficult or painful swallowing
• Sticking of solids or liquids
• Persistent vomiting
• Nocturnal cough or shortness of breath
• Anemia
• Stool positive for occult blood
• Client with new onset of symptoms

Nonpharmacologic Interventions
• Elevate the head of the bed using 4-6 inch (10-15 cm) wooden blocks
• Encourage weight loss (if appropriate)
• Eliminate (when possible) drugs that impair esophageal motility and lower esophageal sphincter tone (e.g. calcium-channel blockers, β-blockers, tricyclic antidepressants, anticholinergics, theophyllines)
• Offer smoking cessation

Client Education
• Counsel client about appropriate use of medications (dose, frequency)
• Recommend dietary modifications (decrease or eliminate coffee, tea, chocolate, alcohol, fatty foods, citrus fruits, mints)
• Recommend small, frequent meals to prevent overdistension of the stomach
• Recommend avoidance of eating for 2-3 hours before bedtime
• Recommend postural modifications (daytime and nocturnal) to prevent acid from entering the esophagus
• Recommend that client avoid bending at the waist or lying down immediately after a meal
• Recommend avoidance of tight-fitting clothing
• No tobacco

Pharmacologic Interventions
Antacids as needed to control symptoms:
aluminum hydroxide/magnesium hydroxide
(A class drug), 30 mL PO pc and hs, increase prn or
aluminum/magnesium/simethicone (A class drug), 30 mL PO pc and hs, increase prn
H2-receptor antagonists:
ranitidine (C class drug), 150 mg PO bid for 6 weeks
In elderly clients and those with reduced renal function, the doses should be one-half to one-quarter the usual doses.

Refer to physician if symptoms not controlled with H2-receptor antagonists for evaluation for proton pump inhibitors.

Proton Pump Inhibitors (by physician order)
Proton pump inhibitors (e.g. rabeprazole B class drug) are a class of drugs used to treat refractory symptoms of GERD. They are more effective for healing esophageal ulceration and maintain the remission of symptoms much better than H2-receptor antagonists. These drugs do not reverse Barrett's esophagus, but may prevent worsening of the disease.

Maintenance therapy for moderate to severe GERD is often needed, as the recurrence rate is high (75% to 90%). Cost and safety are concerns with long-term use of proton pump inhibitors. The lowest dose possible should be used.

Antireflux Surgery
Antireflux surgery is effective in controlling GERD in 90% of well-selected clients. Indications for surgery include intractable reflux esophagitis (in a young person) and major complications such as aspiration, recurrent stricture or major GI bleeding.

Monitoring and Follow-Up
Follow up in 2-3 weeks; if better, continue to treat for another 6-8 weeks.

Referral
Refer to a physician if symptoms are not controlled with therapy.
Peptic Ulcer Disease

Definition
An ulceration of the mucous membrane of the upper digestive tract. Usually refers to a duodenal or gastric ulcer.

Causes
Bacterial infection with Helicobacter pylori. NSAID

Risk Factors
• Severe stress
• Chronic gastritis
• Smoking
• Genetic factors

History
• Symptoms may be vague or absent, classical or atypical (some people with a duodenal ulcer have no symptoms, whereas some with ulcer-like symptoms have no ulcer)
• Chronic benign disease with exacerbations and remissions
• Epigastric burning, gnawing, heartburn
• Discomfort varies, from mild to severe
• Discomfort located near midline between xiphoid and umbilicus or in right upper quadrant
• Symptoms begin 1-3 hours after meals, when stomach becomes empty
• May awaken person from sleep
• Quickly relieved by food, milk or antacids
• Nausea may be present
• Melena or hematemesis indicates complications
• Assess use of alcohol, ASA, anti-inflammatory drugs, tobacco (smoking and chewing)
• Dietary habits

The natural history of a benign ulcer is that two-thirds will recur in the first year after treatment.

Physical Findings
Epigastric tenderness.

Differential Diagnosis
• Gastritis
• GERD
• Irritable bowel syndrome
• Malignant gastric ulcer

• Diverticulitis
• Pancreatitis

Complications
• Chronic blood loss, anemia
• Severe pain
• Sudden hemorrhage, which can lead to hypotension
• Perforation
• Obstruction of the gastric outlet
• Malnutrition

Diagnostic Tests
• Stool for occult blood
• Hemoglobin level
• Refer to physician for diagnostic testing to confirm presence of H. pylori

Management
Goals of Treatment
• Relieve pain
• Reduce stomach acid
• Promote healing
• Prevent complications

Appropriate Consultation
If condition not resolved, consult. Consult a physician if complications are identified or active bleeding is present (see "Gastrointestinal Bleeding," under "Emergencies of the Gastrointestinal System," below, this chapter).

Nonpharmacologic Interventions

Client Education
• Explain the nature of the disease and the expected outcome
• Counsel client about appropriate use of medications (dose, frequency, purpose and importance of compliance)
• Recommend small, frequent meals that are lightly spiced or not spiced at all
• Recommend avoidance of all foods known to increase pain (e.g. large fatty meals, very sweet foods)
• Recommend avoidance of all caffeinated beverages (tea, coffee, colas)
• Recommend avoidance of alcohol
• Recommend avoidance of ASA and other anti-inflammatory drugs
• Recommend tobacco cessation
• Counsel client about reducing stress at home and at work
• Teach client the signs of complications that should be followed up immediately

**Pharmacologic Interventions**

Antacids as needed to control symptoms: aluminum hydroxide/magnesium hydroxide or aluminum/magnesium/simethicone (*A class drug*), 30 mL PO 1 and 3 h pc, hs and prn

Reduce production of stomach acid: ranitidine (*C class drug*), 150 mg PO bid for 6 weeks

**Triple Therapy for H. pylori**

Anyone testing positive for *H. pylori* will need to undergo triple-drug therapy for eradication, as ordered by a physician.

**Monitoring and Follow-Up**

Follow up in 2 weeks to assess response to therapy. Follow up again in 4-6 weeks. Discontinue medications if symptoms have resolved.

**Referral**

Refer to a physician if there is no improvement with treatment or if complications develop.


Gallbladder Disease: Biliary Colic And Cholecystitis

Definition
The spectrum of gallbladder disease ranges from asymptomatic gallstones to biliary colic, cholecystitis, choledocholithiasis and cholangitis.

Cholecystitis is inflammation of the gallbladder caused by obstruction of the cystic duct, usually by a gallstone (calculous cholecystitis). The inflammation may be sterile or bacterial. The obstruction may be acalculous or caused by sludge.

Choledocholithiasis occurs when the stones become lodged in the common bile duct; from this, cholangitis and ascending infections can occur.

Causes

Biliary Colic
Gallstones temporarily obstruct the cystic duct or pass into the common bile duct.

Cholecystitis
The cystic duct or common bile duct becomes obstructed for hours, or gallstones irritate the gallbladder. Bacterial infection is thought to be a consequence, not a cause, of cholecystitis.

The most common organisms are E. coli, Klebsiella spp. and enterococci. Stones of the common bile duct (occurring in 10% of patients with gallbladder disease) are secondary (from the gallbladder) or primary (formed in the bile ducts).

Risk Factors
The phrase "fair, fat and fertile female" summarizes the major risk factors for gallstones. Although gallstones and cholecystitis are more common in women, men with gallstones are more likely to experience cholecystitis than women with gallstones. It is unknown if women who are pregnant or have multiple pregnancies are more likely to have gallstones or if they simply have more symptoms of the stones.

Some oral contraceptives and estrogen replacement therapy may increase the risk of gallstones.

Rates of gallstones, cholecystitis and stones of the common bile duct increase with age. Elderly clients are more likely to have asymptomatic gallstones that result in serious complications without gallbladder colic.

The causes of gallstones in teenagers are the same as for adults, and there is a higher prevalence among girls and during pregnancy.

History
Most gallstones (60% to 80%) are asymptomatic. Small stones are more likely to be symptomatic than large ones. Almost all patients experience symptoms before complications occur. Indigestion, belching, bloating and intolerance of fatty food are thought to be typical symptoms of gallstones; however, these symptoms are just as common in people without gallstones and frequently are not cured by cholecystectomy.

Biliary Colic
• 1-5 hours of constant pain, commonly in the epigastrium or right upper quadrant
• Pain may radiate to the right scapular region or back
• Client tends to move around to seek relief from pain
• Onset of pain occurs hours after a meal, frequently at night, waking the client from sleep
• Peritoneal irritation by direct contact with the gallbladder localizes the pain to the right upper quadrant
• Pain is severe, dull, or boring and constant (not colicky)
• Associated symptoms include nausea, vomiting, pleuritic pain and fever

Cholecystitis
• Persistence of the biliary obstruction leads to cholecystitis
• Persistent right upper quadrant pain
• The character of the pain is similar to the pain associated with gallbladder colic, except that it is prolonged and lasts for hours or days
• Nausea, vomiting and low-grade fever are more commonly associated with cholecystitis
Physical Findings
• Vitals signs parallel the degree of illness
• Clients with biliary colic have relatively normal vital signs
• Clients with cholangitis are more likely to have tachycardia or hypotension (or both) and fever
• Fever may be absent, especially in elderly clients
• Jaundice (in < 20% of patients)

Abdominal Examination in Gallbladder Colic and Cholecystitis
• Epigastric or right upper quadrant tenderness
• Murphy's sign (an inspiratory pause on palpation of the right upper quadrant; specific but not sensitive for gallbladder disease)
• Guarding on palpation
• Fullness in the right upper quadrant may be palpated

As in anyone with abdominal pain, a complete physical examination must be performed (including rectal and pelvic examinations in women). In elderly and diabetic clients, occult cholecystitis or cholangitis may be the source of fever, sepsis or changes in mental status.

Differential Diagnosis
• Appendicitis
• Acute bowel obstruction
• Ascending cholangitis
• Cholelithiasis
• Diverticular disease
• Gastroenteritis
• Hepatitis
• Inflammatory bowel disease
• Mesenteric ischemia
• Myocardial infarction
• Pancreatitis
• Bacterial pneumonia
• Eclampsia
• Hyperemesis gravidarum
• Urinary tract infection
• Renal calculi

Complications
Biliary Colic
• Cholecystitis

Acute Cholecystitis
• Perforation
• Gangrene
• Peritonitis
• Cholangitis
• Abscess
• Fistula
• Pancreatitis
• Ileus

Diagnostic Tests
The choice of laboratory tests will depend on whether the client is well enough to be treated as an outpatient or requires admission to hospital. The results of lab tests should be completely normal if the client has cholelithiasis or gallbladder colic.
• White blood cell (WBC) count and liver function tests (LFTs) (AST, ALT, bilirubin and alkaline phosphate levels) may be helpful in the diagnosis of cholecystitis
• An elevated WBC count is expected; however, a normal value does not rule out cholecystitis
• Bilirubin >3.5 µmol/L may indicate stone in the common bile duct or ascending cholangitis
• Mild elevation of amylase (up to 3 times normal level) may be present in cholecystitis, especially if there is gangrene
• Urinalysis
• Pregnancy test for women of childbearing age

Management Of Biliary Colic
Goals of Treatment
• Relieve pain, nausea and vomiting
• Prevent complications

Appropriate Consultation
Consult physician if pain does not resolve, if fever develops or if significant vomiting continues, as these symptoms indicate that a complication may be developing.

Nonpharmacologic Interventions
• Bed rest
• Clear fluids if vomiting
Client Education
• Explain disease process and prognosis
• Counsel client about appropriate use of medications (dose, frequency)
• Recommend low-fat food as tolerated, once pain resolves

Pharmacologic Interventions
Analgesia
Primary pain should be controlled with anticholinergic antispasmodics:
hyoscine butylbromide (B class drug), 10 mg IM q6h prn (max 100mg/day)
hyoscine butylbromide (C class drug), 10mg, 1-2 tabs, PO q6h (max 6 tabs/day)

Secondary pain should be controlled with meperidine; do not use morphine, which may increase tone in the Oddi’s sphincter:
meperidine (D class drug), 50-100 mg IM q3-4h prn

Consult physician for IV order

Antiemetics to relieve vomiting and nausea:
dimenhydrinate (A class drug), 25-50 mg IM q4-6h prn

Monitoring and Follow-Up
Monitor for a few hours. When nausea and vomiting have resolved, push clear fluids. Follow-up in 24 hours is recommended. If pain increases, fever develops, or the client is unable to tolerate intake by mouth because of vomiting, manage as for acute cholecystitis.

Management Of Cholecystitis
Goals of Treatment
• Relieve pain, nausea and vomiting
• Prevent complications

Appropriate Consultation
Consult physician if pain does not resolve, if fever develops or if significant vomiting continues indicating that a complication may be developing.

Adjuvant Therapy
For clients with severe pain prehospital care should include the following:

• Oxygen, if client is unstable on presentation
• IV therapy with normal saline, rate adjusted according to age, state of hydration and pre-existing medical problems

Nonpharmacologic Interventions
• Bed rest
• Nothing by mouth

Pharmacologic Interventions
Analgesia
Pain control should be given early, without waiting for the diagnosis or surgical consult. Primary pain control should be with anticholinergic antispasmodics:
hyoscine butylbromide (B class drug), 10 mg IM q6h prn (max 100mg/day)
Secondary pain control should be with meperidine; do not use morphine, which may increase tone in the Oddi’s sphincter:
meperidine (D class drug), 50-100 mg IM q3-4h prn

Antiemetics
dimenhydrinate (A class drug), 25-50 mg IM q4-6h
Meperidine and dimenhydrinate can be mixed in the same syringe, but should be used immediately.

Antibiotics
For mild cholecystitis, where inflammation is the primary process, antibiotics are not usually used. For acute cholecystitis (if client is febrile and acutely ill), draw a blood sample for culture and consult physician for IV antibiotics. For clients with allergy to penicillin use only metronidazole.

Monitoring and Follow-Up
Monitor pulse oximetry, vital signs (frequent), blood glucose, intake and output. Severe cholecystitis can evolve into sepsis or cholangitis, especially in diabetic or elderly clients in whom the diagnosis may be delayed.

Referral
Medevac as soon as possible; surgical consult is required.
Abdominal Hernia

Definition
Protrusion of part of the abdominal contents through a weakness in the abdominal wall.

Causes
• Weakness of abdominal wall muscles
• Predisposing factors: abdominal surgery, age, heavy lifting, chronic cough, chronic straining to pass stool or to urinate

History
• Presence of predisposing factor
• Soft, non-tender swelling on abdominal wall
• Pain absent
• Hernia usually appears when client is standing or when straining at bowel movements
• Hernia may disappear when client is lying down
• Pain indicates development of complications
• Inguinal (groin), abdominal (incisional) hernias common

Physical Findings
• Swelling may be seen in groin, may extend into scrotum
• Swelling may be seen on upper anterior thigh (femoral hernia) or abdomen
• Hernia disappears upon lying down, reappears upon standing up or bearing down
• Defect in abdominal wall may be palpable
• Hernia can be pushed back (reduced) through the opening into the abdomen

A painful or non-reducible inguinal mass should be considered a strangulated hernia until it is proven otherwise.

Differential Diagnosis
• Enlarged inguinal lymph node
• Hydrocele
• Testicular mass
• Dilated vein

Complications
• Strangulated hernia
• Bowel obstruction

Diagnostic Tests
None.

Management
Goals of Treatment
• Reduce swelling
• Support weak abdominal wall
• Relieve discomfort
• Prevent recurrence and further enlargement

Appropriate Consultation
Consult a physician immediately if the hernia is not reducible, if it is painful, or if it is associated with symptoms and signs of bowel obstruction. Consult a physician immediately if a painless femoral hernia is suspected.

Nonpharmacologic Interventions
With client lying down, attempt to reduce the inguinal or incisional hernia with gentle manual reduction.
• Do not use force
• Do not attempt to reduce a femoral hernia

Client Education
• Explain disease process, expected course and need for follow-up
• Demonstrate proper lifting techniques
• Teach client signs and symptoms of complications and advise him or her to return to the nursing station if these occur

Monitoring and Follow-Up
Follow as necessary until surgical consult takes place. Monitor for the development of bowel obstruction. See "Obstruction of the Small or Large Bowel," under "Emergencies of the Gastrointestinal System," below, this chapter).

Referral
Arrange elective follow-up with physician for surgical consult. Medevac if there are symptoms of strangulation or bowel obstruction.
Irritable Bowel Syndrome

**Definition**
Functional disturbance of intestinal motility.

**Cause**
- Largely unknown
- Predisposing factors: insufficient dietary fiber, emotional stress, food sensitivity, laxative abuse

**History**
- Usually begins before age 40
- More common in women
- Symptoms vague and long term
- Chronic condition with remissions and exacerbations
- Altered stool frequency and/or consistency
- Diffuse lower-abdominal pain or discomfort
- Pain of variable intensity; may persist for hours or days
- Looser, more frequent bowel movements may occur with onset of pain
- Pain exacerbated by meals, bowel movements or stress
- Pain relieved by defecation
- Weight loss, malaise, may have a fever
- Interference with daily activities
- No rectal bleeding or blood in stool
- White mucus frequently present

**Physical Findings**
- Client may appear quite well or in mild distress
- Abdomen may be distended
- Bowel sounds present and may be increased or decreased
- Colon may be tender and "rope-like"
- Compression of colon may reproduce symptoms

**Differential Diagnosis**
- Constipation
- Gastroenteritis
- Lactose intolerance
- Inflammatory bowel disease
- Drug-induced diarrhea or constipation
- Biliary colic

**Diagnostic Tests**
- Stool for occult blood
- Stool for culture and sensitivity, ova and parasites
- Hemoglobin level

**Management**

**Goals of Treatment**
- Relieve symptoms
- Establish regular bowel habits
- Identify or modify precipitating stresses

**Nonpharmacologic Interventions**

**Client Education**
- Recommend dietary modifications (e.g. regular meals, gradual increase of fiber)
- Recommend increase in fiber content of diet (e.g. raw bran, brown bread, popcorn, All-Bran, Puffed Wheat or Shredded Wheat cereal); when raw (miller's) bran is used, start with a small amount and increase gradually to 1/4 to 1/2 cup daily to avoid bloating and flatulence
- Recommend avoidance of foods that are known to cause symptoms (these vary from person to person)
- Recommend that client consume an adequate amount of fluid when using bulking agents
- Recommend elimination of nicotine and codeine-containing drugs
- Teach relaxation techniques and emphasize the importance of exercise to help with stress-induced symptoms
- Assist client to identify specific stress factors that exacerbate symptoms
- Assist client to gain insight into identifiable emotional factors
- Offer understanding and support, as this is an incompletely and poorly understood syndrome

**Pharmacologic Interventions**
Start a stool-bulking agent: psyllium hydrophilic mucilloid (*A class drug*), 1-2 tsp (5-10 mL) bid or tid with 8 oz (250 mL) fluid
**Monitoring and Follow-Up**

- Follow up in 1-2 weeks
- Adjust the dose of fiber depending on response
- Use less fiber temporarily if gas and bloating are prominent
- Use more fiber if there has been little clinical response

**Referral**

Refer to a physician if symptoms or signs of organic disease are present or if symptoms do not improve with management.
Diverticulitis

Definition
Inflammation and infection in one or more diverticula.

History
• Abdominal pain may present acutely, but more often develops over hours to days, with left lower quadrant pain
• Fever and chills
• Tachycardia
• Anorexia
• Nausea and vomiting

Physical Findings
• Fever
• Tachycardia
• Abdominal tenderness to palpation with possible rebound tenderness
• Palpable mass may be present, representing an abscess or inflammatory phlegmon
• Bowel sounds may be active if there is partial obstruction, or hypoactive or absent if peritonitis has developed
• Rectal exam may help to identify the abscess or inflammatory mass

Differential Diagnosis
• Appendicitis
• Inflammatory bowel disease
• Ischemic colitis
• Colon cancer
• Other causes of bowel obstruction
• Urologic or gynecologic disorders

Complications
• Abscess
• Perforation
• Fistula
• Peritonitis
• Sepsis

Diagnostic Tests
• Stool for occult blood
• Urinalysis

Management
Goals of Treatment
• Rest the bowel
• Relieve symptoms
• Prevent complications

Appropriate Consultation
Consult a physician.

Nonpharmacologic Interventions
• Nothing by mouth
• Nasogastric tube

Adjuvant Therapy
Start IV therapy with normal saline to maintain hydration in client with moderate to severe symptoms.

Pharmacologic Interventions
• Broad-spectrum antibiotics such as ampicillin, gentamicin, clindamycin or cefoxitin are used; consult a physician before starting IV antibiotics
• Antibiotics should be continued for 7-10 days

Referral
Medevac. Surgery may be required if there is peritonitis, with or without evidence of perforation, unresolved obstruction or development of a fistula. Other indications for surgical intervention are failure to improve after several days of medical treatment and recurrence after successful treatment.
Emergencies Of The Gastrointestinal System

Abdominal Pain (Acute)

History
The area of the pain, including its origin and pattern of radiation, time of onset, nature and associated symptoms, will frequently help in making the diagnosis. A menstrual history should be obtained.

Associated Symptoms
- Weight loss may indicate malignancy or malabsorption
- Vomiting may be associated with small-bowel obstruction or volvulus
- Diarrhea and constipation may suggest inflammatory bowel disease, cancer, constipation, malabsorption
- Melena or blood per rectum indicates GI bleeding, which may be associated with peptic ulcer disease, esophageal varices or colon cancer, or may be drug induced
- Check stool by hemoculture; if negative, consider foods (e.g. Kool-Aid, beets) or medicines (iron) as cause
- Jaundice may suggest pancreatic cancer (painless), hepatitis, hemolysis, sickle cell anemia (G6PD [glucose-6-phosphate dehydrogenase] deficiency), alcoholic hepatitis, choledocholithiasis or primary biliary cirrhosis
- Urinary symptoms (dysuria, frequency, urgency, hematuria)
- Renal problems often present with abdominal pain; consider urolithiasis, urinary tract infection or testicular torsion
- Sexual activity, last period, birth control use, history of sexually transmitted infection, vaginal discharge, spotting or bleeding: consider pregnancy or ectopic pregnancy, pelvic inflammatory disease, ovarian torsion or ruptured ovarian cyst
- Medications, especially digoxin, theophylline, steroids and tetracycline (for esophageal ulcers), analgesics, antipyretics, antiemetics, barbiturates, diuretics, alendronate (for esophageal ulcers)

Physical Examination

Vital Signs
- Signs of shock, infection (elevated temperature)
- Signs of dehydration, with dry mucous membranes and decreased skin turgor

Abdominal Examination

Inspection
Scaphoid appearance or distension, point of most severe pain, hernia, scars.

Auscultation
- High-pitched bowel sounds suggest obstructive process
- Absent bowel sounds suggest ileus

Palpation and Percussion
- Muscle rigidity (voluntary or involuntary)
- Localized tenderness, masses, pulsation, hernias, peritoneal irritation (cough or jumping may also elicit "rebound")
- Involuntary guarding
- Murphy's sign (right upper quadrant pain when breathing in and pressing over the liver)
- Liver dimension and spleen dimension
- Tenderness of costovertebral angle
- Pelvic exam in women
- Rectal exam to rule out GI bleeding, prostatitis, etc.
- Absence of rectal tenderness does not preclude or confirm diagnosis of appendicitis

Medical History
- Other major illnesses
- Prior surgery
- Prior studies performed for evaluation of abdominal problems
- Family history of similar complaints
Diagnostic Tests (If Available)

- Stool for occult blood
- Hemoglobin
- WBC count
- Urinalysis

- Pregnancy test for all reproductive-age females, unless status is post-hysterectomy
- Chest x-ray (if available) to rule out pneumonia
- ECG
Table 2: Differential Diagnosis of Abdominal Pain

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Usual location of pain</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis, subphrenic abscess, hepatic abscess</td>
<td>RUQ; may radiate to right shoulder</td>
<td>Elevated liver enzymes, Jaundice</td>
</tr>
<tr>
<td>Cholecystitis, cholelithiasis, cholangitis</td>
<td>RUQ, mid-epigastric region; radiates to back and right scapula</td>
<td>Sudden onset associated with nausea</td>
</tr>
<tr>
<td>Pancreatitis</td>
<td>Mid-epigastric region; radiates to back</td>
<td>May have signs of peritonitis</td>
</tr>
<tr>
<td>Duodenal ulcer or gastric ulcer</td>
<td>Mid-epigastric region, LUQ; radiation to back if posterior ulcer; peritonitis with perforation</td>
<td></td>
</tr>
<tr>
<td>Splenic hematoma or enlargement</td>
<td>LUQ</td>
<td>Hypotension and peritonitis if ruptured</td>
</tr>
<tr>
<td>Aortic aneurysm</td>
<td>Peri-umbilical, especially into back flanks; may present as epigastric or back pain, flank or hip pain</td>
<td>May be colicky; hypotension if ruptured</td>
</tr>
<tr>
<td>Appendicitis</td>
<td>Early; periumbilical; late: RLQ</td>
<td>May present with peritoneal signs, especially in elderly people</td>
</tr>
<tr>
<td>Crohn’s disease or ulcerative colitis</td>
<td>RLQ, but may be LLQ</td>
<td>Diarrhea (bloody in ulcerative colitis), cramps, elevated sedimentation rate</td>
</tr>
<tr>
<td>Mesenteric adenitis</td>
<td>RLQ</td>
<td>Pain secondary to enlarged mesenteric nodes from streptococcal pharyngitis</td>
</tr>
<tr>
<td>Spontaneous bacterial peritonitis</td>
<td>Generalized, with peritoneal signs</td>
<td>Usually in alcoholic people, people with indwelling catheters and those on dialysis</td>
</tr>
<tr>
<td>Diverticulitis</td>
<td>Generally LLQ, very rarely RLQ; may be generalized</td>
<td>Clinical diagnosis (pain + diarrhea, vomiting, fever)</td>
</tr>
<tr>
<td>Meckel’s diverticulum</td>
<td>Below or to left of umbilicus</td>
<td>May be recurrent; presents with rectal bleeding or intestinal obstruction</td>
</tr>
<tr>
<td>Urolithiasis or nephrolithias</td>
<td>Either flank; may radiate to labia or testicles</td>
<td>Colicky; may have blood in urine; need intravenous pyelogram</td>
</tr>
<tr>
<td>Cystitis</td>
<td>Suprapubic</td>
<td>Urinalysis may show blood and leucocytes</td>
</tr>
<tr>
<td>Gynecologic disease, including ovarian cyst, ovarian torsion, ectopic pregnancy, Mittelschmerz, PID</td>
<td>Pain in pelvis, either adnexal area; radiation to groin; may also radiate to right shoulder if free intraperitoneal bleeding</td>
<td>Pregnancy test, cervical cultures, ultrasonography to rule out ectopic pregnancy if this possibility exists</td>
</tr>
<tr>
<td>Metabolic disease such as diabetic ketoacidosis, Addison’s disease</td>
<td>Pain may be diffuse; may have guarding</td>
<td>Associated with nausea and vomiting</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>May mimic appendicitis</td>
<td>Cough and chest pain may also be present</td>
</tr>
<tr>
<td>Cardiac disease</td>
<td>May present as epigastric pain</td>
<td>ECG to rule out cardiac disease, especially if risk factors present; may be confused with esophageal reflux</td>
</tr>
</tbody>
</table>
Management

Initial Decision
Decide whether to admit and observe, discharge, or refer for surgical opinion.

Appropriate Consultation
Consult a physician if the diagnosis is unclear and the presentation appears serious.

Nonpharmacologic Interventions
• Nothing by mouth until diagnosis is clear
• Consider nasogastric tube for vomiting, bleeding or suspected bowel obstruction
• Consider Foley catheter

Adjuvant Therapy
• Start IV therapy with normal saline and hydrate accordingly

Pharmacologic Interventions
Choice of medication will depend on the presentation and the severity of the pain as judged by the client.

Monitoring and Follow-Up
• Monitor pain, vital signs, management and any associated fluid losses closely with intake and output

Referral
Medevac for evaluation if diagnosis is uncertain and the client's condition warrants urgent evaluation.
Pancreatitis (Acute)

Definition
Inflammation of the pancreas.

Causes
- Excessive or chronic alcohol abuse
- Recent alcohol binge
- Acute cholecystitis
- Abdominal trauma
- Penetrating duodenal ulcer

History
- Steady, boring abdominal pain
- Pain located in epigastrium and periumbilical area
- Pain radiates through to back, flanks, lower abdomen and chest
- Pain is relieved by sitting up and leaning forward, aggravated by lying down
- Nausea, vomiting, abdominal distension present
- History of biliary disease or gallstones
- Past or current use of thiazide diuretics, estrogen, azathioprine steroids, sulfasalazine

Physical Findings
- Temperature elevated
- Heart rate elevated
- Blood pressure may be low
- Postural blood pressure drop may be present
- Client anxious, in acute distress
- Distress increased when lying down
- Abdomen may be distended
- Bowel sounds reduced to absent (paralytic ileus)
- Respiratory findings may be present: basal crackles, left-sided atelectasis, pleural effusion
- Acutely tender with muscle guarding and rigidity
- Rebound tenderness present

Differential Diagnosis
- Peptic ulcer disease
- Severe gastritis
- Acute cholecystitis
- Lower lobe pneumonia
- Intestinal obstruction

Complications
- Hypotension
- Shock
- Paralytic ileus
- Sepsis
- Hyperglycemia
- Adult respiratory distress syndrome
- Death

Diagnostic Tests
- Blood glucose level (may be elevated)
- Urinalysis
- WBC count (if possible)

Management
Goals of Treatment
- Relieve symptoms
- Maintain hydration
- Prevent complications

Appropriate Consultation
Consult a physician for help with diagnosis and treatment plan, for pre-hospital care.

Nonpharmacologic Interventions
- Bed rest
- Nothing by mouth
- Insert a nasogastric tube
- Insert a urinary catheter

Adjuvant Therapy
- Start a large-bore IV (14- or 16-gauge) with normal saline; replace volume deficits (see "Shock," in chapter 14, "General Emergencies and Major Trauma")
- Adjust rate according to pulse, postural blood pressure drop, systolic blood pressure
- Aim for pulse < 100 bpm, systolic blood pressure >100 mm Hg

Pharmacologic Interventions
Analgesia:
meperidine (D class drug), IM or IV as per physician order

Antiemetics:
dimenhydrinate (A class drug), 50 mg IM q6h prn
Monitoring and Follow-Up

- Measure hourly urinary output; adjust IV rate to maintain urine output
- Monitor blood glucose (hyperglycemia is common)
- Monitor pulse and blood pressure frequently until the client's condition stabilizes--watch for shock

• Observe for alcohol withdrawal if a recent binge is a known cause of pancreatitis

Referral

Medevac as soon as possible.
Appendicitis

Definition
Inflammation of appendix.

Cause
Obstruction of the opening of the appendix by stool. Infection may occur later.

History
The following outlines the classic pattern for acute appendicitis; however, the client may complain of various forms of abdominal, rectal and back pain depending on the location of the appendix.
• Vague, diffuse periumbilical or epigastric pain
• Pain shifts within hours to right lower quadrant
• Anorexia
• Nausea
• Vomiting usually occurs a few hours after onset of pain, but may not be present
• Low-grade fever may be present
• Urinary frequency, dysuria and diarrhea may develop if tip of appendix irritates the bladder or bowel
• In women, date of the last normal menstrual period and any history of recent menstrual irregularity should be noted

Physical Findings
Presentation is variable, depending on whether the client presents early or late in the evolution of the disease process.
• Temperature mildly elevated
• Heart rate elevated (may be normal in early stage)
• Variable level of distress
• Client holds abdomen, walks slowly and slightly bent over
• Bowel sounds variable: hyperactive to normal in early stages; reduced to absent in later stage
• Localized tenderness in right lower quadrant
• Muscle guarding in right lower quadrant
• Rebound tenderness may be present
• Rectal exam: tenderness in right lower quadrant if tip of appendix is near the rectum

Differential Diagnosis
Appendicitis is known as the "great mimic." The actual signs and symptoms depend on the location of the appendix within the abdomen.
• Gastroenteritis
• Crohn's disease
• Stone in ureter
• Mittelschmerz (ruptured follicular cyst)
• Ectopic pregnancy
• Pelvic inflammatory disease
• Twisted ovarian cyst
• Pyelonephritis
• Biliary colic
• Cholecystitis
• Peptic ulcer disease

Complications
• Abscess
• Localized peritonitis
• Perforation
• Generalized peritonitis
• Sepsis

Diagnostic Tests
• WBC count, if possible
• Urinalysis

Management
Goals of Treatment
• Maintain hydration
• Prevent complications

Appropriate Consultation
Consult a physician as soon as possible.

Nonpharmacologic Interventions
• Bed rest
• Nothing by mouth

Adjuvant Therapy
• Start IV therapy with normal saline
• Adjust IV rate according to age and state of hydration
**Pharmacologic Interventions**
Analgesia:
*meperidine (D class drug), IM or IV as per physician order*
If transfer is delayed, discuss starting IV antibiotics as per physician order:

**Monitoring and Follow-Up**
Monitor vital signs and general condition frequently.

**Referral**
Medevac as soon as possible; surgical consult is required.
Obstruction Of The Small Or Large Bowel

**Definition**
Blockage of small or large bowel (partial or complete, mechanical or paralytic).

**Causes**
- Small bowel: strangulated hernia (40%), adhesions (30%), cancer, Crohn's disease
- Large bowel: cancer (70%), volvulus, diverticulitis, fecal impaction

**History**
- Pain
- Vomiting
- Inability to pass stool or gas
- Bloating
- Other symptoms, depending upon underlying disease process

The exact symptoms of obstruction depend on the location and severity of the obstruction. The higher the level of obstruction, the more acute and rapid the onset of symptoms.

**Small-Bowel Obstruction**
- Pain moderate to severe
- Intermittent waves of pain
- Relative comfort between waves of pain
- Vomiting frequent, violent, bilious when obstruction is high
- Vomiting feculent when obstruction is lower
- Abdominal bloating variable; prominent when obstruction is low
- Reduced rectal gas and stool
- Weakness

**Large-Bowel Obstruction**
- Pain moderately severe (generally less acute than in small-bowel obstruction)
- Colicky
- Distension present, occurs early, may be severe
- Vomiting usually late and infrequent, may be feculent
- Reduced or absent rectal gas and stool
- Sudden, severe pain characteristic of volvulus

**Paralytic Ileus**
- Obstruction of the bowel due to paralysis of the muscle of the bowel wall, caused by generalized peritonitis, any acute inflammation of the abdomen, severe chest injury or any acute illness
- Major symptom is distension, resulting in moderate discomfort
- Pain absent
- Frequent vomiting or regurgitation of gastric contents
- "Silent" distended abdomen on examination

**Physical Findings**
- Heart rate normal or increased
- Respiration normal or increased
- Blood pressure normal or low
- Postural blood pressure drop may be present
- Client appears mildly to severely ill
- Client doubles over with waves of pain in small-bowel obstruction
- Client pale, sweaty, anxious
- Various degrees of abdominal distension
- Hernia may be visible
- Contractions of bowel wall (peristalsis) may be seen
- Bowel sounds increased in early stages
- Peristaltic rushing, high-pitched tinkling sounds present
- Later, bowel sounds are diminished or absent
- Tenderness due to distension may be present
- Tender localized mass or hernia may be present
- Rebound tenderness and rigidity not present unless perforation, peritonitis or strangulation have occurred
- Rectal exam: blood or stool may be present, rectum may be empty
- Examine all hernial orifices, including both femoral rings

**Differential Diagnosis**
- Gastroenteritis
- Appendicitis
- Inflammatory bowel disease with distension
- Perforated ulcer
- Pancreatitis
Complications
- Perforation
- Peritonitis
- Strangulated segment of bowel
- Sepsis
- Hypotension, shock
- Death

Diagnostic Tests
- Stool for occult blood
- Urinalysis
- Hemoglobin (optional; may help with diagnosis and treatment)

Management
Goals of Treatment
- Relieve distension
- Maintain hydration
- Prevent complications

Adjuvant Therapy
- Start a large-bore IV (14- or 16-gauge) with normal saline; replace volume deficits
- Adjust IV rate according to pulse, postural blood pressure drop, blood pressure, state of hydration, age, pre-existing medical problems (see "Shock," in chapter 14, "General Emergencies and Major Trauma")
- Aim for pulse < 100 bpm, systolic blood pressure > 100 mm Hg

Pharmacologic Interventions
- If transfer is delayed, discuss starting IV antibiotics as per physician order.
- Analgesia may be necessary: meperidine (D class drug), IM or IV as per physician order

Monitoring and Follow-Up
Monitor ABC, vital signs, urinary output and general condition frequently.

Referral
Medevac as soon as possible.

Appropriate Consultation
Consult physician as soon as possible.

Nonpharmacologic Interventions
- Bed rest
- Nothing by mouth
- Insert a nasogastric tube, attach to low suction or to straight drainage
- Insert urinary catheter; measure hourly urinary output
Gastrointestinal Bleeding (Upper And Lower)

Definition
Sudden, rapid loss of blood from the gastrointestinal tract. GI bleeding is a complication of some other disease process.

Table 3: Causes of gastrointestinal bleeding

<table>
<thead>
<tr>
<th>Category</th>
<th>Upper GI bleeding</th>
<th>Lower GI bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflammatory</td>
<td>Peptic ulcer, severe gastritis, esophagitis, stress ulcer</td>
<td>Diverticulitis, Crohn’s disease, ulcerative colitis, enterocolitis</td>
</tr>
<tr>
<td>Mechanical</td>
<td>Mallory Weiss tear, hiatal hernia</td>
<td>Anal fissure, diverticulosis, hemorrhoids</td>
</tr>
<tr>
<td>Vascular</td>
<td>Esophageal varices, carcinoma</td>
<td>Carcinoma and polyps, blood dyscrasias</td>
</tr>
<tr>
<td>Neoplastic</td>
<td>Blood dyscrasias</td>
<td>Blood dyscrasias</td>
</tr>
<tr>
<td>Systemic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

History
- Usually a prior history of GI disease
- Hematemesis (vomiting of bright red blood or coffee-ground emesis)
- Melena (black, tarry stools)
- Hematochezia (passage of bright red blood from rectum)
- Sudden weakness or fainting
- Peptic ulcer disease: there may be a history of increasingly severe abdominal pain before onset of vomiting; vomiting will abruptly relieve pain

Physical Findings
- Signs of shock if bleeding is significant
- Pulse rapid and weak
- Respirations rapid
- Blood pressure low-normal or decreased
- Postural blood pressure drop
- Client pale and anxious
- Client weak and sweaty
- Bright red blood in vomitus or stool
- Bowel sounds initially hyperactive due to blood in bowel
- Bowel sounds may become reduced or absent
- Mild-to-severe tenderness may be present
- Signs of peritonitis may be present

Differential Diagnosis
Upper GI Bleeding
- Peptic ulcer
- Esophageal varices
- Severe gastritis

Lower GI Bleeding
- Diverticular disease
- Inflammatory bowel disease
- Cancer colon

Complications
- Hypotension
- Shock
- Peritonitis
- Death

Diagnostic Tests
- Measure hemoglobin
- Test stool for occult blood
- Check stool for gross blood

Management

Goals of Treatment
- Replace circulating blood volume

Appropriate Consultation
- Consult a physician as soon as possible.
Nonpharmacologic Interventions
• Bed rest
• Nothing by mouth
• Insert nasogastric tube and empty the stomach for upper GI bleeding
• Insert urinary catheter; monitor hourly urinary output

Adjuvant Therapy
• Oxygen prn; to keep oxygen saturation > 97%
• Large-bore IV (14- to 16-gauge) with normal saline
• Start a second IV line for volume replacement if there are signs of hypovolemia (see "Shock," in chapter 14 "General Emergencies and Major Trauma")

• Adjust IV rate according to estimated volume depletion, pulse rate, blood pressure, postural blood pressure drop and age

Monitoring and Follow-Up
Monitor ABC, vital signs and general condition closely, as active re-bleeding can occur.

Referral
Medevac as soon as possible.
Chapter 6 - Urinary And Male Genital Systems

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Assessment Of The Urinary And Male Genital Systems

Female Genital Tract
This examination is covered in chapter 13, "Women's Health and Gynecology."

History Of Present Illness And Review Of System

General
The following characteristics of each symptom should be elicited and explored:
- Onset (sudden or gradual)
- Chronology
- Current situation (improving or deteriorating)
- Location
- Radiation
- Quality
- Timing (frequency, duration)
- Severity
- Precipitating and aggravating factors
- Relieving factors
- Associated symptoms
- Interference with daily activities
- Previous diagnosis of similar episodes
- Previous treatments
- Efficacy of previous treatments

Cardinal Symptoms
In addition to the general characteristics outlined above, additional characteristics of specific symptoms should be elicited, as follows.

Urinary System
- Frequency of urination
- Amount of urine (large or small)
- Urgency (client's sense that he or she must void now, cannot wait)
- Dysuria and its timing during voiding (at beginning or end, throughout, internal versus external dysuria)
- Nocturia (new onset or increase in usual pattern)
- Retention
- Incontinence
- Colour and odor of urine
- Hematuria
- Colicky pain
- Pain in costovertebral angle, flank or abdomen
- Suprapubic pain
- Perineal, genital, groin or low-back pain

Male Genital System
- Difficulty in starting or stopping urinary stream
- Voluntary bearing down (straining) to urinate
- Nature of stream (speed, strength, volume)
- Post-void dribbling or post-void fullness
- Discharge from penis, itching
- Lesions on the external genitalia
- Genital, groin, suprapubic or low-back pain
- Testicular pain or swelling
- Painful intercourse
- Sexual orientation
- Number of sexual partners
- Libido
- Erectile dysfunction
- Sexual practices, including risk behaviors (e.g. unprotected oral, anal or vaginal intercourse)
- Fertility (number of children)
- History of sexually transmitted infection (STI), including HIV and hepatitis B
- Testicular self-examination (frequency, regularity)
- History of hydrocele, epididymitis, prostatism, varicocele, hernia, undescended testis, spermatocele, recent vasectomy

Other Associated Symptoms
- Fever, chills, malaise
- Nausea, vomiting
- Diarrhea, constipation
- Decrease in appetite
- Change in sleep pattern

Medical History (Specific To Genitourinary System)
- Cystitis, pyelonephritis
- Renal disease
- Congenital structural abnormalities in the genitourinary (GU) tract
- Renal stones
• Recent onset of or increase in sexual activity
• Recent GU tract instrumentation (e.g. catheter, urethral dilatation, cystoscopy)
• Menopause (with no hormone replacement therapy)
• Use of tampons, douches
• Diabetes mellitus
• Immunocompromised
• STI (repeated)
• Sexual abuse
• Allergies
• Exposure to chemical irritants
• Medications (e.g. immunosuppressants, oral contraceptives, antihypertensives, antipsychotics)
• Risk behaviors (e.g. unprotected sex, alcohol or drug abuse, use of illicit injection drugs)

**Family History (Specific To Genitourinary System)**
• Urinary tract infections (e.g. due to environmental sensitivities or structural abnormalities)

• Renal disease (e.g. renal cancer, polycystic kidneys)
• Diabetes mellitus
• Kidney stones

**Personal And Social History (Specific To Genitourinary System)**
• Personal hygiene, toileting habits
• Sexual practices (risk behaviors, sexual orientation)
• Symptomatic sexual partner
• Use of contraceptive creams, foam, condoms, etc.
• Use of bubble bath, douches
• Tight-fitting underwear or other clothing
• Multiple sexual partners
• Disruption in sex life (from GU symptoms)
• Fear, embarrassment, anxiety
• Missing work, school or social functions because of GU symptoms (e.g. incontinence)
Physical Examination Of The System

General
• Apparent state of health
• Appearance of comfort or distress
• Colour (e.g. flushed, pale)
• Nutritional status (emaciated or obese)
• Match between appearance and stated age

Remember to also examine the following areas as part of your assessment:
• Head, eyes, ears, nose, throat: assess for pharyngitis and conjunctivitis (chlamydial infection, gonorrhea)
• Skin: assess for skin lesions, rashes, polyarthralgias of systemic gonorrhea and hydration status

Vital Signs
• Temperature
• Heart rate
• Respiratory rate
• Blood pressure

Urinary System (Abdominal Examination)
Inspection
• Previous abdominal or flank surgical scars
• Edema (facial, peripheral)

Palpation
• Suprapubic tenderness
• Bladder distension
• Abdominal tenderness or masses
• Costovertebral angle tenderness
• Enlargement of kidney (normal kidneys are usually not palpable unless client is thin)
• Inguinal nodes or swellings

Percussion
• Suprapubic or costovertebral angle tenderness
• Level of kidney
• Bladder distension

Male Genital Tract
Inspection
• Penis, scrotum and pubic area: inflammation, discharge, lesions, swelling, asymmetry, changes in hair distribution, nits, warts
• Rectum: lesions, discharge, swelling, hemorrhoids
• Inguinal and femoral areas (for hernia)

Palpation
• Penis: tenderness, induration, nodules, lesions
• Testes and scrotal contents: size, position, atrophy of testes, tenderness, swelling, warmth, masses, hydrocele
• Rectum: anal sphincter tone, rectal wall tumors, prostate gland
• Prostate: size, shape, contour, consistency, tenderness or nodules
• Superficial inguinal ring (for hernia)
• Inguinal and femoral areas (for hernia)

Laboratory Evaluation
• Urine: colour, cloudy or clear
• Dipstick testing: blood, protein, white blood cells (WBC), nitrites, pH
• Microscopic (spun urine): white and red blood cells, bacteria or casts, epithelial cells
• Culture and sensitivity of urethral discharge or prostatic secretions
Common Problems Of The Male Genitourinary System

Benign Prostatic Hyperplasia

**Definition**
Benign enlargement of prostate gland, which may result in obstruction of the bladder outlet.

**Causes**
- Unknown
- Predisposing factor: age > 55 years

**History**
Urinary symptoms occur when the prostate gland has enlarged to a size that produces partial obstruction of the bladder outlet.

- Continued sense of bladder fullness even after voiding
- Frequent urination in small amounts
- Sense of urgency
- Loss of stream force
- Hesitancy
- Straining to start flow
- Overflow incontinence
- Post-void dribbling
- Nocturia
- Hematuria may be an early symptom.
- Urinary tract infection or urinary retention may be the presenting complaint.

Table 1: American Urological Association symptom index for benign prostatic hyperplasia

<table>
<thead>
<tr>
<th>Questions to be answered</th>
<th>Not at all</th>
<th>Less than one time in five</th>
<th>Less than half the time</th>
<th>About half the time</th>
<th>More than half the time</th>
<th>Almost always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Over the past month, how often have you had a sensation of not emptying your bladder completely after you finish urinating?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. Over the past month, how often have you had to urinate again in less than 2 hours after you finished urinating?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. Over the past month, how often have you found you stopped and stopped several times when you urinated?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. Over the past month, how often have you found it difficult to postpone urination?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. Over the past month, how often have you had a weak urinary stream?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. Over the past month, how often have you had to push or strain to begin urination?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. Over the past month, how many times did you most typically get up to urinate from the time you went to bed at night until the time you got up in the morning?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

- sum of 7 circled numbers equals the symptom score
- Interpretation 0-7 = Mild - Candidate for watchful waiting with periodic evaluation
  8-19 = Moderate - Candidate for treatment options
  20-35 = Severe - Candidate for treatment options
Physical Findings
- Abdomen: bladder may be enlarged if acute urinary retention present; enlarged bladder may be palpable
- Rectal exam: prostate gland enlarged
- Prostate: normal consistency, top or margins may not be palpable, median sulcus may be indistinct

The clinical size of the prostate gland correlates poorly with the severity of symptoms. A client with mild clinical enlargement may present with very troublesome symptoms.

Differential Diagnosis
- Cystitis
- Cancer of the prostate
- Bladder tumor
- Calculi
- Prostatitis (chronic)
- Urethral stricture

Complications
- Recurrent urinary tract infections
- Acute urinary retention
- Hemorrhoids or hernias caused by straining with urination
- Renal damage secondary to chronic obstruction

Diagnostic Tests
- Obtain urine for urinalysis (routine and microscopy, culture and sensitivity)
- Rule out infection, hematuria and glycosuria
- Determine creatinine level
- Prostate surface antigen (PSA): use screening test according to NWT PSA CPG (March 2002) found in Laboratory Manual or refer to Clinical Practice Information Notice (2002-04-19)

Management
Goals of Treatment
- Improve or eliminate symptoms
- Prevent the complications of long-term obstruction of bladder outlet (e.g. urinary tract infections, bladder stones, hydronephrosis)

Appropriate Consultation
Consult a physician if client's symptoms are severe and bothersome enough that he wants immediate treatment or if there is hematuria, nodularity of the prostate or unexpected back pain to rule out prostatic carcinoma.

Nonpharmacologic Interventions
- Instruct client to avoid fluids -- especially tea, coffee and alcohol -- before bedtime, as they tend to cause diuresis in the night
- Review any medications that the client is taking; discontinue if possible
- Cold remedies with decongestants, antihistamines, anticholinergics, antipsychotics, antidepressants and anxiolytics can cause poor bladder emptying and increase obstruction of the bladder outlet
- Advise client to report any sudden change in symptoms for re-evaluation

Pharmacologic Interventions
To improve symptoms, as ordered by physician

Monitoring and Follow-Up
If symptoms are mild, arrange elective follow-up with a physician. Client's symptoms should be monitored every 6 months, and a digital rectal exam performed annually. If symptoms are moderate to severe, refer for consultation (see "Referral," below).

Referral
Refer for urological consultation if symptoms are moderate to severe, causing inconvenience to the client, or if there are complications.
**Epididymitis**

**Definition**
Bacterial infection of epididymis.

**Causes**
- Client ≤ 35 years of age: usually an STI (*Neisseria gonorrhea, Chlamydia*)
- Client > 35 years of age: usually caused by urinary tract pathogen (*Escherichia coli, Klebsiella, Proteus*) or tuberculosis (TB)
- Risk factors in older age group: urinary tract infection, outflow obstruction, prostatic infection, instrumentation of the lower GU tract (e.g. catheterization), STI, prostatic surgery

**History**
- Unilateral scrotal pain and swelling
- Elevation of scrotum may provide relief of pain
- Fever, chills, malaise may be present
- Symptoms of cystitis or urethritis may be present (frequency, urgency, dysuria)

**Physical Findings**
- Temperature may be elevated
- Moderate distress
- Client walks slowly and carefully, sometimes holding scrotum
- Unilateral scrotal swelling and redness
- Urethral discharge may be present
- Scrotum acutely tender and warm to touch
- Epididymis enlarged, cord-like and acutely tender in early stages

**Differential Diagnosis**
- Testicular torsion - very important to rule out
- Infected sebaceous cyst, folliculitis
- Trauma
- Mumps orchitis
- Testicular tumor
- Spermatocele
- Hydropcele
- Varicocele
- Tuberculosis

**Complications**
- Spread of infection to testis
- Abscess
- Sterility

**Diagnostic Tests**
- Urinalysis (routine and microscopy, culture and sensitivity)
- Urethral swabs for culture (*N. gonorrhea and Chlamydia*)
- HIV, Hepatitis B testing
- RPR testing

**Management**
In general, mild infections are treated on an outpatient basis; more severe infections, which are associated with fever and chills, require inpatient care.

**Goals of Treatment**
- Relieve symptoms
- Prevent complications of infection
- Prevent recurrence

**Mild Infection**

**Appropriate Consultation**
Consult a physician if there is concern about underlying non-infectious pathology, especially in a client > 35 years of age, or if symptoms are moderate to severe.

**Nonpharmacologic Interventions**
- Bed rest during acute phase (1-2 days)
- Elevation of scrotum to relieve pain
- Client should use a scrotal support when ambulatory
- Ice should be applied to scrotum for 20 minutes q2-3h to relieve pain
- Client should avoid heavy lifting, straining with stool and sexual intercourse during acute phase
- Advise client to return to the clinic for reassessment if symptoms worsen
**Client Education**

- Explain disease process and expected course
- Counsel client about appropriate use of medication (dose, frequency, side effects, completion of entire course prescribed)
- Counsel client about preventing spread of STIs to sexual partners

**Pharmacologic Interventions**

Analgesia and antipyretics for fever and pain:  
*acetaminophen (A class drug), 500 mg, 1-2 tabs PO q4-6h prn*

Antibiotics for young client with sexually transmitted infection (direct observed therapy by nurse): (Canadian STD Guidelines 1998 edition)  
*cefixime (A class drug), 400 mg, 2 tabs PO stat and one of the following:*
  - *azithromycin (C class drug), 1 g PO (single dose)*
  - *tetracycline (A class drug) 500mg PO qid for 10 days*
  - *doxycycline (A class drug) 100mg PO bid for 10 days*

For clients with allergy to cephalosporins or tetracycline:  
*erythromycin (C class drug), 500 mg PO qid for 10 days*

May also give:  
*ceftriaxone (B class drug) 250mg IM (single dose)*

Antibiotics for client with nonsexually transmitted infection:  
*co-trimoxazole (C class drug), 800/160 mg PO bid for 14 days*  
*or cephalexin (C class drug), 250 mg PO qid for 14 days*

**Monitoring, Follow-Up and Referral**

- Follow up in 48 hours and note response to therapy
- Follow up again in one week or when the course of antibiotics is completed

**Severe Infection**

**Appropriate Consultation**
Consult a physician regarding choice of IV antibiotics.

**Non pharmacologic Interventions**

- Bed rest
- Ice packs should be applied to scrotum

**Pharmacologic Interventions**

Start IV therapy with normal saline to keep vein open.

Analgesia and antipyretics for fever and pain:  
*acetaminophen (A class drug), 500 mg, 1-2 tabs PO q4-6h prn*

For relief of moderate to severe pain:  
*acetaminophen with codeine 30mg (C class drug), 1-2 tabs PO q4h prn*

Antibiotics as per physician order.

**Monitoring, Follow-up and Referral**
Medevac as soon as possible.
Prostatitis (Acute)

Definition
Acute infection of the prostate gland.

Causes
The same organisms that cause cystitis (E. coli, Proteus, Klebsiella).

Risk Factors
• Urinary tract infection
• Prostatic calculi
• Age > 50 years

History
• Abrupt onset of fever and chills
• Genital pain (midline and achy)
• Pain in sacrum and low back may be present
• Dysuria, frequency, urgency (all symptoms of cystitis), nocturia
• Symptoms of bladder-neck obstruction may be present
• Flow and stream may be abnormal
• Pain with bowel movements
• Post-ejaculation pain
• Loss of libido

Physical Findings
• Temperature may be elevated
• Heart rate may be elevated
• Client in moderate-to-severe distress, may appear acutely ill
• Client walks slowly, with legs apart
• Bladder may be visibly distended on abdominal inspection
• Prostate gland enlarged, acutely tender, warm, with boggy consistency
• Small amounts of pus may be expressed from urethra
• Urine may be cloudy or clear
• Dipstick test: blood and protein may be present
• Microscopic examination of urine: bacteria, WBC and a few red blood cells (RBC) may be present

Differential Diagnosis
• Benign prostatic hyperplasia with urinary tract infection
• Epididymitis
• Urethritis
• Cystitis
• Pyelonephritis
• Malignancy

Complications
• Epididymitis
• Pyelonephritis
• Acute urinary retention
• Sepsis
• Abscess
• Chronic prostatitis

Diagnostic Tests
• Urinalysis (routine and microscopy, culture and sensitivity)
• Urethral swabs for culture (N. gonorrhea and Chlamydia) if an STI is suspected (because of history) or a urethral discharge is detected
• HIV testing
• RPR testing

Management
If the symptoms are mild to moderate, treat on an outpatient basis. If the symptoms are severe and the client appears acutely ill, inpatient care is required.

Goals of Treatment
• Relieve symptoms
• Prevent complications

Appropriate Consultation
Consult a physician, especially if the symptoms are severe or the client appears systemically unwell.

Nonpharmacologic Interventions
• Bed rest.
• Increase fluid for adequate hydration
**Pharmacologic Interventions**

**Mild to Moderate Symptoms**

Antibiotics:
- cotrimoxazole *(A class drug)*, 800/160 mg bid for 21 days
- or
- ciprofloxacin *(B class drug)* 500mg bid x 21 days.

If recurrent prostatitis may need 6 weeks.

**Severe Symptoms**

IV therapy as per physician order

Manage fever and pain:
- acetaminophen *(A class drug)*, 500 mg, 1-2 tabs PO q4h prn

**Monitoring and Follow-Up**

- Watch for distended bladder
- If the client is unable to void and has a distended bladder, have him sit in a tub filled with warm water and attempt to void into the water
- Do not catheterize See "Acute Urinary Retention," this chapter, if treatment as described here is not successful.

**Referral**

Medevac as soon as possible if symptoms are severe.
Balanitis

Definition
Inflammation of glans penis.

Causes
• Allergic reaction (e.g. to condom latex, contraceptive jelly)
• Fungal (e.g. Candida albicans) or bacterial (e.g. Streptococcus) infection
• Risk factor: presence of foreskin/phimosis

History
• Penile pain
• Dysuria
• Drainage at site of infection
• Erythema
• Swelling of prepuce
• Ulceration
• Plaques

Physical Findings
• Redness, swelling of the glans penis
• Discharge around glans

Differential Diagnosis
• Leukoplakia
• Lichen planus
• Psoriasis
• Reiter's syndrome

Complications
• Urinary meatal stenosis
• Premalignant changes resulting from chronic irritation
• Urinary tract infection

Diagnostic Tests
Sample any discharge for culture and sensitivity.

Management

Goals of Treatment
• Relieve symptoms
• Prevent recurrence

Nonpharmacologic Interventions
• Warm compresses or sitz baths
• Local hygiene: ensure foreskin is easily retractable

Pharmacologic Interventions
Start topical therapy. Choice depends on whether you think it is a bacterial or a fungal infection or a dermatitis.

Fungal
clotrimazole 1% (A class drug), bid on affected area
or
nystatin (A class drug), bid to qid on affected area

Bacterial
bacitracin ointment (A class drug), qid on affected area

Dermatitis
hydrocortisone 1% ointment (A class drug), qid on affected area

Follow up and Referral
If rapid improvement does not occur with topical treatment, refer to physician.
If phimosis, refer immediately to physician.
Common Problems Of The Urinary System

Asymptomatic Bacteriuria

**Definition**
Presence of bacteria in urine without symptoms.

**Causes**
- Anatomic structure (more common in women because the urethra is short and located close to the vagina)
- Hormonal changes (e.g. pregnancy, oral contraceptives)
- Relaxation of pelvic muscles (in elderly clients)
- Chronic prostatitis
- Contamination of specimen
- Indwelling catheters

**History**
- No urinary complaints
- Usually discovered on routine examination of urine
- Common in women 20-50 years of age
- Chronic low-grade prostatitis often present in men > 50 years of age
- Common in elderly clients and those with an indwelling urinary catheter

**Physical Findings**
Normal.

**Laboratory Findings**
- Urine: clear
- Dipstick test: normal
- Microscopic examination: bacteria evident
- Culture: positive in 24-48 hours

Ensure that the specimen is a properly collected sample of midstream urine.

**Management**

**Goals of Treatment**
- Recognize the significance of asymptomatic bacteriuria in the various subgroups (prenatal, immunocompromised, elderly)
- Eradicate bacteria from GU tract in pregnant women

**Client Education**
- Recommend adequate fluid intake to flush bacteria from the bladder and prevent stasis of urine (6-8 glasses of fluid per day)
- Instruct client about proper hygiene (wiping from front to back)
- Teach client the signs and symptoms of acute infection and advise client to return to the clinic if these occur

**Pharmacologic Interventions**

**Pregnant Women**
Treat all pregnant women with this condition to ensure resolution of the bacteriuria:

*amoxicillin (C class drug), 250-500 mg PO tid for 7 days*

If not sensitive to amoxicillin, consult physician for alternate drug treatment.

For clients with allergy to penicillin:

*nitrofurantoin (C class drug), 100 mg PO bid for 7 days*

**Other Groups: Older Men with Benign Prostatic Hyperplasia**
Ask if there has been any change in symptoms, however small. If symptoms have increased, treat as for cystitis (see below); otherwise repeat urinalysis (routine and microscopy, culture and sensitivity).

**Clients with Urinary Catheter**
Consult with a physician, who may decide that condition may be left untreated. Antibiotic therapy would only encourage the growth of resistant strains of bacteria.

**Elderly Clients**
Antibiotic treatment is not needed. Simple measures such as increasing fluid intake, proper wiping, regular toileting and use of a commode help to reduce the bacterial numbers.
Healthy Non-Pregnant Women
If there have been no GU problems in the past and there are currently no symptoms, the problem is probably only contamination. Repeat the urinalysis (routine and microscopy, culture and sensitivity). Client education as above for nonpharmacologic interventions.
Cystitis

Definition
Bacterial infection of the bladder.

Causes
• E. coli (most common organism, in 80% to 0% of cases)
• Also Klebsiella, Pseudomonas, group B Streptococcus and Proteus mirabilis, Chlamydia

Risk Factors
• Female
• Poor perineal hygiene
• Diabetes mellitus
• Urinary instrumentation (e.g. catheter)
• Neurogenic bladder (because of stroke or multiple sclerosis)
• Congenital abnormality of GU tract
• Renal calculi
• Tumor
• Urethral stricture
• Pregnancy
• Increased sexual activity (in women)
• Use of spermicides, diaphragm
• Prostatic hypertrophy
• Immunocompromise (e.g. HIV infection)

History
• Dysuria
• Frequent urination, small amounts
• Urgency
• Suprapubic discomfort
• Rapid onset

In women, note presence of vaginal discharge, menstrual flow and use of a diaphragm.
In men, note presence of urethral discharge or symptoms suggestive of benign prostatic hyperplasia.

Physical Findings
• Temperature may be elevated
• Mild-to-moderate suprapubic tenderness
• Prostate may be enlarged

Laboratory Findings
• Urine: cloudy, concentrated
• Dipstick test: blood, protein and leucocytes in urine, nitrite positive
• Microscopic (spun urine): WBC, RBC and bacteria may be present

Differential Diagnosis
• Urethritis
• Vulvovaginitis
• Urinary calculi
• Renal TB
• STI
• Benign prostatic hyperplasia
• Diabetes mellitus
• Chronic prostatitis

Complications
• Ascending infection (pyelonephritis)
• Chronic cystitis

Diagnostic Tests
• Urinalysis (routine and microscopy, culture and sensitivity) only if the client is known to have an abnormality of the GU tract, if there is diagnostic uncertainty or if the client is pregnant. Otherwise, empiric antibiotic therapy is appropriate.
• Urine for culture and sensitivity if there is failure to respond to empiric therapy or a relapse occurs less than a month after therapy.
• Vaginal swab for analysis (routine and microscopy, culture and sensitivity) prn.
• Swabs for N. gonorrhoea and Chlamydia if an STI is suspected.
• Blood glucose level if symptoms suggest diabetes mellitus.

Management
Goals of Treatment
• Relieve symptoms
• Eradicate bacteria from the bladder

Client Education
• Counsel client about appropriate use of medications (dose, frequency, side effects, need to complete entire course of medications)
• Recommend increasing fluid intake (to 8-10 glasses per day)
• Instruct client in proper perineal hygiene (wiping from front to back) to prevent recurrence
• Recommend triple voiding (i.e. voiding before and immediately after intercourse, then drinking a large glass of water and voiding again within 1 hour) if client is a sexually active woman with recurrent cystitis. This process flushes out any organisms that may enter the urethra during intercourse.

**Pharmacologic Interventions**
Uncomplicated cystitis should be treated with a 10-day course of antibiotics:
- **cotrimoxazole (C class drug)** 800/160 mg PO bid
- **nitrofurantoin (C class drug)**, 50 mg PO qid (or 100mg bid)
- or **amoxicillin (C class drug)**, 250-500 mg PO tid

Cystitis in pregnancy should be treated with a 7-day course of antibiotics:
- **amoxicillin (C class drug)**, 250-500 mg PO tid
  If not sensitive to amoxicillin, consult with physician for alternate treatment.
  Nitrofurantoin is contraindicated near term and during labor. Contact a physician for help in choosing an antibiotic if the client is allergic to penicillin or is near term.

**Monitoring and Follow-Up**
• If symptoms do not begin to resolve in 72 hours or if symptoms progress despite treatment, client should return to the clinic for reassessment
• Arrange follow-up after the completion of therapy and repeat the urinalysis and culture to ensure resolution of cystitis

**Referral**
Clients with chronic or recurrent cystitis should be referred to a physician. Men ≥ 50 years of age who present with a true (culture-positive) urinary tract infection for the first time should also be referred to a physician for further evaluation.
Pyelonephritis

**Definition**
Bacterial infection of the collection system of the kidney.

**Causes**
- *E. coli* (most common)
- Also Enterobacter, Klebsiella, Pseudomonas and Proteus (among others)
- In unresolving pyelonephritis, suspect TB of the kidney

**History**
- Flank pain
- Fever, shaking chills
- Nausea and vomiting
- Dysuria, frequency, urgency
- Abdominal pain

**Physical Findings**
- Temperature elevated
- Heart rate may be elevated
- Blood pressure may be mildly elevated
- Client appears moderately-to-acutely ill
- Mild, generalized abdominal discomfort
- Marked or severe pain with deep abdominal palpation of kidney
- Marked or severe costovertebral angle tenderness with percussion over kidney

**Laboratory Findings**
- Urine: cloudy, dark or bloody
- Dipstick test: positive for WBC, blood and nitrates, possibly protein
- Microscopic examination (spun urine): WBC, RBC, bacteria

**Differential Diagnosis**
- Pneumonia
- Acute cholecystitis with fever
- Appendicitis
- Acute pancreatitis

**Diagnostic Tests**
- Obtain urine for urinalysis (routine and microscopy, culture and sensitivity)

**Management**
- **Early or mild** infections may be treated on an outpatient basis. **Moderate or severe** infections usually require inpatient treatment.

**Goals of Treatment**
- Eradicate bacterial infection
- Prevent complications

**Appropriate Consultation**
- **Moderate or Severe Infection**
  - Consult a physician regarding IV antibiotics
  - If unable to consult, start empiric IV antibiotic therapy

**Adjuvant Therapy**
- **Moderate or Severe Infection**
  - Start IV therapy with normal saline
  - Adjust IV rate according to age and other medical problems (e.g. diabetes mellitus, heart disease)

**Nonpharmacologic Interventions**
- **Mild Infection**
  - Increase fluid intake (to 8-10 glasses of fluid per day)
  - Bed rest until symptoms improve

**Client Education**
- Counsel client about appropriate use of medications (dose, frequency, completion of entire course of antibiotics)
- Instruct client about proper hygiene to prevent recurrence of infection

**Pharmacologic Interventions**
- **Mild Infection**
  - Early or mild infections may be treated on an outpatient basis.
  - Oral antibiotics--use one of the following for 10-14 days:
    - cotrimoxazole (*C class drug*) 800/160 mg PO bid
    - ciprofloxacin (*B class drug*) 500mg PO bid for 14 days
  - or
amoxicillin (C class drug), 1g PO stat then 500 mg PO tid

Empiric therapy with amoxicillin will be 20% less effective than with cotrimoxazole because of resistant strains of E. coli, but this is the best choice if there is an allergy to sulfa drugs.

Analgesia and antipyretics:
acetaminophen (A class drug), 500 mg, 1-2 tabs PO q4-6h

Moderate to Severe Infection
Analgesia and antipyretics for fever and pain:
acetaminophen (A class drug), 325 or 500 mg, 1 or 2 tabs PO q4-6h prn

Antiemetics to control severe nausea and vomiting:
dimenhydrinate (A class drug), 50-75 mg IM

Antibiotics:
As ordered by physician.

Extra consideration is required in choosing drugs for a pregnant woman. Consult a physician.

Monitoring and Follow-Up
Mild Infection
- Follow up in 2-3 days to determine clinical response to therapy
- In 14 days, repeat the urinalysis and culture to ensure resolution of the infection

Moderate to Severe Infection
- Monitor response to therapy, vital signs and urinary output

Referral
Moderate to Severe Infection
Medevac to hospital as soon as possible.

Young men who present with pyelonephritis for the first time and clients with recurrent pyelonephritis should be referred to physician for further investigation.
**Renal Colic (Calculi)**

**Definition**
Pain produced by the presence and movement of a stone within the ureter or renal pelvis.

**Causes**
- Familial predisposition to formation of calcium stones
- Increased dietary intake of calcium
- Dehydration
- Hyperuricemia (may be associated with gout)
- Recurrent urinary tract infections
- Bone resorption
- Prolonged immobilization
- Other genetic disorders (e.g. cystine stones, an inborn error of amino acid metabolism)

**Risk Factors**
- Family history
- Low fluid intake
- Thiazide diuretics
- Bowel or kidney disease
- Malignant disease

**History**
- Sudden onset of severe colicky pain in the flank
- Pain may radiate to lower abdomen, groin, labia or testicle
- Exact location of pain depends on location of stone, level of obstruction
- Hematuria may be present
- Dysuria, urgency, frequency may develop
- Nausea and vomiting are often present

**Physical Findings**
- Temperature elevated (if infection is also present)
- Heart rate may be elevated
- Blood pressure may be elevated
- Appears in acute distress
- Pale and sweaty
- Restless, tossing about, unable to find a comfortable position
- Abdomen may be distended
- Costovertebral angle and abdominal tenderness
- Bowel sounds may be decreased (because of reactive ileus)

**Laboratory Findings**
- Urine: may be normal or blood may be present

**Differential Diagnosis**
- Acute pyelonephritis
- Acute cholecystitis
- Acute abdomen (cholecystitis, appendicitis, gastroenteritis, diverticulitis)
- Peptic ulcer disease
- Salpingitis
- Gastroenteritis
- Peritonitis
- Pancreatitis
- Ectopic pregnancy

**Complications**
- Recurrent infection of the lower urinary tract
- Hydronephrosis
- Pyelonephritis
- Sepsis

**Diagnostic Tests**
- Urinalysis (routine and microscopic).

**Management**
If symptoms are mild, client is afebrile and diagnosis is clear, treat on outpatient basis. If symptoms are severe or the diagnosis is questionable, consult with a physician and inpatient treatment will be needed.

**Goals of treatment**
- Relieve symptoms
- Identify complications
- Collect stone or stone fragments

**Appropriate Consultation**

**Severe Condition or Questionable Diagnosis**
Consult a physician as soon as possible.

**Nonpharmacologic Interventions**

**Mild Condition**
- Encourage increase in fluid intake
- Strain urine to collect stones
Severe Condition or Questionable Diagnosis
• Bed rest
• Nothing by mouth if vomiting

Adjuvant Therapy
Severe Condition or Questionable Diagnosis
• Start IV therapy with normal saline
• Adjust rate according to severity of vomiting and dehydration, client's age and underlying medical problems
• Generally, it is desirable to push the fluids to help the stone pass, i.e. administer enough fluid to produce urine output of 100-200 mL/h

Pharmacologic Interventions
Mild Condition
To control pain:
acetaminophen with codeine 30mg (C class drug), 1-2 tabs PO q4h prn (maximum 15 tabs)

Severe Condition or Questionable Diagnosis
Analgesia: meperidine (D class drug), as ordered
Antiemetics for nausea and vomiting: dimenhydrinate (A class drug), 50-75 mg IM q4-6 hr prn

Monitoring and Follow-Up
Severe Condition or Questionable Diagnosis
• Monitor urine output
• Strain all urine for stones
• Send any stones for laboratory analysis
• Client may be discharged home once pain and nausea are controlled
• Instruct client to collect and strain all urine for stones and save any stones that are passed
• Follow up 12-24 hours after discharge

Referral
If questionable diagnosis or if condition is severe, if pain or fever persist, medevac to hospital.
Urinary Incontinence

Definition
Involuntary loss of urine.

Causes

Overflow Incontinence
Leakage of urine due to overdistension of the bladder, commonly caused by obstruction of the bladder outlet (e.g. prostatic enlargement, fecal impaction) or neurologic disease (e.g. multiple sclerosis).

Stress Incontinence
Leakage of urine due to an increase in intra-abdominal pressure (e.g. with cough, exercise). This form is more common in women. Poor pelvic support (for example, because of multiple vaginal deliveries or postmenopausal estrogen deficiency) is the primary cause.

Urge Incontinence
Leakage of urine due to inability to delay voiding when an urge is perceived. Causes include hyperactivity or instability of the bladder wall, disorders of the central nervous system (e.g. Parkinson's disease), and bladder irritability from infection, stones, diverticula or tumor.

Functional Incontinence
Leakage of urine due to inability to get to the toilet. Causes include age-related problems (e.g. decreased mobility, cognitive disability), alcohol intoxication, medications (e.g. diuretics, sedatives) and diabetes mellitus (neurogenic bladder).

History
- Loss of bladder control
- Amount of leakage varies with each person and with specific cause
- Qualify degree of difficulty in maintaining continence
- Determine when and how the urinary leakage occurs
- Assess bowel habits, number of pregnancies and vaginal deliveries, postmenopausal symptoms, neurologic deficits
- Review medications
- If infection is present, there will be related symptoms of cystitis

In women, incontinence is often associated with coughing, sneezing, laughing, climbing stairs, exercising (stress incontinence).

In men, dribbling and weak stream is usually associated with other symptoms of bladder-outlet obstruction (see "Benign Prostatic Hyperplasia," above, this chapter)

Previously "dry" elderly clients who suddenly become incontinent may have an early urinary tract infection or an intercurrent illness or infection elsewhere.

If diabetes is suspected, ask about polyuria, polydipsia, polyphagia, weight loss, recurrent cystitis or vaginitis.

Physical Findings
The findings will depend upon the specific cause. A careful examination of the urinary and genital systems, the abdomen and rectum, and the neurologic system is required.
- Distension of the bladder may be present
- Assess prostate, anal-sphincter tone, rectal wall, amount of stool present in rectum
- Note atrophic urethral and vaginal changes, relaxation of pelvic floor, pelvic masses
- Assess deep tendon reflexes and perineal sensation

Differential Diagnosis
See "Causes," above.

Complications
- Breakdown and ulceration of skin in the genital area
- Social embarrassment
- Social and psychological problems

Diagnostic Tests
- Urinalysis (routine and microscopy, culture and sensitivity) to identify cystitis
- Complete blood count, BUN, creatinine, electrolytes and calcium to check renal function
- Blood sugar to rule out diabetes
Management
Management is based on identifying and treating the underlying cause.

Goals of Treatment
• Achieve relief of urinary symptoms
• Increase functional capacity of the bladder

Nonpharmacologic Interventions
The following simple measures should be tried.

Stress Incontinence
• Demonstrate Kegel exercises to strengthen pelvic floor and perineal muscles; advise client to do 10-15 repetitions of each exercise, three or four times a day
• Encourage weight loss, if appropriate, to reduce symptoms
• Encourage frequent toileting q3-4h, complete emptying, voiding before strenuous activities and use of sanitary napkins to maintain dryness
• Encourage client to establish a good bowel routine to reduce straining at stool
• Urinary stress incontinence of some small degree may be physiological and may not be abnormal.

Nighttime Incontinence
• Advise client to reduce fluid intake in the evening 2 hours prior to bedtime
• Advise client to take diuretic drugs earlier in the evening
• Suggest a bedside commode, if available, or a condom catheter

Chronic Day and Nighttime Incontinence
• Advise client to toilet regularly at a bedside commode
• Suggest adult diapers or a condom catheter to help maintain dryness.
• Instruct client and family members about good skin care to prevent skin breakdown and infection

Medications are sometimes ordered by physician as an adjuvant therapeutic intervention to these nonpharmacologic measures.

In the elderly client, assess life situation and any recent life changes, mental status (to detect recent changes or confusion), general medical status (to identify concurrent illness and whether client has physical difficulty getting to the toilet).

If client has a distended bladder, see "Acute Urinary Retention," below, this chapter. Relieve fecal impaction with gentle disimpaction or water enemas (see "Constipation," in chapter 5, "Gastrointestinal System").

Referral
Refer electively to a physician for evaluation if conservative measures fail to improve symptoms.
Emergencies Of The Urinary And Male Genital Systems

Testicular Torsion

**Definition**
Twisting of spermatic cord and testis, which compromises blood supply to these structures and results in ischemic pain.

**Causes**
- Torsion usually spontaneous and idiopathic
- Predisposing structural (genetic) defect
- Occasionally caused by trauma to the groin

**History**
- Sudden onset of severe, constant, unilateral pain in scrotum, groin or lower abdomen
- Pain may be made worse by elevation of scrotum
- Pain not relieved by lying down
- Nausea and vomiting may be present
- Usually occurs in adolescents and young men

**Physical Findings**
- Temperature usually normal
- Heart rate elevated
- Blood pressure mildly elevated (because of pain)
- Client in acute distress
- Client bent over or unable to walk
- Unilateral scrotal swelling and redness
- Testis acutely tender, may be warm
- Testis swollen and found higher up (retracted) in the scrotal sac than expected
- Absence of cremasteric reflex

**Differential Diagnosis**
- Epididymitis
- Orchitis
- Trauma
- Incarcerated or strangulated inguinal hernia
- Torsion appendix testis
- Acute varicocele
- Testicular tumor
- Scrotal abscess

**Complications**
- Testicular infarction
- Testicular atrophy
- Abnormal spermatogenesis
- Infertility

**Diagnostic Tests**
None.

**Management**

**Goals of Treatment**
- Relieve pain
- Prevent complications

**Appropriate Consultation**
Consult a physician immediately. This is a surgical emergency.

**Nonpharmacologic Interventions**
- Nothing by mouth
- Bed rest

**Adjuvant Therapy**
- Start IV therapy with normal saline
- Adjust IV rate according to age and state of hydration

**Pharmacologic Interventions**
Analgesia, as per physician order

**Referral**
Medevac as soon as possible.
Acute Urinary Retention

Definition
Accumulation of urine in the bladder due to an inability to empty the bladder.

Causes
- Any process that causes increased bladder-outlet resistance or decreases bladder contractility
- Benign prostatic hyperplasia
- Side effects of drugs
- Fecal impaction
- Prostatic cancer
- Acute prostatitis
- Neurogenic bladder
- Urethral stricture or stone
- Impingement on sacral nerves by protruding intervertebral disk
- Spinal cord injury

History
- Strong urge to void but inability to do so
- Suprapubic fullness and pain
- Voiding habits before retention (hesitancy, dribbling, daytime frequency, nocturia)
- Bowel habits, last bowel movement and its consistency

Review medications, noting any drugs that might predispose to acute urinary retention (excessive alcohol intake, sedatives, decongestants in over-the-counter cold remedies, anticholinergics, antipsychotics and antidepressants).

With a neurogenic bladder, symptoms of pain, fullness and urgency may be absent. However, dribbling of small amounts of urine (overflow dribbling) may be present.

Physical Findings
- Pulse may be elevated
- Client may appear in moderate-to-acute distress (but there may be no evidence of distress with a neurogenic bladder)
- Client may be restless and sweaty
- Bladder distension may be noted on abdominal inspection

- Tender, distended bladder may be felt above symphysis, often reaching umbilicus (neurogenic bladder is distended but non tender)
- Rectal examination: fecal impaction, enlargement of prostate, nodular or rocky hard prostate, decreased anal tone or absent perineal sensation may be present

Differential Diagnosis
See "Causes," above.

Complications
- Decreased renal function
- Post-obstructive diuresis
- Renal failure
- Infection of stagnant urine

Diagnostic Tests
None.

Management
Goals of Treatment
- Identify underlying cause
- Relieve bladder distension

Appropriate Consultation
Consult a physician.

Nonpharmacologic Interventions
- Encourage client to sit in a tub full of warm water and to try voiding into the water. If the client is able to do so, reassess the bladder for residual distension.

If the bladder is still distended, catheterization is required (unless there are contraindications). Use the following technique:
- Use a Foley catheter (18 French in a male, 16 French in a female)
- If the client is known to have benign prostatic hyperplasia, a 16 French catheter may be tried if catheterization is unsuccessful with the larger size of catheter
- Insert catheter and decompress the bladder slowly
- Remove 200 mL of urine, then clamp the catheter for 30 minutes
• Continue to remove 50-75 mL of urine slowly every 20 minutes until the bladder is empty
• Leave catheter in place after decompression
• Do not insert catheter if retention is due to acute prostatitis
• Do not insert catheter if the pelvis is fractured
• Do not attempt catheterization more than three consecutive times

**Monitoring and Follow-Up**
Monitor hourly urine output carefully for the development of post-obstruction diuresis, a complication that occurs after the release of the obstruction, because of temporary impairment of renal function.

Diuresis is generally self-limiting and can be managed with oral fluid intake based on thirst, but client may require IV fluid therapy to prevent dehydration.

**Referral**
Medevac to hospital.
# Chapter 7 - The Musculoskeletal System

**Assessment Of The Musculoskeletal System**

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Assessment Of The Musculoskeletal System

History Of Present Illness And Review Of System

General
The following characteristics of each symptom should be elicited and explored:
• Onset (sudden or gradual)
• Chronology
• Current situation (improving or deteriorating)
• Location
• Radiation
• Quality
• Timing (frequency, duration)
• Severity
• Precipitating and aggravating factors
• Relieving factors
• Associated symptoms
• Effects on daily activities
• Previous diagnosis of similar episodes
• Previous treatments
• Efficacy of previous treatments

Cardinal Symptoms
In addition to the general characteristics outlined above, additional characteristics of specific symptoms should be elicited as follows.

Bones and Joints
• Pain, swelling, redness, heat, stiffness
• Time of day when these symptoms are most bothersome
• Relation of symptoms to movement
• Limitation of movement
• Deformity
• Extra-articular findings: urethritis, pustular rash, tophi, nodules
• Trauma: obtain accurate description of exact mechanism of injury

Muscles
• Pain
• Weakness
• Twitching
• Wasting
• History of previous injuries and treatment received

Neurovascular Structures
• Paresthesia
• Paresis
• Paralysis

Functional Assessment
Any self-care deficits in bathing, dressing, toileting, grooming, mobility, use of mobility aids.

Medical History (Specific To Musculoskeletal System)
• Previous trauma (e.g. to bones, joints, ligaments)
• Arthritis (rheumatoid or osteoarthritis)
• Diabetes mellitus (associated with greater risk of carpal tunnel syndrome)
• Hypothyroidism (associated with greater risk of carpal tunnel syndrome)
• Recent immobilization of an extremity
• Medications (e.g. steroids)
• Allergies
• Obesity
• Osteoporosis
• Cancer
• Menopause
• Immune deficiency (recent infection)

Family History (Specific To Musculoskeletal System)
• Rheumatoid arthritis
• Diabetes mellitus
• Hypothyroidism (associated with greater risk of carpal tunnel syndrome)
• Osteoporosis
• Cancer (bone)

Personal And Social History (Specific To Musculoskeletal System)
• Absenteeism from work or school (multiple days)
• Occupational hazards (activity involving repetitive joint motion, e.g. kneeling, reaching overhead, computer use)
• Sports activities (especially contact sports)
Risk behaviors for injuries (e.g. snowmobiling, skateboarding, injection drug use, alcohol abuse [specifically drinking and driving])
Calcium intake
Smoking
Exercise habits
Caffeine intake (decreases bone density)

Examination Of The Musculoskeletal System

The purpose of examining the musculoskeletal system is to assess function and performance of activities of daily living, as well as to check for abnormalities. A screening exam is appropriate for most people.

Although the musculoskeletal and neurological systems (see chapter 8, "Central Nervous System") are discussed separately in this set of guidelines, they are usually examined together.

General
• Apparent state of health
• Appearance of comfort or distress
• Colour (e.g. flushed, pale)
• Nutritional status (obese or emaciated)
• Match between appearance and stated age

Musculoskeletal Screening Exam
Observe client walking into examination room; assess gait, posture and use of aids. Determine ability to perform activities of daily living (e.g. sitting, standing, walking, dressing).
Examine specific joints in the following order.
Compare corresponding paired joints.
• Temporomandibular joint
• Cervical spine
• Shoulders
• Elbows
• Wrists, hands and fingers
• Hips
• Knees
• Ankles, feet and toes
• Lumbar spine

Inspection of Joints
• Symmetry of structure and function
• Note alignment, size (muscle bulk, bone enlargement) and contour of the joint
• Inspect skin and tissues over joints for colour, swelling, rash, masses or deformity

Palpation of Joints
Palpate each joint, including skin, muscles, bony articulations and area of joint capsule, for the following features:
• Heat
• Swelling
• Tenderness
• Nodules, masses
• Crepitus
• Ligament instability

Range of Motion
Ask client to demonstrate range of active motion while stabilizing the body area proximal to the joint being moved. If you see a limitation, gently attempt passive motion.
The normal ranges of active and passive motion should be the same.

Muscle Testing
• Test strength of prime muscle groups (i.e. flexors and extensors) for each joint
• Muscle strength should be equal bilaterally and should fully resist your opposing force
• There is wide variability in normal muscle strength among different people

Ligament Stability Around Joints
• Determine stability of collateral ligaments of ankle
• Determine stability of collateral and cruciate ligaments of knee

Neurovascular Status
Assess limbs for the following aspects and conditions:
• Sensation
• Pulses
• Paresis
• Paralysis
This part of the examination is particularly important if the client has experienced trauma.

Table 1 presents the symptoms associated with various types of musculoskeletal injury.

### Table 1: Symptoms of Musculoskeletal Injury

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Fracture</th>
<th>Dislocation</th>
<th>Sprain</th>
<th>Strain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Severe</td>
<td>Moderate to severe</td>
<td>Mild to moderate</td>
<td>Mild to moderate</td>
</tr>
<tr>
<td>Swelling</td>
<td>Moderate to severe</td>
<td>Mild</td>
<td>Mild to severe</td>
<td>Mild to moderate</td>
</tr>
<tr>
<td>Bruising</td>
<td>Mild to severe</td>
<td>Mild to severe</td>
<td>Mild to severe</td>
<td>Mild to severe</td>
</tr>
<tr>
<td>Deformity</td>
<td>Variable</td>
<td>Marked</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Function</td>
<td>Loss of function</td>
<td>Loss of function</td>
<td>Limited</td>
<td>Limited</td>
</tr>
<tr>
<td>Tenderness</td>
<td>Severe</td>
<td>Moderate to severe</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Crepitu</td>
<td>Present</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
</tr>
</tbody>
</table>

### Differential Diagnosis Of Musculoskeletal Cardinal Symptoms

#### Table 2: Causes of joint pain

**Inflammatory**
- Tenosynovitis
- Rheumatoid arthritis
- Viral polyarthritis (e.g. hepatitis B, Epstein-Barr virus)
- Septic arthritis (e.g. *Staphylococcus aureus*, streptococcal species)
- Autoimmune disease (e.g. polymyalgia rheumatica)
- Rheumatic fever
- Immune complex arthritis (e.g. HIV)
- Polyarthritis associated with systemic diseases (e.g. systemic lupus erythematosus, Lyme disease, syphilis, bacterial endocarditis)
- Gouty arthritis

**Non-inflammatory**
- Osteoarthritis
- Tendinitis
- Systemic lupus erythematosus
- Metabolic arthropathy
- Tumors
- Mechanical abnormalities (e.g. erosion of cartilage and bone)
- Blood dyscrasias
- Sickle cell anemia
- Neuroarthropathy

#### Table 3: Causes of neck pain and cervical spine disorders

**Biomechanical**
- Neck strain
- Herniated disk
- Spondylosis
- Myelopathy

**Infectious**
- Osteomyelitis
- Diskitis
- Meningitis
- Herpes zoster
- Lyme disease

**Neurologic**
- Brachial plexitis
- Peripheral entrapment
- Neuropathies
- Reflex sympathetic dystrophy

**Reumatologic**
- Rheumatoid arthritis
- Ankylosing spondylitis
- Psoriatic arthritis
- Reiter’s syndrome
- Myelopathy
- Enteropathic arthritis
- Polymyalgia rheumatica
- Fibromyalgia
- Myofascial pain
- Diffuse idiopathic skeletal hypertrophy
- Microcrystalline disease

**Neoplastic**
- Osteoblastoma
- Osteochondroma
- Giant cell tumour
- Hemangioma
- Metastases
- Multiple myeloma
- Chondrosarcoma
- Chordoma
- Gliomas
- Syringomyelia
- Neurofibroma

**Miscellaneous**
- Paget’s disease
- Sarcoidoisis
### Table 4: Causes of shoulder pain

**Intrinsic Disorders**
- Glenohumeral osteoarthritis
- Acromioclavicular arthritis
- Septic arthritis
- Rheumatoid arthritis
- Gout
- Rotator cuff impingement
- Rotator cuff tear
- Biceps tendinitis
- Biceps tendon rupture
- Calcific tendinitis
- Adhesive capsulitis
- Trauma to bony structures (e.g. clavicle, acromioclavicular joint, glenohumeral joint)

**Extrinsic Disorders (Referred Pain)**
- Cervical spine disorders
- Brachial plexus neuropathy
- Myofascial pain
- Thoracic outlet syndrome
- Diaphragmatic irritation
- Neoplastic disease
- Myocardial ischemia

Shoulder pain can arise from the bony structures of the shoulder or from the muscles, ligaments and tendons that support the shoulder. Most shoulder problems are attributable to overuse and trauma.

### Table 5: Causes of low-back pain

**Mechanical Low-Back Disorders**
- Lumbar sacral strain
- Degenerative disk disease
- Facet joint syndrome
- Spondylolisthesis
- Herniated disk
- Spinal stenosis
- Osteoporosis
- Fracture
- Spondylolysis
- Severe kyphosis
- Severe scoliosis

**Non-mechanical Spine Disease**
- Neoplasia (e.g. multiple myeloma, lymphoma, spinal cord tumor, metastatic carcinoma)
- Infection (e.g. osteomyelitis, septic disk, epidural abscess)
- Inflammatory arthritis
- Ankylosing spondylitis
- Psoriatic spondylitis
- Paget's disease (tuberculosis of spine)

**Referred Pain of Visceral Disease**
- Prostatitis
- Endometriosis
- Chronic pelvic inflammatory disease
- Kidney stones
- Pyelonephritis
- Aortic aneurysm
- Pancreatitis
- Cholecystitis
- Penetrating peptic ulcer
Common Problems Of The Musculoskeletal System

Neck Pain

Definition
Neck pain, acute and chronic, is commonly seen in the primary care setting. Many disorders are implicated in neck pain, but mechanical problems of the cervical spine are the most common cause. Most patients improve with non-operative therapy within 3 months; only about 10% of patients require surgical intervention.

Types
Myofascial Pain
Myofascial pain is the most common type of acute and chronic neck pain. The upper trapezius and levator scapulae are the muscles most frequently involved in myofascial pain of the neck, head and upper back. The pain is often described as dull, aching or burning and is referred from active myofascial trigger points. A myofascial trigger point is a hyper-irritable spot within a taut band of skeletal muscle or muscle fascia that is painful to compression and gives rise to a characteristic pattern of referred pain and tenderness and autonomic phenomena such as tingling, dizziness and gooseflesh. Each muscle with active trigger points gives rise to its own characteristic, predictable and reproducible pattern of referred pain and autonomic symptoms.

Neuropathic Pain
Disease and injury of the neck commonly involve nerves or nerve roots lying along the transverse processes or the paravertebral region of the spinal cord. This produces neuropathic pain felt in the occipital region, the back, the posterior ear and ear lobe, and the anterior neck.

Neuropathic pain is usually described as sharp, burning or aching and often follows the distribution of the affected nerve segment. The pain is worsened by movements that stretch the involved nerve or nerve roots. It is frequently accompanied by sensory and motor disturbances such as hyperesthesia, paresthesia, hypalgesia and a decrease in muscle strength. Disk herniation with radicular pain is one example of neuropathic disease.

Causes
Mechanical Disorders
Mechanical disorders that occur secondary to overuse, trauma or deformity constitute the most common cause of neck pain. Typically, these disorders are characterized by correlating exacerbation or alleviation of symptoms with certain physical activities.

Most mechanical disorders of the cervical spine have a natural history of improvement. In 50% of patients, the pain will decrease in 2-4 weeks, and 80% of patients will be asymptomatic in 2-3 months. The causes of mechanical disorders include neck strain, herniated disk, spondylosis and myelopathy.

Mechanical Neck Problems Without Nerve Compression
Clients with pain only in the cervical area, trapezius and shoulders may have one of many disorders, of which neck strain and cervical hyperextension (whiplash) are the most common.
Table 6: History and physical examination for mechanical neck problems without nerve compression

<table>
<thead>
<tr>
<th>Condition</th>
<th>History</th>
<th>Physical Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck strain</td>
<td>Pain in middle or lower portion of the posterior neck</td>
<td>Local tenderness in paracervical muscles, decreased range of motion, loss of cervical</td>
</tr>
<tr>
<td></td>
<td>Pain may be diffuse or localized to both sides of the spine</td>
<td>lordosis</td>
</tr>
<tr>
<td>Cervical hyperextension</td>
<td>Acceleration-deceleration injury to soft-tissue structures</td>
<td>Soreness, paracervical muscle contraction and decreased range of motion</td>
</tr>
<tr>
<td>(whiplash)</td>
<td>Common causes: rear-impact motor vehicle crashes, falls, diving accidents,</td>
<td>Neurologic examination often unremarkable, but x-rays may reveal loss of cervical</td>
</tr>
<tr>
<td></td>
<td>other sports injuries</td>
<td>lordosis</td>
</tr>
<tr>
<td></td>
<td>Paracervical muscles stretched or torn, and sympathetic ganglia may be</td>
<td>In severely injured clients, structural damage identified on x-rays mandates immediate</td>
</tr>
<tr>
<td></td>
<td>be damaged, resulting in Horner’s syndrome, nausea, hoarseness or</td>
<td>stabilization</td>
</tr>
<tr>
<td></td>
<td>dizziness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intervertebral disk injuries occur with severe trauma</td>
<td></td>
</tr>
<tr>
<td></td>
<td>First symptoms occur 12-24 hours after trauma</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clients experience stiffness and pain with motion; may also have</td>
<td></td>
</tr>
<tr>
<td></td>
<td>difficulty swallowing or chewing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spinal x-rays may be normal or reveal loss of lordosis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In severely injured clients, structural damage identified on x-rays</td>
<td></td>
</tr>
<tr>
<td></td>
<td>mandates immediate stabilization</td>
<td></td>
</tr>
</tbody>
</table>

Mechanical Neck Problems with Spinal Compression

The main type of mechanical neck problem with spinal compression is cervical myelopathy. This condition occurs secondary to compression of the spinal cord or nerve roots in the spinal canal (see Table 7). Only one-third of affected patients report neck pain. Although cervical myelopathy is rare, one form, spondylitic myelopathy, is the most common cause of spinal cord dysfunction in people over the age of 55 years. The location, duration and size of lesions influence the severity and distribution of symptoms.

Compression usually results from a combination of osteophyte growth and degenerative disk disease. Symptoms may involve all limbs and may include difficulty in walking and urinary or fecal incontinence.

The most frequent presentation is arm pain and leg dysfunction. Older clients may describe leg stiffness, foot shuffling and a fear of falling. Common findings include weakness of the limbs, spasticity, fasciculations, hyperreflexia, clonus and Babinski’s reflex in the lower extremities.

Table 7: Characteristics of radicular pain caused by compression of cervical nerve root

<table>
<thead>
<tr>
<th>Nerve root</th>
<th>Area of pain</th>
<th>Location of sensory loss</th>
<th>Location of motor loss</th>
<th>Location of reflex loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>C5</td>
<td>Neck to outer shoulder, arm</td>
<td>Shoulder</td>
<td>Deltoid</td>
<td>Biceps, supinator</td>
</tr>
<tr>
<td>C6</td>
<td>Outer arm to thumb, index finger</td>
<td>Index finger and thumb</td>
<td>Biceps</td>
<td>Biceps, supinator</td>
</tr>
<tr>
<td>C7</td>
<td>Outer arm to middle finger</td>
<td>Index and middle fingers</td>
<td>Triceps</td>
<td>Triceps</td>
</tr>
<tr>
<td>C8</td>
<td>Inner arm to ring and little fingers</td>
<td>Ring and little fingers</td>
<td>Hand muscles</td>
<td>None</td>
</tr>
</tbody>
</table>
Differential Diagnosis Of Neck Pain
See Table 3 in "Differential Diagnosis of Musculoskeletal Cardinal Symptoms," above, this chapter.

Complications
- Permanent nerve damage with compression of nerve root
- Chronic neck pain
- Absenteeism from work
- Disability (long term)

Diagnostic Tests
Discuss with a physician before ordering any tests.

Management
Goals of Treatment
- Relieve symptoms
- Regain or maintain full range of motion
- Prevent complications

Appropriate Consultation
Consult immediately if there is concern of serious injury (e.g. trauma of significant force) or if there is associated neuropathic pain and neurological changes. Treat all other injuries conservatively and follow up closely.

Nonpharmacologic Interventions
- Clients without systemic disorders should be treated with non-operative therapy for 3-6 weeks
- Ice massage for 20 minutes qid provides additional analgesia in some cases
- Heat may decrease muscle tightness and improve range of motion in others
- Cervical collar and limiting motion are suggested; short-term immobilization is useful, particularly at night, when movement during sleep can cause pain
- A soft collar that supports but does not extend the neck is an appropriate treatment; however, its use should be decreased as neck pain diminishes
- The use of a collar in clients with cervical hyperextension should be severely limited except in cases of disk herniation, which requires full-time collar immobilization to limit radicular pain for longer periods.

Pharmacologic Interventions
Anti-inflammatory analgesics such as nonsteroidal anti-inflammatory drugs (NSAIDs) can decrease the pain and inflammation associated with localized disease
ibuprofen (A class drug), 200 mg, 1-2 tabs PO tid-qid
or
naproxen (C class drug), 250 mg PO bid-tid for 2 weeks or longer prn

Do not use if there are contraindications to the use of NSAIDs (such as a history of peptic ulcer disease). Instead, use:
acetaminophen (A class drug), 500 mg, 1-2 tabs PO tid-qid prn

Monitoring and Follow-Up
- Arrange follow-up at 1-2 days, at 7 days and then every 2 weeks to assess response to treatment
- Start range-of-motion exercises within pain-free range in 2-3 days (in cases of minor injury)
- Advise client to begin stretching and strengthening program when range of motion is regained

Referral
Most clients, including those with cervical radiculopathy, improve and return to normal activity within 2 months. Clients who are still symptomatic after 6 weeks of non-operative treatment should be referred to a physician for further evaluation.

Phone consultation or referral to physiotherapy.
Adhesive Capsulitis (Frozen Shoulder), Tendinitis And Bursitis

**Definition**

*Adhesive capsulitis*: Chronically stiff and painful shoulder, which begins without any significant injury.

*Tendinitis and bursitis*: Inflammation of a tendon or a bursa within the shoulder. The supraspinatus and long end of the biceps are especially susceptible.

**Causes**

*Adhesive capsulitis*: Prolonged immobilization from either protracted use of a sling or disuse because of pain in the arm.

*Tendinitis and bursitis*: Overuse, repetitive strain from repeated motion.

**History And Physical Findings**

*Adhesive capsulitis*: Shoulder pain and limitation of movement in one or more directions, with pain occurring at the limits of motion. Other findings relatively unremarkable.

*Tendinitis and bursitis*: Non-specific pain and aching of the shoulder. With supraspinatus tendinitis, the pain is aggravated when the shoulder is abducted and externally rotated against resistance. With bicipital tendinitis, the pain is aggravated when the patient flexes forward against resistance.

**Management**

**Goals of Treatment**

- Relieve pain and inflammation
- Maintain function of shoulder
- Prevent complications

Most of the soft-tissue conditions about the shoulder can be relieved by application of ice and rest for 5-7 days (with short-term use of sling for 2-3 days).

Physical therapy and rehabilitation are extremely important in regaining and maintaining range of motion, flexibility and strength for optimal shoulder functioning.

**Nonpharmacologic Interventions**

**Rest Injured Limb**

- Avoid aggravating positions and activities
- Type and period of rest varies according to severity of symptoms and type of injury or disorder
- For upper limb: use sling in acute stage for brief period (2-3 days), then discontinue

**Ice or Cold Pack Locally to Reduce Pain and Swelling**

- Apply to area for 20 minutes qid
- If soft-tissue injury is severe, apply q2h
- Use ice as long as swelling and pain are present
- Heat is contraindicated in acute soft-tissue injury
- Never use heat in acute or subacute phases of recovery
- Heat may be used for chronic stiffness and swelling

**Pharmacologic Interventions**

Anti-inflammatory analgesics to reduce pain and swelling:

- ibuprofen (*A class drug*), 200 mg, 1-2 tabs PO tid-qid
- naproxen (*C class drug*), 250 mg PO bid-tid for 2 weeks or longer prn

Do not use if there are contraindications to the use of NSAIDs (such as a history of peptic ulcer disease). Instead, use:

- acetaminophen (*A class drug*), 500 mg, 1-2 tabs PO tid-qid prn

**Monitoring and Follow-Up**

- Arrange follow-up at 1-2 days and at 14 days
- Start range-of-motion exercises within pain-free range in 2-3 days (in cases of minor injury)
- Advise client to begin stretching and strengthening program when range of motion is regained
- Exercise progression: passive range of motion, active assisted range of motion, isometrics, active stretching, and late stretching and strengthening exercises
- Exercises are best done in multiple short sessions, not long ones
• Exercise should be preceded by application of moist heat for 10-15 minutes and should be followed by icing for 20 minutes
• Any exercise that causes pain should be temporarily omitted
• As range of motion, flexibility and strength improve, so will shoulder function

**Referral**
Refer to a physician if there is no improvement with conservative therapy in 4-6 weeks. A physiotherapy consultation (if available) is especially important for adhesive capsulitis because optimal treatment of this condition involves extended, aggressive physical therapy.
Rotator Cuff Syndrome

Definition
Pain and diminished function of the shoulder secondary to inflammation and weakness of the muscles of the rotator cuff. There are three stages, as outlined below.

The rotator cuff muscles are the supraspinatus, infraspinatus, teres minor and subscapularis, all of which envelop the scapula.

Causes
Stages 1 and 2: A rotator cuff tendinitis caused by forceful or repetitive motion

Stage 3: A complete traumatic tear of the supraspinatus tendon

History And Physical Findings
Stage 1: Occurs in people ≥ 25 years of age; pain is noted over the anterior aspect of the shoulder and is maximal when the arm is raised from 60° to 120° elevation.

Stage 2: Usually occurs in people 25-40 years of age who have had multiple previous episodes; in addition to pain from tendinitis inflammation of the rotator cuff, some permanent fibrosis, thickening or scarring is present; x-rays may reveal calcific deposits within the rotator cuff.

Stage 3: Client usually > 40 years of age; may feel a sudden pop in the shoulder and then suffer severe pain; client notes increasing weakness when trying to abduct and externally rotate the affected arm.

Management
Goals of Treatment
• Relieve pain and inflammation
• Maintain function of shoulder
• Prevent complications

Appropriate Consultation
Consult a physician immediately about all stage 3 injuries. Consult a physician if a stage 1 or 2 injury remains symptomatic for > 4-6 weeks.

Nonpharmacologic Interventions
Rest Injured Limb
Type and period of rest varies according to type and severity of injury.

Stage 1 and 2: Aggravating positions and activities should be avoided; a sling should be used in acute injury stage for a brief period (2-3 days)

Stage 3: Place injured limb in sling for comfort

Ice or Cold Pack Locally to Reduce Pain and Swelling
Apply ice or cold pack as follows:
• Apply to area for 20 minutes qid
• If soft-tissue injury is severe, apply q2h
• Use ice as long as swelling and pain are present
• Heat is contraindicated in acute soft-tissue injury
• Never use heat in acute or subacute phases of recovery
• Heat may be used for chronic swelling

Pharmacologic Interventions
Stage 1 and 2: Anti-inflammatory analgesics to reduce pain and swelling:
ibuprofen (A class drug), 200 mg, 1-2 tabs PO tid-qid
or
naproxen (C class drug), 250 mg, PO q6h prn

Do not use if there are contraindications to the use of NSAIDs (such as a history of peptic ulcer disease). Instead, use:
acetaminophen (A class drug), 500 mg, 1-2 tabs PO tid-qid prn
or
acetaminophen with codeine 30mg (C class drug), 1-2 tabs q4h prn (maximum 15 tabs)

Stage 2: In addition to the drugs given above, corticosteroids (B class drugs) may be injected into the subacromial bursa.
Stage 3: Analgesics for pain:
*ibuprofen (A class drug), 200 mg, 1-2 tabs PO tid-qid*
*or*
*naproxen (C class drug), 250 mg, PO q6h prn*
*or*
*acetaminophen with codeine 30mg (C class drug), 1-2 tabs q4h prn (maximum 15 tabs)*

Monitoring and Follow-Up
Stages 1 and 2: Clients with this type of injury should be monitored as follows:
• Arrange follow-up at 1-2 days and at 10 days
• Start range-of-motion exercises within pain-free range in 2-3 days (in cases of minor injury)
• Advise client to begin stretching and strengthening program when range of motion is regained
• Exercise progression: passive range of motion, active assisted range of motion, isometrics, active stretching exercises, and late stretching and strengthening exercises
• Exercises are best done in multiple short sessions, not long ones

• Exercise should be preceded by application of moist heat for 10-15 minutes and should be followed by icing for 20 minutes
• Any exercise that causes pain should be temporarily omitted
• As range of motion, flexibility and strength improve, so will shoulder function

Referral
Physiotherapy consultation or referral should be considered if readily available.

Stage 2: If symptoms persist after 4-6 weeks of conservative therapy, consider referral to an orthopedist for surgery consult.

Stage 3: Medevac urgently. Treatment is usually surgical repair, depending on whether there is significant loss of function. Repair is more likely in young clients than in elderly clients. Many elderly clients have progressive loss of the rotator cuff as a result of aging.
Acromioclavicular Injuries

Definition

**Grade 1 (sprain):** Partial tear of the joint capsule. Mild pain without joint deformity and minimal ligamentous disruption and instability.

**Grade 2 (subluxation):** Complete tear of the acromioclavicular ligaments. The acromioclavicular joint is locally tender and painful with motion. The distal end of the clavicle may protrude slightly upward.

**Grade 3 (dislocation):** Complete tear of the acromioclavicular and coracoclavicular ligaments. Significant pain, especially on any attempt at abduction; there is an obvious "step-off" deformity on physical examination.

Causes

Usually results from a direct blow to or fall on the tip of the shoulder.

History

- The history often involves a fall onto the apex of the shoulder, usually with the arm in adduction. Severe forces resulting from significant falls are often associated with grade 3 injuries.
- Pain over injured area
- Inability to use shoulder

Physical Findings

- Pain at rest or elicited with movement
- Pain increases with severity of injury
- Tenderness on palpation of the acromioclavicular joint
- There may be a "step-off" deformity of the acromioclavicular joint
- Note the position of the clavicle

Perform a careful neurovascular assessment of brachial-plexus motor and sensory function, because associated injuries, though rare, can occur.

Complications

- Instability of the shoulder
- Loss of mobility

Diagnostic Tests

- X-ray may be advisable to determine extent of injury, especially in younger people with significant symptoms
- **Grade 1:** Acromioclavicular joint films (with and without weights) yield normal findings
- **Grade 2:** Stress x-ray of the acromioclavicular joint with the client holding a 4.5-kg (10-lb) weight in both hands reveals widening of the joint
- **Grade 3:** X-rays obtained with the client holding weights show superior displacement of the clavicle and complete dislocation of the joint

Management

**Appropriate Consultation**
Consult a physician for all grade 2 and 3 injuries as soon as possible.

**Nonpharmacologic Interventions**

**Rest Injured Limb**

Type and period of rest varies according to severity of injury.
- Avoid aggravating positions and activities
- **Grade 1:** Sling in acute injury stage for very brief period (5-7 days), then discontinue
- **Grade 2:** Subluxation requires a longer period of immobilization (7-14 days)

**Ice or Cold Pack Locally to Reduce Pain and Swelling**

For all grades of acromioclavicular injuries, ice or cold packs may be used:
- Apply to area for 20 minutes qid
- If soft-tissue injury is severe, apply q2h
- Use ice as long as swelling and pain are present
- Heat is contraindicated in acute soft-tissue injury
- Never use heat in acute or subacute phases of recovery
- Heat may be used for chronic stiffness and swelling
**Pharmacologic Interventions**

Anti-inflammatory analgesics to reduce pain and swelling:

- *ibuprofen (A class drug)*, 200 mg, 1-2 tabs PO tid-qid
  - or
- *naproxen (C class drug)*, 250 mg, PO q6h prn

Do not use if there are contraindications to the use of NSAIDs (such as a history of peptic ulcer disease). Instead, use:

- *acetaminophen (A class drug)*, 500 mg, 1-2 tabs PO tid-qid prn
  - or
- *acetaminophen with codeine 30mg (C class drug)*, 1-2 tabs q4h prn (maximum 15 tabs)

**Monitoring and Follow-Up**

- Arrange follow-up at 1-2 days and at 14 days
- Start range-of-motion exercises within pain-free range in 2-3 days (in cases of minor injury)

- Advise client to begin stretching and strengthening program when range of motion is regained
- Exercise progression: passive range of motion, active assisted range of motion, isometrics, active stretching exercises, and late stretching and strengthening exercises
- Exercises are best done in multiple short sessions, not long ones
- Exercise should be preceded by application of moist heat for 10-15 minutes and should be followed by icing for 20 minutes
- Any exercise that causes pain should be temporarily omitted
- As range of motion, flexibility and strength improve, so will shoulder function

**Referral**

Medevac urgently all clients with grade 3 injuries, as orthopedic consultation is required.
Glenohumeral Dislocations

Definition
Dislocation of the humeral head from the glenohumeral joint socket.

Causes
Trauma; usual mechanism is forced abduction and external rotation (95% are anterior dislocations).

History
• Severe pain
• Client usually holds the arm tightly against the body

Physical Findings
• Shoulder appears flattened laterally and prominent anteriorly
• The acromion process is prominent
• Shoulder appears to be "squared off"

Check for associated injuries:
• Proximal humeral fracture
• Avulsion of the rotator cuff
• Injuries to the adjacent neurovascular structures; axillary nerve injury is most common and is associated with decreased active contraction of the deltoid muscle

Differential Diagnosis
• Soft-tissue injury
• Clavicle fracture
• Acromioclavicular joint separation

Complications
• Neurovascular compromise

Diagnostic Tests
X-ray (if available) is necessary before reduction; obtain images in two planes (anteroposterior [AP] and lateral scapula) to confirm the dislocation and to rule out fracture, where possible, if mechanism is suggestive.

Management
Goals of Treatment
• Relieve pain
• Reduce dislocation
• Prevent complications

Appropriate Consultation
Consult a physician. The dislocation should be reduced as soon as possible.

Nonpharmacologic Interventions
Im mobilize the client's arm in a sling-and-swathe dressing.

Pharmacologic Interventions
Analgesia is needed: meperidine (D class drug), 75-100 mg IM and use of muscle relaxant

Monitoring and Follow-Up
Monitor pain and neurovascular status frequently until transfer.

Referral
Medevac to hospital if unable to perform reduction on site. Recurrent dislocation or subluxation is common and may require surgical repair, referral to a physician may be necessary.
Lateral Epicondylitis (Tennis Elbow)

Definition
An inflammatory process occurring at the extensor origin of the lateral epicondyle.

Causes
• Usually secondary to overuse or repetitive use
• Populations at risk: athletes and manual laborers

History
• Pain at the lateral epicondyle
• Referred pain to the extensor surface of the forearm
• Pain exacerbated by resisted extension of the wrist or fingers

Physical Findings
• Swelling (mild)
• Warmth
• Redness (mild)
• Tenderness over lateral elbow

Differential Diagnosis
• Avulsion injury of the tendon
• Bursitis
• Septic tenosynovitis
• Arthritis

Complications
• Recurrent episodes
• Tendon rupture

Diagnostic Tests
None.

Management
Goals of Treatment
• Relieve pain
• Reduce inflammation
• Strengthen the muscle
• Prevent complications

Nonpharmacologic Interventions
Rest the Limb
• Client should avoid exacerbating activities

Pharmacologic Interventions
Anti-inflammatory analgesics to reduce pain and swelling:

- ibuprofen (A class drug), 200 mg, 1-2 tabs PO tid-qid
- naproxen (C class drug), 250 mg, PO q6h prn

Do not use if there are contraindications to the use of NSAIDs (such as a history of peptic ulcer disease). Instead, use:

- acetaminophen (A class drug), 500 mg, 1-2 tabs PO tid-qid prn
- acetaminophen with codeine 30mg (C class drug), 1-2 tabs q4h prn (maximum 15 tabs)

Monitoring and Follow-Up
• Arrange follow-up at 1-2 days and at 14 days
• Start gentle range-of-motion exercises within pain-free range in 2-3 days
• Advise client to begin stretching and strengthening program when range of motion is regained
• Exercise progression: passive range of motion, active assisted range of motion, isometrics, active stretching exercises, and late stretching and strengthening exercises
• Exercises are best done in multiple short sessions, not long ones
• Exercise should be preceded by application of moist heat for 10-15 minutes and should be followed by icing for 20 minutes
Referral
In most clients, the problem subsides with conservative treatment. Refer to a physician if there is failure to respond to treatment.
Carpal Tunnel Syndrome

**Definition**
The symptoms are a result of median nerve dysfunction because of compression within the carpal tunnel. Tends to affect the dominant hand but may be bilateral.

**Causes**
- Overuse
- Ganglion cyst
- Trauma: Colles' fracture
- Predisposing factors: pregnancy, diabetes mellitus, rheumatoid arthritis, hypothyroidism, systemic lupus erythematosus, hypoparathyroidism, hypocalcemia
- Risk factors: jobs that involve repetitive flexion and extension of the wrist

**History**
Symptoms usually affect the thumb, index and middle finger.
- Tingling or pricking sensation in the fingers
- Burning pain in the fingers, especially at night
- Relief of symptoms afforded by shaking or rubbing the hand
- Arm pain

**Physical Findings**
- Sensory loss in the thumb, index and middle fingers
- Tinel's sign: painful sensation of the fingers induced by percussion of the median nerve at the level of the palmar wrist
- Phalen's sign: keeping both wrists in a palmar-flexed position may reproduce symptoms
- Weakness of the hand while performing tasks (e.g. opening jars)
- Muscle wasting of the thenar eminence (late sign)

**Differential Diagnosis**
- Cervical spine spondylosis
- Peripheral neuropathy
- Brachial plexus lesion

**Complications**
Without treatment, permanent injury to the nerve

**Management**

**Goals of Treatment**
- Relieve symptoms
- Prevent complications

**Appropriate Consultation**
Consult a physician if there is evidence of muscle weakness and wasting of the thenar eminence on the initial visit. Otherwise, treat conservatively and follow closely.

**Nonpharmacologic Interventions**
- Avoid aggravating activities, especially repetitive motion activity
- Splint with the wrist in neutral position of extension

**Pharmacologic Interventions**
Anti-inflammatory analgesics:
- ibuprofen (*A class drug*), 200 mg, 1-2 tabs PO tid or
- naproxen (*C class drug*), 250 mg, PO bid-tid

**Monitoring and Follow-Up**
- Follow up in 2 weeks to see if there is response to treatment
- If improving, continue to see every 2 weeks until resolved or until 6 weeks has passed

**Referral**
Refer to a physician if the carpal tunnel symptoms do not improve in 6 weeks. If there is evidence of thenar muscle weakness or atrophy, surgical intervention is indicated.
Knee Injury

Most knee injuries in adults involve the ligaments.

Ligament Injuries

**Collateral Ligament Injury**

*Grade 1 sprain:* Microtear of the ligament; increase in joint opening < 5 mm (0.2 inch); no instability.

*Grade 2 sprain:* Partial macrotear of the ligament accompanied by significant increase in joint opening (with an end point) and instability.

*Grade 3 sprain:* Complete tear of the ligament, with no end point distinguishable on examination.

Collateral ligament injuries are usually caused by direct trauma to the contralateral side of the knee or excessive indirect force to the knee in a varus or valgus manner.

Pain and a sensation of tearing may have been noted by the client at the time of injury. In case of medial collateral ligament injury, there may be tenderness along the distal femur extending to the joint line.

Medial collateral ligament injuries may be associated with meniscal tears.

Valgus and varus tests allow assessment of the collateral ligaments. With the knee in 30° of flexion, the collateral ligaments can be isolated. Increased laxity may be seen (in grade 2 or 3 sprain).

**Anterior Cruciate Ligament Injury**

- History of a twisting injury accompanied by a pop or a tearing feeling and subsequent effusion
- Hemarthrosis found in 75% of cases
- Frequently associated with injury to a medial collateral ligament

**Posterior Cruciate Ligament Injury**

- Most injuries result from direct trauma to proximal tibia when the flexed knee is decelerated rapidly, as in a dashboard injury
- Posterior drawer test is used: knee is flexed 90°, and posterior displacement of the tibia on the femur is attempted

**Meniscal Tears**

- Medial meniscal injury is one of the most common causes of knee-joint pain; medial meniscus is much more susceptible to tears than lateral meniscus
- More than one-third of meniscal injuries are associated with anterior cruciate ligament tear and possibly medial collateral ligament injuries
- Client reports pain at time of injury; pain persists and interferes with weight-bearing activity
- Client often reports that the knee "locks," which may be attributable to pain or a physical inability to extend the knee because the torn meniscus prevents extension
- Most consistent physical finding is tenderness to palpation along the joint line
- Clinical tests help identify meniscal injury (e.g. McMurray's test and Apley's test)

Management

**Goals of Treatment**

- Relieve symptoms
- Restore or maintain knee function
- Prevent complications

Most knee injuries will respond well to conservative management.

**Appropriate Consultation**

If there are any diagnostic doubts, consult a physician as soon as possible.

**Nonpharmacologic Interventions**

Conservative treatment of isolated grade 1 and 2 collateral ligament and minor meniscal injuries involves nonpharmacologic interventions.

- Client should rest with an immobilizer splint or bandage for 7-14 days
- Client should start using crutches with weight bearing as tolerated as soon as ambulation causes only minor pain
- Ice should be applied for 20 minutes qid
• Client should elevate knee for first 24-72 hours
• Initiation of gentle range-of-motion exercises within the pain-free zone should begin as soon as pain and swelling subside enough to allow. Start with quadriceps extension.

**Pharmacologic Interventions**

Anti-inflammatory analgesics:

*ibuprofen (A class drug), 200 mg, 1-2 tabs PO tid*

*naproxen (C class drug), 250 mg, PO bid-tid*

Do not use if there are contraindications to the use of NSAIDs (such as a history of peptic ulcer disease). Instead, use:

*acetaminophen (A class drug), 500 mg, 1-2 tabs PO q4h prn*

If pain moderate to severe initially, use:

*acetaminophen with codeine 30mg (C class drug), 1-2 tabs PO q4h prn to maximum of 15 tabs, then switch to plain acetaminophen*

**Monitoring and Follow-Up**

Follow up in 1-2 days to reassess injury. If swelling and pain are reduced, you may be able to examine knee more thoroughly.

**Referral**

**Collateral Ligament Injury**

Grade 3 collateral ligament injuries can be treated non-operatively, but physician referral may be recommended to assess the need for surgical intervention.

**Anterior Cruciate Ligament Injury**

Treatment should be supervised by an orthopedist. Treatment of acute injuries depends on the severity. Clients without associated meniscal, collateral ligament or posterior cruciate ligament injury should be treated by immobilizing the knee for comfort; crutches should be used.

Clients with associated ligament injury or meniscal injury should be referred immediately to an orthopedist, because surgery may be necessary.

**Posterior Cruciate Ligament Injury**

Isolated tears should be managed conservatively, but some posterior cruciate ligament injuries may require surgical fixation.

**Meniscal Tears**

If the knee remains locked or if symptoms of pain, giving way (a sense that the knee is going to collapse) and swelling persist, client should be referred to a physician to assess for the need for surgical intervention.
**Ankle Sprain**

**Definition**
Inversion or eversion injury causing a tear of ligaments supporting the ankle, usually involving lateral ligaments.

*First-degree sprain:* Ligament is stretched and joint is stable.

*Second-degree sprain:* More severe; significant partial tearing of the ligament, joint is stable.

*Third-degree sprain:* Complete tear of ligament(s), joint is unstable.

**Causes**
- Trauma
- Predisposing laxity of ligaments

**History**
- Sudden twisting motion of foot and lateral ankle
- Most commonly results in forced inversion of foot and ankle with injury to the laterho collateral ligament
- Eversion-type injury to the deltoid ligament is second most common type of sprain
- Depending upon extent of injury and degree of ligament injury, symptoms vary in severity
- Degree of pain depends on severity of injury
- Swelling
- Bruising
- Inability to walk (depending on degree of sprain)

**Physical Findings**
- Affected limb may be unable to bear weight
- Swelling evident (extent depends on severity of sprain)
- Bruising present in moderate and severe sprains
- Anterolateral aspect of ankle joint tender
- Posterolateral aspect of ankle joint may be tender
- In severe sprains, anterior aspect of ankle also tender
- Lateral ligament may show laxity
- Tenderness over either malleolus
- Range of motion (dorsiflexion, plantar flexion, inversion) may be limited because of pain

**Differential Diagnosis**
- Fracture
- Avulsion fracture
- Tendon rupture (e.g. Achilles', peroneal, posterior tibial)

**Complications**
- Chronic laxity of ligaments and recurrent injury to ankle
- Neurovascular compromise

**Diagnostic Tests**
X-ray of ankle (according to Ottawa Ankle Rules, below) to rule out a fracture if indicated.

**Ottawa Ankle Rules**
Perform radiography if there is pain near the malleoli and inability to bear weight immediately at the time of injury and at the time of your examination of the client or if there is point tenderness over the bone at the posterior tip of either malleoli.

Perform radiography if there is pain at the mid-foot and inability to bear weight both immediately and at the time of your examination or there is bone tenderness at the navicular or at the base of the fifth metatarsal.

**Management**

**Goals of Treatment**
- Reduce pain and swelling
- Rehabilitate ankle strength
- Prevent further injury

**Appropriate Consultation**
Consult a physician if joint instability is present at initial examination. Also, consult a physician if there is no improvement after 2 weeks of conservative therapy.

**Nonpharmacologic Interventions**

**Rest the Joint**
Type and period of rest varies according to severity of injury.
- No weight bearing or partial weight bearing with crutches, limited weight-bearing activities
• For first- and second-degree sprains, a gradual increase in weight-bearing is recommended, beginning as soon as pain and stability allow; this promotes healing and proprioception

**Ice or Cold Pack to Reduce Swelling and Pain**
- Apply to lateral aspect of ankle for 20 minutes qid for 48 hours (longer if swelling continues)
- If sprain is severe, apply ice q2h
- Use ice as long as swelling and pain are present
- Heat is contraindicated for the acutely injured ankle
- Never use heat in acute or subacute phases of recovery
- Heat may be used for chronic swelling

**Compression and Elevation to Reduce Swelling and Pain**
- Tensor bandage should be worn during daytime and removed at bedtime
- Ankle should not be wrapped too tightly
- When possible, ankle should be elevated above level of hip

**Exercises**
- Start gentle range-of-motion exercises for dorsiflexion within 24 hours
- Encourage calf stretching as tolerated
- Instruct client to draw letters of alphabet with ankle

Plantar flexion, inversion and eversion should be avoided in the very early stages of rehabilitation.

Muscle-strengthening exercises should be started when range of motion is regained. Instruct client about the following exercises:
- Toe and heel raises on inclined surface, holding end position for 4-6 seconds (10-20 repetitions)
- Toe raises on flat surface, holding end position for 4-6 seconds (10-20 repetitions)
- Heel and toe walking

• Balancing on one foot

**Client Education**
- Counsel about the importance of rest, ice and elevation
- Teach to use crutches to prevent weight bearing
- Teach the proper application of tensor bandage
- Counsel about appropriate use of medications (dose, frequency, side effects)
- Counsel about strategies to prevent further injuries to ankle (e.g. doing warm-up exercises before physical activities such as sports; wearing high-top, lace-up shoes for walking and running)

**Pharmacologic Interventions**

Anti-inflammatory analgesics to reduce pain and swelling:
- ibuprofen (*A class drug*), 200 mg, 1-2 tabs PO tid-qid prn

If there are contraindications to acetylsalicylic acid (ASA) or NSAIDs, use:
- acetaminophen (*A class drug*), 500 mg, 1-2 tabs PO q4h prn

For moderate to severe pain, stronger analgesics may be needed in addition to anti-inflammatory drugs in the first 24-48 hours; use:
- acetaminophen with codeine 30mg (*C class drug*), 1-2 tabs PO q4-6h prn (maximum 15 tabs)

**Monitoring and Follow-Up**
Follow up in clinic at 48 hours and again in 2 weeks, or sooner if pain and swelling persist

**Referral**
Arrange physiotherapy (if readily available) if symptoms persist for more than 2-3 weeks. Refer all grade 3 sprains to a physician. Consider consult with orthopedist for eversion-type injuries.
Low-Back Pain

Acute low-back pain is one of the most common health problems. Almost everyone experiences it in his or her lifetime to some degree.

Back structures that can be a source of pain are ligaments, vertebral bones, facet joints, intervertebral disks, nerve roots and muscles. Pain usually results from strain or degeneration of these structures, but serious inflammatory, infectious and neoplastic disorders also occur.

Back pain can also result from disorders of the visceral structures immediately anterior to the spine: aorta, kidneys, intestines, pancreas, stomach, gallbladder, prostate, uterus and ovaries.
Lumbosacral Strain And Sciatica

**Definition**
Stretching or tearing of muscles, tendons, ligaments or fascia of the lower back secondary to trauma or chronic mechanical stress. May be accompanied by sciatica (pain in buttocks or legs, or both, along path of sciatic nerve, due to nerve root irritation).

**Causes**
- Contusions
- Ligamentous strain
- Muscular strain
- Muscular tension related to mechanical stress
- Osteoarthritis of spine
- Protruding intervertebral disk
- Other disease process

**Risk Factors**
- Aging
- Prolonged periods of standing or sitting
- Poor posture
- Pregnancy
- Obesity
- Improper lifting techniques
- Family history
- Osteoporosis
- Past trauma
- Recent bacterial drug use
- IV drug use
- Immunosuppressed

**History**
Obtain a detailed history, with a precise description of the pain and events surrounding its onset (e.g. activity at the time).
- Pain localized in low lumbar area
- Pain may radiate into buttock or leg (e.g. sciatica)
- Aching pain may be accompanied by intense, sharp muscle spasm
- Sitting increases pain
- Supine posture decreases pain
- Rest decreases pain
- Motion increases pain
- Interference with daily activities
- Interference with performance of job-related activities
- Occupation involving bending or heavy lifting
- History of recent or previous trauma
- Other underlying spinal disk, bone or joint disease (e.g. spinal stenosis, osteoarthritis)
- Fever, chills
- Weight loss
- Cancer

**Physical Findings**
- Client appears in mild-to-severe distress
- Abnormal posture (tilting to one side)
- Difficulty with walking (ataxic gait)
- May be unable to stand or sit up straight
- Spinal deformities may be present
- Bruising or soft-tissue swelling may be present
- Spasm of para-spinal muscles may be present
- Intervertebral disk space may be tender in lumbar area and along paravertebral muscles
- Range-of-motion maneuver may be limited (especially forward flexion)
- Straight leg raising may be limited because of muscle tightness, muscle spasm or nerve root irritation (sciatica)
- Reflexes normal in cases of soft-tissue injury, but may be abnormal in cases of impingement on nerve root
- Weakness with heel or toe walking may be present (in cases of impingement on nerve root)
- Sensory deficits may be present (in cases of impingement on nerve root)
- Bowstring test may be positive (in cases of impingement on nerve root)
- Evaluate for "red flag" indicators for potentially serious conditions

**Red Flag Indicators For Potentially Serious Conditions**

**Possible Fracture**
- Major trauma
- Minor trauma in older clients or clients who may have osteoporosis
Possible Cauda Equina Syndrome (Surgical Emergency)
- Saddle-block anesthesia
- Bladder dysfunction
- Severe or progressive neurologic dysfunction in the legs
- Laxity of anal sphincter
- Major motor weakness in quadriceps (knee extensors), ankle plantar flexors, evertors and dorsiflexors (foot drop)

Possible Tumor or Infection
- Client age < 20 or > 50 years
- History of cancer
- Constitutional symptoms such as fever, chills and weight loss
- Risk factors for spinal infection, recent bacterial infection, injection drug use or immunosuppression
- Pain that is worse in the supine position or severe nighttime pain

Differential Diagnosis

Complications
- Chronic or recurrent back pain
- Absenteeism from work
- Dependency on or abuse of analgesics
- Occupational disability

Diagnostic Tests
In the absence of any red flag indicators, no investigations are needed within the first 4 weeks of acute mechanical low-back pain from lumbar strain.

Management

Goals of Treatment
- Relieve pain
- Prevent further injury
- Educate and reassure the client
- Maintain/improve activity level

Appropriate Consultation
Consult physician for moderate-to-severe back pain, especially if the client is > 50 years of age or has neurologic abnormalities, or if you suspect an underlying organic cause for the back pain.

Nonpharmacologic Interventions
- Clients with sciatica may have a longer expected recovery time than clients with non-specific back symptoms
- Bed rest is useful if pain and spasm preclude motion, but should not exceed 3 days; any longer may actually increase pain and disability
- Heavy physical activity should be reduced for 1-2 weeks; otherwise activity as tolerated
- No heavy lifting (> 11 kg [25 lb])
- Client should sleep on a firm mattress support with pillow under knees when lying on back or between knees when lying on side
- Ice packs can be used to reduce muscle spasm (20 minutes q2-4h for 24-48 hours)
- Use a heating pad or hot water bottle to reduce muscle stiffness (if pain and spasm absent) after the first 48 hours (20 minutes qid prn)
- Provide advice about nutrition and weight loss if client is overweight
- Time off should be brief; goal is to keep client active

Client Education

To Be Avoided
- Prolonged standing
- Prolonged sitting
- Lifting > 11 kg (25 lb)
- Lifting and twisting motion
- Slumping posture

To Be Encouraged
- Lumbar support
- Frequent positional changes
- Maintenance of normal spine alignment when sitting or standing
- Proper lifting techniques
- Counsel client about appropriate use of medications (dose, frequency, abuse, overuse)
- Teach the client back-strengthening and conditioning exercises that can be done at home
• Advise client not to start exercises until acute symptoms have subsided

**Pharmacologic Interventions**
Anti-inflammatory analgesics to reduce pain:
- ibuprofen (**A class drug**), 400 mg, PO tid-qid prn
- naproxen (**C class drug**), 250 mg, PO bid
- acetaminophen (**A class drug**), 500 mg, 1-2 tabs PO tid-qid prn

If pain is moderate to severe, or first-line agents fail to control discomfort:
- acetaminophen with codeine 30mg (**C class drug**), 1-2 tabs PO q4h prn (maximum 15 tabs) -- may be used in addition to the anti-inflammatory drugs

For muscle spasm:
- cyclobenzaprine (**A class drug**), 10mg PO tid for 3 days and reassess

**Monitoring and Follow-Up**
Arrange follow-up at 1-2 days, and then as needed

**Referral**
• Refer to a physician if symptoms persist after 4 weeks, or sooner if symptoms are worsening despite conservative treatment
• Arrange referral to a physiotherapist
Gout

Definition
Inflammatory disease of peripheral joints related to high concentrations of uric acid in the joints and bones.

Causes
• Primary gout: High levels of uric acid from either increased production or decreased excretion of uric acid
• Secondary gout: Hyperuricemia from primary acquired diseases such as hypertension, renal failure, hemolytic anemia, glycogen storage disease, psoriasis, renal insufficiency, sarcoidosis, enzyme deficiencies

Risk Factors
• Obesity
• Lead intoxication
• Medications such as salicylates, thiazide diuretics, corticosteroids, cytotoxic drugs, diazepam, ethambutol, nicotinic acid
• Alcohol abuse (especially binge drinking)
• Other risk factors: family history, diabetes mellitus, hypertension, renal failure, hypothyroidism, hyper- or hypo-parathyroidism, pernicious anemia

History
• Sudden onset of pain in a joint
• Great toe most commonly affected initially
• Instep, ankle, knee, wrist and elbow may be affected
• Almost all attacks are monoarticular (involving only one joint)
• Widespread joint involvement occurs rarely, accompanied by fever, chills and general malaise
• Pain usually occurs spontaneously, is severe, throbbing and continuous
• First attack begins during the night or early morning
• May be precipitated by trauma, alcohol binging, recent infection, emotional stress or administration of medications (diuretics, penicillin, insulin)
• Attacks are recurrent
• Familial tendency

Physical Findings
Acute Attack
• Temperature usually normal
• Heart rate may be elevated
• Client appears in acute distress
• Difficulty walking or unable to bear weight on affected limb
• Metatarsophalangeal or interphalangeal joint of great toe shows the following characteristics: redness and swelling; overlying skin tense and shiny; range of motion reduced and accompanied by pain; joint acutely tender and feels warm or hot

Chronic Disease
• Joint deformity may be present
• Tophi (chalky deposits) may be present in pinnae of ear, olecranon bursa, dorsum of hands, ulnar surface of forearms, Achilles' tendon and joints of hands and feet

Differential Diagnosis
• Septic arthritis
• Pseudogout
• Bursitis
• Cellulitis
• Osteomyelitis
• Degenerative arthritis with acute inflammation
• Rheumatoid arthritis
• Bunion

Complications
• Recurrent attacks
• Joint deformity and reduced mobility
• Chronic pain
• Renal calculi
• Nephropathy (may take 10 years to develop)
• Tophi (deposition of uric acid crystals in soft tissues)

Diagnostic Tests
• Serum uric acid (normal < 0.45 mmol/L [7.5 mg/dL])
Management

Goals of Treatment
- Relieve symptoms
- Prevent recurrence
- Prevent complications

Appropriate Consultation
Consult a physician if the client is acutely ill or febrile on initial presentation. Consult a physician if no response to therapy in 24-48 hours.

Nonpharmacologic Interventions
- No weight bearing
- Immobilize the joint until hyperacute symptoms are controlled
- Client should increase fluid intake during attack (8 glasses daily)
- Client should discontinue alcohol consumption
- Low-fat diet (to reduce dietary purine, if excessive)
- Weight reduction will help an obese client in the long term

Client Education
- Explain chronic nature and course of the disease
- Counsel client about appropriate use of medications (dose, frequency, side effects, adherence to regimen between attacks to prevent future attacks)
- Advise client to avoid known precipitating factors
- Explain how to prevent irritation (e.g. proper-fitting footwear, not going barefoot in the house)
- Advise client to return to clinic at first sign of recurrence
- Advise client to begin anti-inflammatory medications at the first sign of an acute attack

Pharmacologic Interventions
For acute gout, relieve pain and inflammation with NSAIDs:
- ibuprofen (A class drug), 400 mg, PO tid until acute symptoms subside, then taper drug to discontinue in another 72 hours
- or
- naproxen (C class drug), 250 mg PO bid for 7 days

ASA (Aspirin) is contraindicated for gout.

If pain is severe, additional analgesia may be required until anti-inflammatory drugs start to work:
- acetaminophen with codeine 30mg (C class drug), 1-2 tabs PO q4h prn (maximum 15 tabs)

Monitoring and Follow-Up
- Follow up in 24 hours to ensure response to therapy
- Follow up in 1 month to evaluate status
- For client with chronic gout, measure uric acid levels annually and assess adherence to prophylaxis

Referral
Refer to a physician regarding prophylactic therapy for clients with recurrent episodes.
Osteoarthritis (Degenerative Joint Disease)

Definition
Degenerative disease of the articular cartilage of movable joints. Variable amounts of synovial inflammation result, new bone forms at joint surfaces (osteophytes).

Causes
- Unknown.
- Factors associated with osteoarthritis: aging, previous joint trauma, chronic overuse of joint, altered biomechanics, obesity, metabolic disorders (e.g. Wilson's disease), previous infection in a joint, endocrine disorders (e.g. diabetes mellitus), crystalline deposit disease

History
- Family history
- Client usually > 50 years of age
- Joint pain (joints most affected are DIP [distal interphalangeal], PIP [proximal interphalangeal], MCP [metacarpophalangeal], knees, hips, cervical spine, lumbar spine)
- Pain is aching in character
- Pain often worsens with changes in weather
- Pain increases with activity
- Pain relieved by rest
- Localized joint stiffness may be present in the morning or after periods of inactivity
- Stiffness quickly relieved with movement (in less than 30 minutes)
- Generalized joint stiffness absent
- Crepitus (a noisy joint) may be present
- Joint enlargement with limited range of motion may be present
- Flare-ups of pain may occur after unaccustomed exercise

Physical Findings
Extent and pattern of physical findings are variable.
- Difficulty with mobility may be present if spine, hips or knees are affected
- Joints may appear enlarged and deformed
- Range of motion limited according to extent of joint involvement
- Muscle strength and joint stability (ligament) may be affected
- Osteophyte formation (bony enlargement)
- DIP joints may have osteophyte formation dorsally and marginally (Heberden's nodes)
- Redness or swelling not evident unless there has been an episode of secondary reactive synovitis
- Tenderness may be present in late disease
- Crepitations may be felt or heard with movement of joint

Differential Diagnosis
- Other forms of arthritis and articular disease
- Trochanteric bursitis (in clients with hip problems)
- Ligamentous or meniscal problems, local bursitis, loose bodies (in clients with knee problems)

Complications
- Chronic pain
- Progressive joint destruction with increasing loss of function and pain
- Impingement of spinal nerves

Diagnostic Tests
None.

Management
Goals of Treatment
- Relieve or modify symptoms
- Preserve joint function
- Prevent complications

Appropriate Consultation
Consult a physician if client is < 50 years of age, joint involvement is atypical, or nerve dysfunction is suspected.

Nonpharmacologic Interventions
- Weight-reduction strategies if client is obese
- Daily exercise program (walking is best)
- Range-of-motion exercises and muscle-strengthening exercises
- Alternating application of heat and cold to reduce joint pain
Client Education

- Discourage bed rest or inactivity, as this will cause further loss of function and increase immobility
- Explain prognosis, process and expected course of the disease
- Counsel client about appropriate use of medications (dose, frequency, side effects)

Pharmacologic Interventions

acetaminophen (A class drug), 500 mg, 1-2 tabs PO q4h prn

If there is insufficient pain control, add low-dose NSAID, if not contraindicated (e.g. heart failure, hypertension, renal failure, peptic ulcer):

ibuprofen (A class drug), 200 mg, 1-2 tabs PO qid prn
or
naproxen (C class drug), 250 mg bid prn

Monitoring and Follow-Up

Follow up every 6-12 months. Clients receiving daily doses of acetaminophen, ASA or other NSAIDs should undergo regular monitoring as follows: complete blood count, creatinine level, electrolyte level, liver function tests (LFTs) and stool examination (for occult blood).

Referral

Refer to a physician if symptoms are not controlled with conservative treatment. Arrange for physiotherapy (if readily available).
Rheumatoid Arthritis

Definition
A chronic systemic inflammatory disease that affects primarily the peripheral joints. Certain extra-articulat manifestations are common, including rheumatoid nodules, arteritis, peripheral neuropathy, keratoconjunctivitis, pericarditis and splenomegaly.

Causes
- Largely unknown
- Autoimmune disorder
- Viral infection

Risk Factors
- Usually occurs in women 30-60 years of age
- Family history
- Native ancestry

History
- Recent systemic illness or trauma may have occurred
- Onset of symptoms generally insidious
- Hands, wrists, elbows, shoulders, ankles and feet are the joints most commonly affected; joints exhibit pain, swelling, stiffness, warmth, redness
- Pain and stiffness exacerbated by prolonged rest or strenuous activity
- Joint stiffness for at least 1 hour upon rising in morning, over a period of more than 6 weeks
- Fatigue, general malaise, anorexia and weight loss present during acute exacerbations
- Iritis

As disease progresses:
- Morning and resting stiffness lasts for longer periods of time (this increase over time is a good indicator of disease progression)
- Disease progresses to involve multiple other joints
- Progressive joint destruction, deformity

Physical Findings

Acute Exacerbation
- Client in moderate distress
- Temperature may be elevated
- Heart rate may be elevated
- Affected joints swollen (bilateral symmetric joint involvement common)
- Affected joints may be reddened
- Affected joints are warm and tender
- Range of motion reduced

Chronic Progressive Disease
- Affected joints are enlarged
- Joints become deformed: PIP joints take on fusiform shape; flexion contractures may occur (e.g. Swan neck deformity); ulnar deviation of MCP joints; deviation of wrists
- Subcutaneous rheumatoid nodules may be present
- Progressive weight loss may occur

Differential Diagnosis
- Degenerative osteoarthritis with inflammation
- Septic arthritis
- Polymyalgia rheumatica
- Systemic lupus erythematosus
- Gout
- Psoriatic arthritis
- Gonococcal arthritis
- Reiter's syndrome (in men)
- Lyme disease
- Polymyositis
- Inflammatory bowel disease (e.g. Crohn's disease, ulcerative colitis)

Complications
- Chronic pain
- Progressive joint destruction
- Loss of mobility
- Anemia of chronic disease
- Pulmonary and renal involvement
- Dermatitis
- Pericarditis

Diagnostic Tests
Before medications are started, clients should undergo some basic laboratory tests: complete blood count, ESR, rheumatoid factor, anti-nuclear antibody (ANA), creatinine and electrolyte levels, LFTs. Urinalysis should also be performed before drug treatment starts.
Management

Goals of Treatment
• Control pain
• Reduce inflammation
• Preserve joint function
• Prevent long-term disability

Appropriate Consultation
Consult physician for:
• Previously undiagnosed clients
• Clients whose disease is not controlled by current therapy
• Clients whose disease is progressive
• Clients in whom a complication is developing

Client Education
• Adequate rest and nutrition
• Rest for affected joints
• Splint affected joint during acute phase prn
• Ice packs prn to reduce pain and swelling of affected joints
• Adequate, balanced, nutritious diet
• Exercise program to maintain joint mobility and muscle strength
• Maintenance of ideal body weight
• Explain process, course and prognosis of the disease
• Counsel client about appropriate use of medications (dose, frequency, side effects, compliance)
• Instruct client to take medications with meals to reduce gastrointestinal upset
• Stress importance of daily exercise in maintaining function and mobility of joints
• Assess family support systems and encourage family members to become active in client's treatment program
• Advise client to return to clinic if acute episode occurs

Pharmacologic Interventions
Anti-inflammatory analgesics:
- ibuprofen (A class drug), 400 mg, PO tid
- naproxen (C class drug), 250 mg, PO bid

Monitoring and Follow-Up

Acute Episode
• Follow up in 48-72 hours to assess response to therapy

Long-Term Surveillance
• Follow up regularly as dictated by stage of disease
• Assess weight, appetite, energy level, sense of well-being
• Monitor symptoms for progression of disease
• Determine efficacy of therapy
• Encourage joint mobility through exercise program
• Identify acute exacerbations

Referral
Refer clients with persistent joint inflammation (> 3 months) and any who present with severe disease as soon as possible. Arrange physiotherapy consult (if readily available).
Emergencies Of The Musculoskeletal System

Note: For spine and pelvic fractures see Chapter 14: General Emergencies and Major Trauma

**Limb Fractures**

**Definition**
A break in the continuity of the bone.

**Causes**
- Trauma
- Pathological fracture secondary to underlying disease (e.g. osteoporosis)

**Types of Fractures**
- *Closed (simple) fracture:* fracture that does not communicate with the external environment
- *Open (compound) fracture:* fracture that communicates with the external environment (through laceration of skin)
- *Comminuted fracture:* fracture involving three or more fragments
- *Avulsion fracture:* fracture in which fragment of bone is pulled from its normal position by muscular contraction or resistance of a ligament
- *Greenstick fracture:* incomplete angulated fracture of a long bone, seen most often in children
- *Undisplaced fracture:* fractured bone stays in alignment
- *Displaced fracture:* fractured bone goes out of alignment

**History**
- Determine exact mechanism of injury
- Pain
- Swelling
- Loss of function
- Numbness distal to fracture site (possible)

**Commonly Seen Fractures**
- *Fracture of the clavicle:* See "Clavicle Fracture," below, this chapter.
- *Fracture of radial head (elbow):* Usually caused by a fall onto an outstretched hand. Client is reluctant to pronate the hand or flex the elbow beyond 90°.
- *Radial fracture (wrist):* In adults, the most common radial fracture is the Colles' fracture, which is extra-articular and occurs 2.5-3 cm (1-1.2 inch) proximal to the articular surface of the distal radius. This fracture occurs with the hand in dorsiflexion; the distal fracture segment is angulated dorsally and causes a "dinner fork" deformity.
- *Metacarpal fracture:* Also known as "boxer's fracture," this is a fracture of the distal neck of the fifth metacarpal and is generally the result of punching something with a closed fist (generally a wall or refrigerator). Tenderness is localized to the injured metacarpal bone.
- *Finger fracture:* There are three types of finger fractures. (1) Distal tip fractures are usually crush injuries to the tip of the finger. (2) Middle and proximal phalangeal fractures should be examined for evidence of angulation (by x-ray) or rotation (by clinical examination), each of which requires reduction. (3) Small (< 25%) avulsion fractures of the middle phalangeal base occur with a hyperextension injury.
- *Pelvic fracture:* Often associated with major trauma and can lead to significant blood loss. See "Pelvic Fracture," in chapter 14, "General Emergencies and Major Trauma."
- *Hip fracture:* Common in elderly clients. May not be very painful.
- *Femur fracture:* Often associated with major trauma and can lead to significant blood loss.
- *Tibia and fibula fracture*
- *Ankle fracture*

**Physical Findings**
- Skin lacerations with protruding bones may be present if fracture is compound
- Bruising and swelling
- Range of motion decreased
- Affected part may be pale if blood flow to the area is compromised
Limb cool, pulses absent and sensation decreased if blood supply has been compromised. Check temperature of area and presence of pulses distal to site of injury. Test sensory function (to sharp and dull stimuli) distal to site of injury. Affected area extremely tender. If bones are displaced, crepitations may be felt.

**Table 8: Volumes of blood loss associated with some common fractures**

<table>
<thead>
<tr>
<th>Fracture</th>
<th>Volume (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td># tibia</td>
<td>350 - 650</td>
</tr>
<tr>
<td># femur</td>
<td>800 - 1200</td>
</tr>
<tr>
<td># humerus</td>
<td>200 - 500</td>
</tr>
<tr>
<td># ribs</td>
<td>100 - 150</td>
</tr>
<tr>
<td># pelvis</td>
<td>1500 - 2000</td>
</tr>
</tbody>
</table>

**Management**
Most bones join in 6-8 weeks; lower-limb bones may take longer and fractures in children may take less time.

**Goals of Treatment**
- Stabilize fracture
- Relieve pain
- Prevent or manage complications
- Identify and treat associated injuries

**Appropriate Consultation**
Consult physician for all suspected or confirmed fractures.

**Nonpharmacologic Interventions**
Do not attempt to reduce a displaced fracture.
- Immobilize and support involved area using splints, a back slab cast or sling (for upper extremities) as appropriate
- For client with displaced fracture, give nothing by mouth because surgery may be needed

**Client Education**
- Counsel client about appropriate use of medications (dose and frequency)
- Advise client to keep limb elevated as much as possible during the first several days to reduce swelling
- Instruct the client about cast care: keep cast dry, avoid poking objects down the cast, as this may result in damage to the skin
- Advise client to return to the clinic if pain increases, if numbness or tingling develops, if the limb becomes cool or if colour changes are noted in the distal limb
- Teach client how to care for limb after removal of cast: skin should be kept clean and well hydrated with oil or petroleum jelly to prevent drying, cracking and infection; range-of-motion exercises should be done to regain joint mobility

**Adjuvant Therapy**
If hypotension is present in a client with a major fracture (e.g. femur, pelvis, hip), treat for shock:
- Oxygen to keep oxygen saturation > 97%
- Start two large-bore IVs with normal saline or Ringer's lactate
For management of hypovolemic shock, see "Shock," in chapter 14, "General Emergencies and Major Trauma".

**Pharmacologic Interventions**  
Analgesia for pain as ordered by physician.

**Referral**  
Medevac to hospital.

**Management Of Specific Fractures Of The Upper Extremity**

**Fracture of Radial Head**  
Management of undisplaced fracture includes a sling and posterior elbow splint for 1-2 weeks with range-of-motion exercises initiated after 1 week. Continue in sling for another week and do follow-up x-ray to document that no displacement has occurred with mobilization.

Displaced fractures of the radial head should be referred to an orthopedist for operative repair.

**Radial Fracture**  
Reduction by traction and manipulation is performed. After the fracture is reduced, a plaster short-arm cast is applied for 5-8 weeks. If the fracture is undisplaced, casting for 6 weeks without reduction is indicated.

**Metacarpal Fracture**  
Undisplaced fractures of the base of the metacarpals are treated by immobilization in a short-arm cast. Displaced fractures are reduced by traction, with local pressure over the prominent proximal end of the distal metacarpal fracture. Follow-up x-ray within 7 days is necessary. If any instability is noted after reduction or the fracture is comminuted, the client should be referred to an orthopedist for open reduction and internal fixation.

**Distal Tip Fracture**  
Protective splinting of the tip for several weeks is usually satisfactory.

**Middle and Proximal Phalangeal Fracture**  
Nondisplaced extra-articular fractures can be managed by 1-2 weeks of immobilization followed by dynamic splinting with "buddy taping" to the adjacent finger.

Large intra-articular or displaced fractures are usually unstable and require orthopedic referral.

**Small (< 25%) Avulsion Fracture of Middle Phalangeal Base**  
These injuries are managed by 2-3 weeks of immobilization with up to 15° of flexion at the PIP joint, followed by "buddy taping" for 3-6 weeks.

**Monitoring and Follow-Up**  
- Monitor vital signs, and watch for tachycardia and hypotension; shock may occur with major fractures of the pelvis and femur.  
- Monitor neurovascular status of area distal to the fracture site.
Clavicular Fracture

Definition
Break in the continuity of the clavicle.

Eighty percent of clavicle fractures occur in the middle third of the bone (class A), 15% involve the distal or lateral third (class B), and 5% involve the proximal or medial third (class C).

Class B fractures are further classified as:
- Type 1 (non-displaced): the supporting ligaments remain intact and there is no significant displacement of the fracture fragments
- Type 2 (displaced): the coracoclavicular ligament ruptures, with resultant upward displacement of the proximal segment because of the sternocleidomastoid muscle
- Type 3 (articular surface): fracture involves the acromioclavicular joint

Causes
- Fall onto shoulder or outstretched upper extremity
- Direct trauma to clavicle area

History
- Fall onto outstretched upper extremity, fall onto the shoulder or direct clavicular trauma
- Pain (moderate to severe), especially with movement of the upper extremity

Physical Findings
- Tenderness
- Swelling over fracture site
- Deformity
- Ecchymosis, especially when severe displacement causes tenting of skin
- Bleeding due to open fracture (rare)
- Non-use of arm on affected side

Distal neurovascular examination and lung auscultation (to clinically exclude pneumothorax) must be performed.

Differential Diagnosis
- Dislocation
- Shoulder fracture
- Rib pneumothorax (tension and traumatic)
- Rotator cuff injury
- Sternoclavicular joint injury

Complications
- Brachial plexus compression may result from hypertrophic callus formation and may cause peripheral neuropathy
- Delayed union or non-union (especially with distal-third fractures)
- Poor cosmetic appearance
- Post-traumatic arthritis
- Intrathoracic injury (as with fracture of the first rib, great force is necessary to cause proximal-third clavicle fractures, and it is imperative to rule out underlying injuries)
- Pneumothorax
- Subclavian artery and vein injury
- Internal jugular vein injury
- Axillary artery injury

Diagnostic Tests
- Routine clavicle x-ray (the fracture is usually seen with an AP view)
- Chest x-ray, if pneumothorax suspected

Management

Goals of Treatment
- Identify and treat associated life threatening injuries
- Stabilize fracture site
- Relieve pain
- Identify and manage complications

Nonpharmacologic Interventions
- Employ the ABC approach (airway, breathing and circulation) to evaluation and stabilization
- Perform a careful secondary survey
- Apply a cold pack to site of injury
- Immobilize the upper extremity with a sling

Class A (Middle-Third Fractures)
- Treat with sling immobilization (some prefer a figure-of-eight clavicular splint, especially for displaced fractures)
Class B (Distal-Third Fractures)
• Type 1 (non-displaced) and type 3 (articular surface) fractures of the distal clavicle are treated with sling immobilization
• Type 2 (displaced) fractures should be immobilized in a sling and swath and may require orthopedic surgical fixation

Class C (Proximal-Third Fractures)
• Treat non-displaced fractures with sling immobilization
• Displaced fractures may require orthopedic referral for surgical reduction

Client Education
• Client should use a sling or shoulder immobilizer
• Alternatively, client may use a figure-of-eight bandage (clavicle strap); educate clients as to proper placement and adjustment techniques; paresthesias or edema in the hands or fingers indicate that the strap is too tight and should be removed; purpose of this bandage is to reduce pain by decreasing movement of the fracture fragments, not necessarily to maintain perfect alignment; may be combined with a sling for added comfort
• Counsel client about injury prevention: adequate protective gear for participation in certain sports, use of seatbelts, drug and alcohol counseling (as needed), early physical therapy (e.g. range-of-motion exercises) if indicated

Pharmacologic Interventions
Control discomfort with NSAIDs. If pain continues, add a narcotic analgesic:
ibuprofen (A class drug), 400 mg PO tid, prn for 1-2 weeks
If pain is not controlled, add:
acetaminophen with codeine 30mg (C class drug), 1-2 tabs PO q4h prn (maximum 15 tabs)

Monitoring and Follow-Up
• Reassess injuries in 48 hours, then follow up weekly until full shoulder mobility has returned

Referral
• Medevac clients with open fractures
• Refer other clients if not improving
Septic Arthritis

Definition
Bacterial infection of a joint.

Causes
Common pathogens include *Neisseria gonorrhoeae*, *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Mycobacterium tuberculosis*, gram-negative bacilli and occasionally *Haemophilus*; infection with viral and fungal agents is rare but may occur in immunocompromised clients.

Risk Factors
- Trauma
- Recent joint surgery
- Prosthetic joint
- Contiguous spread from osteomyelitis
- Extension of cellulitis
- Hematogenous spread of bacteria
- Pre-existing joint disease (e.g. rheumatoid arthritis)
- Injection drug use
- Prior use of antibiotics, corticosteroids or immunosuppressants
- Serious chronic illness (e.g. diabetes mellitus, liver disease, malignant disease)
- Primary immunodeficiency (e.g. HIV)

History
- Presence of one of the above risk factors
- Fever and chills
- Sudden onset of acute monoarticular joint pain
- Heat
- Redness
- Swelling
- Large joint usually involved
- Client unable to bear weight on affected limb, unable to move joint
- Recent history of urethritis, salpingitis or hemorrhagic skin lesions (indicating gonococcal infection) may be present

Physical Findings
The classic signs of acute inflammation may be absent in elderly clients, chronically debilitated people or clients receiving steroid therapy.
- Temperature elevated
- Heart rate elevated
- Client appears ill and in acute distress
- Joint red
- Joint swelling may be present
- Range of motion severely limited
- Client actively resists any movement of joint
- Hemorrhagic skin lesions may be present
- Joint warmth may be present
- Joint tender
- Regional lymphatic nodes enlarged and tender

Differential Diagnosis
- Localized synovitis due to trauma
- Bursitis
- Cellulitis
- Rheumatic fever arthritis
- Active rheumatoid arthritis
- Active gout or pseudogout
- Reiter's syndrome
- Psoriatic arthritis
- Lyme disease arthritis

Complications
- Sepsis
- Septic shock
- Osteomyelitis
- Joint destruction
- Loss of limb

Diagnostic Tests
None.

Management
Goals of Treatment
- Relieve pain and inflammation
- Prevent complications

Appropriate Consultation
Consult a physician immediately.

Nonpharmacologic Interventions
- Bed rest
- Splint limb, using pillows or a back slab, to protect involved area from injury
Adjuvant Therapy
Start IV therapy to keep vein open.

Pharmacologic Interventions
Analgesic or antipyretics for pain and fever: acetaminophen (A class drug), 500 mg, 1-2 tabs PO q4h prn

Consider starting IV antibiotics in consultation with physician if transfer to hospital will be delayed more than an hour or two.

Monitoring and Follow-Up
Monitor vital signs frequently.

Referral
Medevac as soon as possible.
Osteomyelitis

Definition
Infection of the bone.

Causes
Bacterial infection (common pathogens are \textit{Staphylococcus aureus}, \textit{Streptococcus}).

\textbf{Risk Factors}
- Extension of existing soft-tissue infection
- Trauma
- Direct introduction of organism into the bone
- Hematogenous spread of pre-existing infection

People with diabetes, peripheral vascular disease with chronic skin breakdown, and chronic skin infection are particularly prone to osteomyelitis.

History
- Presence of one of the above risk factors
- Mild-to-moderate fever may be present
- Infection of overlying skin and subcutaneous tissues may be present
- Localized pain, increased by weight bearing or movement
- Heat, redness and swelling of affected area
- Sinus may be draining

\textbf{Blood-Borne Osteomyelitis}
- Original site of infection frequently not apparent
- Most commonly occurs in vertebrae
- Presents as persistent back pain with minimal or absent fever
- May present as acute back pain with high fever, paravertebral muscle spasm and guarding of movements (mimicking pyelonephritis)

Physical Findings
- Temperature may be elevated
- Heart rate moderately elevated
- Client in moderate distress
- Distress with weight-bearing
- Involved area swollen, overlying skin red
- Range of motion reduced if adjacent joint is involved
- Purulent drainage from sinus may be present
- Area warm and tender to touch

Differential Diagnosis
- Infectious arthritis
- Active rheumatoid arthritis
- Cellulitis

Complications
- Chronic osteomyelitis
- Chronic bone pain
- Loss of limb
- Subcutaneous abscess

Diagnostic Tests
None.

Management
\textbf{Goals of Treatment}
- Relieve infection
- Prevent complications

\textbf{Appropriate Consultation}
Consult a physician immediately.

Nonpharmacologic Interventions
- Bed rest
- Elevate and splint affected area

Adjuvant Therapy
Start IV therapy with normal saline to keep vein open.

Pharmacologic Interventions
Antipyretic or analgesic for pain and fever: \textit{acetaminophen (A class drug)}, 500 mg, 1-2 tabs \textit{PO q4h prn}

Consult physician for choice of IV antibiotics

Referral
Medevac as soon as possible.
Chapter 8- The Central Nervous System

Assessment Of The Central Nervous System
History Of Present Illness And Review Of System
Examination Of The Central Nervous System

Common Problems Of The Central Nervous System
Bell's Palsy
Headaches
Muscle Tension Headache
Cluster Headache
Migraine Headaches
Temporal Arteritis (Giant Cell)
Transient Ischemic Attack (TIA)

Emergency Problems Of The Central Nervous System
Differential Diagnosis Of Acute Unconsciousness
Meningitis
Seizure Disorder (Chronic)
Epilepticus (Acute Grand Mal Seizure)
Cerebrovascular Accident (Stroke)
Assessment Of The Central Nervous System

History Of Present Illness And Review Of System

General
The following characteristics of each symptom should be elicited and explored:
• Onset (sudden or gradual)
• Chronology
• Current situation (improving or deteriorating)
• Location
• Radiation
• Quality
• Timing (frequency, duration)
• Severity
• Precipitating and aggravating factors
• Relieving factors
• Associated symptoms
• Effects on daily activities
• Previous diagnosis of similar episodes
• Previous treatments
• Efficacy of previous treatments

Cardinal Symptoms
In addition to the general characteristics outlined above, additional characteristics of specific symptoms should be elicited, as follows.

General Cerebral Function
• Changes in memory, especially recent
• Changes in concentration
• Changes in mood

Cranial Nerve Function
• Changes in vision, drooping eyelids
• Facial weakness
• Disturbance of speech production
• Hearing loss, unusual noise in ears, difficulties with balance
• Impairment of sense of smell or taste

Headaches
• Onset, age at onset
• Pattern, any changes in pattern, how it progresses
• Location, description, whether pulsating, degree of pain
• Time of day, duration, frequency
• Precipitating factors, aggravating factors
• Associated symptoms: nausea, vomiting, visual or sensory disturbances
• Interference with daily activities

Changes in Level of Consciousness
• Dizziness
• Fainting
• Convulsions
• History of head injury that produced any loss of consciousness

Motor Function
• Muscle weakness, paralysis, stiffness, spasm
• Clumsiness, ataxia
• Staggering gait with wide-base stance
• Tremor

Sensory Function
• Loss of or decrease in sensation
• Sensation of "pins and needles," tingling
• Burning sensation

Other Associated Symptoms
• Bowel or bladder dysfunction
• Impotence
• Pain

Medical History (Specific To Central Nervous System)
• Seizures
• Head trauma
• Metabolic disorders (e.g. diabetes mellitus, thyroid problems)
• Cardiac disorders (e.g. hypertension, heart block)
• Transient ischemic attack
• Demyelinating disorders (e.g. multiple sclerosis, Parkinson's disease)
• Alcoholism
• Migraine headaches
• Psychiatric disorders (e.g. depression, bipolar disorder)
• Bell's palsy
Family History (Specific To Central Nervous System)

- Seizures
- Metabolic disorders (e.g. diabetes mellitus)
- Cardiac disorders (e.g. hypertension, myocardial infarction, stroke)
- Demyelinating disorders (e.g. multiple sclerosis, Parkinson's disease)
- Headaches (including types)
- Psychiatric disorders

Personal And Social History (Specific To Central Nervous System)

- Alcoholism and/or drug abuse
- Occupational exposure to neurotoxins
Examination Of The Central Nervous System

General Appearance
- Apparent state of health
- Appearance of comfort or distress
- Colour (e.g. flushed, pale, cyanotic)
- Nutritional status (emaciated or obese)
- Match between appearance and stated age

To Be Assessed During History-Taking
- Level of consciousness
- Mental status
- Speech (clarity, content, volume, rate)

Cranial Nerves
See Table 1.

Screening Examination
The following screening examination will reveal areas of difficulties. If deficits are discovered, a more in-depth examination is required.

Table 1: Screening tests for cranial nerves

<table>
<thead>
<tr>
<th>Cranial Nerve</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Olfactory</td>
<td>Smell (test only if there is a specific complaint)</td>
</tr>
<tr>
<td>II Optic</td>
<td>Visual acuity, visual fields, funduscopic examination</td>
</tr>
<tr>
<td>III Oculomotor</td>
<td>Pupillary response (direct or consensual)</td>
</tr>
<tr>
<td>IV Trochlear</td>
<td>Extraocular eye movements</td>
</tr>
<tr>
<td>VI Abducent</td>
<td>Motor function: clench teeth, open jaw.</td>
</tr>
<tr>
<td></td>
<td>Sensory function: pain (sharp stimulus); light touch (cotton wisp); sensation on forehead, cheek, chin.</td>
</tr>
<tr>
<td></td>
<td>Corneal reflex (omit if client is conscious)</td>
</tr>
<tr>
<td>VII Facial</td>
<td>Facial symmetry; raise eyebrows, frown, close eyes tightly against resistance, show teeth, puff cheeks, smile</td>
</tr>
<tr>
<td>VIII Acoustic (Vestibulocochlear)</td>
<td>Hearing (watch ticking, whisper), Rinne and Weber tests</td>
</tr>
<tr>
<td>IX Glossopharyngeal</td>
<td>Movement of palate, uvula, pharyngeal wall. Gag reflex and swallowing.</td>
</tr>
<tr>
<td>X Vagus</td>
<td>Hoarseness</td>
</tr>
<tr>
<td>XI Spinal accessory</td>
<td>Shoulder shrug against resistance. Head turn against resistance</td>
</tr>
<tr>
<td>XII Hypoglossal</td>
<td>Stick out tongue, push tongue against each cheek</td>
</tr>
</tbody>
</table>

Motor Function, Sensory Function and Reflexes
Assess motor function, sensory function and reflexes together, as follows.
Table 2: Glasgow Coma Score

<table>
<thead>
<tr>
<th>Eye Opening (E)</th>
<th>Verbal Response (V)</th>
<th>Motor Response (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4=Spontaneous</td>
<td>5=Normal conversation</td>
<td>6=Normal</td>
</tr>
<tr>
<td>3=To voice</td>
<td>4=Disoriented conversation</td>
<td>5=Localizes to pain</td>
</tr>
<tr>
<td>2=To pain</td>
<td>3=Words, but not coherent</td>
<td>4=Withdraws to pain</td>
</tr>
<tr>
<td>1=None</td>
<td>2=No words...only sounds</td>
<td>3=Decorticate posture</td>
</tr>
<tr>
<td></td>
<td>1=None</td>
<td>2=Decerebrate</td>
</tr>
</tbody>
</table>

Total = E + V + M

Note that the phrase 'GCS of 11' is essentially meaningless, and it is important to break the figure down into its components, such as E3V3M5 = GCS 11.

A Coma Score of 13 or higher correlates with a mild brain injury, 9 to 12 is a moderate injury and 8 or less a severe brain injury.


**Arms and Hands**
- Grip strength
- Raise both arms and hold (assess for palmar drift)
- Finger-nose test (assess for eye-hand coordination)
- Blunt and sharp pin prick
- Reflexes (biceps, triceps, brachioradialis [supinator])

**Legs**
- Straight-leg raising
- Bowstring test
- Quadriceps test
- Heel-to-toe walk
- Heel-shin test
- Romberg test
- Blunt and sharp pin prick
- Reflexes (Achilles' tendon, patellar, plantar)

**Meningeal Irritation**
Test for meningeal irritation if indicated:
- Neck stiffness
- Brudzinski's sign
- Kernig's sign
Common Problems Of The Central Nervous System

Bell's Palsy

Definition
Sudden, painless, unilateral paralysis of facial muscles due to inflammation and swelling of the seventh cranial nerve (the facial nerve). The condition usually resolves spontaneously.

Causes
• Largely unknown
• Possibly viral infection of facial nerve
• May be related to Lyme disease and HIV infection
• Hereditary and vascular factors may be contributory

Risk Factors
• Pregnancy (third trimester)
• Positive family history
• Hypertension
• Diabetes mellitus

History
• Sudden onset of unilateral facial weakness
• Progression to complete paralysis within a few hours
• Inability to close eye on affected side
• Excessive tearing of affected eye may be present
• Taste sensation may be altered
• Hypersensitivity to sound
• Pain in or behind ear may occur on affected side just before onset of facial weakness

Physical Findings
• Client appears anxious
• Flat nasolabial fold
• Client unable to close eye, raise eyebrow or smile on affected side
• Widened palpebral fissure
• Eyeball rolls upward when client attempts to close eyelid
• Drooling may be present
• Sensation to light touch and pin prick may be reduced
• Loss of forehead wrinkles

Differential Diagnosis
• Stroke (brain stem)
• Cerebral tumor
• Parotid gland tumor
• Middle ear or mastoid infection
• Meningitis
• Head or facial trauma with fracture
• Lyme disease
• Herpes zoster oticus
• Guillain-Barré syndrome
• Multiple sclerosis

Complications
• Corneal abrasion
• Corneal ulceration
• Keratitis
• Chronic facial weakness
• Facial muscle contracture

Diagnostic Tests
None.

Management
Goals of Treatment
• Protect the eye from injury
• Prevent complications

Management is directed toward the symptoms and depends on the time and severity of presentation.

Appropriate Consultation
Consult a physician immediately. If within 72 hours of onset and the client is at high risk for denervation (e.g. full unilateral facial paralysis, > 50 years of age, diabetic), drug therapy may be indicated (see "Pharmacologic Interventions," below)

Nonpharmacologic Interventions
Reassure client that full recovery can be expected in 6-8 weeks.
Client Education
• Counsel client about appropriate use of medications (dose, frequency, side effects)
• Recommend adequate nutritional intake and suggest that client direct food and liquids to unaffected side of mouth to prevent drooling and to promote proper mastication
• Recommend adequate oral hygiene after meals to prevent collection of food and liquids within affected cheek
• Suggest protection of affected eye to prevent corneal abrasions (e.g. wearing sunglasses during the day to prevent dust particles from entering eye, taping the eye closed at night)
• Recommend facial exercises and massage, to be performed 2 or 3 times daily to prevent muscle atrophy (wrinkle forehead, blow out cheeks, purse lips, close eyes)

Pharmacologic Interventions
Antiviral or anti-inflammatory drugs as prescribed by the physician.

Prevention of drying of eye: eye drops hydroxypropyl ethyl cellulose (Isopto Tears®, q1-2h during the day; lubricant ophthalmic eye ointment (Lacri-Lube®) and eye patch hs

Monitoring and Follow-Up
• Arrange daily follow-up for several days
• Assess progression of palsy
• Monitor for symptoms of corneal abrasion: stain corneal surface with fluorescein prn and examine to identify development of corneal abrasion; if corneal abrasion suspected or detected, see "Corneal Abrasion" in chapter 1, "The Eyes"

Referral
Refer to a physician for initial management if complications are suspected or detected or if condition does not resolve.
Headaches

General
Most headaches (90%) are benign. There is a wide variety of causes of headaches, ranging from abnormalities of the head and neck to systemic illness. Other causes include use or abuse of drugs, alcohol or chemicals.

Differential Diagnosis Of Headache

Primary
- Migraine
- Tension (muscle contracture)
- Cluster
- Other
  - Cold stimulus (e.g. ice cream)
  - Benign
  - Post-traumatic

Secondary

Disorders of the Cerebral Parenchyma
- Brain tumor
- Brain abscess
- Intracranial hemorrhage
- Cerebral trauma
- Hydrocephalus
- Hypertension

Disorders Involving the Meninges
- Meningitis
- Subarachnoid bleeding

Disorders Involving the Extracranial Structures
- Dental abscess
- Paranasal sinusitis
- Temporomandibular joint syndrome
- Closed-angle glaucoma
- Trigeminal neuralgia
- Herpes zoster infection
- Retro-orbital disease process

Metabolic Causes
- Food additives or toxins (e.g. nitrites, monosodium glutamate, alcohol)
- Side effect of medication (e.g. nitrates, oral contraceptives, calcium-channel blockers)
- Related to fever
- Related to hypercapnia (increased carbon dioxide levels)

Vascular Causes
- Hypertension
- Vasculitis
- Embolic or thrombotic events

Features Suggestive Of A Serious Cause Of Headache
- Advanced age
- Worst headache ever experienced
- Onset with exertion
- Decreased alertness or cognition
- Radiation of pain between the shoulder blades (which suggests spinal arachnoid irritation)
- Association with nuchal rigidity
- Any history or physical finding suggestive of infection (e.g. fever)
- Headache worsening under observation
Muscle Tension Headache

Definition
Diffuse pain in the head.

- **Episodic:** usually associated with some stressful event, of moderate intensity, self-limited and responds to nonprescription preparations

- **Chronic:** often occurs daily (must be present for at least 15 days per month for 6 months to be considered chronic); pain often bilateral, usually occipito-frontal and associated with contraction of muscles of the neck and scalp

Causes
- Stress or anxiety
- Poor posture
- Cervical osteoarthritis
- Intramuscular vasoconstriction of scalp muscles
- Depression (found in 70% of those with daily headache)
- Life-time prevalence: 88% in females, 69% in males, common in children 8-12 years of age

Risk Factors
- Excess caffeine intake
- Medications (e.g. long-term use of acetaminophen)
- Obstructive sleep apnea
- Family history

History
- History vague
- No obvious relieving or precipitating factors identified
- Document medication use: type, frequency, amount, effect
- Often associated with abuse or overuse of medications, especially analgesics
- 40% of patients have positive family history
- 60% of patients > 20 years of age at onset
- Pain becomes more constant and severe over time
- Stressful events aggravate symptoms

Features Of Headaches
- Generalized
- Constant

- Dull, tight sensation
- Occasionally throbbing
- Present on rising in the morning
- Wax and wane during the day
- Prevent client from falling asleep, but never awaken client from sleep
- Medication affords only minimal or no relief

Associated Symptoms
- Nausea
- Anorexia
- Fatigue
- Concentration impaired

Physical Findings
- Client in no distress, although may complain of headache at time of presentation
- Results of neurologic examination completely normal
- Muscular tightness in the neck, upper trapezius, occipital and frontal scalp muscles

Differential Diagnosis
Although most chronic headaches are benign, it is important to rule out other more serious problems:
- Caffeine dependency
- Nonprescription drug dependency (e.g. acetaminophen with or without codeine)
- Dental disease including temporomandibular joint dysfunction
- Post-traumatic headache
- Depression
- Chronic sinusitis
- Temporal arteritis
- Migraine headache
- Eye problem
- Middle ear disease
- Hypertension
- Intracranial infection (meningitis)

Complications
- Dependence on analgesic medication
- Depression

Diagnostic Tests
None.
Management

Goals of Treatment
• Identify symptoms suggestive of serious pathology
• Relieve symptoms

Appropriate Consultation
Consult physician if symptoms suggest serious pathology (e.g. neurologic deficit). Otherwise, treat conservatively and follow.

Nonpharmacologic Interventions
• Provide supportive environment
• It is important for success of therapy that caregiver be nonjudgmental
• Explore current life situation: encourage client to talk about worries, concerns, fears
• Discover areas of difficulty that could contribute to headaches
• Evaluate stress level
• Ice packs may help
• Massage therapy may help
• Rest in dark, quiet room may help
• Recommend decrease in use of caffeinated products

Client Education
• Counsel client about appropriate use of medications (dose, frequency, avoidance of overuse)
• Suggest stress-management strategies (e.g. relaxation techniques)

Pharmacologic Interventions
Analgesics:
acetaminophen (A class drug), 500 mg, 1-2 tabs PO q4h prn
or
ibuprofen (A class drug), 200 mg, 1-2 tabs PO q4h prn

Monitoring and Follow-Up
Follow up in 1-2 weeks to assess response to interventions.

Referral
Refer to a physician if there is failure to respond to therapy or if there is concern about an underlying disorder, or if recurrent.
Cluster Headache

**Definition**
Recurrent attacks of severe unilateral headaches around the eye and temple. Attacks last approximately 30-120 minutes and occur one to three times per day, at the same time of day, for up to 12 weeks; this pattern is typically followed by 1-24 months without an attack.

Causes
Unknown.

**Risk factors**
- Male > 30 years of age
- Possible relationship to previous head injury
- May be triggered by alcohol, nitroglycerine, disturbance in sleep cycle, emotion (anger), excessive physical activity

**History**
- Client usually male, older than mid-20s
- Cyclic or seasonal pattern to attacks
- Sudden onset of unilateral pain
- Headache usually begins without warning, often during sleep
- Begins as dull ache, which quickly increases to severe pain
- Peaks in 15 minutes
- Pain steady, boring, piercing and centered about one eye (retro-orbital)
- No aggravating or relieving factors
- Pain extends into adjacent cheek, temple, forehead
- Usually resolves within 30-120 minutes, leaving client fatigued
- Pain recurs later the same day or at same time next day
- Cycle repeats itself until "cluster" ends

**Associated Symptoms during Attack**
- Nausea

**Physical Findings**
- Heart rate elevated during attack
- Bradycardia may be present in 43% of cases

**During Attacks**
- Acute distress
- Pale
- Diaphoretic
- Restless
- Ipsilateral nasal rhinorrhea
- Ptosis of affected eyelid
- Conjunctival redness and excessive tearing of affected eye
- Occasionally vomiting

**Between Attacks**
- Client feels well (i.e. completely asymptomatic)
- Results of neurologic examination normal

**Differential Diagnosis**
- Temporal arteritis
- Subarachnoid hemorrhage (initial presentation)
- Episodic, long-lasting tension headaches
- Trigeminal neuralgia
- Acute glaucoma
- Sinusitis
- Pheochromocytoma

**Complications**
- Inadequate nutrition during "cluster"
- Depression
- Potential for drug abuse (e.g. analgesics)

**Diagnostic Tests**
None.

**Management**

**Goals of Treatment**
- Relieve pain
- Prevent recurrence

**Appropriate Consultation**
Consult a physician for acute attack. If symptoms are significant during an initial attack, serious pathology must be ruled out.

**Client Education**
- Explain expected course of disease and prognosis and how to avoid precipitants
• Counsel client about appropriate use of medications (dose, frequency, compliance, avoidance of overuse or abuse of analgesics)
• Counsel client about appropriate use of prophylactic medication
• Recommend avoidance of alcohol, bright light, anger, stressful activity or undue excitement during a cluster
• Recommend that client decrease smoking during a cluster, as smoking reduces response to drug treatment
• Counsel client about smoking cessation

**Pharmacologic Interventions**
Do not give analgesics in a previously undiagnosed client until you have consulted a physician, as these drugs may mask the progression of neurologic symptoms.

A physician may prescribe a trial of dihydroergotamine (*B class drug*) or similar drug.

**Monitoring and Follow-Up**
• Monitor medication compliance
• Assess effectiveness of prophylaxis
• Assess for depression
• Assess for analgesic abuse or dependence

**Referral**
• Refer all previously undiagnosed clients as soon as possible to a physician during an acute attack
• Clients with chronic recurrence of cluster headaches should be evaluated by a physician if symptoms are not controlled by prophylaxis
Migraine Headaches

Definition
Recurrent headaches due to vascular disturbances.

Causes
- Unknown
- Individual attacks may be triggered by specific foods (e.g. chocolate, cheese, smoked meats, alcohol, caffeine, other food additives and preservatives), missing meals, menstrual cycle, oral contraceptives, fatigue, excessive sleep, stress or relief of stress, excessive or flickering light

Risk Factors
- Female
- Young age (10-30 years)
- Family history of migraine

History
- Regular or near regular perimenstrual or periovulatory timing
- Abatement of headache with sleep
- Prodrome may be present: irritability, mood swings, changes in energy level, food cravings, fluid retention
- Aura (including visual defects and sensory losses) may be present: precedes headache, lasts approximately 5-30 minutes, recedes with onset of headache (although sometimes aura and headache may overlap)

Pain of Headache
- Unilateral or diffuse
- Moderate to severe intensity
- Peaks within 1 hour
- Pulsating in nature (at onset or any time during attack)
- Rest in dark, quiet room helps
- Bending forward or moving head increases pain

Associated Symptoms
- Photophobia (aversion to light)
- Phonophobia (aversion to noise)
- Osmophobia (aversion to odors)
- Nausea and vomiting
- Diarrhea, constipation
- Chills, tremor, sweating

Physical Findings

During Attack
- Moderate distress
- Pale
- Diaphoretic
- Scalp arteries may be distended
- Photophobia
- Scalp tenderness
- Results of neurologic exam usually normal during and between attacks

Criteria for Diagnosing Migraine without Aura
1. At least 5 attacks fulfilling criteria 2, 3, 4 and 5
2. Each attack, untreated or treated unsuccessfully, lasts 72 hours
3. Each attack has at least 2 of the following characteristics:
   - Unilateral most often, but 30% to 40% have bilateral pain
   - Pulsating quality (occurring at any time during the attack); 50% of those with migraines report non-throbbing pain; headache quality may vary over the course of the attack
   - Moderate or severe intensity, enough to interfere with daily activities
   - Pain aggravated by physical activity such as walking up or down stairs
4. During an attack at least one of the following symptoms is present:
   - Nausea and vomiting
   - Photophobia, phonophobia and osmophobia
5. There is no evidence from the client's history or physical examination of any other disease that might cause headaches

Criteria for Diagnosing Migraine with Aura
The criteria are the same as for migraine without aura, but also include symptoms of neurologic dysfunction (including visual disturbances) before or during attack.
Differential Diagnosis
• Disorders or infections of head and neck
• Systemic illness
• Toxic effects of drugs, alcohol, chemicals
• Intracranial lesion
• Stroke
• Drug-seeking behavior
• Attention-seeking behaviour

Complications
• Family and marital dysfunction if headaches frequent
• Depression
• Drug addiction (e.g. to prescription analgesics)

Diagnostic Tests
None.

Management
Goals of Treatment
• Identify and modify trigger factors
• Relieve symptoms
• Prevent recurrences

Appropriate Consultation
Consult physician if an acute attack is moderate to severe and is unresponsive to first-line drug therapy, or if attacks recur and are not controlled with current prophylactic regimen.

Severe Attack
Consult physician for medication orders.

Nonpharmacologic Interventions
Mild or Moderate Attack
• Rest in dark, quiet room
• Ice packs
• Pressure massage of the scalp
• Relaxation therapy
• Cognitive-behavioral therapy (e.g. stress management training)

Severe Attack
• Bed rest in dark, quiet room
• Nothing by mouth temporarily if vomiting is significant

Client Education
• Explain expected disease course and prognosis
• Counsel client about appropriate use of medications (dose, frequency, avoidance of overuse or abuse)
• Recommend regular rest and activities, appropriate diet
• Help client to identify trigger factors and then to attempt to reduce or eliminate them (e.g. caffeine, alcohol, certain foods, oral contraceptives, nuts, cheese)
• Prophylactic medications are ineffective if the person is concurrently taking analgesics on a regular basis. Instruct client not to take headache medications other than those prescribed.
• The client should be prepared to experience some side effects, to take the medication daily and to recognize that the drug therapy will need to be adjusted or changed until efficacious drug(s) and doses are identified.
• The client should also expect to have some migraine attacks, although these will probably be less severe or less frequent than before.
• Explain that prophylaxis is designed to be used for a number of months and then weaned. Some clients may need long-term therapy.
• Instruct any female client to report if she becomes pregnant or is contemplating pregnancy, as some prophylactic drug therapies will have to be stopped.

Adjuvant Therapy
Severe Attack
For severe attack only, start IV therapy with normal saline; adjust rate according to state of hydration.

Pharmacologic Interventions
Symptomatic Therapy, Mild or Moderate Attack
Analgesia:
enteric-coated acetylsalicylic acid (ASA) (A class drug), 325 mg, 1-2 tabs PO q4h prn
or
ibuprofen (A class drug), 200 mg, 1-2 tabs PO q4h prn
or
*acetaminophen with codeine 30mg (C class drug), 1-2 tabs PO q4h prn
*Combination medications can be used if clients do not respond to initial therapy with non-steroidal anti-inflammatory drugs (NSAIDs). They are to be used for short periods only. Overuse of such combination medications is one of the most prominent causes of rebound headache (a leading form of chronic daily headaches).

Antiemetics for vomiting if necessary: *dimenhydrinate* (*A class drug*), 50 mg PO q4-6h prn

If headache does not resolve refer to physician for prescription for pain control.

Avoid use of meperidine, if at all possible. This drug should be used as a last resort only.

**Prophylactic Therapy**
As ordered by physician

**Monitoring and Follow-Up**

**Mild or Moderate Attack**
Encourage regular follow-up until headaches are effectively controlled; frequency of follow-up should be individualized to each person's unique circumstances.

**Severe Attack**
Monitor response to therapy and vital signs.

**Referral**

**Mild or Moderate Attack**
- Arrange follow-up with physician to discuss prophylactic therapy if headaches are frequent or severe enough to interfere with daily activities
- Referral for a neurologic examination may be needed if optimum first-line therapy and prophylaxis fail to control attacks

**Severe Attack**
Medevac may be required if attack is prolonged and unresponsive to therapy (a condition known as status migrainous).
Temporal Arteritis (Giant Cell)

**Definition**
Inflammation of temporal arteries.

**Causes**
- Largely unknown
- Possibly autoimmune reaction

**History**
- Age > 50 years
- Client may initially complain of flu-like symptoms
- Headache unilateral or bilateral
- Headache located in temporal or periorbital area
- Onset gradual or sudden
- Pain slight and transient initially
- Pain becomes more severe (throbbing or boring) and constant over several days
- Not relieved by over-the-counter medications

**Associated Symptoms**
- Malaise
- Night sweats
- Fever
- Shoulder and back pain
- Reduced vision of eye on affected side

**Physical Findings**
- Temperature may be mildly elevated
- Client appears mildly-to-moderately ill
- Visual acuity may be reduced on affected side
- Problem with visual acuity may progress to other eye
- Range of motion of shoulder(s) may be reduced; shoulder movement may be painful
- Shoulder joint may be tender
- Temporal artery may be firm, nodular, non-compressible, tender
- Temporal artery may be pulseless

**Differential Diagnosis**
- Other disorders of head and neck
- Systemic illness

**Complications**
- Blindness on affected side
- Progression to blindness of other eye
- Stroke
- Coronary occlusion
- Arterial insufficiency of upper extremities

**Diagnostic Tests**
- Determine erythrocyte sedimentation rate (if test available) (will be elevated)

**Management**

**Goals of Treatment**
- Diagnose the problem
- Prevent complications

**Appropriate Consultation**
Consult a physician immediately if this diagnosis is suspected.

**Pharmacologic Interventions**
Oral prednisone may be initiated by the physician if transfer to hospital will be delayed.

**Referral**
Arrange transfer to hospital for further investigation (e.g. CT scan) and treatment as soon as possible (biopsy of temporal artery is needed to confirm diagnosis).
Transient Ischemic Attack (TIA)

Definition
Acute episode of temporary, focal loss of cerebral function that is vascular in origin. Onset is rapid, and symptoms are of variable duration, typically lasting 2-15 minutes but rarely as long as 24 hours. Most TIAs last less than 1 hour.

TIA is an important omen of impending stroke; one-third of all patients with TIA have a stroke within 5 years of the first event.

Causes
- Temporary reduction or cessation of cerebral blood flow
- Underlying problem: atherosclerosis of carotid or vertebrobasilar arteries

Risk Factors
- Advancing age
- Hypertension
- Diabetes mellitus
- Heart disease
- Cardiac arrhythmias (atrial fibrillation)
- Smoking
- Family history

History
- Usually one of above risk factors is present
- Attacks may occur several times a day or once or twice a year
- Symptoms generally similar for repeat attacks
- Identify previous symptoms of peripheral vascular disease, coronary artery disease
- Symptoms acute at onset
- Symptoms resolve completely in 24 hours
- Client remains conscious throughout attack
- Symptoms depend on affected blood vessel
- Carotid artery: unilateral symptoms, ipsilateral blindness, contralateral weakness or paresthesia, aphasia, headache (may follow attack)
- Vertebrobasilar arteries: confusion, vertigo, binocular blindness or diplopia, weakness or paresthesia of extremities, drop attacks in which client remains conscious but suddenly collapses
- Slurred speech may be present

Physical Findings
Because TIA may be brief, the results of a physical examination may be entirely normal. Careful examination of the neurologic and cardiovascular systems is required. Look for evidence of atherosclerosis (e.g. peripheral vascular disease, heart disease).

- Blood pressure and heart rate often normal
- Pulse may be irregular (because of underlying atrial fibrillation)
- Hypertension may be present
- Client usually looks well
- Muscular weakness of affected side may be obvious or subtle
- Visual acuity may be reduced
- Balance may be slightly affected
- Confusion may be evident
- Look for old surgical scars from previous heart surgery
- Carotid artery thrill may be present
- Focal sensory deficits
- Focal motor deficits
- Deep tendon reflexes may be increased or decreased for first 24 hours after attack
- Carotid bruit(s) may be present
- Other peripheral arterial bruits may be present (e.g. aortic, iliac)
- Heart murmur may be present

Differential Diagnosis
Differential diagnosis includes anything that can cause decreased cerebral blood flow with cerebral ischemia or transient impairment of cerebral function.

- Hypotensive episode
- Bell's palsy
- Dissecting aortic aneurysm
- Heart disease
- Focal seizure
- Cerebrovascular accident
- Hypoglycemia
- Anemia
Complications
- Future cerebrovascular accident or myocardial infarction.
- Injury

Diagnostic Tests
- Electrocardiography may be helpful
- Look for evidence of atrial fibrillation
- Bloodwork (CBC, electrolytes)

Management
Goals of Treatment
- Modify risk factors
- Prevent future TIA or stroke

Appropriate Consultation
Consult a physician as soon as possible.

Client Education
- Explain disease course and expected outcome
- Counsel client about appropriate use of medications (dose, frequency, total amount, long-term use, side effects, precautions if also receiving anticoagulant therapy)

- Recommend that clients receiving anticoagulant therapy avoid foods high in vitamin K (e.g. yellow and green vegetables)
- For clients receiving anticoagulant therapy, stress importance of avoiding injury
- Offer lifestyle counseling on ways to reduce risk factors such as control of hypertension, smoking cessation, weight reduction, reduction of dietary fat, regular exercise

Pharmacologic Interventions
ASA therapy (for antiplatelet effects) as per physician order.

Monitoring and Follow-Up
Follow up regularly to monitor symptoms and track progress in reducing risk factors; frequency of follow-up will depend on severity of symptoms and number of risk factors.

Referral
- Manage as a stroke in progress (see "Cerebrovascular Accident (Stroke)," in next section, "Emergency Problems of the Central Nervous System").
- Medevac to hospital as soon as possible
- For investigation of underlying pathology
Emergency Problems Of The Central Nervous System

Differential Diagnosis Of Acute Unconsciousness

Metabolic disturbances (mnemonic "AEIOU and sometimes S")

- A for anoxia
- E for ethanol intoxication
- I for insulin excess (hypoglycemia)
- O for overdoses (drugs)
- U for uremia
- S for seizure

Hypoperfusion of the brain
- Stroke
- Hypotension
- Hypovolemia
- Arrhythmias
- Head trauma
- Coma

For detailed information on coma, see "Coma (Not Yet Diagnosed)," in chapter 14, "General Emergencies and Major Trauma"

For detailed information on head trauma, see "Head Trauma" in chapter 14, "General Emergencies and Major Trauma".
Meningitis

Definition
Infection of meninges.

Causes
- Viral or bacterial infection
- Most common bacterial causes in adults: *Hemophilus influenzae*, *Neisseria meningitides*, *Streptococcus pneumoniae*

Risk factors
- Alcoholism
- Chronic otitis media
- Sinusitis
- Mastoiditis
- Closed head injury
- Pneumococcal pneumonia
- Recurrent meningitis
- Immunocompromised

History
- Usually preceded by infection of upper respiratory tract
- High fever
- Headache, which becomes increasingly severe
- Headache made worse with movement, especially bending forward
- Sudden vomiting, often without preceding nausea
- Photophobia
- Changes in level of consciousness that progress from irritability, through confusion, drowsiness and stupor to coma
- Seizures may develop
- Stiff neck and/or neck pain

Physical Findings
Perform a full head and neck examination to identify a possible source of infection.
- Temperature elevated
- Heart rate elevated or bradycardia with raised intracranial and intraocular pressure
- Blood pressure normal (low if client is in septic shock)
- Client in moderate-to-acute distress
- Client flushed
- Altered level of consciousness

- Focal neurologic signs
- Photophobia
- Petechiae may be present
- Cervical nodes may be enlarged
- Brudzinski's sign
- Kernig's sign

Differential Diagnosis
- Bacteremia
- Sepsis
- Brain abscess
- Seizure

Complications
- Seizure
- Coma
- Blindness
- Deafness
- Palsies of cranial nerves III, VI, VII, VIII
- Death

Diagnostic Tests
- Complete blood count
- Blood cultures
- Urinalysis (routine and microscopy, culture and sensitivity)
- Throat swab for culture and sensitivity
- WBC
- Consider ECG and chest X-ray

Management
Goals of Treatment
- Control infection
- Prevent complications

Appropriate Consultation
Consult a physician immediately.

Nonpharmacologic Interventions
- Bed rest
- Nothing by mouth
- Insert indwelling urinary catheter (optional if client is conscious)
**Adjuvant Therapy**
Start IV therapy with normal saline; adjust rate according to state of hydration.

Do not overload with fluids, as this could cause brain edema.

**Pharmacologic Interventions**
Antipyretics to control fever:
*acetaminophen (A class drug), 325 or 500 mg, 1-2 tabs PO or PR q4h prn*

IV antibiotics as ordered by physician

**Monitoring and Follow-Up**
- Monitor ABC (airway, breathing, circulation) and vital signs q30-60min or more frequently as required
- Monitor carefully for development of neurologic symptoms
- Monitor intake and hourly urine output

**Referral**
Medevac as soon as possible.
Seizure Disorder (Chronic)

Definition
Sudden, temporary brain dysfunction due to abnormal electrical activity in the brain.

Types
- Generalized tonic, clonic (grand mal)
- Focal
- Absence (petit mal)
- Complex partial
- Partial
- Myoclonic
- Infantile spasm
- Unclassified (characterized by eye movements or chewing)
- Status epilepticus

Causes
- Epilepsy
- Drug-related causes (non-compliance with prescribed regimen, withdrawal syndromes, overdose, multiple drug abuse)
- Hypoxia
- Brain tumor
- Cerebral infection (e.g. meningitis)
- Metabolic disturbance (e.g. hypoglycemia, uremia, liver failure, electrolyte disturbance)
- Alcohol withdrawal
- Head injury
- Stroke

History
- One of causes listed above usually present
- Family history of seizure disorder
- Age at onset, frequency of seizure activity
- Sudden loss of consciousness or loss of motor control (or both)
- Description of seizure activity variable (depends on type)
- Loss of bowel and bladder control during active seizure (e.g. grand mal)
- History of aura before onset of seizure may be present
- Precipitating factors: alcohol use, street drug use, illness such as infection, poor compliance with seizure medications
- History of stroke, head trauma, hypoxia, neurologic infection, exposure to toxins, developmental problems

Physical Findings
After Acute Seizure
- Temperature normal unless infection is present
- Heart rate elevated
- Blood pressure variable
- Postictal state if seizure has occurred recently (e.g. drowsiness, confusion, behavioral changes)
- Evidence of trauma
- Results of neurologic examination and examination of other systems depend on specific cause of seizure

When Not in Active Seizure State
The results of neurologic examination are usually normal.

Differential Diagnosis
- Epilepsy
- Drug-related problem (non-compliance with prescribed regimen, withdrawal syndromes, overdose, multiple drug abuse)
- Hypoxia
- Brain tumor
- Cerebral infection
- Metabolic disturbance (e.g. hypoglycemia, uremia, liver failure, electrolyte disturbance)
- Alcohol withdrawal
- Head injury
- Stroke

Complications
- Injuries during seizure (e.g. a fall)
- Hypoxia during seizure
- Status epilepticus
- Interference with normal lifestyle (e.g. work, driving, social interactions)

Diagnostic Tests
- Blood sugar, electrolytes
- Drug screen and levels
- ECG if questioning a stroke
Management
Management depends on underlying cause and severity of symptoms.

Goals of Treatment
• Control seizures
• Prevent recurrence
• Achieve good adherence to treatment regimen over the long term
• Discontinue medications eventually with continued control of seizures

Appropriate Consultation
• If client is in active seizure on arrival, see "Status Epilepticus (Acute Grand Mal Seizure)," this chapter
• If client is not in active seizure on arrival: consult physician immediately for any case of previously undiagnosed seizure and for anyone with history of breakthrough seizures

Nonpharmacologic Interventions
• Assist client to identify and reduce or avoid trigger factors, alcohol
• Alcohol withdrawal counseling and support
• Recommend regular meals and balanced nutrition
• Encourage stress reduction
• Recommend avoidance of fatigue
• Suggest relaxation therapy

Client Education
• Importance of following medication regime
• Regular laboratory follow-up
• Side effects of medication
• Importance of routine exercise and diet
• Be aware of triggers
• Alcohol counseling if needed

Pharmacologic Interventions
As per physician order.

Anticonvulsants are tailored to the specific type of seizure. Monotherapy is ideal, but 10% to 15% of patients need two or more medications. Poor compliance is the major cause of seizure recurrence.

Commonly Used Anticonvulsants (B class drugs)
• carbamazepine
• clonazepam
• gabapentin
• lamotrigine
• phenobarbital
• phenytoin
• primidone
• valproic acid
• vigabatrin

Monitoring and Follow-Up
• Follow up every 6 months if seizures are well controlled, more frequently if client is having breakthrough seizures
• Assess adherence to medication regimen
• Monitor serum drug levels every 6 months if stable, more frequently if necessary

Referral
• Refer urgently if client is having breakthrough seizures
• Refer electively for review by a physician at least annually if seizures are well controlled
• Consider neurologic follow-up if symptoms are not controlled on current medications
Epilepticus (Acute Grand Mal Seizure)

**Definition**
State of epileptic seizure lasting > 15 minutes or occurrence of repeated seizures without the patient regaining consciousness. If the seizure lasts > 60 minutes and is untreated, status epilepticus is associated with significant morbidity and mortality.

**Cause**
- Unknown
- Inadequate absorption of anticonvulsants
- Noncompliance with medications
- Dosage of anticonvulsants reduced too rapidly

**History**
- Attack begins as seizure
- Episodes of tonic and clonic movements occur repeatedly without client regaining consciousness
- May go on for hours or days

**Physical Findings**
- Temperature normal unless underlying infection is present
- Heart rate elevated, may be irregular
- Respiration irregular (absent during seizure, present between seizures)
- Blood pressure elevated or low
- Oxygen saturation may be decreased
- Client unconscious
- Client pale or cyanotic
- Evidence of loss of bowel and bladder control
- Repeated episodes of tonic and clonic movements
- Foaming at mouth may be present
- Evidence of trauma

**Complications**
- Hypoxia
- Cardiac arrhythmia
- Brain damage
- Death

**Diagnostic Tests**
- Electrocardiogram (ECG) (if available) if client > 50 years of age
- Random blood glucose
- Urinalysis (routine and microscopy, culture and sensitivity)
- Drug screen and levels
- Electrolytes

**Management**

**Goals of Treatment**
- Protect airway
- Stabilize cardiorespiratory function
- Stop seizures

**Nonpharmacologic Interventions**
- Ensure airway is clear and patent
- Suction as necessary
- Insert oral pharyngeal airway
- Assist ventilation as needed with Ambu bag
- Monitor neuro vital signs

**Adjuvant Therapy**
- Oxygen to keep oxygen saturation ≥ 97%
- Start IV therapy with normal saline; adjust rate according to state of hydration
- Monitor closely for respiratory depression

**Pharmacologic Interventions**
Anticonvulsive therapy by physician order. *diazepam (D class drug)*, may be given IV.
Note: diazepam is not effective IM
Administer diazepam with caution to clients who have received barbiturates, as the side effects of respiratory depression are additive.

**Appropriate Consultation**
Consult a physician as soon as possible.

**Monitoring and Follow-Up**
- Identify focal neurologic deficits
- Observe for return to normal level of consciousness
- Monitor vital signs
- Monitor for continued seizure activity

**Referral**
Medevac as soon as possible.
Cerebrovascular Accident (Stroke)

Definition
Sudden onset of a focal neurologic deficit resulting from either infarction or hemorrhage within brain tissue. Eighty percent of strokes are ischemic, and about 25% are caused by cerebral emboli.

Causes
Infarction from Thrombus or Emboli
• Progressing stroke: unstable, progressing neurologic deficits
• Completed stroke: stable, non-progressing neurologic deficit

Risk Factors
• Atrial fibrillation
• Valvular heart disease (especially mitral stenosis and mitral prolapse)
• Coronary artery disease
• Recent myocardial infarction
• Ventricular aneurysm
• Carotid stenosis
• Peripheral vascular disease
• Smoking
• Hyperlipidemia
• Diabetes mellitus
• History of injection drug abuse (e.g. cocaine, amphetamines)

Intracranial Hemorrhage
• Intracerebral hemorrhage: hemorrhage in or around brain
• Subarachnoid hemorrhage: accounts for 5% to 10% of strokes

Risk Factors
• Hypertension
• Arteriovenous malformations

History
• Presence of one of the risk factors listed above
• Abrupt onset is suggestive of infarction, but must rule out brain abscess, tumor and subdural hematoma

Progressing Stroke
• Neurologic dysfunction evolving painlessly over several hours or days
• Headache absent
• Involves progressively more of the body
• Progression stepwise, with periods of stability; may be continuous
• Consciousness may be reduced or altered

Completed Stroke
• Abrupt onset
• Symptoms maximal in a few minutes
• One-sided neurologic deficits
• Consciousness may be reduced or altered

Intracranial Hemorrhage
• Suggested by coma, vomiting, severe headache, history of anticoagulant therapy, history of vascular anomaly (e.g. aneurysm, angioma), systolic blood pressure > 220 mm Hg, blood glucose ≥ 9.43 mmol/L in nondiabetic client
• Subarachnoid hemorrhage suggested by new-onset, severe headache that may be followed by nausea and vomiting and loss of consciousness (transient or coma); however, client may have only headache and normal results on physical exam

Physical Findings
• Heart rate may be elevated, pulse irregular
• Blood pressure may be normal
• Client may be in moderate-to-acute distress
• Client may be unconscious
• Mental confusion may be present
• One-sided weakness may be present
• Aphasia may be present
• Bladder and bowel incontinence may be present
• Sensation may be reduced on affected side
• Muscle weakness on affected side
• Reflexes on affected side may be reduced or hyperactive
• Clonus may be present
• Carotid bruits may be present
• Heart murmur may be present
**Differential Diagnosis**
- Seizure disorder
- Subdural hematoma
- Head injury
- Tumor
- Alcohol consumption

**Complications**
- Inadequate ventilation
- Aspiration
- Seizures
- Disturbances in communication
- Acute urinary retention or urinary incontinence
- Bowel incontinence
- Deep vein thrombosis
- Death

**Diagnostic Tests**
- ECG may be helpful. Look for atrial fibrillation
- Blood sugar

**Management**

**Goals of Treatment**
- Protect airway
- Ensure adequate ventilation
- Decrease deficit

**Nonpharmacologic Interventions**
- Insert oral pharyngeal airway (if unconscious)
- Suction secretions prn
- Ventilate with Ambu bag at 12 bpm prn
- Nothing by mouth if stroke affects level of consciousness or impairs swallowing mechanism
- Insert urinary catheter if level of consciousness impaired

**Adjuvant Therapy**
- Oxygen to keep oxygen saturation ≥ 97%
- Start IV therapy with normal saline; adjust rate according to age, pre-existing medical problems, state of hydration and client's ability to take fluids
- Do not overload with volume, especially if cerebral hemorrhage is suspected.

**Appropriate Consultation**
Consult a physician as soon as possible.

**Pharmacologic Interventions**
- As ordered by physician
- Do not attempt to reduce blood pressure, as elevated blood pressure is often compensatory, and a sudden drop in blood pressure could increase severity of stroke

**Monitoring and Follow-Up**
- Monitor vital signs, fluid intake and hourly urine output
- Monitor level of consciousness, changes in neurologic status
- Monitor for complications
- Monitor for decompensation of pre-existing medical problems

**Referral**
Medevac as soon as possible.
# Chapter 9- The Integumentary System

## Assessment Of The Integumentary System

- History Of Present Illness And Review Of System
- Physical Examination

## Common Problems Of The Skin

- Abscess (Subcutaneous)
- Cellulitis
- Furuncle And Carbuncle
- Impetigo
- Eczema (Atopic Dermatitis)
- Pediculosis (Lice Infestation)
- Scabies
- Ringworm (Tinea)
- Stasis Dermatitis
- Urticaria (Hives)
- Warts (Verrucae)

## Dermatological Emergencies

- Skin Wounds
- Burns
- Frostbite
Assessment Of The Integumentary System

History Of Present Illness And Review Of System

**General**
The following characteristics of each symptom should be elicited and explored:
- Onset (sudden or gradual)
- Chronology
- Current situation (improving or deteriorating)
- Location
- Quality
- Timing (frequency, duration)
- Severity
- Precipitating and aggravating factors
- Relieving factors
- Associated symptoms
- Effects on daily activities
- Previous diagnosis of similar episodes
- Previous treatments
- Efficacy of previous treatments

**Cardinal Symptoms**
In addition to the general characteristics outlined above, additional characteristics of specific symptoms should be elicited, as follows.

**Skin**
- Changes in texture or colour
- Unusual dryness or moisture
- Itching
- Rash
- Bruises, petechiae
- Changes in pigmentation
- Lesions
- Changes in moles or birthmarks

**Hair**
- Changes in amount, texture, distribution

**Nails**
- Changes in texture, structure

**Other Associated Symptoms**
- Site of onset
- Date(s) and site(s) of recurrence(s)
- Intermittent or continuous
- Influence of environmental or occupational factors

**Medical History (Specific To Integumentary System)**
- Allergic manifestation (e.g. asthma, hay fever, urticaria)
- Recent or current viral illness
- Recent or current bacterial illness
- Fever
- Allergies to drugs, foods, other chemical substances
- Medications (e.g. steroids, OCPs [oral contraceptive pills], antibiotics, OTCs [over-the-counter drugs])
- Immunosuppression (e.g. HIV/AIDS)
- Seborrheic dermatitis
- Psoriasis
- Diabetes mellitus

**Family History (Specific To Integumentary System)**
- Allergies (e.g. seasonal, to food)
- Seborrheic dermatitis
- Others at home with similar symptoms (e.g. rash)
- Psoriasis

**Personal And Social History (Specific To Integumentary System)**
- Obesity
- Poor hygiene
- Hot or humid environment, poor environmental sanitation
- Stress (may precipitate flares of chronic skin problem such as psoriasis)
- Exposure to new chemicals (e.g. soaps), foods, pets, plants
- Emotional disturbance
- History of sensitive skin
- Others at home, work or school with similar symptoms
- Recent travel
Physical Examination

• Apparent state of health
• Appearance of comfort or distress
• Colour (e.g. flushed, pale)
• Nutritional status (obese or emaciated)
• State of hydration
• Match between appearance and stated age
• Vital signs (temperature may be elevated)

• Vascularity (erythema, abnormal veins)
• Bruises, petechiae
• Edema (dependent, facial)
• Induration
• Individual lesions (colour, type, texture, general pattern of distribution, character of edge, whether raised or flat)
• Hair (amount, texture, distribution)
• Nails (shape, texture, discoloration, grooving)
• Mucous membranes
• Flexural folds or skin creases
• Examine lymph nodes
• Examine area distal to enlarged lymph nodes

Inspection And Palpation Of The Skin

• Colour
• Temperature, texture, turgor
• Dryness or moisture
• Scaling
• Pigmentation

Table 1: Major Types of Skin Lesions

<table>
<thead>
<tr>
<th>Type of Lesion</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atrophy</td>
<td>Skin thin and wrinkled</td>
</tr>
<tr>
<td>Crust (scab)</td>
<td>Dried serum, blood or pus</td>
</tr>
<tr>
<td>Erosion</td>
<td>Loss of part or all of the epidermis</td>
</tr>
<tr>
<td>Excoriation</td>
<td>Linear or hollowed-out crusted area, caused by scratching, rubbing or picking</td>
</tr>
<tr>
<td>Lichenification</td>
<td>Skin thickened, skin markings accentuated (e.g. atopic dermatitis)</td>
</tr>
<tr>
<td>Macule</td>
<td>Flat, circumscribed, discoloured spot; size and shape variable (e.g. freckle, mole, port-wine stain)</td>
</tr>
<tr>
<td>Nodule</td>
<td>Palpable, solid lesion that may or may not be elevated (keratinous cyst, small lipoma, fibroma)</td>
</tr>
<tr>
<td>Papule</td>
<td>Solid elevated lesion (e.g. wart, psoriasis, syphilitic lesion, pigmented mole)</td>
</tr>
<tr>
<td>Pustule</td>
<td>Superficial elevated lesion containing pus (impetigo, acne, furuncle, carbuncle)</td>
</tr>
<tr>
<td>Scales</td>
<td>Heaping-up of the horny epithelium (e.g. psoriasis, seborrheic dermatitis, fungal infection, chronic dermatitis)</td>
</tr>
<tr>
<td>Telangiectasia</td>
<td>Fine, often irregular red line produced by dilatation of a normally invisible capillary</td>
</tr>
<tr>
<td>Vesicle</td>
<td>Circumscribed, elevated lesion &lt;5 mm in diameter containing clear fluid; larger vesicles are classified as bullae or blisters (e.g. insect bite, allergic contact dermatitis, sunburn)</td>
</tr>
<tr>
<td>Ulcer</td>
<td>Loss of epidermis and at least part of the dermis</td>
</tr>
<tr>
<td>Wheal</td>
<td>Transient, irregularly shaped, elevated, indurated, changeable lesion caused by local edema (e.g. allergic reaction to a drug, a bite, sunlight)</td>
</tr>
</tbody>
</table>
Common Problems Of The Skin

Abscess (Subcutaneous)

**Definition**
A collection of pus in subcutaneous tissues.

**Causes**
- Infection with bacteria, e.g. *Staphylococcus aureus*, anaerobes, other microorganisms
- Predisposing factors: folliculitis, cellulitis, trauma, incision

**History**
- Pain, swelling, redness at infected site
- Fever may be present
- Injury or trauma

**Physical Findings**
- Temperature may be elevated
- Heart rate may be elevated
- Client may look ill
- Localized redness, swelling
- Lesion may be draining
- Localized induration
- Tenderness
- Fluctuance (may be difficult to palpate if abscess is deep)
- Regional lymph nodes may be enlarged and tender
- Size of abscess often difficult to estimate; abscess usually larger than suspected

**Differential Diagnosis**
Cellulitis.

**Complications**
Sepsis.

**Diagnostic Tests**
Swab discharge for culture and sensitivity.

**Management**

**Goals of Treatment**
- Control infection
- Prevent complications

**Appropriate Consultation**
Consult a physician if client is febrile or appears acutely ill; if extensive cellulitis, lymphangitis or adenopathy is present; or if an abscess is suspected or detected in a critical region (e.g. head or neck, hands, feet, perirectal area) or in an immunocompromised client (e.g. diabetic person).

**Nonpharmacologic Interventions**
- Soak abscess with warm saline compresses four times a day
- Cover any open areas with a sterile, non-adherent dressing (e.g. Telfa®)
- Rest, elevate and gently splint infected limb

**Client Education**
- Medication instruction
- Dressing changes as directed
- Cleansing of wound

**Adjunctive Therapy**
As per physician consultation if indicated

**Pharmacologic Interventions**

**Small, Uncomplicated Abscess**

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>cloxacillin</em> (A class drug), 250-500 mg PO qid for 10 days</td>
<td></td>
</tr>
<tr>
<td><em>cephalexin</em> (C class drug), 250 mg PO qid for 10 days</td>
<td></td>
</tr>
</tbody>
</table>

For clients with allergy to penicillin:

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>erythromycin</em> (A class drug), 250-500 mg PO qid</td>
<td></td>
</tr>
</tbody>
</table>

**Antipyretics and analgesia:**

<table>
<thead>
<tr>
<th>Antipyretic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>acetaminophen</em> (A class drug), 325 or 500 mg, 1-2 tabs PO q4-6h prn</td>
<td></td>
</tr>
</tbody>
</table>

IV antibiotics may be started before transfer if ordered by a physician.

**Monitoring and Follow-Up**
Refer if not resolving or if complications occur.
Cellulitis

Definition
Acute, diffuse, spreading infection of the skin, involving the deeper layers of the skin and the subcutaneous tissue.

Causes
• Bacteria: most commonly Staphylococcus or Streptococcus
• Predisposing factors: local trauma, furuncle, underlying skin ulcer, type 2 diabetes, poor circulation

If a bite was the original trauma, different organisms are involved. See "Skin Wounds," in "Dermatological Emergencies," below, this chapter.

History
• Localized pain
• Redness
• Swelling
• Area increasingly red, warm to touch, painful
• Area around skin lesion also tender
• Mild fever and headache may be present

Physical Findings
• Temperature may be elevated
• Heart rate may be elevated
• Redness, swelling
• Advancing edge of lesion diffuse, not sharply demarcated
• Small amount of purulent discharge may be present
• Skin surrounding lesion red and swollen, may be tense
• Edema
• Tenderness
• Induration (firm to touch)
• Regional lymph nodes may be enlarged, tender

Differential Diagnosis
• Folliculitis
• Foreign body
• Abscess
• Necrotizing fasciitis

Complications
• Extension of infection
• Abscess
• Sepsis

Diagnostic Tests
• Swab any wound discharge for culture and sensitivity.
• WBC

Management
Goals of Treatment
• Control infection
• Identify formation of abscess
• Prevent complications

Appropriate Consultation
Consult physician if any of the following conditions pertain:
• cellulitis is moderate to severe (e.g. large area is involved)
• cellulitis is progressing rapidly, which may indicate an invasive streptococcal infection
• cellulitis involves hands, feet, face or a joint
• client is immunocompromised (e.g. has diabetes mellitus)
• client is febrile, appears acutely ill or shows signs of sepsis

Nonpharmacologic Interventions
• Apply warm saline compresses to affected areas qid
• Elevate, rest and gently splint the affected limb

Client Education
• Counsel client about appropriate use of medications (dose, frequency, compliance)
• Encourage proper hygiene of all skin wounds to prevent future infection
• Stress importance of close follow-up

Adjuvant Therapy
• If original lesion caused by trauma, check for tetanus vaccination; if not up to date, administer tetanus vaccine.
• Start IV therapy with normal saline to keep vein open; adjust rate according to state of hydration and age

**Pharmacologic Interventions**

Oral antibiotics:
- cloxacillin *(A class drug)*, 250-500 mg PO qid for 10 days
  - or
- erythromycin *(A class drug)*, 250 mg PO qid for 10 days
  - or
- cephalaxin (Keflex) *(C class drug)*, 250-500 mg PO qid for 10 days

Antipyretics and analgesia:
- acetaminophen *(A class drug)*, 500 mg, 1-2 tabs PO q4-6h prn

Administer IV antibiotics only as directed by a physician.

**Monitoring and Follow-Up**

• Follow up daily to ensure that infection is controlled
• Instruct client to return for reassessment immediately if lesion becomes fluctuant, if pain increases or if fever develops

Monitor affected area frequently for progression.

**Referral**

Refer to physician if no improvement.
Furuncle And Carbuncle

Definition

Furuncle or boil: an acute, tender perifollicular inflammatory nodule

Carbuncle: a cluster of furuncles, generally larger and deeper

Causes

• Staphylococcal infection of several hair follicles
• Predisposing factors: obesity, diabetes mellitus, poor hygiene, excessive friction or perspiration, seborrhea, local trauma (e.g. from plucking hairs), use of systemic steroids

History

• Usually found on the neck, axilla, breasts, face and buttocks
• Local redness, swelling, pain, tenderness
• Begins as a small nodule, quickly becomes a large pustule
• If poked, purulent, sanguineous material drains
• May occur singly or in groups
• May be recurrent
• Fever absent

Physical Findings

• Nodule or pustule 5-30 mm in diameter
• Deep red in colour
• Central area may spontaneously drain pus
• Carbuncle may present as red mass with multiple draining sinuses in area of thick, inelastic tissue (e.g. posterior neck, back, thigh)
• Lesion(s) warm, tender to touch
• May be fluctuant
• Regional lymph nodes usually not enlarged or tender

Differential Diagnosis

• Cellulitis
• Abscess
• Impetigo
• Insect bites

Complications

• Scarring
• Spread of infection (e.g. lymphangitis, lymphadenitis)
• Abscess
• Recurrence

Diagnostic Tests

• Swab discharge for culture and sensitivity
• Determine blood glucose level if infection is recurrent or if symptoms suggestive of diabetes mellitus are present

Management

Goals of Treatment

• Control infection
• Prevent recurrence
• Identify predisposing underlying conditions (e.g. diabetes mellitus)

Appropriate Consultation

Consult physician if a large furuncle or carbuncle is present, as surgical drainage may be needed.

Nonpharmacologic Interventions

• Apply warm saline compresses to area at least qid. This may lead to resolution or spontaneous drainage if the lesion or lesions are mild.
• Cover area with a sterile, non-adherent dressing
• If area is fluctuant and pointing, incise lesion with a single stab wound and allow pus to drain.

Client Education

• Counsel client about appropriate use of medications (dose, frequency)
• Encourage proper hygiene of the area
• Stress importance of regular skin cleansing to prevent future infection
• Recommend that client avoid picking or squeezing the lesions
• Instruct clients with recurrent disease to bathe area bid with a mild antiseptic soap to help prevent recurrences
**Pharmacologic Interventions**
Antibiotics if infection is moderate or severe:
*cloxacillin (A class drug), 250 mg PO qid for 7-10 days*

For clients with allergy to penicillin:
*erythromycin (A class drug), 250 mg PO qid for 7-10 days*

**Monitoring and Follow-Up**
- Follow up in 2 days and at 7-10 days
- Instruct client to return immediately for reassessment if lesion becomes fluctuant, if pain increases or if fever develops

**Referral**
Arrange elective follow-up with physician if infections recur.
Impetigo

**Definition**
Highly contagious superficial bacterial infection of skin.

**Causes**
- *Streptococcus, Staphylococcus* or a mixture of both
- Predisposing factors: local trauma, insect bites, skin lesions from other disorders (e.g. eczema, scabies, pediculosis)

**History**
- More common on face, scalp and hands, but may occur anywhere
- Involved area is usually exposed
- New lesions usually due to auto-innoculation
- Rash begins as red spots, which may be itchy
- Lesions become small blisters and pustules, which rupture and drain
- Discharge dries to form characteristic golden yellow crusts
- Lesions painless
- Fever and systemic symptoms rare
- Mild fever may be present in more generalized infections

**Physical Findings**
- Thick, golden yellow, crusted lesion on a red base
- Numerous skin lesions at various stages present (vesicles, pustules, crusts, serous or pustular drainage, healing lesions)
- Bullae may be present
- Lesions and surrounding skin may feel warm to touch
- Regional lymph nodes may be enlarged, tender

**Differential Diagnosis**
- Infected eczema, contact dermatitis, scabies
- Herpes simplex infection with blisters or crusts
- Chickenpox infection with blisters or crusts
- Shingles (herpes zoster) with blisters or crusts
- Bullous insect bites

**Complications**
- Localized or widespread cellulitis
- Post-streptococcal glomerulonephritis (uncommon in adults)

**Diagnostic Tests**
None.

**Management**

**Goals of Treatment**
- Control infection
- Prevent auto-innoculation
- Prevent spread to other household members

**Appropriate Consultation**
Consult a physician if there is failure to respond to therapy.

**Nonpharmacologic Interventions**
- Apply warm saline compresses to soften and soak away crusts qid and prn
- Cleanse with antiseptic antimicrobial agent to decrease bacterial growth

**Client Education**
- Counsel client about appropriate use of medications (dose, frequency, compliance)
- Recommend proper hygiene (i.e. daily washing with prescribed soap)
- Counsel client about prevention of future episodes
- Suggest strategies to prevent spread to other household members (e.g. proper hand-washing, use of separate towels)

**Pharmacologic Interventions**
Apply topical antibiotic preparation after each soaking:
- *mupirocin ointment (A class drug), qid*

Oral antibiotics may be necessary if there are multiple lesions that appear infected:
- *cloxacillin (A class drug), 500 mg PO qid for 10 days*
  or
- *erythromycin (A class drug), 250 mg PO qid for 10 days*
or
cephalexin (C class drug), 500 mg PO qid for 10 days

**Monitoring and Follow-Up**
- Follow up in 2-3 days to assess response to treatment
- Instruct client to return for reassessment if fever develops or infection spreads despite therapy

**Referral**
Not usually necessary unless complications develop.
Eczema (Atopic Dermatitis)

Definition
Chronic, itchy, inflammatory condition of the skin

Causes
- Largely unknown
- Inherited skin sensitivity
- Allergy

History
- Pattern in adulthood differs from that in infancy and childhood
- Periods of remission and exacerbation
- Family history of eczema, allergies and asthma common
- Characterized chiefly by itching and scaling
- Eruptions of small groups of vesicles may occur
- Scratching leads to rupture of vesicles
- Clear serous fluid oozes from vesicles, leading to development of rash
- Vicious cycle of itch, scratch, rash, itch
- Usually affects face, neck, upper arms and back, flexural folds, feet
- May be more generalized
- Secondary bacterial infection common
- Specific irritating agents can be identified
- Wool, solvents, perfumed creams, lotions, soaps bothersome
- Allergies, asthma, contact dermatitis often present

Physical Findings
- Skin scaly, dry, thickened (lichenified)
- Fissures may be present
- Excoriations
- Mild redness and edema often present
- Vesicles may be present in some areas
- Lesions may be weeping
- Pustular or crusted lesions may be present
- Some areas of skin usually show chronic changes (thin skin, scarring, lichenification)

Differential Diagnosis
- Seborrheic dermatitis
- Dry skin (winter itch)
- Allergic contact dermatitis
- Psoriasis
- Scabies

Complications
- Secondary bacterial infection
- Chronic irritation of skin
- Side effects of medication (e.g. steroid preparations)

Diagnostic Tests
None.

Management
Goals of Treatment
- Relieve symptoms
- Prevent secondary infection

Appropriate Consultation
Consult a physician if no response to therapy after 1 week.

Nonpharmacologic Interventions
- Offer support to client, as it can be difficult to live with this irritating and cosmetically unattractive condition
- Advise client to stop using steroid preparations once acute lesions have healed, since steroids do not have any preventive benefit and may further irritate and damage skin
- Assist client to identify precipitating and aggravating factors, and encourage avoidance
- If lesions are dry, promote lubrication with Glaxal® base, Nivea® cream or petroleum jelly (Vaseline® bid, after bathing and prn

Client Education
- Counsel client about appropriate use of medications (dose, frequency, application)
- Encourage proper hygiene to prevent secondary bacterial infection
- Recommend loose-fitting cotton clothing
- Recommend avoidance of coarse materials and wool
- Recommend avoidance of overheating
- Recommend avoidance of irritants at work and at home
- Recommend use of a soap substitute (e.g. Aveeno® and avoidance of soaps)
- Suggest that cotton gloves be worn inside rubber gloves when client works with liquids
• Suggest that greasy lubricants be applied within minutes of leaving shower or bath to "lock in" moisture

**Pharmacologic Interventions**
Reduce inflammation if itch moderate or severe:
*hydrocortisone 0.5% cream or ointment (A class drug), tid for 1-2 weeks*

Gels and creams are used for acute, weeping eruptions. Ointments are used for dry or lichenified lesions. Lotions are used for hairy areas.

Relieve itch with oral antihistamines:
* diphenhydramine (A class drug) 25-50mg PO tid-qid
  or
* hydroxyzine (A class drug), 10-25 mg PO hs and bid prn

Start with 10 mg if client is small, elderly or taking anxiolytics. Sedative effect of hydroxyzine is useful to break the itch-scratch cycle.

**Monitoring and Follow-up**
Follow up in 1-2 weeks to assess response. Advise client to return sooner if there are signs of infection developing.

**Referral**
Arrange elective follow-up with a physician if there is no response to treatment.
Pediculosis (Lice Infestation)

Definition
Infestation with lice.

Causes
There are 3 types: head lice, body lice and pubic lice.

Risk Factors
• Crowded housing (e.g. shared beds), crowded schools
• High pediatric population
• Failure to recognize an infestation
• Faulty application of treatments
• Failure to treat close contacts simultaneously
• Failure to eradicate lice from linens and clothing at time of treatment
• Lack of running water, which can predispose to poor hygiene and secondary skin infection

History
• Head lice: involve scalp
• Body lice: involve body
• Pubic lice: involve pubic area and may be found in hairs of abdomen, thighs, axilla, eyebrows, eyelashes
• Severe itching of involved area
• Excoriation of skin
• Secondary bacterial infection may occur
• Client may find lice or nits on bedclothes, in seams of clothing

Physical Findings
• Small gray-white nits cemented to base of hair shafts
• Lice may be visualized
• Excoriation of skin

Differential Diagnosis
• Dandruff

Complications
• Recurrent infestation
• Skin infection

Diagnostic Tests
None.

Management
Goals of Treatment
• Eradicate infestation
• Prevent recurrences
• Prevent spread to close contacts

Nonpharmacologic Interventions
• Remove dead lice and nits with tweezers or nit comb. Soaking the head with white vinegar and waiting 10 mins before combing may loosen nits
• Avoid irritation of eyes and mucous membranes
• Remove nits on eyelashes with petroleum jelly (nits become coated, and ova die from suffocation)
• Instruct client to place small amount of petroleum jelly on tips of fingers, then close eyes and rub petroleum jelly into lids and brows; repeat bid or tid for 4 or 5 days
• Examine all family members and close personal contacts, including schoolmates and daycare contacts, and treat if infested
• Recommend that combs, brushes, hats, coats, bedding and clothing of all household members be washed in warm soapy water

Client Education
• Counsel client about proper use of medication and side effects
• Recommend avoidance of sharing of combs, brushes, hats, etc.
• Suggest that mattresses (which can harbor lice) be taken outside for the day
• Things that cannot be washed should be dry-cleaned or put in clothes dryer
• May return to school post-treatment

Pharmacologic Interventions
Antiparasitic shampoo agent for head lice (apply topically and massage in thoroughly for 10 minutes, then rinse):
permethrin cream rinse (A class drug)

Monitoring and Follow-Up
Follow up in 7 days. Shampoo treatment may be repeated 7-10 days after original application.

Referral
Usually not necessary.
Scabies

Definition
Infestation of the skin with a mite parasite.

Cause
*Sarcoptes scabiei.*

Risk Factors
- Failure to recognize an infestation
- Faulty application of treatment regimens
- Failure to treat close contacts
- Failure to eradicate mites from clothing and bed linen
- Crowded housing, shared beds, crowded schools and daycare centers
- High pediatric population
- Lack of running water, which may predispose to poor hygiene and secondary skin infection

History
- Severe itching
- Itching generally worse at night
- Rash of hands, feet, flexural folds
- Transmitted by intimate contact with infected person
- Transmitted by clothes
- Symptoms may take 2-3 weeks to develop after contact with mite
- Symptoms are due to hypersensitivity to mite and its products

Physical Findings
- Usually affects interdigital web spaces, flexures of wrists and arms, axilla, belt line, lower folds of buttocks, genitalia, areolae of nipple
- Diffuse red rash
- Primary lesions: papules, vesicles, pustules, burrows
- Secondary lesions: scabs, excoriations, crusts, nodules, secondary infection
- Lesions in various stages present at the same time
- Secondary lesions may predominate
- Burrows (gray or flesh-coloured ridges 5-15 mm long) may be few or many
- Burrows commonly seen on anterior wrist or hand and in interdigital web spaces

Differential Diagnosis
- Pediculosis
- Impetigo
- Eczema
- Contact and irritant dermatitis

Complications
- Secondary bacterial infection

Diagnostic Tests
None.

Management

Goals of Treatment
- Eradicate infestation
- Control secondary infection
- Relieve symptoms

Appropriate Consultation
Consult physician if unsure of diagnosis.

Nonpharmacologic Interventions
- Prophylactic therapy essential for all household members, since signs of scabies may not appear for 1-2 months after the infection is acquired
- Treat all household members at the same time to prevent re-infection
- All bed linen (sheets, pillowslips) and clothing worn next to the skin (underwear, T-shirts, socks, jeans) should be laundered in a hot soapy wash and dried with a hot drying cycle
- If hot water is not available, place all bed linen and clothing into plastic bags and store away from family for 5-7 days, as the parasite cannot survive beyond 4 days without skin contact
- Placing bedding outside in the cold or in ultraviolet light will also help
- Children may return to daycare or school the day after treatment is completed
- Healthcare workers who have had close contact with clients with scabies may require treatment
- Community education, aimed at early recognition and awareness of scabies, is important
- In widespread scabies epidemics, prophylactic treatment of a whole community may be optimal management
• Vacuum upholstered furniture

**Client Education**
• Counsel client about proper use and side effects of medication.
• Hygiene

**Pharmacologic Interventions**
Scabicide cream or lotion, to be applied to entire body, from chin to toes (emphasize that scabicide must be applied in skin creases, between fingers and toes, between buttocks, under breasts and to external genitalia):
*permethrin 5% dermal cream (A class drug), (drug of choice)*

Use as per product monograph. Treatment may be repeated in one week if necessary.
The safety of permethrin in pregnant and lactating women has not been established.

Topical antiparasitic agents can cause dermatitis if used incorrectly (i.e. if overused).

Pruritus may be a problem particularly at night. Instruct client that itch will persist for up to 2 weeks. To manage itching:
*diphenhydramine (A class drug) 25-50mg PO tid-qid*
*or*
*hydroxyzine (A class drug), 10-25 mg PO bid and hs prn*

**Monitoring and Follow-Up**
• Follow up in 1 week to assess response to treatment
• Advise client to return immediately if signs of secondary infection develop

**Referral**
Refer if no response to treatment.
Ringworm (Tinea)

Definition
Superficial infection of skin.
- On feet: tinea pedis (athlete's foot)
- In groin: tinea cruris (jock itch)
- On body: tinea corporis

Causes
Fungi that invade dead tissues such as the stratum corneum, nails and hair (dermatophytes). More common in diabetics.

History and Physical Findings
See Table 2 below

Table 2: History and physical findings for various forms of tinea

<table>
<thead>
<tr>
<th>Type</th>
<th>History</th>
<th>Physical findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tinea pedis</td>
<td>Affects feet. Itch severe. Scaling and redness, mainly between toes.</td>
<td>Scaling of lateral interdigital areas. Moist, whitened, macerated, cracked skin may be present. Skin peels off easily with red, tender area underneath. One or several small vesicles may be present. Vesicles rupture leaving a “collarette” of scales. May involve sole of foot with marked scaling (itch minimal)</td>
</tr>
<tr>
<td>Tinea corporis</td>
<td>Affects any smooth, non-hairy part of body.</td>
<td>Lesions variable in size. Typically a well-circumscribed circular or oval patch. Reddish pink and scaly. Central clearing. Accentuation of redness at outer border. Margins scaly, vesicular or pustular.</td>
</tr>
</tbody>
</table>

Differential Diagnosis
- Soft corn
- Wart
- Seborrheic dermatitis
- Candidal infection of foot or groin
- Local chafing or irritation of groin
- Contact or allergic dermatitis
- Psoriasis

Complications
Secondary bacterial infection (particularly with tinea pedis).

Diagnostic Tests
Take skin scrapings for mycologic investigation (fungal culture).

Management

Goals of Treatment
- Relieve symptoms
- Eradicate infection

Appropriate Consultation
Consult a physician if there is failure to respond to an adequate trial of antifungal therapy.

Nonpharmacologic Interventions

Client Education
- Recommend elimination of moisture and heat
• Suggest that client modify socks and footwear e.g. avoid wearing rubber shoes
• Recommend avoidance of restrictive clothing, nylon underwear, prolonged wearing of wet bathing suit or work clothes
• Counsel client about appropriate use of medications (dose, frequency, compliance)
• Recommend proper hygiene e.g. client should change socks frequently

**Pharmacologic Interventions**
For tinea pedis and tinea cruris, topical antifungal agent for at least 2 weeks; continue until 1 week after resolution of lesions:
- **miconazole skin cream (A class drug), bid or tid**
- **clotrimazole skin cream (A class drug), bid or tid**
- **tolnaftate cream or powder (A class drug), bid or tid**

Tolnaftate powder has additional drying benefits.

For tinea corporis, apply one of these topical antifungal agents for 2-4 weeks.

**Monitoring and Follow-Up**
Follow up in 2 weeks to ensure resolution.

**Referral**
Refer to physician if fungal infections are recurrent, if they develop in an immunosuppressed or diabetic client, if there is no response to therapy, or if the nails become involved.
Stasis Dermatitis

**Definition**
Inflammation of skin caused by pooling of venous blood in lower limb.

**Causes**
- Improper venous drainage
- Predisposing factors: varicose veins, previous deep vein thrombosis, arterial disease, smoking, CHF, diabetes

**History**
- Itchiness
- Itch worsens with use of soaps, drying, bathing
- Swelling of ankles
- Initially, swelling is relieved by elevation
- Later, swelling may become constant

**Physical Findings**
- Usually begins on medial ankle, may spread to lower third of leg
- Localized swelling
- Tiny petechiae
- Excoriations, redness, scales
- Diffuse red-brown pigmentation develops
- Entire circumference of lower leg may become involved

**Differential Diagnosis**
- Contact dermatitis
- Cellulitis

**Complications**
- Skin breakdown, ulceration
- Infection
- Deep venous thrombosis

**Diagnostic Tests**
None.

**Management**

**Goals of Treatment**
- Control edema
- Prevent formation of ulcers
- Prevent infection

**Appropriate Consultation**
Consult physician if no resolution or if condition progresses.

**Nonpharmacologic Interventions**
- Encourage client to elevate legs
- Application of compression with support hose or tensor bandages when ambulatory
- Application of cool normal-saline soaks or wet normal-saline dressings in acute phase
- Lubrication of area twice daily with emollient cream
- Avoidance of irritants (soap, hot water, rough clothes, rubbing)

**Pharmacologic Interventions**
Antibiotics as ordered by physician if superinfection apparent.

**Monitoring and Follow-Up**
- Follow up in 1 week to determine if there is a response to conservative therapy
- Monitor for signs of skin breakdown, infection
- Advise client of the signs of infection and instruct him or her to return to clinic immediately if they occur

**Referral**
Arrange follow-up with physician if condition deteriorates.
Urticaria (Hives)

**Definition**
Local wheal and erythema of skin

**Causes**
- Often unknown
- Chronic idiopathic
- Hypersensitivity to foods, drugs, inhaled allergens, insect bite or sting
- Emotional upset
- Physical agents (e.g. heat, cold, sun)
- Systemic disease (e.g. systemic lupus erythematosus)
- Infection (e.g. hepatitis, mononucleosis or other viral illness)

**History**
- Recent exposure to one of above causes possible
- Itchy white-to-pink patches
- Client may feel unwell

**Physical Findings**
- May occur anywhere on body
- May be localized or generalized
- Lesions multiple, irregular in shape and size
- Raised white or light rose-pink patches, usually surrounded by red halo
- Peripheral extension and coalescence of patches may occur
- Patches may wax and wane
- Individual wheals rarely persist for > 12-24 hours
- Signs of scratching may be evident

**Differential Diagnosis**
- Vasculitis
- Insect bites
- Erythema multiforme
- Systemic lupus erythematosus

**Complications**
- Recurrence
- Severe itching
- Systemic allergic response with bronchospasm
- Anaphylaxis

**Diagnostic Tests**
None.

**Management**

**Goals of Treatment**
- Relieve symptoms
- Identify precipitating factor
- Prevent recurrence

**Appropriate Consultation**
Contact physician if any of the following pertain:
- Symptoms are severe
- Complications are present
- If shortness of breath, wheezing or swelling of tongue or mouth occurs
- Client is pregnant or lactating

**Nonpharmacologic Interventions**
- Application of cool compresses to reduce itching
- Avoidance of overheating
- Temporary avoidance of hot, spicy food
- Colloidal oatmeal baths

**Client Education**
- Counsel client about appropriate use of medications (dose, frequency, side effects)
- Recommend proper skin hygiene to prevent infection
- Recommend avoidance of scratching; client should keep fingernails short and clean
- Assist client in identifying causative agent (including any recent changes in food or brands, as different food companies put different additives into their products)

**Pharmacologic Interventions**
Apply topical antipruritic agents:
*calamine lotion qid prn*

Oral antihistamine to relieve itch and suppress formation of new lesions:
*cetirizine (A class drug) 10mg PO od for 2-7 days or diphenhydramine (A class drug), 25-50 mg PO q6-8h for 2-7 days*
hydroxyzine (A class drug), 25-50 mg PO q6-8h for 2-7 days

Monitoring and Follow-up

- Follow up in 2-7 days
- Instruct client to return for reassessment if lesions progress despite therapy
- Instruct client to return to clinic immediately if shortness of breath, wheezing or swelling of tongue or mouth occurs; in this situation, refer to "Anaphylaxis," in chapter 14, "General Emergencies and Major Trauma"

Referral

Refer to a physician for evaluation if lesions are recurrent or persistent.
Warts (Verrucae)

Definition
Common, contagious, benign epithelial hyperkeratotic tumors

Causes
Human papillomavirus

History
• Occur most commonly in children
• May persist for many years and disappear spontaneously
• Single or multiple lesions

Physical Findings
• Usually occur on hands, fingers, feet and face
• May be small or large
• May be single or in clusters
• Raised tumors with thickened, rough surface
• White, gray, yellow or brown
• Black dots (thrombosed capillaries) may be seen within wart
• Well-defined round or irregular margin
• Surface may be flat (flat wart)
• Firm, rough
• Lesions bleed from central capillaries when pared

Differential Diagnosis
• Corns
• Molloscum contagiosum
• Melanoma

Complications
• Unacceptable cosmetic appearance
• Enlargement or spread of warts

Diagnostic Tests
None.

Management
Goals of Treatment
• Eradication of lesion
• Control of spread

Appropriate Consultation
Arrange consultation with physician if warts are on face or genitals, or if client is pregnant.

Nonpharmacologic Interventions
• Give the client lots of support and encouragement to persevere, as the treatment is long and tedious
• Before each application of medication: soak affected area in warm water to soften wart; use a pumice stone to remove dead tissue, or pare away dead skin with scalpel

Client Education
• Counsel client about appropriate use of medications - dose, frequency, application
• Protect normal surrounding skin with Vaseline® petroleum jelly
• Suggest strategies to avoid spread to other areas of body and to other persons

Pharmacologic Interventions
Apply topical treatment to warts: salicylic and lactic acid liquid (A class drug), od for up to 3 months

Monitoring and Follow-Up
Follow up every week to assess response and adherence to treatment regime.

Referral
Refer electively to a physician if no response after 12 weeks of therapy.
Dermatological Emergencies

Skin Wounds

Definition
Breath in the integrity of the skin (external surface of the body)

Causes
*Blunt trauma:* split- or crush-type injuries will swell more and tend to have more devitalized tissue and a higher risk of infection

*Sharp trauma:* clean edges, low cellular injury and low risk of infection

*Bite injury:* animal or human

History
* Mechanism of injury
* Contaminants: wound contact with manure, rust, dirt, etc. will increase risk of infection
* Time of injury (after 3 hours, the bacterial count in a wound increases dramatically)
* Amount of blood lost
* Loss of function in nearby tendons, ligaments, nerves (sensation)
* Medical illnesses, conditions, treatments: diabetes mellitus, chemotherapy, steroids, peripheral vascular disease and malnutrition may delay wound-healing and increase the risk of infection
* Allergies (to drugs, dressings, local anesthetics)
* Medications currently used (especially steroids, anticoagulants)
* Status of tetanus vaccination
* Status of rabies vaccination

Physical Examination
* Temperature
* Heart rate, blood pressure (if significant blood loss from wound)
* Dimensions of wound, including depth

Assess for infection:
* Redness
* Heat
* Tenderness
* Discharge
* Fever
* Local lymphadenopathy

Assess integrity of underlying structures (nerves, ligaments, tendons, blood vessels):
* Vascular injury:* Capillary refill should be checked distally.
* Neurologic injury:* Check distal muscle strength, movement distal to wound and sensation. Always check sensation before administering anesthesia. For hand and finger lacerations check two-point discrimination, which should be < 1 cm at the fingertips.
* Tendons:* Can be evaluated by inspection, but individual muscles must also be tested for full range of motion and full strength.

Complications
* Infection
* Poor healing
* Laceration of nerve
* Compartment syndrome: loss of sensation may be the first sign; pain severe, out of proportion to injury
* Crush injury may decrease two-point discrimination, and it may take several months to recover
* Injury to major vascular structures (e.g. artery)
* Injury to tendon

Diagnostic Tests
* Usually none
* If there is strong clinical suspicion of foreign body or fracture, x-ray or ultrasound may be necessary

Management

Goals of Treatment
* Restore function
• Minimize risk of infection
• Repair injured tissue with a minimum of cosmetic deformity

**Appropriate Consultation**
Consult a physician if any of the following pertain:
• Wound is extensive, deep or infected
• Muscle, tendon, nerve or vascular compromise is present or suspected
• Significant tissue deficit is present
• Wound is more than 12 hours old

**Wound Repair: General Principles**
• Most wounds may be closed with sutures up to 12 hours after the injury; clean well and use clinical judgment when choosing which wounds to close.
• Do not suture wounds that are infected or inflamed, dirty wounds, human or animal bites, puncture wounds, neglected wounds or severe crush wounds.
• Wounds on the face that are up to 24 hours old may be closed after thorough cleaning. The blood supply in this area is much better and the risk of infection therefore much lower.
• Do not clamp vascular structures until it is determined if the vessel is a significant one needing repair.

**Nonpharmacologic Interventions**

**Homeostasis**
Direct pressure is the first choice for controlling bleeding. If a fracture is involved, immobilization will help control bleeding

**Skin Preparation**
• Debridement: Using aseptic technique, remove devitalized tissue; avoid taking healthy tissue.
• High-pressure irrigation is the most effective means of cleansing a wound. Use normal saline in a 60-mL syringe with a 19-gauge needle.

Scrubbing does not cleanse the wound as well, and using any disinfectant in the wound damages healthy cells needed for healing.
• Skin disinfection: Can be performed with povidone-iodine solution. Avoid getting the solution in the wound, because it will impede healing.
• Hair can be clipped in the area if necessary. Shaving hair is not recommended.
• Never shave eyebrows. They are needed for alignment of the wound and may not grow back.
• Flush well with normal saline after disinfection.

**Open Wound Care**
• To keep the wound open, pack it with bulky, wet saline gauze dressings daily. This will keep the tissue moist and help debride.
• Avoid iodine dressings because they damage healthy tissue and slow granulation.
• When clean granulation tissue is apparent, secondary closure may be considered; alternatively, the dressing can be changed to dry, sterile, packing material.

**Wound Closure**
• Steri-Strips: If the wound is small and shallow and falls together naturally along lines of tension, it may only need to be reinforced with steri-strips. Dress the wound with dry sterile gauze. Instruct client to keep wound clean and dry for 48 hours.
• Suturing: Larger wounds need suturing (Table 3). Close in layers as necessary using simple interrupted sutures.

<table>
<thead>
<tr>
<th>Type of suture</th>
<th>Size</th>
<th>Body area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonabsorbable</td>
<td>Silk or Nylon coated with polypropylene glycol (Prolene®)</td>
<td>#3-0, 4-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absorbable</td>
<td>Chromic (catgut)</td>
<td>#3-0, 4-0, 5-0</td>
</tr>
<tr>
<td></td>
<td>Monofilament (Monocryl®)</td>
<td></td>
</tr>
</tbody>
</table>
Local Anesthetic for Suturing
Lidocaine (1% to 2%) is the most frequently used local anesthetic (onset 2-5 minutes, duration 60 minutes):
- lidocaine 1% with or without epinephrine (maximum 30 mL)
- or lidocaine 2% with or without epinephrine (maximum 10 mL)

Nurses should use 1% lidocaine without epinephrine as first choice when suturing a wound.

For adults, the maximum dose of 1% lidocaine (without epinephrine) is 4.5 mg/kg (maximum 30 mL).

Never use lidocaine with epinephrine on the ears, nose, fingers, toes or penis.

- Use a 22- or 25-gauge needle
- Infiltrate the anesthetic slowly through the open wound edge, avoiding the intact skin
- Always pull back on plunger to ensure the needle is not in a blood vessel
- Administer subsequent injections into an area that has already been anesthetized
- It may be of value to dribble a small amount of lidocaine on to the wound before infiltration to provide some initial anesthesia
- Give anesthetic at least 5 minutes to be effective
- If extensive suturing is required, it may be necessary to anesthetize and suture a small area at a time to prevent anesthetic from wearing off before suturing is complete

Toxic effects of lidocaine: Observed if anesthetic is injected into a blood vessel inadvertently; symptoms include dizziness, tinnitus, nystagmus, seizures, coma, respiratory depression, arrhythmias and seizures (all symptoms are usually self limiting)

Pharmacologic Interventions
Antibiotic Prophylaxis
There is no medical indication for prophylactic antibiotics in routine, uncontaminated skin wounds. However, consider prophylactic antibiotic use for clients prone to endocarditis, clients with peripheral vascular disease:
- cloxacillin (A class drug), 250-500 mg PO qid for 10 days

For clients with allergy to penicillin:
- erythromycin (A class drug), 250 mg PO qid or 500 mg bid for 10 days

Topical Antibiotics
Consider topical antibiotic ointment for wounds on face and torso:
- bacitracin ointment (A class drug), qid for 5 days

Antibiotics for Bites
Human Bites
Antibiotics should be given prophylactically for all human bites:
- amoxicillin/clavulanate (B class drug), 20-40 mg/kg daily, divided tid, PO for 7 days
  - Cefixime is an acceptable alternative.

Consider IV antibiotics if infection has already occurred, especially for a bite on the hand.

Cat Bites
Antibiotics are routinely given for cat bites.

The drug of choice is:
- amoxicillin/clavulanate (B class drug), 20-40 mg/kg daily, divided tid, PO for 7 days
  - Vibramycin is an alternative.

Dog Bites
Only 5% of dog bites become infected, and routine prophylaxis is not recommended. If there is a need to treat, amoxicillin/clavulanate is the drug of choice (as for other types of bites).

Tetanus Prophylaxis
**Client Education**
- Keep wound covered for 24 hours

**Monitoring and Follow-up**
- Instruct client to return for reassessment if redness, swelling, discharge, pain or fever develops

**General Guidelines for Removing Sutures**
- Wound appears clean and healed
- Wound appears dry; no drainage evident
- For larger wounds it is advisable to initially remove alternate sutures to ensure that wound edges stay approximated
- Sutures should be removed according to the recommendations in Table 4

Increase time before removal of sutures in diabetic or steroid-dependent clients in whom healing may take several weeks.

**Table 4: Timing of removal of sutures**

<table>
<thead>
<tr>
<th>Site of wound</th>
<th>Timing of suture removal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face</td>
<td>3-5 days; steri-strip reinforcement after suture removal</td>
</tr>
<tr>
<td>Scalp</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Trunk</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Arms</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Legs</td>
<td>10-14 days</td>
</tr>
<tr>
<td>Joints (dorsal surface)</td>
<td>14-21 days (splint recommended)</td>
</tr>
</tbody>
</table>

**Referral**
- Consider surgical consult if there is suspicion of injury to major structures
- Open fracture is an indication for surgical debridement and repair (except in the case of fracture of a distal phalanx, where copious irrigation and oral antibiotics are acceptable treatment if the injury can be monitored carefully for infection)
Burns

Definition
Tissue injury caused by thermal contact.

Types of Burns
First-Degree
Affects epidermis only; painful and erythematous.

Second-Degree
• Superficial: Affects epidermis and outer half of dermis; hairs are spared
• Deep: Affects epidermis, with destruction of reticular dermis; can easily convert to full-thickness burn if secondary infection, mechanical trauma or progressive thrombosis occurs

Third-Degree
Tissue is dry, pearly white, charred, leathery. Heals by epithelial migration from the periphery and by contracture. May involve adipose, fascia, muscle or bone.

Causes
Thermal
• Due to external heat source

• Flame; tends to cause full-thickness burn, especially if clothing burns
• Molten metal, tars or melted synthetics lead to prolonged skin contact

Electrical
• Similar to crush injuries: muscle necrosis, rhabdomyolysis, myoglobinuria occur
• Require special consideration as these burns are often more serious than they appear; always assume that an electrical burn is severe

Chemical
• Strong acids are quickly neutralized or quickly absorbed
• Alkalis cause liquefaction necrosis and can penetrate deeply, leading to progressive necrosis up to several hours after contact

Radiation
• Initially appear hyperemic; may later resemble third-degree burns
• Changes can extend deep into the tissue
• Sunburns are of this type and involve moderate superficial pain

Table 5: Assessing depth of a burn

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>First degree</th>
<th>Second degree</th>
<th>Third degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blisters</td>
<td>None</td>
<td>Present</td>
<td>None</td>
</tr>
<tr>
<td>Colour</td>
<td>Red</td>
<td>Red</td>
<td>White, charred</td>
</tr>
<tr>
<td>Moisture</td>
<td>Dry</td>
<td>Wet</td>
<td>Dry</td>
</tr>
<tr>
<td>Sensation</td>
<td>Present</td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>Pain</td>
<td>Moderate</td>
<td>Severe</td>
<td>Absent</td>
</tr>
</tbody>
</table>

History
• Obtain accurate description of exact mechanism of injury
• Inquire about any treatment given at home (e.g. cooling, application of oils)
• Medical history (but only when time permits)
• Medications currently being taken (but only when time permits)
• Allergies (but only when time permits)
• Tetanus vaccination status (but only when time permits)

Physical Findings
• Assess ABC
• Temperature may be elevated if wounds infected
• Heart rate may be elevated because of pain
• Blood pressure may be low if client is in shock
• Determine depth (Table 5) and extent (Figure 1) of the burn

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Figure 1: Assessing extent of a burn (Wallace's Rule of Nines)

Assessing The Severity Of The Burn
The severity of a burn depends on the:
• depth of the burn
• amount of surface area involved
• location of the burn
• accompanying complications
• age of the patient

Differential Diagnosis
• Scalded skin syndrome
• Systemic reaction (e.g. drug reaction)
• Yeast infection

Complications
• Increasing depth of burn
• Shock

• Secondary infection
• Renal failure
• Carbon monoxide poisoning

Diagnostic Tests
None.

Management
Table 6: Criteria for transfer of burn patient

<table>
<thead>
<tr>
<th>Criteria for Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burns covering 10% or more of body surface (if age &gt;50 years)</td>
</tr>
<tr>
<td>Second and third degree burns covering 20% or more of body surface (any age)</td>
</tr>
<tr>
<td>Burns of face, hands, feet, perianal or genital area, over major joints</td>
</tr>
<tr>
<td>Smoke inhalation, electrical burns, chemical burns</td>
</tr>
<tr>
<td>Burns associated with major injuries or fractures</td>
</tr>
<tr>
<td>Circumferential chest or extremity burns</td>
</tr>
<tr>
<td>Lesser burns in a client with underlying disease (e.g. diabetes mellitus)</td>
</tr>
</tbody>
</table>

Goals of Treatment
• Promote healing and restoration of tissue
• Prevent complications

Nonpharmacologic Interventions
The first step is general first aid, cleansing and cooling the affected area.
• Thermal burn: Cool if area is still warm to touch. Burns caused by liquid should be cooled rapidly, and any clothing in contact with the area should be removed rapidly to decrease contact time. Immerse in cool water to reduce heat and prevent extension of burn. Do not immerse or apply cold water if burns involve > 10% of body.
• **Chemical burn:** Irrigate. If dry powder is still visible on the skin, brush it away before irrigating the skin with water. Irrigate with copious amounts of water for at least 15 (preferably 30) minutes after powders have been removed. This process should be started at the accident scene if possible. Alkali burns should be irrigated for 1-2 hours after injury. Call poison control center for specific instructions.

• **Tar burn:** Cool, clean gently, and apply a petrolatum-based antibacterial ointment (e.g. Polysporin®) or other petroleum-based product. Do not attempt to scrape tar off the skin surface, as this can cause further damage. Avoid chemical solvents, which may cause additional burns. After 24 hours the tar can be washed away and the injury treated as a thermal burn.

• **Electrical burn:** Be cautious and observe the client closely. Watch for cardiac arrhythmias. Cardiac monitoring for 24 hours is essential if there was significant exposure to electrical current. Apply a cervical collar. Look for long-bone fractures secondary to muscle contraction. An electrical burn may cause thrombosis of any vessel in the body. Clean and dress as for a thermal burn (see below).

---

**Treatment Of Minor Burns**

**Nonpharmacologic Interventions**

**First degree burns**
- Cleanse with normal saline or sterile water
- **Dressings:** Cover area lightly with sterile, dry gauze dressing

**Second degree burns**
- Remove any attached clothing and debris
- Cleanse with normal saline or sterile water
- Gently debride using sterile technique
- Small blisters may be left intact
- Debride open blisters
- **Dressings:** Small, less severe second-degree burns do not require antimicrobial ointment or impregnated dressings; instead, apply non-adherent porous mesh gauze dressing (e.g. Jelenet®)

**Client Education**
- Counsel client about appropriate use of medications (dose, frequency)

**Pharmacologic Interventions**

**Analgesia:**
- ibuprofen (*A class drug*), 200 mg, 1-2 tabs PO q6h prn
- acetaminophen (*A class drug*), 500 mg, 1-2 tabs, q4h prn
- acetaminophen with codeine 30mg (*C class drug*), 1-2 tabs q4-6h prn (maximum 15 tabs)

Consult a physician if additional analgesia needed for debridement, etc.

Larger, more severe deep second-degree burns require topical antibiotic ointment or impregnated dressings (ointments can make evaluation of drainage difficult). Apply:
- silver sulfadiazine (*C class drug*), od
- bacitracin ointment (*A class drug*), od
- chlorhexidine dressing (*A class drug*), 0.5%, od

- Absolute contraindication to silver sulfadiazine: term pregnancy
- Relative contraindication to silver sulfadiazine: possible cross-sensitivity to other sulfonamides, pregnancy

Prophylactic antibiotics should rarely be required but may be considered for:
- immunocompromised clients
- clients at high risk of endocarditis
- clients with artificial joints

Discuss choice with a physician.

**Monitoring and Follow-Up**
- Follow up in 24 hours and daily until the burn is healed
• Re-evaluate depth and extent of injury
• Monitor for healing and development of infection
• Cleanse and debride prn; tub soaks can help loosen coagulum and speed separation of necrotic debris
• Reapply bacitracin or silver sulfadiazine and dry sterile dressing

• Absolute sterility is not mandatory during dressing changes; however, cleanliness and thorough cleaning of hands, sinks, tubs and any instruments used is emphasized. Acetic acid (0.25%) can be applied for pseudomonal prophylaxis.
Figure 2: Treatment of Major Burns

Stop the burning process

**Perform primary survey**

Provide airway and breathing assistance
- oxygen therapy
- positioning

Consult with physician

Apply wet normal saline dressings to cool the burn

**Perform secondary survey**

Assess severity of the burn (use rule of nines)

Initiate IV normal saline

Provide analgesia for pain
- morphine 2.5 mg IV
  titrated to effect

Calculate IV fluid requirements and administer fluids according to formula:
\[ \text{wt (kg)} \times \% \text{burn} = \text{mL/hr} \]

Insert Foley catheter and monitor urine output

Provide further wound care

Transport according to criteria for hospitalization

Source: the Canadian Red Cross Society and Outpost Hospitals Program (January 2000)
Figure 3: Treatment of Chemical burns

Perform primary survey

Provide airway and breathing assistance
- oxygen therapy
- positioning

Consult with physician

Manage the chemical
- flush/irrigate burns
- remove clothing
- protect yourself

Perform secondary survey

Assess severity of the burn

Initiate IV normal saline

Provide analgesia for pain
- morphine 2.5 mg IV
titrated to effect

Administer fluids according to formula

Monitor vital signs and systemic signs

Transport according to criteria for hospitalization

Source: The Canadian Red Cross Society and Outpost Hospital Program (January 2000)
Frostbite

Definition
Thermal injury to tissue caused by cold. Injury may occur without (Table 7) or with (Table 8) freezing of the tissue. Freezing of the tissue is defined by the formation of ice crystals.

Cause
Exposure to cold.

History
Most commonly affects hands and feet.

Frostnip
• Initially cold, burning pain
• Area becomes blanched
• With rewarming, area becomes reddened

Frostbite
• Cold burning pain progresses to tingling
• Later, numbness or heavy sensation
• Area becomes pale or white
• Rewarming causes pain

Physical Findings (See also Tables 7 and 8)
• Variable
• Temperature may be reduced if there is associated hypothermia or elevated if there is infection
• Client in mild-to-acute distress
• Affected area may be reddened or white
• Edema may be present
• Blisters may be present
• Infection may be evident if client presents later
• Area is initially cold and hard to touch
• Sensation reduced (feels like a piece of wood)
• If rewarming has occurred, area will be warm and tender

Differential Diagnosis
• Superficial versus deep frostbite

Complications
• Infection
• Hypothermia
• Tissue loss
• Hypersensitivity to cold in affected area may last several years or be permanent
• Gangrene

Management
Goals of Treatment
• Identify associated hypothermia
• Rewarm parts
• Control pain
• Prevent infection

Nonpharmacologic Interventions
• Rapidly rewarm affected part by immersion in 42°C water for 20-30 minutes; slow rewarming is not good.
• Do not rub and do not use hot water bottles
• Rest affected limb; avoid irritation to skin
• Continue rewarming once process has started until skin is warm, soft, pliable and flushed red
• Prevent refreezing; if in the field, do not thaw extremity until assured it will not refreeze
• Elevate limb once it is rewarmed; leave exposed if possible
• Do not break blisters
• Separate toes and fingers with dry cotton wool
• Wrap client loosely in bulky soft material and protect from injury and exposure during transport
• Give warm fluids to drink
• Forbid smoking

Client Education
• Dress in layers with appropriate cold-weather gear
• Cover all exposed skin areas
• Prepare properly for trips in cold climates
• Avoidance of smoking, as nicotine constricts small vessels
Table 7: Types of cold injury without frostbite

<table>
<thead>
<tr>
<th>Type of injury</th>
<th>Cause</th>
<th>Clinical observations</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilblain (peripheral cold injury without freezing of tissue)</td>
<td>Prolonged dry exposure at temperatures above freezing</td>
<td>Affected areas are pruritic, reddish blue; may be swollen; may have blisters or superficial ulcerations; areas may be more temperature sensitive in future; no permanent injury</td>
<td>Rewarm as for frostbite (see text); pain medication should be provided</td>
</tr>
<tr>
<td>Trench foot and immersion injury</td>
<td>Prolonged wet exposure at temperatures above freezing</td>
<td>May have tissue destruction resembling second degree burns, including blisters, pain, hypersensitivity to cold; temperature sensitivity may be permanent</td>
<td>Rewarm as for frostbite (see text)</td>
</tr>
</tbody>
</table>

Pharmacologic Interventions

**Mild Frostbite**
Analgesia for pain:
acetaminophen *(A class drug)*, 325 or 500 mg, 1-2 tabs PO q4h prn
or
ibuprofen *(A class drug)*, 400 mg, 1-2 tabs PO q4h prn

**Moderate to Severe Frostbite**
Analgesia for pain, which may be severe during rewarming:
meperidine *(D class drug)*, 50-100 mg IM q3-4h

Monitoring and Follow-up

**Mild Frostbite**
Reassess and re-dress wound daily for 4-7 days, until the wound is healing well. Watch for signs of infection.

**Appropriate Consultation**
Consult a physician for all but mild frostnip.

**Referral**
Medevac anyone with moderate-to-severe frostbite to hospital as soon as possible.

Table 8: Classification of frostbite

<table>
<thead>
<tr>
<th>Frostnip</th>
<th>Superficial frostbite</th>
<th>Deep frostbite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial, skin changes reversible</td>
<td>Tissue below skin pliable, soft Blisters appear in 24-48 hours; fluid reabsorbs; hard, blackened eschar develops; generally superficial, remains sensitive to heat and cold</td>
<td>Tissue feels woody under skin; affects muscles, tendons, etc. Extremity cool, deep purple or red, with dark, hemorrhagic blisters and loss of distal function; may take several months to determine extent of injury</td>
</tr>
<tr>
<td>Skin blanched, numb; loss of sensation</td>
<td>Treat conservatively; generally resolves without surgical intervention in 3-4 weeks</td>
<td>Frozen tissue will eventually slough</td>
</tr>
<tr>
<td>Comparable to first degree hot thermal burn</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter 10- Hematology, Metabolism, and Endocrinology

Common Hematologic Problems

Anemia
Iron Deficiency Anemia
Megaloblastic Anemia

Common Endocrine And Metabolic Problems

Diabetes Mellitus
Hyperthyroidism
Hypothyroidism
Osteoporosis

Metabolic Emergencies

Diabetic Ketoacidosis
Hypoglycemia

Explanatory Note

For this chapter, history and examination of the system are not discussed as such, because hematologic, metabolic and endocrine disorders often manifest symptoms and signs in more than one body system. The cardiovascular, gastrointestinal, neurologic, endocrine and integumentary systems in particular should be evaluated, as problems or symptoms of hematologic, metabolic and endocrine disorders commonly manifest in these systems.

See individual chapters for information on history and physical examination relevant to each of these systems.
Common Hematologic Problems

Anemia

Definition
Anemia can be generally defined as a reduction in hemoglobin level. In determining the seriousness of the anemia, the level of hemoglobin is less important than the underlying cause. However, there are more than 200 types of anemia, which makes determining the cause difficult.

Classification
There are three main ways of classifying anemias.

Cytometric types: depend on cell size and hemoglobin-content parameters, such as mean corpuscular volume (MCV) and mean corpuscular hemoglobin concentration (MCHC)

Erythrokinetic types: take into account the rates of red blood cell (RBC) production and destruction

Biochemical/molecular types: consider the cause of the anemia at the molecular level

For example, sickle cell anemia is classified as normocytic, normochromic in the cytometric classification, as hemolytic in the erythrokinetic classification, and as resulting from a DNA mutation producing amino acid substitution in the hemoglobin chain according to the biochemical/molecular classification.

History
When symptoms do develop, they are related to the precarious state of oxygen delivery to the tissues:

- Dyspnea on exertion
- Easy fatigability
- Fainting, lightheadedness
- Tinnitus, roaring in the ears
- Headache
- Palpitations
- Exacerbation of pre-existing cardiovascular conditions

Angina pectoris, intermittent claudication and nighttime muscle cramps are some of the effects of anemia on already-compromised perfusion.

Physical Findings
For slowly developing anemia:
- Pallor
- Tachycardia
- Systolic ejection murmur

In rapidly developing anemia (as from hemorrhage and certain catastrophic hemolytic anemias), additional symptoms and signs are noted:
- Syncope on rising from bed
- Orthostatic hypotension (i.e. the blood pressure falls when the patient is raised from a supine to a sitting or standing position)
- Orthostatic tachycardia

Keep in mind that if anemia develops through rapid bleeding, the hematocrit and hemoglobin will be normal (because in hemorrhage the loss of RBCs and plasma is proportional). Therefore, your appreciation of the clinical signs will be of more value in diagnosing this type of anemia than will the results of laboratory tests.
Iron Deficiency Anemia

Definition
Subnormal quantity of hemoglobin, number of RBCs or volume of packed cells in the blood. In general, clients with hemoglobin more than two standard deviations (SD) below the mean should be considered anemic, and investigation is needed. The anemia is often accompanied by depletion of iron stores.

Table 1: Reference value for blood components

<table>
<thead>
<tr>
<th>Component</th>
<th>Measurement</th>
<th>Age (years)</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin</td>
<td>(g/L)</td>
<td>1-4</td>
<td>111-145</td>
<td>111-145</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-9</td>
<td>114-145</td>
<td>114-151</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-14</td>
<td>124-145</td>
<td>124-158</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥15</td>
<td>121-164</td>
<td>140-179</td>
</tr>
<tr>
<td>Red blood cells</td>
<td>(x 10^{12}/L)</td>
<td>1-4</td>
<td>4.0 – 5.2</td>
<td>4.0 – 5.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-9</td>
<td>4.2 – 5.3</td>
<td>4.2 – 5.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-14</td>
<td>4.5 – 5.7</td>
<td>4.5 – 5.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15-49</td>
<td>4.0 – 5.4</td>
<td>4.6 – 6.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥50</td>
<td>4.0 – 5.6</td>
<td>4.4 – 5.8</td>
</tr>
<tr>
<td>Hematocrit</td>
<td>(proportion)</td>
<td>1-4</td>
<td>0.35 – 0.45</td>
<td>0.35 – 0.45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-9</td>
<td>0.36 – 0.47</td>
<td>0.36 – 0.47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-14</td>
<td>0.38 – 0.47</td>
<td>0.38 – 0.49</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥15</td>
<td>0.38 – 0.50</td>
<td>0.42 – 0.54</td>
</tr>
<tr>
<td>White blood cells</td>
<td>(x 10^{9}/L)</td>
<td>1-4</td>
<td>5.0 – 12.0</td>
<td>5.0 – 12.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-49</td>
<td>4.0 – 10.5</td>
<td>4.0 – 10.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥50</td>
<td>4.0 – 10.0</td>
<td>4.0 – 11.0</td>
</tr>
<tr>
<td>Platelets</td>
<td>(x 10^{9}/L)</td>
<td>1-4</td>
<td>175 – 500</td>
<td>175 – 500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-9</td>
<td>175 – 420</td>
<td>175 – 420</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-14</td>
<td>175 – 375</td>
<td>175 – 375</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥15</td>
<td>170 – 375</td>
<td>160 – 350</td>
</tr>
</tbody>
</table>

Causes
- Inadequate dietary intake of iron (common in children, adolescents and elderly people)
- Increased requirements for iron without concomitant increase in intake (during growth spurts in infants, young children, adolescents and pregnant women)
- Blood loss due to excessive menstruation, disease of the gastrointestinal tract (e.g. peptic ulcer, hiatus hernia), malignant disease, telangiectasia, previous acute blood loss (e.g. trauma, surgery)
- Impaired absorption of iron because of partial gastrectomy, malabsorption syndromes

History
- Iron deficiency anemia is not a disease, but a sign of an underlying disorder
- A complete history and physical examination are required
- Symptoms vary according to severity of the anemia, underlying cause, rapidity with which the underlying condition developed, and presence of pre-existing heart and lung disease

Mild Condition
- Often asymptomatic
- Fatigue
- Dyspnea
- Palpitations after exertion
**Moderate or Severe Condition**
- Symptomatic at rest
- Exercise intolerance
- Symptoms of heart failure, syncope may be present
- Palpitations, dizziness, headache, tinnitus
- Irritability, insomnia, inability to concentrate
- Hypersensitivity to cold and malaise
- Menstrual disturbances
- Medications such as anticonvulsants (e.g. phenytoin, primidone, triamterene, sulfamethoxazole/trimethoprim (long-term use only), oral contraceptives
- HIV medications (e.g. zidovudine [AZT] and antineoplastic drugs [for chemotherapy])
- Alcohol intake
- Dietary history (e.g. strict vegetarianism)
- Gastric or small-bowel surgery
- Chronic inflammatory disease such as rheumatoid arthritis, Crohn's disease
- Malignant disease
- Diminished renal, hepatic or thyroid function

**Physical Findings**
- Heart rate increased
- Postural blood pressure drop may be present
- General pallor
- Appears tired and lethargic
- Conjunctival and palmar pallor
- Glossitis may occur in severe anemia
- Cracking at corners of mouth
- Nail changes
- Liver or spleen may be enlarged
- Skin and hair may feel dry
- Functional systolic murmur may be present

**Differential Diagnosis**
Rule out other causes of anemia. See general section "Anemia," above, this chapter.

**Complications**
- Frequent infections
- Side effects of iron therapy
- Decompensation of pre-existing medical problems

**Diagnostic Tests**
- Complete blood count, differential blood count, reticulocyte count, blood smear film for RBC morphology
- Serum iron level, total iron-binding capacity (TIBC), serum ferritin level
- Test three separate samples of stool for occult blood

**Management**

**Goals of Treatment**
- Increase hemoglobin concentration
- Replenish body stores of iron
- Identify underlying cause

**Appropriate Consultation**
Consult a physician immediately if hemoglobin < 90 g/L, stool is positive for occult blood or client appears acutely ill.

**Client Education**
- Explain disease process, course and prognosis
- Counsel client about appropriate use of medications (dose, frequency, side effects)
- Suggest dietary modifications to increase intake of iron (e.g. organ meats, egg yolk, prunes, grapes, raisins, cream of wheat)
- Recommend frequent periods of rest to reduce fatigue
- Recommend avoidance of alcohol and acetylsalicylic acid (ASA) products
- Counsel client about prevention of constipation (e.g. encourage a high-roughage diet)

**Pharmacologic Interventions**
Oral iron therapy: *ferrous sulfate (A class drug), 300 mg PO tid*

**Monitoring and Follow-Up**
Follow up in 1 month: hemoglobin level should rise by at least 1 g/L while client is receiving therapy. Continue iron for 3 months after initial follow-up to replenish iron stores.

**Referral**
Any client in whom there is no response after 1 month of oral therapy should be referred to a physician for further investigation.)
Megaloblastic Anemia

Definition
Production of abnormally large, oval RBCs with elevated MCV (>100 fL [femtoliters]).

Causes
Vitamin B12 deficiency (pernicious anemia), resulting from:
• Inadequate dietary intake (e.g. strict vegetarianism)
• Impaired absorption (e.g. after gastrectomy or surgery to the ileum)
• Increased requirements (e.g. in pregnancy)
• Faulty utilization

Folic acid deficiency, resulting from:
• Inadequate intake (e.g. in elderly, alcoholic or chronically ill clients)
• Malabsorption syndromes
• Increased demand (e.g. in pregnancy, terminal illness)
• Use of drugs that are folate antagonists such as methotrexate, phenytoin, sulfamethoxazole/trimethoprim
• HIV disease (and associated drug therapy)
• Other chemotherapy agents

History
• Insidious onset
• Occurs in the fifth to sixth decades of life
• Fatigue, lethargy
• Indigestion, constipation or diarrhea
• Sore tongue
• Neurological symptoms (such as peripheral neuropathy, weakness, unsteadiness, spasticity and changes in emotional affect) occur with vitamin B12 deficiency
• Neurological symptoms are absent in folic acid deficiency

Differential Diagnosis
Other types of anemia (see general section "Anemia," above, this chapter).

Complications
• Infections
• Falls or other trauma
• Heart failure

Diagnostic Tests
• Complete blood count
• Differential blood count
• Blood smear
• Iron level
• Total iron-binding capacity (TIBC)
• Ferritin level
• Vitamin B12 level
• Serum level of RBC folate

Management
Goals of Treatment
• Determine the cause of the anemia
• Replace identified deficiencies

Appropriate Consultation
Consult a physician immediately if the symptoms of anemia are significant or if complications are present, and to obtain medication orders.

Client Education
• Explain disease process, course and prognosis
• Counsel client about appropriate use of medications (dose, frequency, side effects)
• Provide dietary counseling on foods rich in folic acid: green leafy vegetables, grains, wheat bran, liver
• Stress importance of returning for follow-up

Pharmacologic Interventions
For vitamin B12 deficiency (pernicious) anemia and folic acid deficiency anemia: medications as per physician order.

Monitoring and Follow-Up
• Follow up 2 weeks after treatment is started to determine response to therapy; recheck blood work at that time
• With both types of deficiency anemia there is usually a rapid response: within 1 week,
• hematocrit levels begin to rise
• Continue to follow up monthly, and repeat blood work until stabilized
• Physician referral if no improvement
Serum potassium level should be monitored closely in clients with severe pernicious anemia complicated by heart failure. (A rapid rise in reticulocytes and use of diuretics combine to cause hypokalemia. Supplementary potassium should be administered). **Consult a physician for the medication order.**

As hemoglobin rises in response to vitamin B12 administration, the MCV gradually decreases and the client may become microcytic, with the hemoglobin plateauing at a level below normal. If this occurs, oral iron therapy should be added to achieve maximum hemoglobin response.
Common Endocrine And Metabolic Problems

Diabetes Mellitus

**Definition**
Diabetes mellitus is a metabolic disorder characterized by hyperglycemia, which is due to reduced insulin secretion, increased tissue resistance to insulin action or both.

**Classification**
- **Type 1**
  Type 1 diabetes mellitus is primarily the result of pancreatic β-cell destruction, which leads to absolute insulin deficiency and tendency to ketoacidosis. Onset is usually at younger age (<30 years).
- **Type 2**
  Type 2 diabetes mellitus occurs as a result of some degree of defect in insulin secretion and an increase in resistance to insulin in the tissues. Age at onset is usually middle age or older. People with type 2 diabetes are much less prone to ketoacidosis.

The prevalence of type 2 diabetes is reaching epidemic proportions among First Nations people. Age-adjusted prevalence rates are 19% to 26%, among the highest in the world. The condition is also occurring atypically in children and young adults in this population.

**Gestational Diabetes**
Gestational diabetes is a transient disorder, starting in pregnancy and ending with delivery. Women with gestational diabetes often go on to have type 2 diabetes later in life. Gestational diabetes is defined as fasting blood glucose ≥ 5.3 mmol/L and 1-hour pc blood glucose ≥ 10.6 mmol/L or 2-hour pc blood glucose ≥ 8.9 mmol/L. These pc glucose levels are based on a 75-g glucose load.

**Impaired Glucose Tolerance (Pre-Diabetes)**

**Impaired Fasting Glucose Tolerance**
People with a fasting blood glucose level between 6.1 and 7.0 mmol/L, which is below the diagnostic threshold for diabetes, are considered to have impaired fasting glucose tolerance.

**Impaired Glucose Tolerance**
People with a fasting blood glucose level > 6.1 - 7.0 mmol/L and a 2-hour pc blood glucose level between 7.8 and 11.1 mmol/L are considered to have impaired glucose tolerance.

Both of these groups have a higher risk of diabetes mellitus and cardiovascular disease than the general population. Preventive interventions involving lifestyle changes and more frequent screening for diabetes should be a priority for these people.

**Causes**
- Genetic
- Autoimmune
- Related to pancreatitis

**Risk Factors**
- Family history
- Hypertension
- Hyperlipidemia
- Central obesity
- Smoking
- High-fat diet
- Previous gestational diabetes

**History**
- Polyuria, polydipsia, polyphagia
- Nocturia
- Weight history (especially any weight loss)
- Fatigue, irritability
- Obesity (particularly in the central trunk)
- Blurred vision, changes in vision, frequent changes in optical prescription
- Nausea and vomiting
- Unresolving "flu-like" illness (ketoacidosis)
- Reversible paresthesia of fingers or toes

**Past History**
- Obstetric: gestational diabetes, large babies (>4.5 kg at delivery)
- Endocrine disorders
- Cardiovascular disease
• Hypertension
• Hyperlipidemia
• Recurrent or unresolving vaginal infections (yeast), urinary tract infections, skin infections (especially of feet)
• Surgery (e.g. on pancreas)

**Family History**
• Diabetes mellitus
• Hyperlipidemia
• Hypertension
• Renal disease
• Infertility
• Hirsutism
• Autoimmune diseases
• Pancreatitis
• Blindness

**Current Health**
• Eating habits (food choices, meal patterns, cultural influences concerning food)
• Physical activity level, factors limiting physical activity
• Medications (e.g. thiazides, sugar-containing medications, corticosteroids)
• Allergies
• Smoking habits
• Alcohol use
• Social factors: family dynamics, education, employment, lifestyle, coping skills

**Physical Findings**
A complete review and examination of all body systems must be done to detect the presence of any damage secondary to the diabetes.
• Client appears ill if diabetes is of acute onset
• Client appears wasted if there has been weight loss
• Vital signs: changes depend on initial presenting complaint and presence of underlying damage to target organs
• Blood pressure may be elevated
• Eyes: funduscopic signs of retinopathy
• Oral cavity: poor dental health (client at risk for infection)
• Neck: thyroid assessment
• Chest: routine respiratory exam

• Cardiac system: signs of heart failure, bruits, peripheral pulses
• Abdomen: enlargement of organs
• Genitourinary system: signs of nephropathy (e.g. proteinuria)
• Musculoskeletal system: signs of limited joint mobility, arthropathy of hands
• Skin: infection (e.g. feet or nails), colour, temperature, poor healing
• Signs of neuropathy: neurological effects; changes in vibrational sense (e.g. in feet), proprioception, response to light touch (with monofilament), reflexes

**Differential Diagnosis**
• Impaired fasting glucose tolerance (fasting blood glucose 6.1-7.0 mmol/L)
• Impaired glucose tolerance (2-hour pc blood glucose level with 75-g glucose tolerance test [GTT] 7.8-11.1 mmol/L)
• Nondiabetic glycosuria
• Drug side effects (e.g. oral contraceptives, corticosteroids, thiazide diuretics)
• Diabetes insipidus
• Pheochromocytoma
• Cushing's syndrome

**Complications**
• Ketoacidosis (type 1); see "Diabetic Ketoacidosis," under "Metabolic Emergencies," below, this chapter
• Hyperosmolar nonketotic coma
• Coronary artery disease, peripheral vascular disease
• Nephropathy, urinary infections
• Retinopathy, cataracts (early onset), blindness
• Peripheral neuropathy
• Recurrent skin (yeast) infections
• Premature death from complications

**Diagnostic Tests**
Diagnostic Blood Glucose Levels
Random blood glucose level $\geq 11.1$ mmol/L in presence of symptoms (if random result $< 11.1$ mmol/L, have client return within a day or two for a fasting glucose test to ascertain definitive diagnosis)
Fasting blood glucose level $\geq 7.0$ mmol/L on two or more occasions or
Blood glucose level 2 hours after oral GTT (with 75-g load) = 11.1 mmol/L

**Other Tests**
- Lipid levels, complete blood count, creatinine level and TSH
- Urinalysis (routine and microscopy)
- Urine dipstick test for glucose, ketones and protein, microalbuminuria

**Management**

**Goals of Treatment**
- Attain optimum glycemic control
- Educate the client for self-care
- Prevent complications
- Attain optimum control of concomitant hypertension and hyperlipidemia and other cardiovascular risk factors
- Prioritize for alcohol and drug rehabilitation

**Appropriate Consultation**
Consult a physician immediately if diabetes mellitus is suspected. All drug therapy for clients with diabetes is initiated by a physician.

**Nonpharmacologic Interventions**

**Lifestyle Modifications**
- Nutrition therapy: consultation with dietician is recommended
- Nutritional recommendations: choose well-balanced diet from the four food groups; decrease saturated fats to $<10\%$ of total calories; ensure adequate intake of carbohydrates, protein, vitamins and minerals
- Useful starting point is to plan meals with 55% carbohydrates and 30% fat content
- Exercise program: regular activity (e.g. walking for 20 minutes three times weekly)
- Weight control to maintain healthy body weight
- Smoking and alcohol cessation
- Education in diabetes self-care

**Client Education**
- Explain nature, course and prognosis of disease, as well as possible complications: condition can be controlled, but it cannot be cured
- Counsel client about appropriate use of medications (dose, frequency, route of administration, side effects)
- If client is taking insulin, monitor ability to self-administer
- Provide dietary counseling
- Have client maintain a dietary intake journal, and review the journal regularly
- Home glucose monitoring is essential; have client demonstrate ability to perform these tests accurately, provide instruction as necessary, and encourage maintenance of daily diary of results
- Discuss with client the procedure to follow in the event of an illness
- Educate client about signs and symptoms of hyperglycemia and hypoglycemia, and tell client what to do if these conditions develop
- Discuss foot care with client: keep feet clean; avoid dry skin (apply moisturizer daily); wear appropriate shoes or boots (not tight); avoid going barefoot; avoid open-toe shoes; do not cut nails too short; give prompt attention to cuts and sores
- Exercise will help with weight control and will reduce blood glucose levels

Involve the entire family in diabetic teaching to give them an understanding of diabetes and to enlist their support and assistance in the client's management of the condition.

**Pharmacologic Interventions**

**Type 1**
Insulin therapy as ordered by physician (Table 2).

**Type 2**
Physician-initiated drug therapy:

**Monitoring and Follow-Up**
Follow up every 4-6 weeks initially or more often as needed. Once stabilized, follow up three or four times a year. Monitoring should involve the following components.

At each visit:
1. Assess compliance with medications, diet and exercise
2. Review dietary journal with client and tailor diet plan to client's preferences and food availability
3. Measure blood pressure and weight each visit
4. Perform foot examination at least twice yearly
5. Encourage weight loss if appropriate: aim to reduce excess body weight by about 0.5 kg/week (in most cases this can be achieved by reducing caloric intake by about 500 calories/day)
6. Encourage client to exercise regularly (a daily walk is the best form of exercise for the general population)
7. Measure fasting blood glucose; measure HbA1C every 3-4 months if client is not stable and every 6 months if client is stable
8. Urinalysis for gross protein (q 6-12 months)
9. If nephropathy is diagnosed, refer to physician. Follow-up monitoring as directed by physician

Annually:
10. Electrocardiography (ECG) (if > 35 years of age)
11. Fasting lipid profile
12. Eye (dilated funduscopic) exam by eye team

(see Flow Sheet)

(Reference: Practical Diabetes Management: Clinical Support for Primary Care Physicians. Fall 2000. Intramed Health Services, Mississauga, ON) (www.amda.ab.ca)

Referral
- Refer all newly diagnosed clients to a physician as soon as possible for complete evaluation and referral to diabetic clinic.
- Arrange follow-up with a physician twice yearly if stable or more frequently as necessary

Table 2: Types of insulin

<table>
<thead>
<tr>
<th>Type</th>
<th>Time to onset of action</th>
<th>Peak action</th>
<th>Duration of action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lispro</td>
<td>5-10 minutes</td>
<td>45 minutes</td>
<td>3-4 hours</td>
</tr>
<tr>
<td>Regular</td>
<td>30-45 minutes</td>
<td>2-5 hours</td>
<td>5-8 hours</td>
</tr>
<tr>
<td>NPH</td>
<td>1-3 hours</td>
<td>4-12 hours</td>
<td>18-24 hours</td>
</tr>
<tr>
<td>70/30</td>
<td>30-45 minutes</td>
<td>2-12 hours</td>
<td>18-24 hours</td>
</tr>
<tr>
<td>50/50</td>
<td>30-45 minutes</td>
<td>2-12 hours</td>
<td>18-24 hours</td>
</tr>
<tr>
<td>Lente</td>
<td>2-5 hours</td>
<td>7-15 hours</td>
<td>18-22 hours</td>
</tr>
<tr>
<td>Ultra-Lente</td>
<td>4-6 hours</td>
<td>8-20 hours</td>
<td>24-28 hours</td>
</tr>
</tbody>
</table>

Prevention Strategies

Primary Prevention, Type 1 Diabetes Mellitus
There are no known proven strategies to prevent type 1 diabetes mellitus.

Primary Prevention, Type 2 Diabetes Mellitus
- The major focus of any diabetes strategy should be primary prevention
- Programs should be targeted to school children and their parents (to prevent diabetes in future generations) and to individuals who are at increased risk
- Primary prevention is aimed at weight control through a program of diet and exercise

Screening Strategies

Screening for Diabetes Mellitus
High-risk groups require aggressive screening for diabetes.

The 2003 Clinical Practice Guidelines for the Management of Diabetes in Canada (Meltzer et al. 2003) recommended the following screening principles.

People > 45 years of age should be screened every 3 years. Screening should be annual for anyone with any of the following risk factors:
- Obesity (body mass index > 27 kg/m2)
- First-degree relative with diabetes mellitus
- Member of a high-risk population (e.g. Aboriginal Canadian)
• Low level of high-density lipoprotein (HDL)<0.90 mmol/L or elevated fasting level of triglyceride (>2.8 mmol/L)
• History of gestational diabetes
• History of impaired fasting glucose tolerance (fasting blood glucose 6.1-6.9 mmol/L)
• History of impaired glucose tolerance (fasting blood glucose < 7.0 mmol/L, 2-hour pc blood glucose level [2 hours after oral GTT] 7.8-11.0 mmol/L)
• Hypertension
• Coronary artery disease
• Presence of complications associated with diabetes
# Diabetes Care Flow Sheet for Patients with Diabetes

**Date of Diagnosis:**

**Pre-existing Complications:**

<table>
<thead>
<tr>
<th>Diabetic Medications:</th>
<th>Date:</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

**GUIDELINES**

<table>
<thead>
<tr>
<th>3 TO 6 MONTHS</th>
<th>PROCEDURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>Fastinng or pre-meal glucose level ≤ 4.7 mmol/L (100 mg/dl) 3-2 hrs after meal ≤ 5.1 mmol/L (90 mg/dl) Every 3-6 months: Target &lt; 0.070 (&lt; 115% of upper limit of normal)</td>
</tr>
<tr>
<td>Hormone Replacement Therapy</td>
<td>Goal is 1.30/80</td>
</tr>
<tr>
<td>Proteinuria</td>
<td>Goal for pts. with overt nephropathy ≤ 2.5/3.0</td>
</tr>
<tr>
<td>Goal body mass index (BMI) ≥ 25</td>
<td>Weight/BMI</td>
</tr>
<tr>
<td>Foot care</td>
<td>Lower extremity exam (when done)</td>
</tr>
<tr>
<td>Reinforce lifestyle counseling</td>
<td>Smoking, activity, diet, stress (when done)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIPIDS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fasting Lipid Profile</td>
<td>Total Chol</td>
</tr>
<tr>
<td></td>
<td>For pts ≥ 30 years of age</td>
<td>LDL</td>
</tr>
<tr>
<td></td>
<td>(goal ≤ 5.2)</td>
<td>LDL</td>
</tr>
<tr>
<td></td>
<td>(goal &gt; 1.0)</td>
<td>HDL</td>
</tr>
<tr>
<td></td>
<td>(goal ≤ 2.0)</td>
<td>Triglycerides</td>
</tr>
<tr>
<td></td>
<td>Total Chol/HDL Ratio</td>
<td>Ratio</td>
</tr>
<tr>
<td></td>
<td>(goal ≤ 4.0)</td>
<td></td>
</tr>
</tbody>
</table>

|  | Lipid lowering Meds. (when indicated) | |

<table>
<thead>
<tr>
<th>ANNUALLY AND/OR AS INDICATED</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting Glucose Test/Lab</td>
<td>Fasting Glucose Metabolism/Lab Comparison</td>
</tr>
<tr>
<td>Microalbumin screen</td>
<td>Microalbumin screen (albumin:creatinine ratio (MAUT)) (when indicated)</td>
</tr>
<tr>
<td>24-hr Microalbumin as indicated</td>
<td>24-hr Microalbumin as indicated</td>
</tr>
<tr>
<td>Ophthalmologist/ Optometrist for dilated eye exam</td>
<td>24-hr Microalbumin as indicated</td>
</tr>
<tr>
<td>Sensory testing</td>
<td>Sensory testing</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes/Lipids Education</td>
<td>Diabetes/Lipids Education</td>
</tr>
</tbody>
</table>

*Produced June, 2003 jointly by the Chinook Health Region & Alberta Clinical Practice Guideline Program*
1. Type 1 DM - screening initiated in individuals ≥15 years of age with a 5-year history of Type 1 DM.
2. Type 2 DM - screening initiated upon diagnosis and annually.
3. Avoid screening if patient acutely ill, febrile or engaging in strenuous activity.
4. Option - may use urine dipstick in clinic for proteinuria - if positive (>trace proteinuria) proceed directly to 24-hour timed urine specimen.
5. Confirmation required elevation in 2 out of 3 albumin/creatinine ratio measurements performed over 3 months. If uncertainty about elevation exists, consider a timed urine collection to measure the rate of microalbuminuria.
6a. Blood pressure goal ≤130/80
6b. With overt nephropathy BP goal ≤125/75
7. Other considerations:
   - Elimination of all CV risk factors (discontinue smoking, treat dyslipidemia)
   - Intensive glucose control
   - Protein as per recommended nutrient intake (consult dietitian)
   - Measure serum potassium and serum creatinine
   - If serum creatinine >130 umol/L, discontinue Metformin
   - > 50% decrease in creatinine clearance rate requires a referral to a nephrologist or internist
8. ACE inhibitor use assumes no contraindications. Serum potassium and creatinine levels should be monitored 1-2 weeks after initiation of therapy or after each dosage change.
9. Monitor serum creatinine, serum potassium, 24-hour urine creatinine clearance and rate of proteinuria at least 2x/year.

*Adapted from the 1998 clinical practice guidelines for the management of diabetes in Canada, CMAJ 1998;159(8 suppl) and also Recommendations for the management and treatment of dyslipidemia, CMAJ 2000;162(10)1441-7
Hyperthyroidism

Definition
One form of thyrotoxicosis in which an excess of thyroid hormone is secreted.

Causes
- Graves' disease
- Toxic multinodular goiter (which develops in response to some bodily need, e.g. pregnancy)
- Thyroid cancer
- Postpartum thyroiditis (onset 2-6 months postpartum) is a mild, short-term form

Risk Factors
- For Graves' disease: positive family history, female 20-40 years of age, other autoimmune disorders
- For toxic multinodular goiter: older age; recent exposure to iodine-containing medication (e.g. amiodarone or radiodiagnostic dye); long-standing simple goiter; conditions such as puberty or pregnancy; immunologic, viral or genetic disorders

History
- Usually woman between 20 and 40 years of age
- Symptoms (as listed below) variable in severity
- Fatigue, weakness
- Insomnia
- Weight loss with no change in diet or appetite
- Heat intolerance
- Excessive sweating
- Alterations in bowel habits
- Menstrual changes (e.g. decreased menses)
- Restlessness, nervousness, irritability
- Inability to concentrate
- Mood swings (from depression to extreme euphoria)
- Visual changes (e.g. diplopia, photophobia, eye irritation, bulging eyes, decreased blinking)
- Difficulty swallowing, hoarse voice
- Palpitations
- Exertional dyspnea, fatigue, chest pain
- Edema (e.g. periorbital, in feet and ankles)
- Loss of hair, change in hair texture (hair becomes fine and silky)

Special considerations in the elderly client:
- Classic presentation may be absent
- Usually only three clinical signs: fatigue, weight loss, tachycardia
- Goiter is much less common in this age group

Special considerations in the pregnant client:
- Radioactive iodine is contraindicated in pregnancy
- Propylthiouracil can induce hypothyroidism or cretinism in the fetus
- Thyrotoxicosis may improve during pregnancy but will relapse in the postpartum period

Physical Findings
- Heart rate increased, may be irregular (client may present with atrial fibrillation)
- Blood pressure: systolic hypertension may be present
- Weight decreased
- Skin warm, moist and velvety; palms may be sweaty
- Hair thin and silky
- Eyes prominent or protruding, staring; lid lag present (exophthalmos)
- Only 50% of patients have enlargement of the thyroid gland
- Thyroid diffusely enlarged, smooth, possibly asymmetrical and nodular; a thrill may be felt or a bruit may be heard directly over the gland
- Heart: point of maximal impulse (PMI) displaced if enlargement has occurred; thrills or systolic murmur may be present
- Lungs normal
- Liver and spleen enlarged
- Hands: fine resting tremor may be present
- Legs: bilateral non-pitting edema
- Hyperactive reflexes

Differential Diagnosis
- Transient thyroiditis
- Thyroid cancer
- Pheochromocytoma
- Menopause
- Anxiety
Complications
- Exophthalmos
- Loss of vision
- Corneal abrasions
- Atrial fibrillation
- Angina
- Heart failure
- Hypertension
- Thyrotoxic storm (rare)
- Osteoporosis (in elderly women)

Diagnostic Tests
Progressive TSH. TSH (will be decreased) and thyroxine (T₄) level (may be elevated).

Management
Goals of Treatment
- Relieve symptoms
- Return to euthyroid state
- Prevent complications

Appropriate Consultation
Consult a physician.

Nonpharmacologic Interventions
- Dietary modifications: high-calorie diet, frequent nutritious snacks, caffeine restriction
- Frequent rest periods to avoid fatigue
- Protection of the eyes to prevent irritation and abrasions: sunglasses, patches at night, use of artificial tears to prevent drying

Client Education
- Explain disease course and expected outcome
- Counsel client about appropriate use of medications (dose, frequency, side effects, avoidance of abrupt discontinuation)

Pharmacologic Interventions
Drug therapy as ordered by physician.
Radioactive iodine therapy as ordered by specialist

Monitoring and Follow-Up
- Clients treated with radioactive iodine should be seen monthly until a euthyroid state achieved; thereafter, follow up every 6 months
- Monitor TSH level for hypothyroidism
- Elderly women with hyperthyroidism are at increased risk for accelerated bone loss; consider monitoring bone density annually in these clients

Referral
Refer all newly diagnosed clients
Hypothyroidism

Definition
A clinical state resulting from decreased secretion of thyroid hormones or from resistance to hormone action; this leads to a progressive slowing of all body functions.

Myxedema is the severest form of hypothyroidism.

Causes

Primary Hypothyroidism
- Idiopathic decrease in production of hormone
- Autoimmune thyroiditis (Hashimoto’s disease)
- Endemic iodine deficiency
- Congenital defects

Secondary Hypothyroidism
- Radioactive iodine therapy
- Thyroidectomy
- Insufficient dose of thyroid replacement therapy
- Subacute thyroiditis (after a viral illness)
- Common in the postpartum period as subacute granulomatous thyroiditis
- Insufficient stimulation from the pituitary or hypothalamus axis (pituitary or adrenal disease)

Risk Factors
- Woman > 40 years of age (at highest risk)
- Presence of another autoimmune disorder
- Recent acute viral or bacterial infection
- Treatment with radioactive iodine
- Thyroidectomy
- Evidence of pituitary or hypothalamic disease
- Postpartum period

History
Symptoms may be subtle, insidious.

Early Symptoms
- Weakness
- Fatigue
- Cold intolerance
- Lethargy
- Dry, flaky skin
- Headache
- Menorrhagia
- Anorexia

Late Symptoms
- Slowing of intellectual and motor activity
- Absence of sweating
- Modest weight gain
- Constipation
- Periorbital and peripheral edema
- Pallor
- Hoarseness
- Decreased sense of taste and smell
- Muscle aches and stiffness
- Dyspnea
- Deafness
- Cessation of menses
- Night blindness
- Depression
- Infertility

Physical Findings
- Heart rate decreased
- Blood pressure normal (diastolic hypertension may be present)
- Postural hypotension (with pituitary or hypothalamic failure)
- Facial pallor
- Jaundice may be present
- Puffiness of face and eyelids (myxedema)
- Thin, brittle nails
- Coarse, thin hair
- Occasional purpura
- Thickening of nose and lips in more advanced cases
- Poor skin turgor
- Dry, rough, thickened skin
- Thyroid gland may be enlarged
- Pleural effusion may be present
- Displaced apical beat (if enlargement of left ventricle has occurred)
- Heart sounds may seem distant
- Delayed return of deep tendon reflexes (Achilles)

Differential Diagnosis
- Thyroid cancer
- Euthyroid sick syndrome
- Nephrotic syndrome
- Nephritis
Depression  
Dementia from other causes  
Heart failure  

Complications  
Coronary artery disease, congestive heart failure  
Constipation, megacolon  
Increased susceptibility to infection  
Mental disturbances including depression, organic psychosis  
Myxedema coma  
Infertility  
Hypersensitivity to opiates  
Adrenal crisis  
Bone demineralization  

Diagnostic Tests  
TSH and T₄  
Complete blood count  
Cholesterol and triglycerides  
Liver function tests (LFTs)  

Management  
Goals of Treatment  
Return to euthyroid state  
Prevent complications  

Appropriate Consultation  
Consult with a physician  

Client Education  
Explain nature, course and prognosis of disease  
Counsel client about appropriate use of medications, including side effects  

Emphasize the need for lifelong treatment and the dangers of not taking medications  
Teach client about signs and symptoms of hyperthyroidism (indicating medication overdose) and hypothyroidism (indicating medication underdose)  
Provide dietary advice (e.g. increase fiber and fluids to prevent constipation)  
Drugs should be taken on an empty stomach, as dietary fiber can interfere with absorption.  

Pharmacologic Interventions  
As ordered by physician  

Monitoring and Follow-Up  
Follow up as needed until stabilized  
Monitor weight, blood pressure and energy level  
Assess compliance with medications  
Monitor TSH and T₄ levels as ordered until euthyroid state is attained  
Follow up every 6-12 months after TSH level is normalized  

Referral  
Refer to physician for diagnosis  
Arrange follow-up with a physician as required:  
During initial replacement phase  
Whenever symptoms are not controlled by therapy  
If there is evidence of complications  
Once yearly when maintenance dose is established
Osteoporosis

**Definition**
Generalized, progressive disorder of bone metabolism characterized by reduction of bone tissue mass, resulting in bone fragility.

**Causes**
Rarely due to a single factor.

*Primary Osteoporosis*
- Type 1 results from postmenopausal endocrine changes and occurs between 51 and 75 years of age
- Type 2 occurs in people > 70 years of age and probably results from age-related reduction in vitamin D synthesis or resistance to vitamin D effects

*Secondary Osteoporosis*
- Endocrine basis: glucocorticoid excess, hyperthyroidism, hyperparathyroidism, diabetes mellitus
- Drug-induced: corticosteroids, barbiturates, heparin, thyroid hormones, alcohol, tobacco, caffeine
- Other causes: chronic renal failure, liver disease, chronic obstructive pulmonary disease (COPD), rheumatoid arthritis, malignant disease, Cushing's syndrome, multiple myeloma

**Risk Factors**
- Family history
- Age
- Female
- Low initial bone mass (slender body frame)
- Menopause (estrogen deficiency)
- Deficient calcium and vitamin D intake or absorption
- Smoking
- Excessive alcohol consumption
- Excessive caffeine
- Sedentary lifestyle (with reduced stress on bones)
- Osteoarthritis

**History**
- Postmenopausal female (90% of cases)
- Generalized aching in bones, particularly lower back
- Non-traumatic fractures, often of weight-bearing bones of spine
- Progressive structural changes of spine (e.g. kyphosis and lordosis)
- Loss of height
- Minimal trauma may cause hip and Colles' fractures
- Diet - calcium poor

**Physical Findings**
- Usually thin, frail elderly woman
- Various degrees of bony deformity, often of spine (kyphosis)
- Height decreased (compared with known previous height)
- Bone tenderness to deep palpation may be present (particularly over tibia)
- Difficulty with mobility

**Differential Diagnosis**
- In premenopausal women and in men, rule out organic disease (see "Causes, Secondary Osteoporosis," above)
- Osteoarthritis
- Renal or collagen disease
- Metastatic bone disease
- Multiple myeloma
- Hyperthyroidism

**Complications**
- Vertebral crush fractures
- Physiological fractures
- Chronic pain and disability

**Diagnostic Tests**
- Complete blood count and erythrocyte sedimentation rate (ESR); levels of glucose, TSH, parathyroid hormone, estrogen, alkaline phosphatase, calcium, vitamin D
- Bone densitometry test as ordered by a physician
**Management**

**Goals of Treatment**
- Primary prevention
- Reduce further bone loss in elderly clients
- Detect and manage fractures

**Nonpharmacologic Interventions**
- Ensure adequate calcium and vitamin D intake in diet (1200-1500 mg per day)
- Recommend an exercise program (walking 50-60 minutes three times a week provides optimum benefit)
- Smoking cessation counseling
- Encourage elimination of alcohol and caffeine from diet
- Assess home environment for hazards to mobility; modify or provide aids as required

**Client Education**
- Explain disease course and outcome: this is a chronic condition that can be controlled but not cured; pain is often chronic
- Counsel client about appropriate use of medications (dose, frequency, side effects, importance of compliance)
- Advise client to return to clinic for assessment if character of pain changes or if pain becomes more severe

- Importance of calcium rich foods (dietary sources of calcium include salmon, sardines, green vegetables, cheeses, skim milk)
- Discuss risk factors
- Make changes to exercise pattern
- Preventative supplement options available over the counter

**Pharmacologic Interventions**
Hormone Replacement Therapy as ordered by physician. Women with symptomatic osteoporosis who are unable or unwilling to use estrogen may benefit from bisphosphonate drug therapy, e.g. etidronate (B class drug).

**Monitoring and Follow-Up**
- Women should undergo Pap smear testing when HRT is started
- Bone densitometry as ordered by physician
- Follow-up as discussed with physician
- People taking calcium supplements may be at risk for kidney stones.

**Referral**
Refer the following clients to a physician for assessment:
- Persons with high risk for or clinical evidence of osteoporosis
- Women in menopause (for prophylactic hormone replacement)
- Suspected osteoporosis
Metabolic Emergencies

Diabetic Ketoacidosis

**Definition**
A condition due to insulin deficiency that is characterized by hyperglycemia, ketonemia, ketonuria, acidosis and dehydration.

**Causes**
- Type 1 diabetes mellitus.
- Noncompliance with diet
- Failure to take insulin properly
- Concurrent illness or infection or failure to adjust diabetic regimen when ill
- Inadequate insulin (dose, type)

**History**
- Insidious onset
- Malaise, weakness, marked fatigue
- Thirst
- Polyuria, polydipsia, polyphagia
- Anorexia
- Nausea and vomiting
- Abdominal pain
- Muscle aches
- Headache
- Blurred vision
- Reversible paresthesia in fingertips

**Physical Findings**
- Client appears ill
- Temperature normal
- Heart rate rapid
- Respirations deep and rapid (Kussmaul respiration)
- Blood pressure usually normal
- Postural blood pressure drop
- Reduced level of consciousness may be present
- Fruity odor on breath
- Mucous membranes dry
- Skin warm and dry, loss of turgor

**Complications**
- Severe dehydration
- Electrolyte imbalance (e.g. hyponatremia, hypokalemia, hyperkalemia, decreased serum bicarbonate)
- Cerebral edema related to overaggressive rehydration
- Hypoglycemia related to overcorrection of hyperglycemia
- Gastric dilatation
- Paralytic ileus

**Diagnostic Tests**
- Concentration of ketones in urine
- Random blood glucose level with glucometer
- Blood for baseline creatinine and electrolyte levels and complete blood count
- ECG may be helpful: look for the tall T-wave of hyperkalemia and watch for signs of silent myocardial infarction in the older diabetic client

**Management**
The reversal of diabetic ketoacidosis should be gradual to prevent overcorrection.

**Goals of Treatment**
- Assess and stabilize airway, breathing and circulation (ABC)
- Rehydrate
- Identify precipitating factors
- Treat any underlying cause (e.g. infection)
- Reduce blood glucose to about 13.8 mmol/L

**Appropriate Consultation**
Consult a physician immediately

**Adjuvant Therapy**
Oxygen as needed; keep oxygen saturation > 97%

**Intravenous Therapy**
Reversing the dehydration will assist in reducing the blood glucose level.
- Start IV therapy with 0.9% normal saline
• Run at 500-1000 mL/h (10-20 mL/kg per hour) as per physician orders
• After this, adjust IV infusion rate according to clinical response, state of hydration and ongoing urinary losses

Nonpharmacologic Interventions
• Insert indwelling urinary catheter
• Insert nasogastric tube if client is comatose

Pharmacologic Interventions
Consult a physician to start insulin therapy.

Monitoring and Follow-Up
• Check blood glucose hourly and before insulin administration: avoid falls in glucose > 5.5 mmol per hour
• Monitor heart rate, blood pressure, postural blood pressure changes and mental status frequently
• Cardiac monitoring
• Measure intake and output hourly; test urine for ketones hourly (hyperglycemia will resolve before ketonuria) and report results to physician
• Clients may take fluids orally when they can be tolerated

Referral
Medevac as soon as possible.
Hypoglycemia

**Definition**
Subnormal blood glucose level.

**Causes**
- Delayed meal
- Inadequate total caloric intake
- Unusual physical exertion
- Insulin measurement error
- Insulin overdose
- "Brittle" diabetic

**History**
- Sudden onset
- Hunger
- Sweating
- Shakiness, tremor
- Anxiety, restlessness
- Faintness, weakness
- Nausea
- Palpitations
- Progression to mental confusion, bizarre behavior, personality changes, reduced consciousness or loss of consciousness, seizures

**Physical Findings**
- Heart rate rapid
- Blood pressure elevated
- Pale
- Diaphoretic
- Anxious, restless
- Tremor
- Confusion
- Bizarre or aggressive behavior
- Staggering gait, may appear intoxicated
- Unconscious or experiencing seizure
- Cold, clammy skin

**Differential Diagnosis**
- Alcohol intoxication
- Alcohol-induced hypoglycemia
- Drug-induced hypoglycemia (e.g. overdose)

**Complications**
- Injury due to a fall
- Hypoxia of brain
- Seizures
- Death

**Diagnostic Tests**
Blood glucose level with glucometer (< 3.3 mmol/L is the autonomic warning level; if 2.8 mmol/L, client will have symptoms of neuroglycemia).

**Management**

**Goals of Treatment**
- Increase blood glucose level quickly
- Identify concurrent illness or associated injury

**Nonpharmacologic Interventions**
- Assess and stabilize ABC
- Give the conscious client 12 oz (360 mL) sweetened orange juice or some other form of rapidly absorbed sugar

**Adjuvant Therapy**
Adjuvant therapy should be undertaken if client is nauseated, stuporous or unconscious or is unable to take oral therapy.
- Oxygen to keep oxygen saturations >97%
- Start IV therapy with 5% dextrose in water (D5W) at 100-150 mL/h

Pharmacologic Interventions
dextrose (*D class drug*), 50% solution, preloaded syringe, 25-50 mL IV stat over 1-3 minutes or
glucagon (*D class drug*), 0.5-1.0 mg SC, IM or IV

**Monitoring and Follow-Up**
- Observe response to treatment
- Recheck serum glucose level immediately
- When client regains consciousness or recovers, obtain an accurate history and do a thorough examination
- Identify any associated illness, previous episodes of hypoglycemia, head trauma or other injuries
- Give client a balanced meal
- Monitor glucose hourly with glucometer for recurring hypoglycemia

**Appropriate Consultation**
Consult a physician as soon as possible.

**Referral**
Medevac client if you are unable to stabilize blood glucose or if underlying cause is not clear.
Chapter 11- Communicable Diseases

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  Invasive Group A Streptococcal Infection................................................................................................. 18

Communicable Diseases
Refer to: Communicable Disease Manual (GNWT, DHSS, February 2000)
Available on GNWT DHSS infoweb (http://infoweb.hlthss.gov.nt.ca/) under "Internal Resources" - "Internal Forms and Manuals"

Human Immunodeficiency Virus
For information about HIV infection and AIDS, refer to: HIV Infection and AIDS: Information for Health Professionals (GNWT, DHSS, August 1999)

Sexually transmitted infections
New Canadian STD guidelines are due to be published in 2003
Refer also to American STD guidelines 2002 (http://www.cdc.gov/std/treatment/rr5106.pdf) and Communicable Disease Manual above

Immunization
Common Communicable Diseases

Sexually Transmitted Infections

Note: The term Sexually Transmitted Disease (STD) is now being replaced with Sexually Transmitted Infection (STI). The term STI has been used throughout this document, except when referring to documents where the term STD was originally used. Nurses are encouraged to use the term sexually transmitted infection and the abbreviation STI. Health Canada now uses STI but many of their older publications and web pages still use the term STD.

History Of Present Illness And Review Of System

When investigating any possible sexually transmitted infection (STI) the practitioner must obtain the following information in a nonjudgmental, factual manner.

General History

A detailed, comprehensive sexual history is mandatory.

- Site(s) of sexual contact (vaginal, oral, anal)
- Sexual orientation (homosexual, bisexual, heterosexual)
- Use of condoms
- Use of other birth control methods
- Number of sexual partners in recent past (For length of time to trace contacts see Communicable Disease Manual, page STDs-2)
- History of sex with injection drug users
- Exchange of sex for money, drugs or other benefit (e.g. housing)
- Period since last sexual intercourse with most recent partner
- Previous history of STIs
- Present symptoms of STIs in client and in partner(s)
- Injection drug use, needle-sharing, tattoo, piercing
- Enlargement of lymph nodes
- Fever or chills
- Joint pain, arthritis, conjunctivitis, rash at other body sites

Specific History

Men

- Urethral discharge (amount, colour and time of day it is most noticeable [in urethritis the discharge is most prominent after a long period without voiding])
- Dysuria
- Itch or irritation in distal urethra or meatus
- Pain or swelling in the scrotum or inguinal region
- Genital rash or lesions
- Rectal discharge, itch or pain
- Changes in oral mucosa

Women

- Vaginal discharge (amount and colour, odor and consistency, presence of vaginal itch)
- Painful intercourse on penetration or deep dyspareunia
- Burning sensation with urination (as urine passes over the external genitalia)
- Genital rashes or lesions
- Lower abdominal pain
- Postcoital, midcycle or excessive menstrual bleeding
- Dysuria, frequency, urgency, nocturia, hematuria
- Last menstrual period and any possibility of pregnancy
- Rectal discharge, itch or pain
- Changes in oral mucosa

Examination Of The System

When an STI is suspected, the practitioner is advised to perform a detailed, comprehensive examination of the entire genitourinary region, as well as a full extragenital examination to detect other manifestations of the possible STI.

Remember to inspect the pubic hair for lice and nits and the perianal region for abnormalities.

Pay special attention to the pharynx, the conjunctiva, the lymph nodes, the joints and the skin on the lower abdomen, thighs, palms, forearms and soles.
**Physical Examination**

**Men**
- Inspect and palpate the penis and glans for lesions
- Retract foreskin if required
- Examine meatus for urethral discharge
- Milk urethra from base of penis to glans three or four times to detect small amounts of discharge
- Inspect and palpate scrotum for heat, tenderness, swelling and lesions
- Examine perianal area for discharge, tenderness, swelling, lesions and tears

**Women**
- Genital examination must also include a speculum examination with adequate visualization of the cervical os
- Inspect and palpate the external genitalia, including the labia, to detect lesions, swelling, erythema, discharge
- Inspect colour of vaginal walls
- Observe the amount and colour of vaginal and endocervical discharge
- Wipe off secretions overlying the cervix, and inspect for erythema and edema
- Monitor for bleeding induced by taking endocervical swabs
- Examine perianal area for discharge, tenderness, swelling, lesions and tears

**Differential Diagnosis of STIs**
The client's symptoms and signs may suggest the specific STI (Table 1).

**Diagnostic Tests**

**Men**
- Obtain urine or samples from urethra, rectum and pharynx to be cultured for *Chlamydia* and *Neisseria gonorrhoeae*
- Obtain sample for syphilis testing (RPR, VDRL)
- Obtain samples for viral culture (e.g. herpes; dark-field smear for syphilis), which may be warranted if there are genital lesions
- Offer HIV, Hepatitis B and Hepatitis C counseling and testing if client has apparent risk factors

**Women**
- Obtain urine or samples from the endocervix, rectum and pharynx to be cultured for *Chlamydia, N. gonorrhoeae* and other bacteria
- Hanging drop (saline wet mount) to test for candida, trichomonas and bacterial vaginosis
- Observe for clue cells on saline wet mount
- Perform "whiff test" of vaginal secretions
- Offer HIV counseling and testing if client has apparent risk factors
- Test for HPV
- Test for Herpes

**Clinical Presentation And Management**

For a complete discussion of the clinical presentation and treatment of STIs, refer to and follow the *Canadian STD Guidelines* (Health Canada, 1998).

**Contact Tracing**

**General Principles**
- A client who presents with symptoms suggestive of an STI should be considered an index case until proven otherwise.
- Investigate this symptomatic client by obtaining appropriate swab and blood samples, and treat with appropriate medications as if the test results were positive.
- Obtain a list of all sexual contacts in the past 2-12 months (see Communicable Disease Manual, page STDs - 2). Fill out the appropriate reporting forms and send to the Public Health Department.
- If the test results are negative for an STI, further steps are not necessary.
- If the test results are positive for an STI, call in the contacts of the index case.
- Treat each contact as if he or she were a new index case.
- Obtain the appropriate swab and blood samples from each contact.
- Treat each new index case with appropriate medications as if the test results were positive.
- Index cases should be treated with the appropriate antibiotic(s) at the time of presentation because of the length of time required to receive test results.
• Be alert to the fact that notifiable diseases may differ from one province or territory to another. Become familiar with the notifiable diseases in your province or territory and report accordingly.

**Table 1: Symptom and signs of some sexually transmitted infections**

<table>
<thead>
<tr>
<th>Symptoms and signs</th>
<th>Possible STI syndrome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In men</strong></td>
<td></td>
</tr>
<tr>
<td>Urethral discharge, burning on urination, urethral or meatal itch</td>
<td>Urethritis</td>
</tr>
<tr>
<td>Painful genital ulcers or lesions, painful inguinal lymphadenopathy</td>
<td>Genital ulcer disease (e.g. genital herpes, syphilis, chancroid)</td>
</tr>
<tr>
<td>Painless genital lesions with or without inguinal lymphadenopathy</td>
<td>Genital ulcer disease, genital warts (condyloma accuminata or human papillomavirus infection)</td>
</tr>
<tr>
<td>Acute onset of unilateral scrotal pain or swelling</td>
<td>Epididymitis</td>
</tr>
<tr>
<td>Rectal discharge, rectal bleeding, tenesmus constipation</td>
<td>Proctitis</td>
</tr>
<tr>
<td><strong>In women</strong></td>
<td></td>
</tr>
<tr>
<td>Vaginal discharge, odor, genital itch, introital dyspareunia, external dysuria</td>
<td>Vulvovaginitis (e.g. <em>trichomonas vaginalis</em> infection)</td>
</tr>
<tr>
<td>Recent onset of abdominal pain, unusual vaginal bleeding, deep dyspareunia, with or without genital discharge</td>
<td>Cervicitis or pelvic inflammatory disease</td>
</tr>
<tr>
<td>Painful genital ulcers or lesions, painful inguinal lymphadenopathy</td>
<td>Genital ulcer disease (e.g. genital herpes, syphilis, chancroid)</td>
</tr>
<tr>
<td>Painless genital lesions with or without inguinal lymphadenopathy</td>
<td>Genital ulcer disease, genital warts (e.g. condyloma accuminata or human papillomavirus infection)</td>
</tr>
<tr>
<td>Rectal discharge, rectal bleeding, tenesmus constipation</td>
<td>Proctitis</td>
</tr>
<tr>
<td>SCHEDULE A - Item I</td>
<td>SCHEDULE A - Item II</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Reportable to Chief Medical Health Officer by telephone as soon as suspected and followed within 24 hours by a written report.</td>
<td>Reportable to Office of the Chief Medical Health Officer (OCMHO) in writing within 7 days.</td>
</tr>
</tbody>
</table>

1. **Amebiasis**
2. **Anthrax**
3. **Botulism**
4. **Campylobacteriosis**
5. **Cholera**
6. **Diphtheria**
7. **Escherichia coli (verotoxigenic)**
8. **Food Poisoning (including communicable enteric infections)**
9. **Gastroenteritis, epidemic (including institutional outbreaks)**
10. **Hantaviral disease (including Hantavirus Pulmonary Syndrome)**
11. **Hemorrhagic Fevers**
12. **Hepatitis (all forms)**
13. **Influenza**
14. **Invasive Group A Streptococcal infections (including Toxic Shock Syndrome, Necrotizing Fasciitis, Myositis and Pneumonitis)**
15. **Invasive Haemophilus influenzae type B (Hib) infections**
16. **Invasive Neisseria meningitidis infections**
17. **Legionellosis**
18. **Malaria**
19. **Measles**
20. **Meningitis/Encephalitis**
21. **Neonatal Group B Streptococcal infections**
22. **Pertussis (whooping cough)**
23. **Plague**
24. **Polioomyelitis**
25. **Rabies (or exposure to rabies)**
26. **Rubella and congenital rubella syndrome**
27. **Salmonellosis**
28. **Shigellosis**
29. **Syphilis**
30. **Tetanus**
31. **Tuberculosis**
32. **Typhoid and paratyphoid fevers**
33. **Yellow fever**
34. **Epidemic forms of other diseases**
35. **Unusual clinical manifestations of disease**

1. **Acquired Immunodeficiency Syndrome (AIDS) and any Human Immunodeficiency Virus (HIV) Infection**
2. **Brucellosis**
3. **Chancroid**
4. **Chicken Pox (Varicella)**
5. **Chlamydial Infections**
6. **Congenital Cytomegalovirus infection**
7. **Congenital or Neonatal Herpes simplex infections**
8. **Creutzfeldt-Jacob Disease**
9. **Cryptosporidiosis**
10. **Cyclospora**
11. **Giardiasis (symptomatic cases only)**
12. **Gonococcal infections**
13. **Hemolytic Uremic Syndrome**
14. **Human T-cell Lymphotropic Virus infections**
15. **Leprosy**
16. **Listeriosis**
17. **Lyme Disease**
18. **Methicillin-Resistant Staphylococcus Aureus (MRSA)**
19. **Mumps**
20. **Psittacosis/Ornithosis**
21. **Q fever**
22. **Respiratory Syncytial Virus (RSV)**
23. **Tapeworm infestations (including Echinococcal disease)**
24. **Trichinosis**
25. **Toxoplasmosis (symptomatic only)**
26. **Tularemia**
27. **Vancomycin-Resistant Enterococci (VRE)**
Hepatitis

Definition
Inflammation of liver cells resulting in necrosis and bile stasis.

Causes
Five distinct viruses: hepatitis A virus, hepatitis B virus, hepatitis C virus, hepatitis D virus and hepatitis E virus (not seen in Canada).

Table 3: Comparison of five forms of viral hepatitis

<table>
<thead>
<tr>
<th>Form</th>
<th>Transmission</th>
<th>Incubation time</th>
<th>Chronicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Fecal – oral</td>
<td>15 – 50 days</td>
<td>No</td>
</tr>
<tr>
<td>B</td>
<td>Parenteral, sexual, perinatal</td>
<td>45 – 160 days</td>
<td>Yes (1% of cases)</td>
</tr>
<tr>
<td>C</td>
<td>Parenteral</td>
<td>14 – 140 days</td>
<td>Yes (70% of cases)</td>
</tr>
<tr>
<td>D</td>
<td>Parenteral; may coexist with hepatitis B</td>
<td>Unknown</td>
<td>Yes</td>
</tr>
<tr>
<td>E</td>
<td>Fecal – oral</td>
<td>14 – 60 days</td>
<td>No</td>
</tr>
</tbody>
</table>

History
The five types of hepatitis are similar in clinical presentation and therefore cannot be readily distinguished by clinical features. Serologic testing is needed for accurate diagnosis. The severity of symptoms depends on the infective agent, and many of those infected are asymptomatic.

• Fever (unusual with hepatitis B or C, occurs in 60% of those with hepatitis A)
• Malaise
• Nausea and vomiting
• Anorexia
• Dark, tea-coloured urine
• Abdominal pain, especially in right upper quadrant
• Jaundice (in 60% of affected adults)
• Headache

Physical Findings
Findings depend on stage of disease.

• Temperature may be elevated in pre-icteric phase
• Client appears mildly-to-moderately ill
• Lethargy
• Sclera jaundiced
• Skin jaundiced
• Liver may be tender and enlarged; edge of liver smooth and soft
• Bowel sounds normal
• Bruising (a sign of severe disease)

Differential Diagnosis

• Hepatic cancer
• Cirrhosis
• Infectious mononucleosis
• Alcohol-induced hepatitis
• Drug-induced hepatitis
• Obstructive jaundice

Complications

• Fulminant hepatitis (occurs in 0.1% of cases, but prevalence is higher among pregnant women)
• Spread to close contacts or community
• Increased incidence of liver cancer

Diagnostic Tests

• Urinalysis: urine dark, tea-coloured; dipstick test positive for bilirubin
• Liver function tests (LFTs): increased AST (aspartate aminotransferase) and ALT (alanine aminotransferase) (ALT in particular shows marked elevation)
• Alkaline phosphatase (mild-to-moderate increase)
• Bilirubin (normal to markedly elevated)
• Hepatitis serology screening (see Table 4 for details of findings)

It is impossible to distinguish a flare-up of chronic hepatitis B or C from acute cases; only over time will it be possible to identify a carrier of the virus.
Table 4: Serologic features of viral hepatitis

<table>
<thead>
<tr>
<th>Form</th>
<th>Serologic marker</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>IgM anti-HAV</td>
<td>Acute disease</td>
</tr>
<tr>
<td></td>
<td>IgG anti-HAV</td>
<td>Remote infection and immunity</td>
</tr>
<tr>
<td>B</td>
<td>HBsAg</td>
<td>Acute or chronic disease</td>
</tr>
<tr>
<td></td>
<td>HBeAg</td>
<td>Active replication</td>
</tr>
<tr>
<td></td>
<td>IgM anti-HBcAg</td>
<td>Active disease</td>
</tr>
<tr>
<td></td>
<td>IgG anti-HBcAg</td>
<td>Acute disease</td>
</tr>
<tr>
<td></td>
<td>• HBsAg positive</td>
<td>Chronic disease</td>
</tr>
<tr>
<td></td>
<td>• HBsAg negative</td>
<td>Prior exposure</td>
</tr>
<tr>
<td>C</td>
<td>Anti-HCV</td>
<td>Acute, chronic or unresolved disease; co-infection with HIV</td>
</tr>
<tr>
<td>D</td>
<td>HBsAg and anti-HDV</td>
<td>Acute disease</td>
</tr>
<tr>
<td></td>
<td>• IgM anti-HBcAg positive</td>
<td>Co-infection with HBV</td>
</tr>
<tr>
<td></td>
<td>• IgG anti-HBcAg positive</td>
<td>Superinfection</td>
</tr>
<tr>
<td>E</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

HAV - hepatitis A virus  
HBV - hepatitis B virus  
HBsAg - hepatitis B surface antigen  
HBeAg - hepatitis B e antigen  
HBcAg - hepatitis B core antigen  
HCV - hepatitis C virus  
HDV - hepatitis D virus

Management
Hepatitis is a reportable communicable disease. In most cases no specific therapy is indicated, and it usually resolves spontaneously in 4-8 weeks without complications or sequelae.

Clients are most infective before the onset of jaundice. Virus may be shed for up to 1 week after jaundice appears.

Goals of Treatment
• Prevent disease
• Minimize liver damage
• Reduce spread of infection
• Symptom control and treatment

Appropriate Consultation
Consult a physician for all cases (except those that are clearly mild hepatitis A) and for any client who is acutely ill at the time of presentation.

Nonpharmacologic Interventions
• Increase hydration (8-10 glasses of fluid daily)
• Adequate, well-balanced diet
• Abstention from alcohol for 3-4 months
• Activity as tolerated

• Client should be symptom-free before returning to school/work and usual routines

Community Outbreaks of Hepatitis A
During community outbreaks of hepatitis A, advise community members about the following preventive measures:
• Water purification (boiling of water for 20 minutes) before drinking
• Impeccable hand washing to reduce fecal-oral spread
• Sanitary disposal of fecal material
• Use of separate linens and dishes may be helpful but proper cleansing of these items is more important

Pharmacologic Interventions
• For symptomatic relief (e.g. fever, nausea and vomiting, pruritus, abdominal pain) consult physician
• Any hepatotoxic drugs should be identified and discontinued until recovery is complete
• Stop oral contraceptives to avoid cholestatic symptoms, and counsel client about alternative contraceptive method
**Monitoring and Follow-Up**

- Follow up all acute cases of hepatitis A in 24-48 hours to re-evaluate condition. After that, see client weekly for 2-4 weeks and again at 6 weeks to verify resolution of symptoms.
- Repeat LFTs at 6 weeks (in acute hepatitis B and C, elevation of liver enzymes may be prolonged, so LFTs should be repeated every 3 months until normal).
- Clients with chronic hepatitis B and C should be seen every 3-4 months for symptoms and signs, and liver function should be monitored.

**Referral**

- Referral to a physician is required for further assessment, diagnosis and investigation for all but hepatitis A, (hepatitis B, C and D can become chronic).
- Medevac anyone who is acutely ill at time of presentation

**Prevention Of Spread And Management Of Contacts**

Management of contacts depends on the underlying cause of disease.

**Hepatitis A**

Immune serum globulin is effective in preventing or modifying hepatitis A in household contacts: *immune globulin (A class drug)*, 0.02 mL/kg

Use of immune globulin more than 2 weeks after last exposure is not indicated.

Routine prophylaxis with hepatitis A vaccine is not indicated but is advisable for people traveling to areas of high prevalence, for people living in areas where disease is endemic and there are recurrent outbreaks, for immunocompromised people (e.g. HIV-positive clients) and for homosexual men.

This vaccine is not yet one of those routinely supplied by provincial government programs. Check with the Communicable Disease Consultant at the Department of Health and Social Services for information on how to obtain this vaccine for a client who might benefit from prophylaxis.

Control measures: Community teaching about and impeccable hand-washing to prevent fecal-oral spread is the key. Sanitary disposal of feces is also important.

Children and adults with hepatitis A should be excluded from school, daycare and work places until at least 1 week after onset of illness (until jaundice disappears).

Schoolroom exposure does not generally pose a risk to others, and mass vaccination with immune globulin is not indicated.

**Hepatitis B**

Immunoprophylaxis with hepatitis B vaccine is indicated for all persons at risk, and is a routine part of the childhood vaccination program in the NWT.

Groups at risk: healthcare workers, dialysis patients, recipients of blood or blood products, injection drug users, sexually active homosexual males, people in household or sexual contact with an infected person, people with needlestick injury, people engaging in high-risk sexual behavior, newborns of infected mothers.

In AdultsGive: *hepatitis B vaccine, 1.0 mL IM at 0, 1 and 6 months (3 doses) (where time zero is the time of the first dose)*

*hepatitis B human immune globulin 0.06 mg/kg IM* can be given within 24 hours of percutaneous or permucosal exposure (e.g. needlestick injury) in a previously un-immunized person. Follow with three doses of hepatitis B vaccine as outlined above.

**Hepatitis C**

There are no specific prevention strategies other than avoidance of contact with the blood of an infected person through universal blood and body fluid precautions. Safe sex practices are recommended. Once infected, minimal alcohol use (< 4 drinks/week) is important to prevent liver damage. Teach client about hepatotoxic medications.
**Hepatitis D**
Hepatitis D cannot be transmitted except in the presence of hepatitis B virus. Prevention of hepatitis B is therefore key in preventing hepatitis D. Universal precautions for blood and body fluids should be observed.

**Hepatitis E**
Immunoprophylaxis for hepatitis E (which is not seen yet in Canada) does not exist. Prevention through good sanitation and hygiene is key.
Mononucleosis (Infectious)

Definition
Acute viral infection with classic triad of symptoms: fever, pharyngitis and enlarged lymph glands.

Causes
- Epstein-Barr virus
- Spread from person to person by the oropharyngeal route (via saliva), and only rarely by blood transfusion
- Incubation period 4-6 weeks

History
Adolescents and young adults are most often affected.
- Fever
- Sore throat
- Fatigue, malaise
- Headache
- Eyelid and orbital swelling
- Lymph glands swollen (especially posterior cervical glands)
- Period of communicability is prolonged, and pharyngeal excretion of virus may persist for a year or more after illness

Physical Findings
- Temperature may be mildly elevated
- Client appears tired
- Eyelid and periorbital edema
- Pharynx red, swollen; may have tonsillar exudate
- Petechiae on the palate
- Enlargement of lymph nodes of the neck (especially posterior cervical nodes)
- Splenomegaly
- Hepatomegaly, with or without jaundice

Differential Diagnosis
- Group A streptococcal (GAS) pharyngitis
- Hepatitis
- Viral pharyngitis
- Cytomegalovirus infection
- Toxoplasmosis
- Secondary syphilis
- Rubella

Complications
- Pneumonia
- Guillain-Barré syndrome
- Hepatitis
- Aseptic meningitis
- Encephalitis
- Hemolytic anemia
- Thrombocytopenia
- Agranulocytosis
- Myocarditis
- Splenic rupture
- Polyneuritis
- Orchitis

Diagnostic Tests
- Serum sample for mononucleosis spot test
- Complete blood count (lymphocytosis is characteristic)
- Throat swab to rule out group A streptococcal (GAS) pharyngitis

Management
Goals of Treatment
- Provide supportive care until recovery
- Prevent complications

Nonpharmacologic Interventions
- Warm salt water gargles for sore throat

Client Education
- Advise client to eat foods as tolerated, but recommend well-balanced nutrition
- Advise client to undertake activity as tolerated; help client to plan a realistic schedule of rest, with modification of school or work responsibilities as needed
- Suggest increasing fluid intake, which may be beneficial
- Teach client good hand-washing technique to prevent spread, but client does not need to be isolated from others
- Suggest that client decrease stress if possible
- Recommend that client avoid contact sports for at least 1 month or until full resolution of enlarged spleen because of the increased risk of splenic rupture
• Advise client the duration of the illness is variable, with the typical, uncomplicated illness lasting 3-4 weeks

Pharmacologic Interventions
Mild analgesic:
ibuprofen (A class drug), 200 mg, 1-2 tabs PO q4h prn
or
acetaminophen (A class drug), 325 or 500 mg, 1-2 tabs PO q4h prn

Monitoring and Follow-Up
Follow up once weekly until symptoms resolve.

Appropriate Consultation
Consult a physician if symptoms persist for more than 3 weeks or if there are any complications, such as jaundice or neurological symptoms.

Referral
Not usually required.
Bacterial Gastroenteritis

Refer to Communicable Disease Manual (February 2000), Enteric Diseases (Bacterial)

Management

Goals of Treatment
• Prevent complications
• Prevent spread of infection to others
• Identify asymptomatic household carriers of Salmonella

Infection with Salmonella and Shigella are notifiable communicable diseases.

Appropriate Consultation
Consult a physician for treatment of clients who are immunocompromised or debilitated and those who have severe symptoms or are dehydrated.

Nonpharmacologic Interventions
Refer to "Diarrhea," in chapter 5, "Gastrointestinal System," for details of general management of diarrhea.

Rehydrate with small amounts of fluids, given frequently; use oral rehydration fluids if necessary or IV therapy if serious dehydration is present (see "Dehydration" in chapter 5, "Gastrointestinal System").

Client Education
• Recommend increased rest during acute phase
• Recommend water purification (boiling all water used in the house for 20 minutes)
• Counsel client about appropriate personal hygiene (hand-washing after touching soiled material and after using the washroom; separate utensils)

• Teach client how to avoid spreading bacteria to other household and community members (impeccable hand washing after toileting is the most useful intervention)
• Teach client the signs of dehydration and advise client to return to clinic if these occur
• Enteric precautions are required during acute illness, because Shigella infection is highly contagious
• Clients should not handle food or provide child or patient care until follow-up stool cultures are negative

Pharmacologic Interventions
Control nausea and vomiting: dimenhydrinate (A class drug), 25-50 mg IM prn stat, then 50 mg PO q4-6h prn

Do not use anti-diarrheal medications (e.g. loperamide or diphenoxylate-atropine), as these slow the clearance of bacteria from the bowel.

Consult with a physician before giving antibiotics, as they may prolong the carrier state and encourage development of resistant strains.

Monitoring and Follow-Up
• Instruct client to return for follow-up in 24-48 hours if symptoms are not diminishing
• Isolation not necessary
• Household contacts or contacts involved in direct client care must be investigated (obtain three stool samples for culture)

Referral
Usually not necessary unless there is significant dehydration or failure to improve with therapy.
Giardiasis Gastroenteritis

Refer to Communicable Disease Manual (February 2000), Enteric Diseases (Parasitic)

Definition
Parasitic intestinal infection.

Causes
- *Giardia lamblia*, one of the most commonly identified intestinal parasites
- Infection caused by ingestion of infective cysts
- Person-to-person transmission (fecal-oral) and poor hygiene are the primary means of infection
- Giardiasis may also be contracted through the ingestion of contaminated water, a mechanism responsible for a significant number of waterborne outbreaks
- Venereal transmission occurs through direct fecal-oral transmission

History
A broad spectrum of clinical syndromes may occur. Most symptoms are gastrointestinal. A small number of people have the following symptoms:
- Abrupt onset of explosive, watery diarrhea
- Abdominal cramps
- Foul flatus
- Vomiting
- Fever and malaise

These symptoms last 3–4 days before transition into the more common subacute syndrome.

Most patients experience a more insidious onset of symptoms, which are recurrent or resistant:
- Stool malodorous, mushy and greasy
- Watery diarrhea may alternate with soft stools or even constipation
- Stools do not contain blood or pus, since dysenteric symptoms are not a feature of giardiasis

Upper GI symptoms, often exacerbated by eating, accompany stool changes or may be present in the absence of soft stools:
- Upper and mid-abdominal cramping
- Nausea
- Early satiety
- Bloating
- Sulfurous belching
- Substernal burning and acid indigestion
- Anorexia
- Fatigue, malaise
- Weight loss (occurs in > 50% of patients, average weight loss is 4.5 kg [10 lb])
- Chronic illness (adults present with long-standing malabsorption syndrome and children with failure-to-thrive syndrome)

Unusual presentations include:
- Allergic manifestations, such as urticaria
- Erythema multiforme
- Bronchospasm
- Reactive arthritis
- Biliary tract disease

Physical Findings
- Physical examination generally unremarkable
- Abdominal examination may reveal nonspecific tenderness without evidence of peritoneal irritation
- Rectal examination should reveal heme-negative stool
- In severe cases, evidence of dehydration or wasting may be present

Differential Diagnosis
- Gastroenteritis (viral, bacterial)
- Amebiasis
- Bacterial overgrowth syndromes
- Crohn's ileitis
- *Cryptosporidium enteritis*
- Irritable bowel syndrome
- Sprue (celiac [nontropical] or tropical)
- Lactose intolerance

Complications
- Dehydration
- Malabsorption and weight loss

Diagnostic Tests
Stool samples (three) taken at 2-day intervals should be examined for ova and parasites.
Management

**Goals of Treatment**

- Relieve symptoms
- Prevent complications
- Prevent spread to others

**Nonpharmacologic Interventions**

Emergency care consists of restoration of volume status through oral rehydration or IV administration of crystalloid solution if client is dehydrated on presentation. For details, see "Dehydration" in chapter 5, "Gastrointestinal System."

- Advise client to eat foods as tolerated; low-lactose and low-fat diet may be helpful until symptoms diminish
- Advise client to undertake activity as tolerated
- Frequent, impeccable hand washing, especially after toileting, is essential
- Drinking water should be purified by boiling for 20 minutes
- Ensure that close contacts of the client are also examined for giardiasis and treated, if appropriate

**Pharmacologic Interventions**

Antibacterial, antiprotozoan to treat infection: *metronidazole (A class drug)*, 250 mg PO tid for 5-7 days

High-dose, short-course regimens are less efficacious and should be avoided. The most common side effects include a metallic taste in the mouth, nausea, dizziness and headache.

Do not give to pregnant women, especially those in the first trimester. Consult a physician for alternative treatment for a pregnant woman.

**Monitoring and Follow-Up**

- Follow up closely (e.g. daily) if dehydrated on presentation: monitor hydration status, weight and symptoms
- Obtain repeat stool samples in 1-2 weeks to ensure resolution of infection

**Appropriate Consultation**

Consultation is generally not necessary for giardiasis unless there is no improvement with treatment.

**Referral**

Refer to a physician as soon as possible if symptoms persist or worsen despite treatment.
Tuberculosis

Refer to NWT Tuberculosis Manual (March 2003)

Definition
Acute granulomatous infection with a mycobacterium. Organism is initially inhaled into the body through the pulmonary system. After pulmonary inoculation, the organism can spread to other areas of the body, including the middle ear, bones, joints, meninges, kidney and skin. Spread is contiguous or via the lymph or blood.

Approximately 85% of patients present with pulmonary disease. Most active cases are confirmed by culture of Mycobacterium tuberculosis.

Extrapulmonary disease may be diagnosed on the basis of characteristic pathological findings and clinical presentation.

Extrapulmonary disease is more common in clients with HIV infection and those from certain ethnic groups, including Asians and Aboriginal Canadians, than in other clients.

Stages Of Disease

Latent Infection
The person has a primary infection with the organism and has low numbers of tubercle bacilli in the body but does not have active disease. The risk of active infection is high in certain groups of people with latent disease. (See "Risk Factors," below.)

Active Tuberculosis
The person has active infection and high numbers of tubercle bacilli, and the condition is contagious. The risk of active disease is highest in the first 2 years after exposure.

Causes
Mycobacterium tuberculosis

Risk Factors
• Aboriginal Canadian ancestry
• Single men > 65 years of age
• Urban homelessness
• Institutional living (e.g. in a correctional facility or nursing home)
• Immunocompromise (e.g. HIV/AIDS)
• Medications that suppress immunity (e.g. high-dose steroids)
• Diabetes mellitus
• Chronic renal failure
• Malnutrition
• Alcoholism
• Close contact with an infected person

History
TB should always be considered if the classic symptoms are present in a client from a high-risk group, if unexplained cough and constitutional symptoms persist for more than a few weeks or if pneumonia fails to resolve in any client.

• Cough
• Hemoptysis
• Fever
• Night sweats
• Anorexia
• Weight loss
• Fatigue
• Exposure to TB
• History of active TB and adequacy of previous treatment
• History of positive Mantoux test and adequacy of prophylaxis

Be alert to the diseases, drugs and conditions that predispose an infected client to active TB

Physical Findings
Perform a complete physical examination.

• Client may appear chronically ill, cachectic
• Weight loss
• Signs of pleural effusion on chest examination
• Enlargement of liver or spleen
• Enlargement of lymph nodes

Differential Diagnosis
• Pneumonia
• Bronchiectasis
• Lymphoma
• Fungal infection
Complications
• Lung abscess
• Empyema
• Spread of infection to extrapulmonary structures
• Spread of infection to others
• Drug resistance
• Death

Diagnostic Tests
Mantoux Test (Tuberculin Skin Test)
The Mantoux test has three indications: diagnosis of infection, diagnosis of active disease and epidemiological tool.

The test should not be performed in the following situations:
• client who has had previous severe blistering reactions to the Mantoux test
• client with documented active TB
• client with extensive burns or eczema
• client who has had a viral infection (such as measles or mumps) in the past month or who has received vaccination with a live-virus vaccine in the past month (e.g. MMR)

False-negative results may occur in seriously ill, anergic people (e.g. those with HIV/AIDS or active TB).

Reaction to tuberculin antigen may wane to non-reactivity with age, whereas repeat skin testing may boost reactivity. Thus, it is important to perform a two-step Mantoux test in populations who are likely to undergo serial testing (e.g. nursing home residents and healthcare workers). This will identify those whose response has waned over time.

BCG (bacille Calmette-Guérin) vaccination may trigger a positive Mantoux result. This response wanes over time, usually disappearing in 10-15 years. In general, a positive Mantoux result > 10 years after BCG vaccination should not be attributed to the BCG.

The standard dose of the purified protein derivative (PPD) used in the Mantoux test is 5 tuberculin units. The result is determined 48-72 hours after injection by measurement (in millimeters) of the transverse diameter of induration (the surrounding erythema should be ignored).

It is insufficient to describe the test result as simply "positive" or "negative." These designations are arbitrary and have different meanings in different people.

Consult the NWT Tuberculosis Manual (March 2003) for guidelines for significant and insignificant Mantoux test results. (Section 5, page 4)

Other Diagnostic Tests
• Complete blood count
• Chest x-ray
• Three sputum samples for acid-fast bacilli and M. tuberculosis culture
• Three urine samples for acid-fast bacilli culture

Management
Goals of Treatment
• Prevent latent infection from progressing to active disease
• Ensure adequate treatment of active disease
• Prevent spread of disease to others

Appropriate Consultation
Consult a physician immediately for all cases of suspected active TB and for any client who has a newly positive Mantoux test result.

Nonpharmacologic Interventions
• Notify the NWT Department of Health and Social Services of clients whose Mantoux tests have recently converted to positive, as well as all new cases of active TB
• Complete TB assessment form
• Carry out contact tracing: all close family, friends and job contacts should undergo screening Mantoux test, repeated 3 months later if the initial result is negative
• Check with the Communicable Disease Consultant at the Department of Health and Social Services for additional information
• Adequate balanced nutrition, which aids healing and may help prevent active TB in those with latent infection
• Adequate rest, especially in active disease
Client Education

- Explain disease process, course and prognosis
- Stress importance of strict adherence to medication regimen
- Explain risks, benefits and side effects of drugs
- Stress importance of close follow-up

Pharmacologic Interventions

Latent Disease

Therapy with a single drug, isoniazid (INH), can greatly reduce the risk of active TB in those with latent infection. Therefore, for those with a positive Mantoux test result, INH prophylaxis may be considered. The risk of adverse effects from INH must be weighed against its benefit in reducing the risk of active disease.

isoniazid (INH) (B class drug), 300 mg PO od for 6-9 months
and
pyridoxine (vitamin B6) (B class drug), 25 mg PO od

Active Infection

Treatment is always with multiple drugs for 6-12 months on average and only initiated by a physician.

The optimal initial regimen is three or four drugs, including INH, rifampin, pyrazinamide, ethambutol and streptomycin.

If drug resistance is a possibility, a four-drug regimen should be considered.

In addition to the antituberculous drugs, the client may also be given vitamin B6 (especially in the presence of alcoholism, diabetes mellitus or pregnancy, or if there is a concern about nutritional status), although this is optional:

pyridoxine (vitamin B6) (B class drug), 25 mg PO od

After 2 months of therapy, pyrazinamide is usually discontinued if culture results indicate the presence of a fully sensitive organism. Then, INH and rifampin can be given twice weekly.

A twice-weekly schedule lends itself to fully supervised directly observed therapy (DOT). This optimal regimen should last at least 6 months in total.

A total of 9 months or more may be needed if clinical, radiologic or bacteriologic findings show a slow response. If second-line regimens are required, and particularly if there is a concern about drug resistance, much longer courses of treatment (15-18 months) are required. Regimens of 18 months or longer are needed if neither INH or rifampin is used in the drug regimen.

TB medications are prescribed by TB specialists. Consult the Communicable Disease Consultant at the Department of Health and Social Services before TB drugs are prescribed.

Table 5: Doses of and common adverse reactions to first-line antituberculous drugs

<table>
<thead>
<tr>
<th>Drug</th>
<th>Usual daily dose</th>
<th>Adverse reactions*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoniazid (INH)</td>
<td>300 mg</td>
<td>Hepatitis, paresthesia</td>
</tr>
<tr>
<td>Rifampin</td>
<td>600 mg</td>
<td>Hepatitis, flu-like illness</td>
</tr>
<tr>
<td>Pyrazinamide</td>
<td>1500-2500 mg in divided doses</td>
<td>Hepatitis, elevated serum level of uric acid, arthralgia</td>
</tr>
<tr>
<td>Ethambutol</td>
<td>2400 mg in divided doses</td>
<td>Retrobulbar neuritis</td>
</tr>
<tr>
<td>Streptomycin</td>
<td>1000mg</td>
<td>Vertigo, tinnitus, renal failure</td>
</tr>
</tbody>
</table>

* All of these drugs may cause rash, nausea and fever
**Monitoring and Follow-Up**

- Follow client closely while on therapy (at least monthly)
- Monitor adherence to medication regimen, for symptoms of disease and for drug side effects
- Liver enzyme levels should be checked regularly
- Clients receiving ethambutol should have colour vision screened every 6 months
- Clients with active TB need repeat chest x-ray monthly for the first 3 months
- Have a physician review client at every opportunity during therapy

**Referral**

All clients with suspected active TB should be admitted to hospital for investigation and treatment. If transport is in a public vehicle (e.g. aircraft), the client should wear an appropriate mask (one that can filter particles of 1 µm in diameter and that provides a tight facial seal) to protect others.
Invasive Group A Streptococcal Infection

**Definition**
Invasive Group A streptococcal (GAS) disease is a severe and sometimes life-threatening infection in which the bacteria have invaded various parts of the body, such as the blood, the cerebrospinal fluid, deep muscle and fat tissue, or the lungs.

Invasive GAS infections may manifest as any of several clinical syndromes, including pneumonia, bacteremia in association with cutaneous infection (e.g. cellulitis, erysipelas or infection of a surgical or non-surgical wound), deep soft-tissue infection (e.g. myositis or necrotizing fasciitis), meningitis, peritonitis, osteomyelitis, septic arthritis, postpartum sepsis (i.e. puerperal fever), neonatal sepsis or non-focal bacteremia.

Two of the most severe, but least common, forms of invasive GAS disease are:
- necrotizing fasciitis (infection of muscle and fat tissue) and
- streptococcal toxic shock syndrome (STSS).

Approximately 20% of patients with necrotizing fasciitis and 60% with STSS die.

Only about 10% to 15% of patients with other forms of invasive GAS disease die.

**Cause**
Group A *Streptococcus*.

**Risk factors**
Although anyone can get GAS disease (including STSS), people with underlying health problems such as diabetes mellitus, chronic heart, lung or kidney problems, cancer or HIV infection are at greater risk for invasive GAS disease.

A break in the skin, such as a cut or surgical wound, or chickenpox may increase a person's risk. Close contacts of a case (family or household members, healthcare providers, nursing home staff) may be at increased risk for infection because of direct contact with secretions from the infected person.

**History And Physical Findings**
Presence of risk factors.

Early signs and symptoms of necrotizing fasciitis:
- Severe pain, swelling and redness at the wound site
- Fever

Early signs and symptoms of STSS:
- Fever
- Dizziness
- Confusion
- Rash and abdominal pain
- Severe pain, swelling and redness at the wound site

**Streptococcal Toxic Shock Syndrome**
STSS is an illness with the following clinical manifestations occurring within the first 48 hours of illness:
- hypotension (defined by systolic blood pressure \(\leq 90\) mm Hg for adults or less than the fifth percentile by age for children < 16 years of age)
- multiorgan involvement characterized by two or more of the following:
  - renal impairment
  - coagulopathy
  - liver involvement
  - acute respiratory distress syndrome (defined by acute onset of diffuse pulmonary infiltrates and hypoxemia in the absence of cardiac failure or by evidence of diffuse capillary leak manifested as acute onset of generalized edema or pleural or peritoneal effusion with hypoalbuminemia)
  - generalized erythematous macular rash that may show desquamation
  - soft-tissue necrosis, including necrotizing fasciitis or myositis, or gangrene

**Differential Diagnosis**
- Cellulitis
- Sepsis
- Septic shock

**Complications**
- Sepsis
- Septic shock
- Amputation
- Death
Diagnostic Tests
None.

Management

Prevention of Invasive GAS Infection
- Spread of all types of GAS infections may be reduced by proper hand washing, especially after coughing and sneezing, before preparing foods and before eating
- For anyone with a significant sore throat, a throat swab should be taken for culture and sensitivity if clinically indicated (see Appendix 1, "Sore Throat Score," in chapter 2, "Ears, Nose and Throat") to determine whether it is a streptococcal infection; if so, the person should stay home from work, school or daycare until 4 hours or more after antibiotic therapy has been initiated
- All wounds should be kept clean and should be monitored for possible signs of infection (e.g. increasing redness, swelling and pain at the wound site); clients should be advised to seek medical help immediately if any of these signs occur, especially if fever is also present

Appropriate Consultation
Consult a physician immediately if there is suspicion of invasive GAS infection.

Nonpharmacologic Interventions
- Protect airway and ensure adequate ventilation
- Bed rest
- Protect infected area from further injury

- In addition to antibiotics, supportive care in an intensive care unit and sometimes surgery are necessary with these diseases

Adjuvant Therapy
- Oxygen prn to keep saturation ≥ 97%
- Start IV therapy with normal saline to keep vein open

If client presents with signs of sepsis or septic shock, aggressive fluid resuscitation is necessary, as follows:

Start two large-bore IV lines with normal saline (for details, see "Shock," in chapter 14, "General Emergencies and Major Trauma")

If client's symptoms are suspicious for GAS disease or he or she would be at higher risk of invasive disease (e.g. if he or she has diabetes mellitus, cancer, chronic heart disease, alcoholism), antibiotic therapy may be started while waiting for transfer. Choice of antibiotics should be determined in consultation with a physician.

Monitoring and Follow-Up
Monitor ABC and symptoms frequently.

Referral
Medevac.
Chapter 12 - Obstetrics

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References

The references for these topics are not meant to be inclusive. It is expected that the Community Health Nurse would consult with her nurse-in-charge, the visiting settlement physician, the various hospitals’ emergency physicians, and/or the Northern Women’s Health Program.
Assessment of the Prenatal Client

Prenatal Care: Initial And Subsequent Visits
Refer to NWT Prenatal Record and Reference Guide for completion of the NWT Prenatal Record (September 2005) and check references at the end of this topic.

Initial Visit

History
Health History
• Cardiovascular
• Hypertension
• Genitourinary
• Renal
• Thrombosis/Phlebitis
• Asthma
• Diabetes
• Epilepsy
• Thyroid disease
• Bleeding disorder
• Transfusions –including the year
• Surgeries
• Psychiatric/Depression
• TB exposure
• Infections

Social History
• Nutrition- recall chart to ID women at risk for deficiencies. Can use Canada Food Guide.
• Special diet
• Alcohol –T-ACE tool
• Drugs –includes marijuana
• Substance abuse e.g. glue, hairspray
• Smoking-includes smokeless tobacco
• Second hand smoke
• Domestic violence: use SAFE or ALPHA tools
• Support systems –outside the Health Centre

Family/Genetic History
• Congenital Anomaly
• Neural tube defect
• Genetic disease
• Diabetes- including gestational
• Hypertension
• Bleeding Disorder
• Twins- and multiple births
• Anesthesia problem

• Psychiatric problem
• Other

Obstetrical History
• Number of pregnancies including abortions
• Dates and locations of previous pregnancies
• Perinatal complications – including antepartum, intrapartum, delivery, and postpartum
• Delivery history
• Infant sex, birth weight, condition
• Present health of children

Clinical Dating
• LNMP - Start and end dates of most recent normal menstrual period
• Was most recent period like others in duration and amount of flow? (if not, determine dates of previous period)
• Was there any bleeding after most recent normal menstrual period?
• Amenorrhea for how long. One or two periods missed (however, may be amenorrheic because of Depo Provera effect)
• Contraceptives: type, when last used
• EDD –by LNMP
• Ultrasound - Dating Ultrasound if dates are uncertain - do prior to 16 weeks gestation.

Present Pregnancy
• Bleeding -determine amount, any associated pain
• Nausea and vomiting in the morning
• Vaginal discharge or fluid leakage (colour, odor, amount)
• Infections or fever -urinary symptoms
• Depression
• Other
Allergies/Medications
- Type, dosage, period of use
- Prescription, traditional, OTC
- Type of reaction to medications

Physical Examination
Perform a complete examination of all systems on first visit.

General
- Apparent state of health
- Appearance of comfort or distress
- Colour (e.g. flushed, pale)
- Nutritional status (obese or emaciated)
- Facial edema
- Tender/nontender thyroid enlargement may be present

Vital Signs
- Temperature
- Heart rate: elevated (by 10%) in second half of pregnancy because of increased blood volume
- Respiratory rate
- Blood pressure (sitting)
- Fetal heart rate: 110-160 bpm (heard at 12-18 weeks gestational age)

Breasts
- Enlarged; areolae and nipples darker and enlarged
- Signs of infection
- Masses, tenderness
- Nipples: shape (e.g. inverted), erosion, discharge
- Body piercing
- Augmentation surgeries

Abdomen
- Striae
- Scars
- Measurement of fundal height, shape of fundus
- Agreement between fundal height and expected date of delivery
- Fetal lie, presentation and movements
- Engagement
- Uterine tenderness or hardness
- Contractions (e.g. Braxton-Hicks)

Pelvis
- Perineal varicosities
- Previous tears, episiotomy
- Hemorrhoids
- Vaginal bleeding, discharge (colour, odor, consistency, amount)
- Cervix and vaginal walls have bluish color (8 weeks+)
- Uterus: palpable only on pelvic examination in first trimester and in obese women.
- Describe uterine size (e.g. average size, orange, grapefruit)
- Position of uterus (e.g. retroverted)
- Cervical assessment (position, appearance)
- Muscular support in the pelvic floor (e.g. cystocele, rectocele)
- Evidence of infections (e.g. warts, herpes)
- Body piercing

Laboratory Tests
Blood Work follow NWT Guidelines
- Complete blood count
- ABO grouping and Rhesus (Rh) type
- Antibody screening
- Rubella titre
- Syphilis testing
- Hepatitis Band C screening
- HIV test (opt out program in the NWT, required prior to infant BCG)
- Varicella antibody titre if no history of varicella infection or contact with infection

Urine Testing
- At initial visit: urinalysis, routine and microscopy, culture and sensitivity

Cervical and Vaginal Examination
- PAP smear unless the client is being followed in an abnormal pap schedule already.
- HSSA approved testing for Neisseria gonorrhoea, and Chlamydia. A cervical swab for culture and sensitivity or the first urine is used for this test.
- Vaginal swab for culture for trichomonas, bacterial vaginosis.
**Subsequent visits**

**History**
- Identified risk factors from history each visit
- Headaches, edema
- Abdominal pain
- Vaginal bleeding or discharge
- Urinary complaints
- GI disturbances
- New stressors
- Sings of premature labour

**Physical**
- SFH – Client lying down. Measure fundal height from top of symphysis to top of fundus with tape measure and record (in centimetres [cm])
- As a general rule, measurement in centimetres equals number of weeks of gestation after 20 weeks until 36-38 weeks (Table 1)
- Vital signs:
  - BP: a physiological drop usually occurs in second trimester
  - Heart Rate/Heart sounds: soft systolic ejection flow murmur may be present (because of expanded vascular volume)
- Weight: ideal 10-12 kg (2 kg in first trimester, about 4-5 kg in second trimester and 4-5 kg in third trimester)
- Assess: fetal lie, presentation and movements. At 34 weeks, if the fetal lie is not cephalic, consider referral to visiting physician.
- Assess fetal head for engagement in maternal pelvis later in pregnancy
- Fetal heart: rate and rhythm of heartbeat, location of heart tones (e.g. above umbilicus at term may mean breech)

**Quickening**
- Advise client to record date of first perceived fetal movement (usually occurs at 20 weeks gestational age in primigravida and at 18 weeks in multigravida).

**Lightening**
- Occurs when the fetal head engages in maternal pelvis.
- Usually occurs by 37 weeks gestational age in primigravida.

**Laboratory tests**

**Swabs and Cultures**
- Group B streptococcus (GBS) screening at 35-37 weeks – recto/vaginal. (If multiple gestation consider at 32 weeks).
- Repeat Neisseria gonorrhoeae and Chlamydia culture at 35-37 weeks gestational age

**Urine testing**
- Urinalysis at each visit (dipstick)
- Microscopic examination and culture and sensitivity as required
- There is increased risk of asymptomatic bacteriuria in pregnancy that could cause premature labour.

**Maternal serum screening (MSS)**
- Offered to all women with sufficient information and appropriate discussion to allow informed consent. At 15-20 weeks, optimally at 16 weeks gestational if at risk, and if requested by mother
- Based on identified risk and individual clinic situations.

**Amniocentesis**
- Offered to clients over the age of 40 (singleton) or 32 (twins) at the time of delivery, and/or clients with first degree relatives with neural tube defects/spina bifida.
- Offer to clients if MSS is positive.
- All women should receive appropriate counseling first, and offered genetic counseling.

**ABO+Rh**
- If Rh-negative, repeat antibody screen per Blood Services recommendation

**Hemoglobin:**
- Screen once during each trimester (a drop in hemoglobin is expected in the second trimester because of increased blood volume)
- If low, closer monitoring each trimester
- Consider pharmacological/nutrition intervention.
Diabetes Screening

GCT – refers to oral 50-g glucose challenge test

GTT – refers to oral 75-g glucose tolerance test. If woman is not at high risk, perform 50-g glucose challenge test (GCT) at 24-28 weeks gestational age.

If woman is at high risk (morbid obesity, strong family history, previous stillbirth), give the initial oral GCT at 16-20 weeks. May consider oral GTT on consultation with physician.

• Oral GCT value of greater than or equal to 7.8mmol/L at 1 hour is considered positive and f/u by oral GTT of 75G for proper diagnosis and treatment.

• If the oral GCT is greater than or equal to 10.3mmol/L, the patient is diagnosed with GDM and does not need further testing

• If the oral GCT was given at 16-20 weeks, and if negative, then f/u by a second one at 24-28 weeks. May consider oral GTT on consult with physician.

Table 1: Approximate measurements of fundal height ***SFH is equal to the GA after 20 weeks plus or minus 2 cm If there is no change in SFH over 3 weeks, then refer to MD or referral centre for follow-up.

<table>
<thead>
<tr>
<th>Weeks of gestation</th>
<th>Fundal height</th>
<th>Fundal height as measured with fingers</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Not palpable in abdomen (still in pelvis)</td>
<td>Size of an orange (bimanual examination)</td>
</tr>
<tr>
<td>12</td>
<td>Variable</td>
<td>At symphysis</td>
</tr>
<tr>
<td>16</td>
<td>Variable</td>
<td>Halfway between symphysis and umbilicus</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
<td>At umbilicus</td>
</tr>
<tr>
<td>24</td>
<td>24</td>
<td>3 or 4 fingers above umbilicus</td>
</tr>
<tr>
<td>28</td>
<td>28</td>
<td>Halfway between umbilicus and xyphoid process</td>
</tr>
<tr>
<td>32</td>
<td>32</td>
<td>3 or 4 fingers below xyphoid</td>
</tr>
<tr>
<td>36</td>
<td>36</td>
<td>At xyphoid process</td>
</tr>
<tr>
<td>38-40</td>
<td>Variable</td>
<td>2 fingers below xyphoid</td>
</tr>
</tbody>
</table>

* Measurements differ between primigravida and multigravida

Screening (Anatomical) Ultrasound

• Recommend ultrasound between 16-20 weeks (optimal time 18 weeks) for anatomy and confirmation of dates (if not already done).

• Follow-up screens are not routine, and are at the discretion of the referral midwife, nurse practitioner or physician. May need to consult one if soft markers are present or abnormalities are identified.

• If the dates are uncertain, then a first trimester ultrasound is recommended. In this case a second ultrasound is recommended at 18 weeks gestation.

Management: Antenatal Care Goals

• Identify problems and complications early and seek appropriate interventions to contribute to healthy pregnancy

• Ensure maternal and fetal well being

• Provide reassurance and education
**Appropriate Consultation**

Arrange a consultation with the physician once per trimester if possible and as necessary if an abnormality is identified or suspected.

**Client Education**

- Encourage adequate dietary intake of protein and fiber
- Recommend avoidance of overeating and excessive weight gain
- Recommend smoking cessation if appropriate
- Encourage abstinence from alcohol and any drug substances
- Advise client to avoid use of over-the-counter (OTC) drugs
- Counsel client on initial visit re expected laboratory/radiology tests
- Recommend daily exercise to maintain physical and mental health.
- Recommend proper daily personal hygiene
- Teach client about signs of preterm labour
- Recommend loose fitting, comfortable clothing and avoidance of restrictive clothing around legs (e.g. knee socks, "knee highs")
- Counsel client about infant nutrition options early in pregnancy, promote breastfeeding
- Teach proper breast care: cleaning, proper support for breast-feeding
- Advise client that sexual intercourse may be continued if she feels comfortable and there are no specific contraindications (bleeding)
- Encourage attendance at prenatal classes if offered in the community

**Pharmacologic Interventions**

- *Prenatal vitamins (A class drug)*, 1 tab PO daily throughout pregnancy

If hemoglobin < 100 g/L, start iron:
- *ferrous sulfate (C class drug)*, 300 mg PO 1-3 times per day throughout pregnancy

**Rhogam (B class drug)** should be given to Rh-negative women at 28 weeks gestational age. If given earlier, another course should be given 12-13 weeks after the first course. Remember to give Rhogam if pregnancy is terminated spontaneously or therapeutically.

**Usual Schedule for Monitoring and Follow-Up**

- Up to 28 weeks gestational age: every 4 weeks
- 28-36 weeks gestational age: every 2 weeks
- 36 weeks until delivery or evacuation: weekly
- If clinical situations require it, schedule visits more frequently.
- Additional visits at 34 and 35 weeks are recommended in communities from where the patient will eventually need to be transported.

**Referral**

- Refer to physician as soon as possible if high risk identified
- In client’s third trimester, consult with NIC and receiving centre to determine appropriate elective travel date for client.
- Consult the HSSA’s Policy for elective travel for confinement.

**References**

National Institute on Alcohol Abuse and Alcoholism, October 2004

Midmer et al. (1996). The “ALPHA” tool. LAMP and Women’s Habitat, Ontario: The SAFE Tool.

SOGC Fetal Health Surveillance 2002


SOGC. Healthy Beginnings: Guide for Care during the Pregnancy and Childbirth (December 1998) #71.


BC Reproductive Care Program (June 2003) Antenatal Screening and Diagnostic Tests Guideline #17.

SOGC. Screening for Gestational Diabetes Mellitis. (November 2002). #121

SOGC. CPG. The Use of First Trimester Ultrasound (October 2003). #135.


SOGC. CPG Exercise in Pregnancy and the Postpartum Period. (June 2003). #129.
Common Obstetric Problems and Emergencies

Bleeding In Pregnancy
A variety of conditions or problems may cause bleeding during pregnancy (Table 4). Many of these are obstetric emergencies and are discussed in detail below.

Table 4: Differential diagnosis of bleeding in pregnancy

<table>
<thead>
<tr>
<th>Gestational age &lt; 20 weeks</th>
<th>Gestational age ≥ 20 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implantation bleeding</td>
<td>Placenta previa</td>
</tr>
<tr>
<td>Delayed normal menses</td>
<td>Abruptio placentae</td>
</tr>
<tr>
<td>Cervical lesions (erosion, polyp, dysplasia)</td>
<td>Premature labour</td>
</tr>
<tr>
<td>Ectopic pregnancy</td>
<td>Hydatidiform mole</td>
</tr>
<tr>
<td>Spontaneous abortion</td>
<td>Intrauterine death</td>
</tr>
<tr>
<td>(threatened, inevitable, incomplete)</td>
<td>Cervical lesions</td>
</tr>
<tr>
<td>Missed abortion</td>
<td>“Show”</td>
</tr>
</tbody>
</table>

Spontaneous Abortion

Definition
Loss or impending loss of pregnancy before 20 weeks gestation.

Threatened Abortion
• Early symptoms of pregnancy may be present
• Mild cramps with bleeding
• Cervix long and closed
• Uterus appropriate for gestational age
• Progresses to inevitable abortion in approximately 50% of cases

Inevitable Abortion
• Persistent cramps and moderate free bleeding
• Cervical os is open
• Should not be confused with incompetent cervix, which is not associated with cramping and is potentially treatable; incompetent cervix is associated with painless cervical dilatation

Complete Abortion
• Entire conceptus expelled, followed by decrease or cessation of cramps and bleeding
• On examination, uterus is firm and smaller than would be expected for gestational length of pregnancy

Incomplete Abortion
• Symptoms the same as for inevitable abortion but some products of conception are retained in the uterus (where blood clots may be mistaken for tissue) or cervical canal, a situation that causes ongoing cramping and excessive bleeding
• Speculum examination reveals dilated internal os and tissue within the endocervical canal or vagina.
• Bleeding may be heavy.

Missed Abortion
• Products of conception retained 3 or more weeks after fetal death
• Signs and symptoms of pregnancy abate; pregnancy test becomes negative
• Brownish vaginal discharge (rarely frank bleeding) occurs
• Cramping rare
• Uterus soft, irregular and smaller than gestational age
• Ultrasonography rules out live fetus

Septic Abortion
• Any of the above scenarios and temperature > 38°C without other source of fever
• Associated with intrauterine device or instrumentation during therapeutic abortion procedure
• Abdominal and uterine tenderness are present, as well as purulent discharge and possibly shock
Causes
Spontaneous abortion occurs in 15% to 25% of clinically recognized pregnancies and perhaps closer to 50% of all conceptions.
• Fetal abnormalities incompatible with life (chromosomal and other)
• Defective implantation
• Maternal infection
• Uterine and cervical anomalies

History
• Symptoms and signs suggestive of pregnancy (missed period or periods, nausea, vomiting, breast tenderness)
• Cramping pain
• Vaginal bleeding often with passage of tissue

All clients with bleeding sufficient to soak one pad per hour or symptoms of orthostatic drop in blood pressure (dizziness upon standing, faintness) need to be examined.

Physical Findings
Examination should include stability of vital signs, orthostatic vital signs, pelvic examination to look for open or closed cervical os, presence of tissue and other causes of vaginal bleeding (such as cervical erosion, polyp, infection, vaginal lesion or ectopic fetus). The uterus should be measured. Fetal heart tones should be checked carefully with Doppler scanning.
• Heart rate may be elevated
• Blood pressure may be low
• Postural blood pressure drop may be present
• Oxygen saturation may be abnormal if in shock
• Client appears anxious

Pelvic Examination
• Keep to a minimum
• Only use gentle speculum exam on advice of physician
• Threatened abortion: cervical os closed, bleeding from os may be seen
• Inevitable abortion: cervical os open, some products of conception bulging through os, bleeding from os can be seen
• Incomplete abortion: cervical os open, bleeding from os can be seen, mild suprapubic tenderness present, uterus may be small for dates

Differential Diagnosis
• Ectopic pregnancy
• Hydatidiform mole
• Other common causes of vaginal bleeding (e.g. cervical erosion, polyp, cervicitis, local trauma)

For other entities, see Table 4, above, this chapter.

Complications
• Severe hemorrhage
• Hypovolemic shock
• Retention of products with or without endometritis
• Cervical shock (vasovagal hypotension due to dilatation of cervix by tissue)
• An infection

Diagnostic Tests
• Pregnancy test positive in 75% of cases, so negative result does not rule out spontaneous abortion.
• Measure hemoglobin level
• Urinalysis

Management
Goals of Treatment
• Prevent complications
• Control blood loss
• Maintain blood volume

In an outpatient setting it is often difficult to determine if a spontaneous abortion is complete or incomplete. It is probably prudent to manage all spontaneous abortions as incomplete abortions if there is significant, active vaginal bleeding associated with abdominal pain.

Threatened, Incomplete or Inevitable Abortion without Hemodynamic Compromise
If there is no hemodynamic compromise, threatened, incomplete or inevitable abortion should be managed as outlined in Table 5.
Inevitable or Incomplete Abortion in Hemodynamically Unstable Client

Appropriate Consultation
Consult a physician as soon as client is stabilized.

Nonpharmacologic Interventions
- Nothing by mouth
- Bed rest
- Trendelenburg position (prn) to aid venous return
- Insert urinary catheter if client is in shock
- Monitor intake and output hourly
- Aim for urine output of 50 mL/h

Adjuvant Therapy
Initial aggressive fluid resuscitation is needed if client is in hypovolemic shock:
- Start IV therapy with normal saline
- Start two large-bore IV lines if client is hypotensive
- Give 20 mL/kg normal saline as a bolus over 15 minutes
- Reassess for signs of shock
- Repeat 20 mL/kg boluses until systolic blood pressure stabilizes at >90 mm Hg, then adjust rate according to severity of vaginal bleeding and vital signs
- Oxygen to keep saturation > 97%
Refer to protocol for managing hypovolemic shock, under "Shock," in chapter 14, "General Emergencies and Major Trauma."

Pharmacologic Interventions
oxytocin drip (D class drug), 20 units in 1 L normal saline or Ringer's lactate, 50-100 mL/h

If you cannot start IV therapy and bleeding is significant: oxytocin (D class drug), 5-10 mg IM and consult physician.

Verify Rh status and give Rh immune globulin (RhIG) within 48 hours, if indicated (available from the Laboratory Department of Regional Hospitals).

Monitoring and Follow-Up
- Monitor vaginal bleeding, cramps, passage of tissue or clots, vital signs, intake and output
- Save all products of conception passed and send to hospital with client

Referral
Medevac as soon as possible.

References
websites and references: (last accessed 18 September 2006)
http://www.emedicine.com/med/topic3241.htm
Early Pregnancy Loss; Petrozza, J.C. et al
Abortion, Complete; Valley, V.T., et al
http://www.emedicine.com/EMERG/topic5.htm
Abortion, Incomplete; Valley, V.T., et al
Abortion, Inevitable; Valley, V.T., et al
Abortion, Missed; Valley, V.T., et al
http://www.emedicine.com/emerg/topic7.htm
Abortion, Threatened; Gaufberg, S.V.
Abortion, Septic; Gaufberg, S.V.
Table 5: Management of threatened, incomplete or inevitable abortion without hemodynamic compromise

<table>
<thead>
<tr>
<th>Threatened abortion</th>
<th>Incomplete or inevitable abortion</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Rest has traditionally been advised however, there is not enough evidence to suggest that increased rest has any effect on the outcome. <a href="http://www.cochrane.org/reviews/en/ab003576.html">www.cochrane.org/reviews/en/ab003576.html</a> accessed 18 Sept 2006</td>
<td>• Rest is not indicated as it is not expected to save this pregnancy</td>
</tr>
<tr>
<td>• acetaminophen (<strong>A class drug</strong>) 500mg 1-2 tabs PO q4h prn for discomfort</td>
<td>• acetaminophen (<strong>A class drug</strong>) 500mg 1-2 tabs PO q4h prn for discomfort</td>
</tr>
<tr>
<td>• Nothing in the vagina (no tampons, douches, intercourse)</td>
<td>• Nothing in the vagina (no tampons, douches, intercourse)</td>
</tr>
<tr>
<td>• Consider ultrasonography to visualize gestational sac and cardiac activity or to rule out ectopic pregnancy and multiple pregnancy. (Cardiac activity predictive of continued pregnancy in &gt;90% of cases)</td>
<td>• Tissue visible in os should be gently removed with ring forceps to allow contraction of uterus; minimize manipulation to minimize risk of infection</td>
</tr>
<tr>
<td>• Consider monitoring quantitative β-HCG (human chorionic gonadotropin) for prognosis (increase of &lt;66% in 48 hours predictive of abortion or ectopic pregnancy)</td>
<td>• Consider pharmacologic interventions as above</td>
</tr>
<tr>
<td>• Provide emotional support</td>
<td>• Clients with incomplete abortion (tissue passed with continued bleeding) often require suction curettage or dilatation and curettage</td>
</tr>
<tr>
<td></td>
<td>• Provide emotional support</td>
</tr>
</tbody>
</table>
Ectopic Pregnancy

Definition
Implantation and growth of fertilized ovum outside of uterus. Commonly occurs in a fallopian tube, but may also occur in the abdominal cavity, on an ovary or in the cervix. The following applies to tubal ectopic pregnancies.

* Any woman of reproductive age who presents with abdominal pain, cramping and/or vaginal bleeding – ectopic pregnancy should be considered. This is a medical emergency*

Causes
Unknown but accounts for 2% of all pregnancies.

Risk factors
• Previous STI and/or pelvic inflammatory disease
• Current use of intrauterine device
• Previous tubal or abdominal surgery
• Previous ectopic pregnancy
• Relative infertility
• Use of fertility drugs or assisted reproductive technology
• Increasing age – most common in women aged 35-44
• Smoking (may alter tubal/uterine motility, or altered immunity)

History
• Amenorrhea of 6-8 weeks
• If amenorrhea not present most recent period may have been lighter and represent an implantation bleed
• Symptoms of pregnancy, followed by abnormal vaginal bleeding, may be only scanty spotting (Vaginal bleeding is present in ~ 50% of cases)
• Lower abdominal pain: crampy, may be unilateral
• May have had previous positive pregnancy test

Acute (Ruptured) Ectopic Pregnancy
• Accounts for 40% of cases
• May be hemodynamically unstable
• Sudden onset of unilateral lower abdominal pain
• Pain usually severe
• Pain may be constant or intermittent
• Pain may be severe enough to cause fainting
• Pain may become generalized or remain localized in one quadrant
• Pain may radiate to shoulder tip (in cases of massive hemorrhage). This is usually noted in a supine position and/or on inspiration
• Nausea and vomiting frequently present
• Backache may be present

Chronic (Unruptured) Ectopic Pregnancy
• Accounts for 60% of cases
• Slight, persistent vaginal spotting over several days
• Lower abdominal discomfort (often mild)
• Attacks of sharp pain and faintness occasionally present
• Distension may be present

Physical Findings
• Hemodynamically unstable if ruptured (elevated heart rate, hypotensive)
• Postural blood pressure drop may be present as an early sign of blood loss
• Client in moderate-to-acute distress
• Pale, sweating
• Client walks carefully, bent slightly forward, holding lower abdomen (guarding)
• Abdominal distension may be present
• Bowel sounds may be decreased
• Lower abdominal tenderness
• Rebound, guarding, rigidity may be present and are suggestive of rupture

Pelvic Examination
• Caution –pelvic exam should be gentle so as not to rupture an unruptured ectopic.
• Unilateral adnexal tenderness
• Tender adnexal mass or fullness may be present
• Cervical os closed
• Bleeding adnexal mass or fullness may be present
• Pain on movement of cervix
• Uterus may be soft, enlarged, nontender
**Differential Diagnosis**  
- Acute appendicitis  
- Acute pelvic inflammatory disease  
- Ruptured ovarian cyst or torsion of ovarian cyst  
- Other acute abdominal pathology  
- Spontaneous abortion

**Complications**  
- Shock  
- Future ectopic pregnancy  
- Risk of maternal mortality if not treated

**Diagnostic Tests**  
- Pregnancy test: result may be positive or negative  
- Hemoglobin  
- Chronic ectopic: increased WBC  
- Ultrasound is the definitive test to rule out ectopic.

**Management**  
Maintain a high index of suspicion for this diagnosis in a sexually active female who has pain and vaginal bleeding.

**Goals of Treatment**  
- Manage complications  
- Rule out differential diagnoses and treat appropriately (Secondary level assessment may be needed to differentiate – i.e. ultrasound)

**Appropriate Consultation & Referral**  
**Consult a physician as soon as possible for Medevac as urgent surgical intervention may be required.**

If Pain Severe or Client Hemodynamically Compromised  
Severe pain or hemodynamic compromise suggests possible rupture.

**Nonpharmacologic Interventions**  
- Bed rest  
- Trendelenburg position (prn) to aid venous return if client is in shock  
- Nothing by mouth  
- Monitor vital signs  
- Insert urinary catheter

**Adjuvant Therapy**  
- Oxygen to keep saturation ≥ 97%  
- Start 2 large-bore (14 or 16-gauge) IV lines with normal saline or Ringer's lactate  
- Reassess for signs of shock

See protocol for managing hypovolemic shock, under "Shock," in chapter 14, "General Emergencies and Major Trauma."

**Monitoring and Follow-Up**  
- Monitor vital signs closely q5-15min  
- Monitor intake and urine output hourly

**References**  

[http://www.cmaj.ca/cgi/content/full/173/8/905](http://www.cmaj.ca/cgi/content/full/173/8/905)

[http://www.aafp.org/afp/20000215/1080.html](http://www.aafp.org/afp/20000215/1080.html)
Hydatidiform Mole

Definition
Mass of vessels resulting from cystic proliferation of chorionic epithelium. May be benign or malignant. Forms part of the spectrum of tumours termed Gestational Trophoblastic Disease.

Causes
Most complete hydatidiform moles are 46XX and all the chromosomes come from the male; 10-15% are 46XY, (2 sperm, 1 carrying an X and the other a Y fertilize an empty egg). Partial hydatidiform moles are 69 XXY and 2 sets of chromosomes are of paternal origin.

History
• Bleeding during late first trimester, early second trimester
• Vaginal blood dark brown to bright red
• Spotting or profuse bleeding
• Passage of cysts (in grape-like clusters)
• Absence of quickening
• Pre-eclampsia may be present
• Exaggerated signs of pregnancy
• Excessive nausea and vomiting (may present as hyperemesis gravidarum)

Physical Findings
• Blood pressure may be elevated
• Fundal height may be greater than expected for dates
• Examine all material passed per vagina for presence of cysts
• Uterus larger than expected for dates
• Mild uterine tenderness may be present because of over-distension
• Fetal parts not felt
• Fetal heart not heard

Most clients are symptomatic before 17th week of pregnancy.

Suspect this diagnosis in clients with the following signs and symptoms:
• Pregnancy-induced hypertension during first half of pregnancy
• Hyperthyroidism
• Bleeding during pregnancy, accompanied by no detectable fetal heartbeat and uterine enlargement after 12 weeks gestation by dates

Differential Diagnosis
• Threatened or inevitable abortion

For differential diagnosis of bleeding in pregnancy, see "Bleeding in Pregnancy," above, this chapter.

Complications
• Hemorrhage
• Sepsis
• Choriocarcinoma (typically occurs later)

Diagnostic Tests
• Urine pregnancy test
• Urinalysis: routine and microscopic
• Measure hemoglobin level if client is bleeding
• Quantitative serum HCG. Any level >100,00mIU/ml should arouse suspicion of molar pregnancy.
• CBC, RFTs, LFTs, Thyroxin
• Ultrasound to rule out hydatidiform mole.

Management
Goals of Treatment
• Identify condition early
• Prevent complications

Appropriate Consultation
Consult a physician if this diagnosis is suspected.

Client Education
• Because of the small but real potential for development of malignant disease, and because these malignancies are absolutely curable, the importance of consistent follow-up care (after uterine evacuation) must be emphasized.
• The patient must avoid pregnancy until HCG levels have remained normal for 6 months
• Effective contraception should be used. If a pregnancy was to occur, the elevation in beta-
HCG levels could not be differentiated from the disease process.
• Future pregnancies should undergo early sonographic evaluation because of the increased risk of recurrence of a molar gestation.
• The risk of recurrence is 1-2%.
• Regular pelvic examinations
• CXR is indicated if HCG levels rise

**Referral**
Refer for definitive assessment, which requires ultrasonography and measurement of serum human chorionic gonadotropin (HCG) as soon as possible. Definitive treatment is surgical evacuation.

**Long-Term Follow-up**
Follow up after surgery is critical.

• Serial measurement of HCG (weekly) until three consecutive negative results, then monthly for 6-months
• Regular pelvic examinations
• CXR indicated if serum HCG rises.
• Emotional support

**References**
www.sogc.org SOGC. Gestational Trophoblastic Disease. (May 2002). #114

http://www.emedicine.com/med/topic1047.htm
Hydatidiform Mole; Moore, L., et al

http://www.emedicine.com/med/topic866.htm
Gestational Trophoblastic Neoplasia; Hernandez, E.
Hyperemesis Gravidarum (HG)

**Definition**
HG is defined as excessive vomiting that leads to weight loss >5% of prepregnancy weight, with associated electrolyte imbalances and ketonuria (Occurs in about 1% of pregnancies). Will need a physician consult if this severe.

**Causes**
Largely unknown. Can involve many contributing factors.

**History**
- Persistent and excessive nausea and vomiting throughout the day
- Client unable to keep down any solids or liquids

If the condition is prolonged, client may also report:
- Fatigue
- Lethargy
- Headache
- Fainting
- Weight loss
- Anxiety
- Depression
- Signs of hypokalemia

**Physical Findings**
- Heart rate may be elevated and weak (due to fluid loss)
- Blood pressure normal, but may be low if dehydrated
- Postural blood pressure drop may be present if dehydrated
- Weight may be reduced from previous measurement
- Client appears in mild-to-moderate distress (The nausea and vomiting in pregnancy (NVP) may be mild, moderate or severe but may not accurately reflect the distress it causes). The negative impact of NVP on relationships has major consequences on women’s working abilities- 47% feel job efficiency is reduced, 35% lose work time, and 25% lose time from home life.

- Various degrees of dehydration may be present: skin may be pale, eyes may appear sunken, mucous membranes may be dry, skin turgor may be poor

**Laboratory Findings**
- Urinalysis: urine concentrated; ketones may be present
- Oliguria
- Anemia
- Electrolyte imbalances.

**Differential Diagnosis (complete history taking and physical exam must be done)**
- Hydatidiform mole
- Multiple gestation
- Other medical causes of vomiting (e.g. gastroenteritis, pancreatitis)
- Mood disorders
- Thyroid disorder
- Renal disorder
- Helicobacter pylori

**Complications**
- Dehydration
- Electrolyte disturbances
- Nutritional deficiencies
- Intrauterine growth retardation (IUGR)
- Fetal death
- Maternal anxiety and depression

**Diagnostic Tests**
- Urinalysis: routine and microscopic
- CBC, electrolytes
- Consider ultrasound for growth and to rule out multiple pregnancy, and molar pregnancy.

**Management**
**Goals of Treatment**
- Recognize condition early to prevent progression and hospitalizations.
- Prevent complications
NWT Clinical Practice Guidelines for Primary Community Care Nursing

• Exclude organic causes (e.g. urinary infection, hepatitis, disorders of the gastrointestinal tract, gallbladder or pancreas)

**Appropriate Consultation**

- Consult a physician if nonpharmacologic interventions fail to control symptoms in milder cases
- Consult a physician immediately if the woman shows signs of dehydration

**Nonpharmacologic Interventions**

- Ginger supplementation
- Reassure client that condition improves with time, usually by end of first trimester
- Advise client to arise slowly and to keep soda crackers at the bedside (to be eaten before rising)
- Suggest that client eat small amounts, at frequent intervals, of whatever food and fluids appeal
- Emphasis is on intake, not on content, while client is symptomatic; see Table 3 for suggestions of foods that appeal to pregnant women because of their taste and texture. There is no evidence to prove that dietary changes relieve the NVP. SOGC recommends dietary and lifestyle changes should be liberally encouraged and women should be counseled to eat whatever appeals to them
- Suggest that someone else do the cooking at home, as food odors may initiate nausea
- Omit iron and vitamin supplementation until nausea resolves (the use of B6 complex is encouraged in pregnancy.
- Ask client to monitor intake and urine output at home
- Recommend increased rest, as fatigue seems to exacerbate symptoms; client may need help with other children in the home
- Arranging for leaves of absence from work early in the pregnancy may reduce the overall time lost from outside employment
- Psychotherapeutic measures (e.g. stimulus control, biofeedback, relaxation techniques and imagery) may be helpful
- Acupressure at the P6 (Neiguan) point has been demonstrated to be helpful. This point is on the inner aspect of the wrists, just proximal to the flexor crease. (e.g. Seabands®)

**Pharmacologic Interventions**

Consult with physician for drug(s) of choice and dosage routine if medication needed to control vomiting. Patient prescription may be required.

gravol (A class drug) can be used for short term relief.

diclectin as per physicians order

Consider Esophageal reflux therapies (antacids and ranitidine)

**Monitoring and Follow-Up**

Follow up weekly until symptoms resolve:
- Measure fundal height and compare with previous values
- Monitor fetal heart rate
- Monitor vital signs, urine output and ketones
- CBC and electrolytes
- Ultrasound for growth if needed
- Observe dental enamel for damage and encourage dental hygiene

**Adjuvant Therapy**

If client is significantly dehydrated:
- Initially maintain nothing by mouth
- Bed rest
- Start IV therapy with normal saline
- Adjust rate according to state of hydration
- Transfer or medevac

---

**Table 3: Foods that may appeal to pregnant women**

<table>
<thead>
<tr>
<th>Taste or texture</th>
<th>Food suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salty</td>
<td>Chips, pretzels</td>
</tr>
<tr>
<td>Tart, sour</td>
<td>Pickles, lemonade</td>
</tr>
<tr>
<td>Earthy</td>
<td>Brown rice</td>
</tr>
<tr>
<td>Crunchy</td>
<td>Celery sticks, apples</td>
</tr>
<tr>
<td>Bland</td>
<td>Mashed potatoes</td>
</tr>
<tr>
<td>Soft</td>
<td>Bread, noodles</td>
</tr>
<tr>
<td>Sweet</td>
<td>Sugary cereal</td>
</tr>
<tr>
<td>Fruity</td>
<td>Juicy, fruity popsicles</td>
</tr>
<tr>
<td>Wet</td>
<td>Juices, seltzer drinks</td>
</tr>
<tr>
<td>Dry</td>
<td>Crackers</td>
</tr>
</tbody>
</table>
If hypovolemia is present, see protocol for managing hypovolemic shock, under "Shock," in chapter 14, "General Emergencies and Major Treatment"

References

SOGC The Management of Nausea and Vomiting of Pregnancy. (October 2002) #120.

The Motherisk Nausa and Vomiting of Pregnancy (NVP) Forum
http://www.motherisk.org/women/forum.jsp
Multiple Gestation

Definition
Presence of more than one fetus in a single pregnancy. While there are important considerations, this is a normal variation.

Causes
• Fertilization of more than one ovum
• Splitting of one fertilized ovum into two separate fetuses
• Predisposing factors: familial history of multiple gestation, treatment of infertility with ovulatory drugs
• Older >30
• High parity or history of previous multiple birth

History
Suspect multiple gestation in clients with family history of multiple gestation and in those receiving drug treatment for infertility.
• Discomforts of pregnancy may present earlier and are more pronounced
• Morning sickness, nausea and heartburn may present earlier and are more persistent
• Later in pregnancy, dyspnea and indigestion are more pronounced

Physical Findings
• Fundal height greater than expected for dates
• Fetal movements may be seen over wide area
• Excessive number of fetal parts may be felt
• Two distinct fetal hearts may be heard
• Weight gain above the expected, especially early in pregnancy
• Elevated hCG and alpha-fetoprotein above expected levels.

Differential Diagnosis
• Polyhydramnios
• Large single baby (macrosomia)

Complications
Maternal Complications
• Preeclampsia (can develop sooner and be more severe)
• Anemia
• Premature labour and delivery
• Polyhydramnios
• Hyperemesis gravidarum
• Post-partum haemorrhage

Fetal Complications
• Intrauterine growth retardation (IUGR)
• Congenital anomalies (twice the risk)
• Intrauterine death
• Prematurity
• Twin to twin transfusion

Diagnostic Tests
• Ultrasonography is needed for definitive diagnosis and to confirm chorionicity.
• Serial Ultrasounds (i.e. every 2 weeks) beginning at 24 weeks gestational age to assess the growth of each fetus, rule out discordancy, anomalies and feto-fetal transfusion syndromes, and are also used to measure cervical length.
• GBS swab and STI screen at 32 weeks as delivery prior to 40 weeks gestation is common
• CBC – once a trimester at least, and more frequently if hemoglobin is below 10, nutrition is not adequate, or other concerns such as poor weight gain. There is an increased demand for iron in all pregnancies and this is intensified in a multiple gestation.
• MSS – at 15-20 weeks, optimally at 16 weeks.
• Amniocentesis – offered at maternal age of 32 years or more at time of delivery or if MSS is positive.

Management
Goals of Treatment
• Identify multiple gestation early
• Identify complications early

Appropriate Consultation
• Consult a physician if this diagnosis is suspected as regular physician follow up will be required, and a referral to an Obstetrician/Gynecologist may be required for delivery. Thereafter, consult physician if complications are suspected or detected.
• Consult a nutritionist, or a dietician as nutritional demands are increased in a multi-
fetal pregnancy. This consult may be done as a teleconference.

**Nonpharmacologic Interventions**
- Assess family support and readiness for multiple birth and possible prematurity. This should also include possible transfer of the client and/or infants to Yellowknife or Edmonton.
- Arrange earlier transfer (i.e. 34 weeks) to tertiary setting to await delivery as with most multi-fetal pregnancies delivery occurs at about 36 weeks of gestation.
- Notify expected place of delivery of twin pregnancy. Due to staffing levels and gestation at birth the woman and infants may need to be transferred out of NT.

**Client Education**
- Symptoms of preterm labour
- Prepare family for possible Cesarean section. Most twins if vertex can be delivered vaginally. Cesarean section is indicated under certain conditions determined by physician.
- Instruct client about proper nutrition (including vitamin and iron supplementation): nutritional demands in a multi-fetal pregnancy differ from those of a singleton pregnancy, and an increase of 300 kcal daily over intake for a singleton pregnancy is recommended.

**Pharmacologic Interventions**
*None for multi-fetal pregnancy – as per all other pregnancies, and pregnancy related complications.*

**Monitoring and Follow-up**
- Follow up in clinic biweekly from time of diagnosis
- Regular visits as determined by physician

**Referral**
As discussed refer to physician and dietician/nutritionist

**References**


Last updated Aug. 6, 2005

Last updated May 2
Polyhydramnios

Definition
Accumulation of excessive amounts of amniotic fluid (>1500 mL).

Causes
- In ~65% of cases of polyhydramnios the cause is unknown
- Gestational diabetes
- Multiple gestation
- Fetal anomalies (e.g. neural tube defect)
- Fetal infection (CMV, Toxoplasmosis, Rubella, Syphilis)
- Isoimmunization

History
- Develops after 28-32 weeks of gestation
- Presence of predisposing maternal conditions (diabetes)
- Abdominal discomfort due to overstretching of uterus and abdominal wall
- Dyspnea and heartburn due to excessive elevation of diaphragm
- Leg and vulvar edema
- Excessive weight gain

Physical Findings
- Weight increased by 2-4 kg in 4 weeks above weight gain expected for gestation without explanation
- Uterus larger than expected for dates
- Shape of abdomen is globular
- Skin over abdomen shiny, with prominent veins and marked striae
- Fundal height greater than expected for dates
- Fetal parts difficult to feel
- Uterus tense
- Fetal heart beat muffled or distant or may be inaudible

Differential Diagnosis
- Multiple pregnancy

Complications
- Premature labour
- Malpresentation
- Prolapse of umbilical cord with rupture of membranes
- Postpartum hemorrhage
- Preeclampsia
- Placental abruption
- Renal Dysfunction (maternal & fetal)

Diagnostic Tests
- Anatomical Ultrasonography needed to confirm diagnosis and for detailed anatomy to rule out congenital anomalies.

Management
Goals of Treatment
Identify condition early.

Appropriate Consultation
Consult a physician if this diagnosis is suspected.

Nonpharmacologic Interventions
Provide support and counseling as necessary to client and family.

Pharmacologic Interventions
None.

Referral
Arrange referral for investigation

References
Boyd, R.L. and Carter, B.S. E-Medicine: Polyhydramnios and Oligohydramnios
http://www.emedicine.com/ped/topic1854.htm
Last updated May 19, 2006

Perinatal Institute: Fundal Height Measurement, Example 4: Excessive Growth
Accessed Oct. 9, 2006
Gestational Diabetes

NOTE: If client has pre-existing diabetes, it is an automatic referral to a physician for guiding care.

Definition
Gestational diabetes consists of both insulin resistance and diminished insulin secretion that develops during pregnancy. The mother has increased risks for gestational hypertension, polyhydramnios, UTI’s, and operative delivery secondary to macrosomia and sequela. After the birth, blood sugars usually return to normal levels; however, research shows that the occurrence of gestational diabetes increases the future risk for progression of type 2 diabetes mellitus.

Causes
• Genetic predisposition
• Increased tissue resistance to insulin during pregnancy, due to increased levels of estrogen and progesterone
• Preexisting diabetes

Current Risk Factors
• Maternal obesity (BMI >40)
• Previous diagnosis of GDM or glucose intolerance
• Excessive weight gain during pregnancy
• Hyperlipidemia
• Hypertension
• Repeated glycosuria (> +1)
• Maternal age > 35 years
• Member of high-risk population (e.g. Aboriginal people, Hispanic, Asian or African descent)
• First degree relative with diabetes
• Past history of glucose intolerance
• Past adverse obstetrical history whose outcomes usually related to gestational diabetes (large baby > 4500 gm, shoulder dystocia)
• Recurrent miscarriages
• History of congenital anomalies (if poor glucose control during fetal organ formation)
• Polycystic ovary syndrome and / hirsutism
• Corticosteroid use

History
Most clients with gestational diabetes are asymptomatic.
• Polydipsia
• Polyuria
• Polyphagia
• Weight loss
• Failure to gain weight
• Recurrent urinary tract infections or vaginal candidiasis
• Blurred vision
• Headaches
• Drowsiness
• Hyperpnea (deep respirations)
• Nausea
• Signs of hypoglycemia

Physical Findings
• Fundal height may be greater than expected for gestational dates as per rule of plus or minus 2 cm after 20 weeks gestation.
• Polyhydramnios on ultrasound

Laboratory Findings
• Urine: glucose or ketones may be indicated by dipstick test
• 24-28 week GCT > 7.8 mmol (see NWT Guidelines and Diabetes algorithm)

Complications
Maternal
• Ketoacidosis
• Postpartum hypoglycemia
• Polyhydramnios
• Premature labour and delivery
• Complication in labor and delivery related fetal size (macrosomia is defined as > 4500 grams)
• Post partum hemorrhage

Fetal
• Intrauterine death
• IUGR
• Prematurity and Sequalea
• Neonatal hypoglycemia
• Congenital malformations
• Neonatal death

**Diagnosis Tests**

**Gestational Diabetes Screening**

*If woman is not at high risk*, perform 50-g glucose challenge test (GCT) at 24-28 weeks gestational age.

*If woman is at high risk* (morbid obesity, strong family history, previous stillbirth) or has symptoms suggestive of gestational diabetes, give the initial oral GCT at 16-20 weeks. May consider oral GTT on consult with physician.

- Oral GCT value of greater than or equal to 7.8mmol/L at 1 hour is considered positive and f/u by oral GTT of 75G for proper diagnosis and treatment.
- If the oral GCT was given at 16-20 weeks, and if negative, then f/u by a second one at 24-28 weeks. May consider oral GTT on consult with physician.

**Table 2: Diagnostic glucose levels in 2-hour glucose tolerance test**

<table>
<thead>
<tr>
<th>Time after glucose load</th>
<th>Diagnostic glucose level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>≥ 5.3 mmol</td>
</tr>
<tr>
<td>1 hour</td>
<td>≥ 10.6 mmol</td>
</tr>
<tr>
<td>2 hours</td>
<td>≥ 8.9 mmol</td>
</tr>
</tbody>
</table>

Source: guidelines screening for gestational diabetes (2003 clinical practice guidelines for management of diabetes in Canada)

**Referral to physician needed if the results fall within these values. (Done through regular referral procedure if no access to an MD in community)**

**Management**

**Goals of Treatment**

- Identify condition early
- Optimize control of blood sugar
- Prevent maternal and fetal complications
- Recommend glucose levels pre-prandial < 5.3

**Appropriate Consultation**

Consult a physician as soon as abnormal glucose tolerance is diagnosed in a pregnant woman. Internal Medicine specialist may be consulted by the GP. Thereafter, consult a physician if client fails to gain weight or loses weight, has discrepancies in fundal heights and if she is symptomatic.

**No pharmacologic Interventions**

Dietary adjustment is the mainstay of therapy

- Referral to diabetic clinic.
- Caloric intake should be 30-35 kcal/kg daily
- “Going on a diet” not encouraged.
- Client should avoid cakes, candy and other fast-acting carbohydrate foods
- Dietary composition should be 50% to 60% carbohydrate, 20% to 25% protein and 20% fat, with high fiber content
- Three meals and three snacks, one at bedtime, is recommended. Keep it simple. “NO powdered juice” diet
- Complex carbohydrates are recommended (e.g. bread, pasta, beans, potatoes). Portion size of fist
Discourage excessive salt use
Encourage exercise, which has been shown to be especially beneficial when used in combination with dietary therapy
Encourage home glucose monitoring as per the diabetic clinic’s recommendations
Encourage use of a diabetic log, and review home monitoring at each visit
Prevention of excessive weight gain is important
Provide support and reassurance during pregnancy
Follow diabetic clinic’s recommendations on a patient specific basis.

**Pharmacologic Interventions**
If fasting glucose remains >10.3 mmol/L, insulin therapy is indicated and will be prescribed by the physician.

Insulin requirement tends to rise as pregnancy progresses, so frequent dose adjustments may be needed. Woman may need to travel to see MD more often.

**Monitoring and Follow-Up (unless ordered otherwise)**
Follow up every 2 weeks until 36 weeks gestational age and then weekly. Assess the following:
- Dietary compliance
- Weight gain or loss
- Peripheral edema
- Blood pressure
- Uterine size
- Fetal growth
- Home glucose monitoring results

Check patient’s blood sugar log at each visit. Do finger poke with each prenatal visit. Recommended preprandial level < 5.3 mmol. Follow diabetic clinic and physician’s recommendations. Consult with a physician if evidence of poorly controlled glucose levels or changes needed to treatment regime. May need to travel to see an MD. Plan for early referral for delivery.

**Ultrasonography**
- Ultrasonography should be done early in the pregnancy for accurate gestational dating.
- Follow up ultrasounds will be determined by the physician in consultation with OB/GYN. Growth may be monitored more frequently due to the diabetes.

**Other Follow-Up**
- After 40 weeks of gestation, fetal surveillance is initiated, and delivery is recommended if there is any evidence of fetal compromise.
- Women with gestational diabetes should have a 75-g oral glucose tolerance test (OGTT) 6-12 weeks postpartum to rule out persistent carbohydrate intolerance.

Counsel the client that her risk of frank diabetes at some point later in her life is approximately 35%.

**Referral**
- Referral to settlement physician to internal medicine for complex care is usually needed for all but the mildest cases
- Follow-up should be by a physician whenever possible
- Client would benefit from assessment and counseling by a dietician if this service is readily available

Consult with settlement physician about optimum time for transfer out of community for delivery.

**References**
Gestational Diabetes

Screening for Gestational Diabetes
Assess risk and screen early if multiple risk factors. All pregnant women should be screened for glucose abnormalities between 24 and 28 weeks gestation.

Assess Risk
*If multiple risk factors present, screen in the first trimester and repeat as needed.*

All pregnant women between 24 – 28 weeks gestation

- Glucose challenge test (GCT) = plasma glucose drawn 1 hour post 50 g glucose drink

- Plasma glucose <7.8 mmol/l
  - **No gestational diabetes.**
  - Retest if risk factors warrant

- Plasma glucose 7.8 – 10.2 mmol/l
  - Administer 75 g OGTT
    - AC ≥ 5.3 mmol/L
    - 1 hr ≥ 10.6 mmol/L
  - If 1 value met or exceeded
  - IGT of pregnancy
    - Initiate diet + testing
    - And re-evaluate lab glucose in 2 – 4 wks.
  - If 2 values met or exceeded
  - Gestational Diabetes
    - Initiate diet, testing and/or insulin as required for treatment

- Plasma glucose ≥10.3 mmol/L
  - Gestational Diabetes
  - Initiate diet, testing and/or insulin as required for treatment
Hypertension in Pregnancy

Definition
Hypertension in Pregnancy is found in 10% of cases and is classified in four categories:

1. Chronic or Pre-existing hypertension: Begins prior to pregnancy, or prior to 20 wks gestation, and BP >140/90 mmHg. Is not associated with proteinuria, end-organ damage, and persists after delivery.

2. Gestational hypertension with proteinuria, edema & sustained hypertension (a.k.a. Preeclampsia)
   • Mild: BP >140/90 mmHg <160/110 mmHg (or an increase of 30/15 mmHg respectively), Proteinuria 1+ - 2+ (<300mg/24hr, on 24 hr urine), no end organ damage, no pathological edema. Severe: BP >160/110 mmHg.
   • Proteinuria 3+ - 4+ (>500mg/24hr on 24 hr urine), end organ damage present (HELLP*, oliguria, IUGR), may have unexpected wt. gain (>1kg/week)

3. Pre-existing hypertension with superimposed gestational hypertension with proteinuria. (Patient’s with pre-existing hypertension may develop significant proteinuria, end organ damage, pathological edema {preeclampsia})

4. Gestational Hypertension without proteinuria. Usually diagnosed in the latter half of the pregnancy, is transient in nature, no proteinuria, no end organ damage, may develop within 24 hours postpartum, but resolves approximately 2 weeks post partum. Hypertension that is diagnosed antenatally, but final classification to be made 6 weeks after delivery

*HELLP syndrome – hemolysis, elevated liver enzymes, low platelets

Causes
• Unknown
• Predisposing factors: hypertension, primigravida, <20 years or >35 years of age, diabetes mellitus, chronic renal disease, multiple gestation, polyhydramnios, hydatidiform mole

• If father of this pregnancy is different than the previous pregnancy

History
• History of pregnancies – often found in primigravida, or first pregnancy with new partner
• Age of client
• Thorough family history to rule out possible presence of one of predisposing factors listed above
• Excessive weight gain may be first warning signal
• Symptoms that range from minimal to severe (see physical findings)

Physical Findings
• Physical findings depends on severity of disease (Edema is not a diagnostic criteria for Gestational Hypertension)
• Severity of the disease is determined by relative increase in blood pressure above client’s normal readings, and presence of signs and symptoms.
• Hypertension in pregnancy requires preeclampsia to be ruled out (proteinuria, end organ damage), therefore the symptoms are related to end organ damage and are listed by system and from mild to severe:

CNS:
Headache, visual disturbances (mobile spots), hyper-reflexes, stuporous, unconscious, clonus, seizures (eclampsia – see following page on eclampsia), stroke, coma

CVS:
Increasing severe blood pressure, HELLP syndrome (hemolysis, elevated liver enzymes, low platelets)

Resp:
Dyspnea related to pulmonary edema

Abd:
Nausea and vomiting, RUG / epigastric pain secondary to liver damage, abruptio placentae,

GU:
Proteinuria (see definitions), oliguria,

Fetal:
Tachycardia >160bpm, IUGR secondary to placental insufficiency, fetal acidosis
Recommendations On Criteria For Diagnosis

- See Definitions for clarity
- Except for very high diastolic readings (≥ 110 mm Hg or more), all diastolic readings ≥ 90 mm Hg should be confirmed/repeated after 4 hours.
- A rest period of 10 minutes should be allowed before the blood pressure is measured. The woman should be sitting upright and a correctly sized cuff should be positioned at the level of the heart.

If any proteinuria present:

- Rule out other causes (UTI, vaginal discharge, etc.)
- See client again soon and reassess urine, BP and check for signs and symptoms
- If proteinuria present on consecutive visit with no other causes, or with elevated BP, or other symptoms, do a 24 hour urine collection
- Edema and weight gain should not be used as diagnostic criteria.

Laboratory Findings

- Proteinuria on dipstick (consider 24 hour urine)
- May find low platelets (HELLP syndrome)
- Monitor for elevated liver enzymes

Complications

- Preterm delivery (as definitive treatment for gestational hypertension with proteinuria is delivery)
- Abruptio placentae
- Baby small for gestational age (e.g. intrauterine growth retardation [IUGR])
- HELLP syndrome (Hemolysis, elevated liver enzymes, low platelet count)
- Disseminated intravascular coagulation (DIC)
- Aspiration or injury during seizure
- Maternal and fetal morbidity and mortality

Diagnostic Tests

- CBC, PT, PTT
- Urinalysis and 24 hour urine, BUN & Cr
- Liver Function Tests

Management

Goals of Treatment

- Identify the condition early to prevent progression
- Prevent maternal and fetal complications (See 'physical findings')
- Prevent eclampsia

Appropriate Consultation

- Consult a physician if hypertension in pregnancy is present.
- Do not delay consultation if proteinuria, or symptoms present. May require medevac if signs and symptoms present or progress.
- Urgent consultation with physician in referral centre if BP is 160/110 or more.

Client Education

- Explain disease course and expected outcome.
- Stress the necessity of frequently monitoring condition for early detection of disease progression.
- Instruct client to return to clinic immediately if signs and symptoms occur and/or progress.
- Possibility of referral out with a prolonged stay in Community of Delivery.

Non-pharmacologic Interventions

- Non-pharmacologic management should be considered for any pregnant woman with a systolic blood pressure of 140-150 mm Hg or a diastolic pressure of 90-99 mm Hg, or both, as measured in a clinical setting.
- A short-term stay in hospital may be required for definitive diagnosis (serial blood pressure, ultrasonography, lab tests)
- Management, dependent on blood pressure, gestational age, and presence of associated maternal and fetal risk factors, includes close supervision, limitation of activities and some bed rest.
- A normal diet without salt restriction is advised.
- Pre-existing hypertension should be managed the same way as before pregnancy. However, additional concerns are the effects on fetal well-being and the worsening of hypertension during the second half of pregnancy.
There is, as yet, no treatment that will prevent exacerbation of the condition. If severity increases:

- Bedrest in a quiet, dark room
- Position client on her left side
- Be prepared for possibility of eclampsia – oral airway, NPO, suction/ambubag, record seizure time, length, and type.
- Foley catheter and maintain urine output >25mL/hr, check proteinuria hourly.

**Pharmacologic Interventions**

**For mild gestational hypertension with or without proteinuria:**

- Antihypertensives – if patient was on antihypertensive treatment prenatally, continue with this after consultation with physician. *methylodopa (B class drug)*, as per physician prescription

**Monitoring and Follow-Up**

- Monitor vital signs and general condition for progression of symptoms
- Monitor symptoms related to complications (headaches, abdominal pain, reflexes, etc.)
- Assess fetal heart, fetal movement and fetal growth
- Provide symptomatic support
- May require weekly prenatal assessments

**Referral**

Medevac to hospital for evaluation may be advisable if there are significant symptoms and risk.

**For severe gestational hypertension with proteinuria:**

Refer to your HSSA protocol.

Infuse over 15 minutes:

*magnesium sulfate (B class drug)*, 2-4 g in 100 mL of normal saline via a drip chamber

Then reassess respiratory rate and reflexes.

Piggyback administration of this drug via a main line is required.

Magnesium sulfate is a cerebral depressant that reduces neuromuscular irritability. It can cause vasodilation and reduction in blood pressure.

Symptoms of magnesium sulfate toxicity: respiration rate of less than 8, respiratory depression or arrest, maternal sedation, reduced or absent deep tendon reflexes, cardiac arrest, coma. The antidote is *calcium gluconate (B class drug).*

**Keep preloaded syringe of 10% calcium gluconate at bedside.**

After the loading dose of magnesium sulfate:

*solution of 20 g magnesium sulfate in 1 L normal saline or Ringer's lactate, 1-2 g/h (50-100 mL/h)*

Transport may be commenced once the loading dose is complete and the maintenance dose has been started.

**Monitoring and Follow-Up**

- Monitor state of consciousness and respiratory rate constantly; monitor deep tendon reflexes (patellar) and blood pressure q15min; monitor fetal heart rate q30min.
- If respiratory rate 8-12/min, reflexes reduced or urine output < 100 mL in previous 4 hours, reduce infusion of magnesium sulfate by 50%.
- If respiratory rate < 8/min or reflexes absent, stop infusion of magnesium sulfate, then unclamp main line of Ringer's lactate and run at 100 mL/h. Consult a physician and then give antidote:

*10% calcium gluconate (B class drug), 10 mL(1 g)*

IV over 5-10 minutes

If a seizure occurs:

- Suction nasopharynx prn
- Administer oxygen
- Position the client on her side and cushion appropriately
- Record length and type of seizure
- After seizure, assess uterine contractions, vaginal bleeding, uterine tenderness, abdominal pain and fetal heart rate
- Discuss the use of additional seizure medications with physician
• In case of prolonged seizure activity, consideration should be given to tracheal intubation.

Antihypertensive therapy is added if maternal diastolic blood pressure is ≥ 105 mm Hg:
hydroalazine (B class drug), 5 mg IM stat or 1 mg IV as test dose, then 5-25 mg IV over 2-4 minutes;

May need to be repeated in 20-30 minutes (5-10 mg IV) if the blood pressure is not reduced effectively with the first dose. With severe hypertension (diastolic pressure ≥ 110 mm Hg), the administration of an antihypertensive agent should be considered as follows: hydroalazine (B class drug), 5-10 mg via intermittent IV bolus administration.

Check blood pressure every 5 minutes.
Do not decrease the diastolic pressure to < 90 mm Hg as this would reduce the placental perfusion and be detrimental to the fetus. Abruptio placentae is a possible complication of acute changes in blood pressure.

Precautions with Hydralazine
• Antihypertensive effects start within 30-60 minutes and last for about 4-6 hours
• Contraindication: heart disease
• Side effects: tachycardia, palpitations, faintness, headache, hypotension

Referral
Medevac as soon as possible.

Immediate Medevac required if progression of signs and symptoms, or risk for eclampsia (seizures).

References
Canadian Hypertension Society (2006)
ALARM (Advances in Labour and Risk Management), (SOGC, 2003)
http://www.bchealthguide.org/kbase/topic/major/hw2834/descrip.htm

Michael B Brooks, MD, Consulting Staff, Department of Emergency Medicine, St. Mary-Corwin Medical Center, (emedicine, 2005).

Paul Gibson, MD, Assistant Professor, Departments of Medicine and Obstetrics and Gynecology, Division of General Internal Medicine, University of Calgary, (emedicine, 2006)
Therapeutic approach to hypertension during pregnancy: Extrapolation of findings from reproductive studies in animals to humans

Arieh Lalkin, MD; Ronen Loebstein, MD; Antonio Addis, PHARMD; Gideon Koren, MD, FRCPC, 1998 (www.motherrisk.org)
Hypertensive Crisis (Eclampsia)

Definitions
- **Eclampsia**: Convulsions or coma in pregnant or postpartum woman. Convulsion may occur in a stable client with mildly elevated blood pressure in absence of excessive weight gain and/or edema.
- **HELLP syndrome**: hemolysis, elevated liver enzymes, low platelet count.

History
A complete history and physical should be completed and include but not limited to:
- Grand mal seizure may have occurred before presentation
- Facial twiching may rapidly progresses to body rigidity
- Generalized contraction and relaxation of body muscles follows
- Typically lasts for 60-75 seconds
- Coma follows the convulsion
- Client usually does not remember anything of the event
- Respiration absent during seizure
- Rapid and deep respiration usually begins after convulsion ends

One-third of seizures occur prenatally, one-third occur during labour, and one-third occur within the first 24 hours postpartum.

Physical Findings
- Physical findings in eclampsia are extremely variable
- Client in acute distress (respiratory, CNS, end organ damage – e.g. renal, liver, lungs)
- May be stuporous, unconscious or in convulsion
- Vomiting or retching may be present
- Deep tendon reflexes hyperreactive
- Clonus may be present
- Urine: proteinuria present

Complications
- Maternal injury during seizure/s
- End organ disease and/or damage
- Aspiration
- IUGR - Fetal distress
- Preterm labour and delivery
- Abruptio placentae
- HELLP syndrome (hemolysis, elevated liver enzymes, low platelet count)
- Disseminated intravascular coagulopathy - hemorrhage
- Stroke (CVA)
- Maternal death
- Fetal death

Diagnostic Tests
- Vital signs including oxygen saturation
- Urinalysis (for proteinuria, 24hr urine if positive)
- Measure blood glucose level
- Measure hemoglobin level

Management
**Goals of Treatment**
- Prevent end organ disease/damage, including brain injury
- Prevent convulsions
- Prevent maternal injury during convulsion
- Prevent fetal injury

**Appropriate Consultation**
Consult a physician as soon as possible, and recommend medevac.

The stabilization of the client should be discussed with the referral center to determine what drug therapy should be initiated before transfer and whether the therapy should be continued in transit. If intravenous magnesium sulfate or hydralazine hydrochloride is used during transport, a physician should accompany the client. Tracheal intubation and ventilation might become necessary if there is respiratory depression.

**Adjuvant Therapy**
- Oxygen 6-10 L/min
- Start IV therapy with normal saline to keep vein open
- Adjust IV rate if there is unusual fluid loss (vomiting, diarrhea, other)
Do not overhydrate with IV fluids as this may increase risk of iatrogenic pulmonary edema.

**Nonpharmacologic Interventions**
- Bed rest in a quiet, darkened room
- Position client on her left side
- Stay with client at all times; do not leave her alone (one to one nursing care)
- Nothing by mouth
- Protect airway
- Place artificial airway in client’s mouth prn
- Ensure that breathing and ventilation are adequate
- Have oral airway and Ambu bag at bedside
- Wipe away and suction oral secretions
- Document time, duration and type of seizure
- Insert Foley catheter attached to a closed drainage bag to monitor urine output closely (recommended); urinary output should be greater than 25 mL/h
- Check urine for protein hourly

**Pharmacologic Interventions**

Infuse over 15 minutes:

- magnesium sulfate (_B class drug_), 2-4 g in 100 mL of normal saline via a drip chamber

Then reassess respiratory rate and reflexes.

Piggyback administration of this drug via a main line.

Magnesium sulfate is a cerebral depressant that reduces neuromuscular irritability. It can cause vasodilation and reduction in blood pressure.

Symptoms of magnesium sulfate toxicity: respiratory depression or arrest, reduced or absent deep tendon reflexes, cardiac arrest, coma. The antidote is calcium gluconate (_B class drug_).

**Keep preloaded syringe of 10% calcium gluconate at bedside.**

After the loading dose of magnesium sulfate:

- solution of 20 g magnesium sulfate in 1 L normal saline or Ringer's lactate, 1-2 g/h (50-100 mL/h)

Transport may be commenced once the loading dose is complete and the maintenance dose has been started.

**Monitoring and Follow-Up**

- Monitor state of consciousness and respiratory rate constantly; monitor deep tendon reflexes (patellar) and blood pressure q15min; monitor fetal heart rate q30min.
- If respiratory rate 8-12/min, reflexes reduced or urine output < 100 mL in previous 4 hours, reduce infusion of magnesium sulfate by 50%.
- If respiratory rate < 8/min or reflexes absent, stop infusion of magnesium sulfate, then unclamp main line of Ringer's lactate and run at 100 mL/h. Consult a physician and then give antidote:

  10% calcium gluconate (_B class drug_), 10 mL (1 g) IV over 5-10 minutes

If a seizure occurs:
- Suction nasopharynx prn
- Administer oxygen
- Position the client on her side and cushion appropriately
- Record length and type of seizure
- After seizure, assess uterine contractions, vaginal bleeding, uterine tenderness, abdominal pain and fetal heart rate
- Discuss the use of additional seizure medications with physician
- In case of prolonged seizure activity, consideration should be given to intubation

**Antihypertensive therapy** is added if maternal diastolic blood pressure is \( \geq 105 \) mm Hg:

hydralazine (_B class drug_), 5 mg IM stat or 1 mg IV as test dose, then 5-25 mg IV over 2-4 minutes; May need to be repeated in 20-30 minutes (5-10 mg IV) if the blood pressure is not reduced effectively with the first dose. With severe hypertension (diastolic pressure \( \geq 110 \) mm Hg), the administration of an antihypertensive agent should be considered as follows:

hydralazine (_B class drug_), 5-10 mg via intermittent IV bolus administration

Check blood pressure every 5 minutes.
Do not decrease the diastolic pressure to < 90 mm Hg as this would reduce the placental perfusion and be detrimental to the fetus. Abruptio placentae is a possible complication of acute changes in blood pressure.

Precautions with Hydralazine
• Antihypertensive effects start within 30-60 minutes and last for about 4-6 hours
• Contraindication: heart disease
• Side effects: tachycardia, palpitations, faintness, headache, hypotension

Referral
Medevac as soon as possible.

References
Dr. Turnell, Lecture Reproductive-Urology, Obstetric Review, University of Alberta, 2004
Webpage: www.familydoctor.org (search hypertension and eclampsia)
Intrauterine Growth Restriction (IUGR)

Definition
• Slow fetal growth within uterus
• Fetus small for gestational age
• Symmetrical vs. Asymmetrical

Asymmetrical occurs in most of the cases of IUGR and occurs due to placental insufficiency. The abdomen is small, but the head and limbs are within acceptable percentile. Symmetrical usually occurs due to anomaly, the head and limbs are generally below the 10th percentile.

Causes
Maternal Factors:
• Age
• Environmental / Social factors – smoking, drug use, alcohol use, obesity
• Poor obstetrical history – past IUGR, stillbirth, or birth defect babies
• History of maternal disease – hypertension etc.

Fetal Factors:
• Chromosomal abnormalities
• Structural abnormalities
• Multiple gestation
• Prematurity
• Infections – CMV, toxoplasmosis, rubella, herpes, HIV, Hepatitis A or B, Syphilis

Placental Factors:
• Inadequate placenta – r/t maternal medications, maternal disease processes, maternal elevated AFP
• Impaired umbilical blood exchange – previa, hypertension

History
• Usually occurs in second trimester
• Client may be aware of lack of growth
• Altered fetal movements (increased or decreased)
• Gestational hypertension and gestational diabetes may be present
• Other illnesses may be present

• Poor weight gain (doesn’t ‘look’ pregnant)

Physical Findings
• Weight unchanged or decreased from previous visit
• Fundal height unchanged or less than expected from previous visit

Suspicion should be raised if fundal height does not exhibit the predicted growth: at 20wks = 20cm +/- 2cm or no increase over a 3 week period. Actual fundal height is not reliable until the second trimester, however measurements still need to be done throughout pregnancy for trending.

A lag in fundal height by 4 cm warrants ultrasound evaluation.

Differential Diagnosis
• Miscalculation of dates (Use LMP if woman is sure of dates, or use earliest U/S for EDD calculations. If discrepancy is <10days and woman is sure of her dates, use her LMP dates for EDD)
• Improper measurement on previous assessment
• Intrauterine death

Complications
Antepartum Complications
• Oligohydramnios (insufficient liquor)
• Intrapartum fetal acidosis (due to insufficient placental circulation)
• Intrauterine death
• Risk of preterm labour

Neonatal Complications
• Persistent fetal circulation
• Meconium aspiration syndrome
• Hypoxic ischemic encephalopathy
• Hypoglycemia
• Hypocalcemia
• Hyperviscosity
• Defective temperature regulation

Diagnostic Tests
• Urinalysis
• Blood sugar measurement
• Ultrasonography (18 week Anatomical U/S)
• Maternal workup to rule out underlying pathology

Ultrasonography, preferably serial, is needed for definitive diagnosis.

Management
Goals of Treatment
• Prevent condition through education about nutrition, avoidance of substance use, especially smoking
• Identify associated disorders early (e.g. diabetes mellitus, hypertension)
• Genetic screening – Maternal Serum Screening if warranted and consent received*
• Maintain a healthy fetus and hopefully a healthy newborn.

MSS – refer to handout from the NWHP at the Stanton Territorial Hospital

Appropriate Consultation
Consult a physician immediately if this diagnosis is detected or suspected. Consider consult to nutritionist if this is identified as a contributing factor.

Nonpharmacologic Interventions
• Provide support to client and family.
• Attempt to treat underlying cause.

Pharmacologic Interventions
None.

Monitoring and Follow-Up
• Once this diagnosis is made, more frequent prenatal visits are essential for monitoring.
• This may include serial ultrasounds and stress tests. The frequency of visits will depend on establishing the underlying cause of the growth retardation.
• More frequent visits to referral centre may be needed throughout pregnancy for serial growth ultrasounds.

Referral
• Refer to physician and/or NWHP (Northern Woman’s Health Program) as soon as possible for further assessment.
• Close antenatal surveillance is required, and the decision as to when to deliver the infant is complex.
• Consideration must be given to have this woman’s prenatal care delivered in a secondary or tertiary care centre.

References

Antepartum Hemorrhage (Late)

Definition
Vaginal bleeding that occurs after 20 weeks of gestation.

Causes
The two most common causes are placenta previa and abruptio placentae, described in Table 6.

Diagnostic Tests
- Measure hemoglobin level
- Urinalysis

Management
Goals of Treatment
- Identify condition early
- Resuscitate and stabilize if client is in shock
- Prevent complications

Appropriate Consultation
Consult a physician as soon as possible.

Nonpharmacologic Interventions
- Nothing by mouth
- Bed rest
- Trendelenburg position (prn) to aid venous return if client is in shock
- Insert urinary catheter if client is in shock
- Monitor intake and output hourly
- Aim for urine output of 50 mL/h

Adjuvant Therapy
Initial aggressive fluid resuscitation is needed if client is in hypovolemic shock:
- Start two large bore 14g-18g
- Start IV therapy with normal saline
- Give 20 mL/kg normal saline as a bolus over 15 minutes
- Reassess for signs of shock
- Repeat 20 mL/kg boluses until systolic blood pressure stabilizes at >90 mm Hg
- Ongoing IV therapy is based on response to initial fluid resuscitation, continuing losses and underlying cause, treat to achieve a good hemodynamic response
- Adjust IV rate accordingly, to maintain urine output of 50 mL/h
- Oxygen to keep saturation ≥ 97%

Pharmacologic Intervention
Verify Rh status and give Rh immune globulin (RhIG) within 48 hours, if indicated (available from the Laboratory Department of Regional Hospitals).

Monitoring and Follow-Up
- Monitor vital signs q10-15min if hypotension is present or vaginal bleeding continues
- Monitor fetal heart rate q15min
- Monitor for signs of onset of labour
- Assess stability of pre-existing medical problems

Referral
Medevac as soon as possible.

References
Abruptio Placentae; Gaufberg, S.V

http://www.emedicine.com/MED/topic3271.htm
Placenta Previa; Ko, P
### Table 6: Description and classification of placenta previa and abruption placentae

<table>
<thead>
<tr>
<th>Placenta previa</th>
<th>Abruptio placentae</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>Separation of the placenta from the uterine wall after 20 weeks gestation; may be partial, rarely complete</td>
</tr>
<tr>
<td>Aberrant implantation of placenta in lower uterine segment</td>
<td></td>
</tr>
<tr>
<td><strong>Classification</strong></td>
<td>Mild: slight vaginal bleeding (&lt; 100 mL); no fetal heart rate abnormalities; no evidence of shock or coagulopathy</td>
</tr>
<tr>
<td>Marginal: low-lying implantation, near the cervical os but not covering it</td>
<td></td>
</tr>
<tr>
<td>Partial: partly covering cervical os</td>
<td>Moderate: moderate vaginal bleeding (100-500 mL) and uterine hypersensitivity with or without elevated tone; mild shock and fetal distress may be present</td>
</tr>
<tr>
<td>Complete: completely covering cervical os</td>
<td>Severe: extensive vaginal bleeding (&gt;500 mL), tetanic uterus and moderate to profound maternal shock; fetal death and maternal coagulopathy are characteristic</td>
</tr>
<tr>
<td><strong>Prevalence</strong></td>
<td>10% of all deliveries (severe form rare)</td>
</tr>
<tr>
<td>1 in 200 deliveries often misdiagnosed in 2nd trimester on ultrasound, before lower segment has formed.</td>
<td></td>
</tr>
<tr>
<td><strong>Risk Factors</strong></td>
<td>Prior history of abruption, maternal hypertension, cigarette or cocaine use, increasing maternal age, multiparity; sudden decompression of uterus (rupture of membranes, after delivery of first twin), trauma to abdomen</td>
</tr>
<tr>
<td>Increasing maternal age, multiparity, prior uterine scar; associated with breech and transverse presentations, prior placenta previa</td>
<td></td>
</tr>
<tr>
<td><strong>Clinical Presentation</strong></td>
<td></td>
</tr>
<tr>
<td>• Vaginal bleeding is typically painless, with bright red blood</td>
<td></td>
</tr>
<tr>
<td>• Blood loss is usually not massive with initial bleed, but bleeding tends to recur and become heavier as the pregnancy progresses</td>
<td></td>
</tr>
<tr>
<td>• Verify Rh status</td>
<td></td>
</tr>
<tr>
<td><strong>Physical Findings</strong></td>
<td></td>
</tr>
<tr>
<td>• Heart rate may be normal or elevated</td>
<td></td>
</tr>
<tr>
<td>• Blood pressure normal, low or hypotensive</td>
<td></td>
</tr>
<tr>
<td>• Postural blood pressure drop may be present</td>
<td></td>
</tr>
<tr>
<td>• Fetal heart rate usually normal, initially</td>
<td>• Vaginal bleeding in 80% of cases, but may be concealed in the remainder (i.e. retroplacental bleeding); therefore maternal hemodynamic situation may not be explained by observed blood loss</td>
</tr>
<tr>
<td>• Fetal heart rate depends on amount of bleeding</td>
<td>• Pain and increased uterine tone typical</td>
</tr>
<tr>
<td>• Mild distress to frank shock</td>
<td>• Pain increased in severity</td>
</tr>
<tr>
<td>• Bright red bleeding per vagina</td>
<td>• Verify Rh status</td>
</tr>
<tr>
<td>• Fundal height consistent with dates</td>
<td></td>
</tr>
<tr>
<td>• Uterus soft, normal tone, nontender</td>
<td></td>
</tr>
<tr>
<td>• Uterine size consistent with dates</td>
<td></td>
</tr>
<tr>
<td>• Transverse, oblique or breech lies common</td>
<td></td>
</tr>
<tr>
<td>• Should be suspected in client with persistent breech presentation</td>
<td></td>
</tr>
<tr>
<td>• Advisability of speculum examination debatable</td>
<td></td>
</tr>
<tr>
<td>• Digital examination contraindicated in Health Centres</td>
<td></td>
</tr>
</tbody>
</table>
Group B Streptococcal Infection

Definition
Group B streptococci (GBS) is a bacterial infection that involves the pregnant woman and her newborn infant, causing maternal infections of the uterus, placenta, and urinary tract and infections in the infant that can be localized or involving the infant’s entire life.

Estimates of GBS colonization rates among pregnant women range from 15% to 40%. GBS infection is transmitted in 40% to 70% of cases, but sepsis develops in only 1% to 2% of affected newborns.

GBS sepsis presents in the early neonatal period (<7 days of age) or somewhat later (7 days to 3 months of age). Early onset is more common and is associated with a higher mortality rate.

Diagnostic Tests
• Universal screening of all pregnant women at 35-37 weeks of gestation with a vaginal/rectal swab.

Management
Appropriate Consultation
• Consult a physician or nurse practitioner when risk factors are indicated.

Risk Factors for which Intrapartum Chemoprophylaxis is recommended
• Treat with IV antibiotics in the following cases:
• Intrapartum (at time of labour) or with rupture of membranes if:
• Positive GBS culture screening done at 35 weeks,
• Any woman with an infant previously infected with GBS,
• Any woman with documented GBS bacteriuria in this pregnancy.
• Women in preterm labour at <37 weeks gestational age unless there has been negative GBS vaginal/rectal swab culture within 5 weeks.
• If GBS culture result is unknown and the woman has ruptured membranes at term for greater than 18 hours.

Pharmacologic Interventions
Antibiotic regimen of choice for intrapartum prophylaxis:
penicillin G 5 million units (B class drug) IV load followed by 2.5 million units every 4 hours until delivery
or
ampicillin (C class drug), 2 g IV at least 4h prior to delivery, followed by 1-2 g IV q4-6h until delivery or until labour is stopped

For clients with allergy to penicillin:
clindamycin (B class drug), 900 mg IV q8h until delivery or until labour is stopped

References


Preterm Labour

Definition
Onset between age of viability and 37 weeks gestational age of regular contractions with progressive cervical dilatation and/or effacement.

Discrimination from "false labour" is difficult, unless there is cervical dilatation, which indicates true labour; however, postponement of treatment until such dilatation occurs may lower the chances of treatment success.

Causes
Frequently unknown. Several factors have been associated with preterm labor.

Maternal Factors
- Infection (systemic, vaginal, urinary tract, amnionitis)
- Uterine anomalies
- Fibroids
- Retained intrauterine device
- Cervical incompetence
- Overdistended uterus (polyhydramnios, multiple gestation)
- Rupture of membranes
- Physical and situational stress
- Poor nutrition/underweight
- Smoking
- Gestational hypertension

Fetal Factors
- Congenital anomalies
- Intrauterine death

History
- Presence of one or more risk factors
- Onset of contractions
- Contractions regular, becoming stronger and closer together
- Rupture of membranes and passage of bloody mucus may have occurred
- Clients at risk should be identified during routine prenatal visits
- Cramping, general discomfort, lower back pain

Physical Findings
- In early gestation, subtle signs with general discomfort and lower back pain.
- Moderate distress
- "Bloody show" may be present.
- Contractions (strength, frequency, duration)
- If contractions moderate to strong, uterine changes seen on abdomen
- Fetal heart rate: identify changes with contractions.
- Uterine tenderness or hardness
- Assess position and presentation of fetus, engagement of head
- Cervical dilatation, effacement, descent and presentation of fetal parts
- Avoid digital exam in presence of suspected ROM unless ordered by consulting physician prior to transport.

Differential Diagnosis
- Braxton-Hicks contractions in later pregnancy
- False labour in later pregnancy
- Urinary Tract Infection
- Pelvic/vaginal infection

Complications
- Progression to active labour
- Progression to preterm delivery

Diagnostic tests
- Fern test of amniotic fluid
- Amnioswab test
- Urinalysis: evidence of infection may be present
- Cervical and vaginal swabs for STI, BV
- Consider Point of Care Testing dipstick, if available, to estimate the cervical ripeness and the risk of preterm delivery for e.g Actim Partus or Fetal Fibronectin

Management
Goals of Treatment
- Slow or halt labor
- Deliver preterm infant safely, if delivery necessary in most appropriate setting whenever possible.
**Appropriate Consultation**
Consult a physician. Discuss care plan based on most accurate gestational age, membrane status, cervical dilation.

**Nonpharmacologic Intervention**
Bed rest in left lateral decubitus position.

**Adjuvant Therapy**
*Start IV therapy with normal saline to keep vein open*

**Pharmacologic Interventions**

* **Tocolytic agent**
Discuss with a physician possible use of tocolytic agent to attempt to halt contractions and to permit timely transport to referral centre.

- **indomethacin (A class drug)** only if <32 weeks gestational age, 100mg PR prior to transfer. Consult with physician for subsequent doses if transport is delayed

- **Steroids**
Discuss with physician the use of steroids to accelerate fetal lung maturation only in fetuses less than 34 weeks gestational age:

  - Preferred drug of choice- **betamethasone (B class drug)** 12 mg IM q24 hours x 2 doses
  - Or alternately **dexamethasone (B class drug)**, 6 mg IM q12h, 4 doses only

**Antibiotics**
- Discuss with physician for antibiotic use depending on clinical picture.
- Ensure Group B strep prophylaxis for all women with confirmed positive GBS or unknown GBS status.

Give: **penicillin G (B class drug)** 5 million units IV load followed by 2.5 million units every 4 hours until delivery or labor has stopped or **ampicillin (C class drug)**, 2 g IV at least 4h prior to delivery, followed by 1 g IV q4-6h until delivery or until labour is stopped

For clients with allergy to penicillin:
- **clindamycin (B class drug)**, 900 mg IV q8h until delivery or until labour is stopped
- Consider antibiotics for all women with ruptured membranes with risk factors such as:
- Increased temperature > 38°C or fetal/maternal tachycardia or uterine tenderness
- Consider antepartum antibiotics for all women with ruptured membranes prior to 34 weeks, regardless of clinical presentation

**Monitoring and Follow-Up**
- Monitor uterine contractions, vital signs and fetal heart rate

Assess probability of imminent delivery on the basis of the following factors:
- Cervical effacement and dilatation
- Frequency of uterine contractions
- Parity
- Previous obstetric history
- Woman states is ready to push.

Prepare for delivery as necessary. Refer to "Unplanned Delivery in the Health Centre," at the end of this chapter.

**Referral**
Medevac as soon as possible

**References**

SOGC. Women’s Health Information, Pregnancy, Preterm Labour. (October 2006).

Table 7: Quick reference guide for procedures prior to and during medevac of pregnant women with suspected / confirmed premature labour or premature rupture of membranes

Always consult with the receiving physician. The care plan will be based on many factors including, but not limited to, the most accurate gestational age, membrane status, labour status and cervical dilation, parity, and obstetrical history.

Establish IV line; consider need for second line
Avoid unnecessary digital exam in presence of suspected or confirmed rupture of membranes.

Tocolysis
Discuss with physician the possible use of a tocolytic agent to attempt to halt contractions in order to facilitate timely transport to referral centre.

**indomethacin** (only if < 32 weeks) 100 mg PR prior to transport
Consult with physician for subsequent doses if transport is delayed.

Steroids
Discuss with physician the possible use of steroids to accelerate fetal lung maturation, only if <34 weeks.

Preferred Drug: 
**betamethasone 12 mg IM q 24 hrs x 2 doses**

or alternately, 
**dexamethasone 6 mg IM q12h x 4 doses**

Antibiotics
Ensure Group B Strep antibiotic prophylaxis for all women with unknown or confirmed positive GBS status, regardless of gestational age or membrane status.

Preferred Drug: 
**penicillin G 5 million units IV loading dose at least 4 hours prior to delivery, then 2.5 million units IV q4h until delivery**

or alternately, 
**ampicillin 2g IV loading dose, then 1 g IV q4h until delivery**

If client allergic to penicillin:

**clindamycin 900mg IV q8h until delivery**

Consider antibiotics appropriate for chorioamnionitis for all women with ruptured membranes who present with fever, maternal or fetal tachycardia, uterine tenderness or irritability, or WBC changes.

Consult physician for choice of antibiotics.

Consider antepartum antibiotics for all women with ruptured membranes prior to 34 weeks, regardless of clinical presentation.
Premature Rupture of Membranes

Definition
Rupture of membranes is considered premature if it occurs more than 1 hour before onset of labour. "Preterm premature" is premature rupture of membranes is rupture that occurs before 37 weeks of gestation.

Causes
• Unknown
• Abdominal trauma
• Incompetence of cervix
• Uterine abnormality
• Hydramnios
• Multiple gestation
• Abnormal lie of fetus
• Placenta previa
• Viral or bacterial intrauterine infection
• Bacterial vaginal infection
• Previous cervical surgery
• Following amniocentesis
• Smoking and other lifestyle habits

History
• Sudden gush of fluid or continuous trickle from vagina
• Fluid may be clear or colored as pale green, brownish, stained with blood
• Sometimes described as loss of control of bladder or wet panties
• Using pads for leakage
• No uterine contractions felt

Prenatal History
• Assess (from history or from records) for vaginal group B streptococcus (GBS) status during pregnancy

Physical Findings
• Cervical digital examination with ruptured membranes increases risk of chorioamnionitis. Therefore, evaluate cervix visually with sterile speculum. Avoid digital examination if possible, unless client is in labour and delivery is inevitable
• Fetal heart rate – evidence of bradycardia suspect cord prolapse.

• Vital signs
• Assess fundal height for consistency with dates
• Assess fetal engagement through abdominal wall
• Evaluate for uterine contractions
• Assess fluid leaking from vagina (color, odor, amount)
• Assess for bleeding from vagina
• Check for cord prolapse.

If rupture of membranes has been documented, a sterile vaginal examination should be performed with the following goal:
• Assess cervix for changes and signs of onset of labor

Differential Diagnosis
• Loss of bladder control
• Premature labour
• Term labour

Complications
• Intrauterine infection
• Preterm delivery
• Cord prolapse/compression

Diagnostic Tests
• Amniotest—using sterile swab
• Urinalysis (routine, microscopic and culture)
• CBC and differential early on
• Ferning testing

Management
Goals of Treatment
• Identify presence of amniotic fluid
• Prevent infection
• Develop appropriate care plan for medevac/possible delivery

Appropriate Consultation
Consult a physician as soon as possible if you suspect this diagnosis.

Nonpharmacologic Interventions
• Bed rest
• Diet as tolerated
• Encourage ample fluid intake po
• Change sanitary pad at least q2h
• Shower rather than bath.
• Pericare appropriate
• Change maternal position (left lateral or right lateral recumbent) that optimizes FHR.
• Knee chest position. If cord prolapse is confirmed, maintain knee-chest position and apply digital pressure on presenting part, holding it away from the cord, up and out of the pelvis, normally until the client reaches the OR.
  (Consult with a physician and medevac team re assignment of responsibility during transport)
  Or
• Knee chest position: alternate method – using an indwelling Foley catheter, fill the bladder with 500 ml normal saline. This will keep the presenting part away from the cord.

**Pharmacologic Interventions**

**Antibiotics**
Discuss with a physician the need for prophylactic antibiotics depending on vaginal GBS status and clinical presentation (i.e. febrile or not, in labor or not)

**Steroids**
If transport is delayed and gestational age is less than 34 weeks, discuss with a physician the role of corticosteroids in fostering fetal lung maturation. Refer to “Preterm Labour” in this chapter.

**Monitoring and Follow-Up**
• Monitor for development of labour or infection
• Monitor vital signs, including temperature, q2h
• Monitor fetal heart rate q2h if not in labour (q15min if in labor)
• Monitor quantity of fluid loss pv
• Monitor vaginal loss for foul-smelling discharge
• Monitor fundus for development of tenderness

**Referral**
Medevac as soon as possible.

**Reference**
Postpartum Hemorrhage

Definition
Postpartum hemorrhage (PPH) is typically classified as primary or secondary (Table 8). Blood loss > 500 mL after spontaneous vaginal delivery and >1000 mL after instrumental or operative delivery. Therefore, clinical experience is necessary to determine when bleeding is occurring too rapidly or at the wrong time or is unresponsive to appropriate treatment. Any post partum blood loss that leads to homodynamic instability is to be treated as hemorrhage. Blood loss will be less well tolerated if the client has low hemoglobin (anemia) or has not had the normal expansion of blood volume during pregnancy, as in cases of hypertension with proteinuria.

Complications
- Anemia
- Hypotension
- Hypovolemic shock
- Secondary infection
- Sepsis
- Maternal death

Diagnostic Tests
Serial or follow up CBC

Management
Goals of Treatment
- Replace blood losses
- Stimulate uterus to contract
- Prevent hypovolemic shock

See protocol for managing hypovolemic shock, under "Shock," in chapter 14, "General Emergencies and Major Trauma."

Appropriate Consultation
Consult a physician as soon as possible.

Nonpharmacologic Interventions
- Nothing by mouth
- Bed rest, warmth, supportive measures
- Trendelenburg position if client is in hypovolemic shock (this may cause pooling of blood in uterus, but it is helpful)
- Massage fundus manually to stimulate uterine contraction. Be cautious not to over-massage.
- Insert Foley catheter (bladder distension can prevent effective contraction of uterus)
- Bimanual compression may be necessary if bleeding uncontrolled with all other interventions: capture uterus between both hands (one hand in vagina, one hand on fundus) and exert firm pressure

Adjuvant Therapy
- Oxygen to keep oxygen saturation ≥ 97%
- Start at least 2 large-bore (14- or 16-gauge) IV lines with normal saline
- Aggressive fluid resuscitation as necessary for hemodynamic stabilization
- Give 20 mL/kg IV fluids as a bolus over 15 minutes
- Reassess for signs of shock
- Repeat 20 mL/kg boluses of IV fluids until systolic blood pressure stabilizes at >90 mm Hg
- Treat to achieve a good hemodynamic response

Pharmacologic Interventions
Assist uterine contraction:
\textit{oxytocin (D class drug), 10 units IM or 5 units IV push stat}
\textit{then: oxytocin (D class drug), 20 units in 1 L normal saline IV fluid infused rapidly}

Bolus oxytocin can cause transient hypotension then hypertension.

Consult physician for further management.

Monitoring and Follow-up
- Monitor vital signs and general condition frequently until stable
- Monitor intake and hourly urine output
- Aim for urine output of about 50 mL/h

Referral
Medevac as soon as possible. Surgical intervention may be required.

Reference
ALARM – PPH Chapter 2005
Table 8: Definition, causes, history and physical findings for primary and secondary postpartum hemorrhage

<table>
<thead>
<tr>
<th>Primary</th>
<th>Secondary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>Blood loss &gt; 500 mL per vagina 24 hours to 6 weeks postpartum (usually occurs between 10th and 14th day)</td>
</tr>
<tr>
<td><strong>Causes</strong></td>
<td>Retained placental fragments</td>
</tr>
<tr>
<td>TONE: Atonic uterus</td>
<td>Endometritis</td>
</tr>
<tr>
<td>TISSUE: Laceration of cervix, vagina, perineum,</td>
<td></td>
</tr>
<tr>
<td>TRAUMA: laceration, rupture, inversion</td>
<td></td>
</tr>
<tr>
<td>THROMBIN: coagulopathy</td>
<td></td>
</tr>
<tr>
<td>Predisposing factors; prolonged labour, rapid labour, high parity, bladder distension, multiple gestation, partial separation of placenta, retained fragments, retained blood clots, antepartum hemorrhage, uterine inversion</td>
<td></td>
</tr>
<tr>
<td><strong>History</strong></td>
<td>Persistent bright red lochia or large or small amount</td>
</tr>
<tr>
<td>Presence of one of the above causes</td>
<td>Lochia may have returned to normal</td>
</tr>
<tr>
<td>Vaginal bleeding</td>
<td>Client presents with sudden, severe, bright red bleeding</td>
</tr>
<tr>
<td>Restlessness, anxiousness</td>
<td>Passage of clots and tissue</td>
</tr>
<tr>
<td>Nausea and vomiting may develop</td>
<td>Fatigue and dizziness may be present (if bleeding is slow, continuous)</td>
</tr>
<tr>
<td>Note Rh status</td>
<td>Symptoms of shock may be present (if bleeding is sudden, acute)</td>
</tr>
<tr>
<td><strong>Physical Findings</strong></td>
<td>Foul discharge and fever may be present (if there is a secondary infection)</td>
</tr>
<tr>
<td>Heart rate rapid</td>
<td>Temperature may be elevated</td>
</tr>
<tr>
<td>Blood pressure low or hypotensive</td>
<td>Heart rate rapid; may be weak, thready (if client is in shock)</td>
</tr>
<tr>
<td>Postural blood pressure drop may be present</td>
<td>Blood pressure low to hypotensive (if client is in shock)</td>
</tr>
<tr>
<td>Acute distress possible (agitation from shock)</td>
<td>Postural blood pressure drop may be present (early sign of impending shock)</td>
</tr>
<tr>
<td>Client pale, possibly diaphoretic</td>
<td>Client in moderate to severe distress</td>
</tr>
<tr>
<td>Continued profuse bleeding after delivery</td>
<td>Bright red bleeding per vagina</td>
</tr>
<tr>
<td>Placenta or membranes may be incomplete</td>
<td>Purulent or foul-smelling discharge may be present (if there is an infection)</td>
</tr>
<tr>
<td>Fundus above level of umbilicus</td>
<td>Fundus can be visible or palpated high in abdomen</td>
</tr>
<tr>
<td>Uterus soft, boggy</td>
<td>Fundus may be soft</td>
</tr>
<tr>
<td></td>
<td>Tenderness may be present (secondary infection)</td>
</tr>
<tr>
<td></td>
<td>Pelvic examination: cervical os open, bright red bleeding from os, tissue may be present in os</td>
</tr>
</tbody>
</table>
Unplanned Delivery of a Term Pregnancy in the Health Centre

History

• Lightening within past 2 weeks (usually only in primigravida)
• Frequency of micturition increased
• Easier breathing
• Greater difficulty walking
• Braxton-Hicks contractions occur from 16 weeks onwards but may have become more noticeable to the woman in the past few weeks.
• Passage of red mucus-like material per vagina ("bloody show")
• Fluid gush (may be described as loss of bladder control but possibly amniotic fluid)
• Onset of painful, rhythmic uterine contractions, increasing in length, strength and frequency
• Contractions may be felt in back and low in abdomen
• Record time of onset, frequency and duration of contractions
• No history of pregnancy (concealed pregnancy)

Physical Findings and Initial Monitoring

• Baseline TPR
• Heart rate increased
• Blood pressure may be mildly elevated
• Fetal heart rate 110-160 bpm; determine location of heart tones
• Abdominal contour changes with contraction
• Bloody mucus may be seen on perineum
• Assess length, strength and frequency of contractions
• Palpate to assess fetal lie, presentation and engagement of fetal head
• Assess rupture of membranes (e.g. amniotest)
• Perform vaginal examination (using sterile technique if ruptured membranes): assess effacement and dilatation of cervix, presentation and descent of presenting part
• Monitor fetal heart rate before and after a contraction for a full minute

Diagnostic Tests

• Urinalysis: routine; measure for glucose, ketones and proteinuria
• If poor or no prenatal care consider hemoglobin and random blood glucose

Management

Goals of Treatment

• Ensure maternal and fetal well-being
• Delivery of healthy baby
• Delivery in supportive environment.

Appropriate Consultation

*Consult a physician to arrange transfer to hospital for delivery where possible.

Adjuvant Therapy

Consider saline lock, use fluid only if dehydrated or complications arise. If transferring, will need IV access.

Nonpharmacologic Interventions

If possible, have family member(s) or friend(s) stay with client during labour, at client’s discretion
• Assist and encourage client with breathing and relaxation techniques in response to client’s needs.
• Ensure adequate nutrition and hydration status during labour as per client (PO or IV)
• Supportive comfort measures

Monitoring and Follow-Up

• Monitor progress of labour
• Monitor contractions, maternal vital signs and fetal heart rate hourly in early labour, more frequently as delivery nears
• Fetal heart rate (FHR) should be monitored before and after a contraction every 15-30 minutes during the active first stage of labour and after every push in the second stage (Fetal Health Surveillance in Labour SOGC, Bodell’s book) as per facility policy.
• Perform vaginal exams to assess effacement and cervical dilatation (in normal labour these should not be more often than 4 hourly, unless there is a clinical indication to do otherwise)
• Observe colour of liquor, if ruptured membranes

**Progression of Normal Labour**
• Plot progress on partogram
• It is important for FHR to return to normal rate if it decelerates with a contraction. To encourage this, change client’s position, turn on left side if lying down. Encourage the client to walk or remain upright throughout labour.

In a primigravida (rule of thumb):
• Cervix will efface first, then dilate
• Dilatation progresses at about 1 cm every hour
• Full dilatation on average takes approximately 10-12 hours.
• Once full dilatation is achieved, delivery of baby may take 1-2 hours
• Unplanned labours in a community often happen much faster than stated above. Be prepared.

In a multigravida:
• Effacement and dilatation are extremely variable, but usually occur together
• Time to delivery of baby is also extremely variable

**Referral**
When considering evacuation of a client in labour the following factors should be considered:
• Progress of labour
• Stage of dilatation
• Parity

• Estimated length of time required for evacuation
• If there is a possibility of the client delivering en route, keep client at Health Centre and deliver baby there
• Reassess client upon arrival of transport team.

**When Delivery Is Imminent**
Ensure second health care professional present. Prepare delivery equipment, resuscitation equipment and incubator.

**Care during Delivery**
• Control delivery of head, stop client pushing and let head come out naturally
• Support perineum to prevent tears
• Once head is delivered, check for presence of cord around neck
• If cord is wrapped around neck, gently slip a finger under cord and gently pull it over head
• If cord is tightly around neck, insert two fingers under cord, using two 3” straight artery forceps (or whatever available) to clamp cord, cut between clamps and unwind cord from neck.
• Wipe face clear of secretions
• Guide anterior shoulder out under symphysis pubis, and deliver posterior shoulder through the curve of Carus—do not pull on baby
• Body will slip out quickly without much assistance from practitioner

**Care after Baby is Delivered**
• Clamp cord in two places, and cut between clamps after cord stops pulsating
• Dry baby and wrap
• Keep baby warm and ensure that respiration is established
• Assess Apgar scores at 1 and 5 minutes
• Give baby to mother (unless problems identified)
• Obtain 20-mL sample of cord blood
• Assessment and care of newborn according to NWT Newborn Record Form
**Delivery of Placenta**

Wait for delivery of placenta (can take up to 30 minutes).

Look for signs of placental separation:
- Client may state she feels another contraction
- Cord will lengthen
- A gush of blood may occur
- Uterus may be seen to tighten with a contraction
- **Do not pull on the cord to hasten delivery** unless you are sure placenta has separated.

Once the placenta has separated:
- If the woman is lying/semi-recumbent in bed, place one hand on abdomen, just above symphysis and hold uterus back.
- Hold cord and guide placenta downwards and out, following the curve of Carus
- Alternatively, when you think the placenta has separated, have the woman stand, kneel or squat depending on her condition and ask her to either gently push or “cough” the placenta out. If you do this, you MUST NOT pull on the cord at all, but you may gently guide the placenta out, following the curve of Carus. If you have difficulty with the placenta and the woman’s vital signs are completely normal, with no evidence of bleeding per vaginam, this is a good way to get the placenta out, as it is usually just sitting in the vagina waiting to “fall” out.
- To aid in the deliver in the after coming membranes, rotate placenta gently as you withdraw the membranes.
- If having difficulty, consult at earliest opportunity, preferably on speaker phone, stay with patient
- Examine placenta and membranes for completeness
- Do not give oxytocin until placenta has been delivered.
- Total blood lose is about 500 ml. If greater, refer to post partum hemorrhage topic. Some women may be negatively affected by a smaller blood loss.

**After Delivery of Placenta**

- Palpate uterus to ensure it is firm
- If uterus is boggy massage fundus of uterus, which is top – not front - of uterus, until firm
- Examine perineum for tears

**Pharmacologic Interventions**

Administer oxytocin to promote contraction of uterus after delivery of the placenta:
- oxytocin (*D class drug*), 5-10 units IM or 5 units IV push
- and/or
- oxytocin (*D class drug*), 10-20 units in a 1-L bag of Ringer’s lactate IV at 100-150 mL/h

**Postpartum Monitoring**

- Monitor vaginal blood loss, uterine firmness and vital signs every 15 minutes during the first hour, then monitor every 30 minutes for 2 hours if mother is not up and walking.
- If using more than one pad completely soaked, per hour, consult
- Examine and clean baby
- Encourage early ambulation if all vital signs normal

**Referral**

Consult with doctor to see if transfer warranted. Transfer mother and baby to hospital if necessary. If delivery has occurred without complications and baby has no problems at birth and is term (37-42 weeks) there is no valid clinical reason for sending Mum and Baby to hospital. There may be staffing reasons i.e. not enough staff to observe Mum and baby for a few hours. Following normal birth Mum and Baby may return home after approximately 6 hours, or at Mum’s discretion.
**Documentation**
If baby is born in Health Centre complete Registration of Live Birth, Labour and Delivery Summary and Newborn Record and any other pertinent documents.

**References**
Chapter 13- Women’s Health and Gynecology

Assessment Of The Female Reproductive System

History Of Present Illness And Review Of System
Examination Of The Female Reproductive System

Common Women's Health Issues And Gynecological Problems

Abnormal Uterine Bleeding
Dysfunctional Uterine Bleeding (DUB)
Dysmenorrhea
Breast Lumps
Mastitis
Vulvovaginitis
Human Papillomavirus (HPV) (Genital Warts)
Pelvic Inflammatory Disease (PID)
Contraception
Menopause

Gynecological Emergencies

Acute Pelvic Pain Of Gynecological Origin
Assessment Of The Female Reproductive System

History Of Present Illness And Review Of System

General
The following characteristics of each symptom should be elicited and explored:
• Onset (sudden or gradual)
• Chronology
• Current situation (improving or deteriorating)
• Location
• Radiation
• Quality
• Timing (frequency, duration)
• Severity
• Precipitating and aggravating factors
• Relieving factors
• Associated symptoms
• Effects on daily activities
• Previous diagnosis of similar episodes
• Previous treatments
• Efficacy of previous treatments

Cardinal Symptoms
In addition to the general characteristics outlined above, characteristics of specific symptoms should be elicited, as follows.

Menstrual History
• Age at menarche
• Interval, regularity, duration and amount of flow
• Date of most recent menstrual period
• Was most recent menstrual period normal?
• Dysmenorrhea
• Premenstrual symptoms (e.g. swelling, headache, mood swings, pain)
• Abnormal uterine bleeding
• Symptoms of menopause
• Age at menopause
• Postmenopausal bleeding

Obstetric History
• Number of pregnancies, live deliveries, stillbirths, abortions
• Difficulties with pregnancies, deliveries
• Birth weight of babies
• Problems with infertility
• Other related problems (e.g. previous anesthetic reaction)

Use of Contraception
• Type used (past and present)
• Difficulties with method, suitability
• If discontinued, reasons for doing so

Sexual History
• Sexual orientation
• Regularity and type of intercourse
• Number of partners in the past 12 months
• Associated symptoms (e.g. pain, postcoital bleeding)
• Sexual dysfunction

Breasts
• Soreness, tenderness and their relation to menstrual cycle
• Redness, swelling, nipple discharge
• Change in contour, presence of masses
• Is client breast-feeding?
• History of breast cancer or polycystic breasts

Lymphatic System
• Enlarged, painful nodes (in axilla, groin)

Vaginal Discharge
• Onset, colour, odor, consistency, quantity
• Relation to menstrual period
• Associated symptoms (e.g. rectal or urethral discharge, vaginal itch or burning, urinary symptoms, malaise, abdominal pain, fever, rashes)
• Relation to medication use (e.g. antibiotics, steroids)
• History of previous vaginal or pelvic infections and their treatment

Pain
• Onset, location, radiation, character, severity
• Relation to menstruation
• Aggravating and relieving factors
• Use of analgesics and their effect
• Associated gastrointestinal, urinary or vaginal symptoms
• Are symptoms related to an encounter with a new sexual partner?

Other Associated Symptoms
• Ulcerations
• Persistent lesions
• Sense of pelvic relaxation (pelvic organs feel as though they are falling down or out)
• Infertility
• Pelvic infection

Examination Of The Female Reproductive System

General

Subjective
• Apparent state of health
• Appearance of comfort or distress
• Colour (e.g. flushed or pale)
• Nutritional status (obese or emaciated)
• Match between appearance and stated age

Vital Signs
• Temperature
• Pulse
• Respiratory rate
• Blood pressure

Breasts
For NWT Protocol and Procedure for Breast Examination (Self and Clinical) see: Community Health Nursing Program Standards and Protocols, Adult Health, (March 2003), Appendix A, pp10-17

Lymph Nodes
Palpate the following areas and identify enlargement, tenderness, mobility and consistency:
• Upper extremity: supraclavicular area, infraclavicular area, axilla, epitrochlear nodes
• Lower extremity: inguinal nodes

External Genitalia
• Distribution of hair
• Labia majora and labia minora: lesions, ulcerations, masses, induration, areas of different colour
• Clitoris: size, lesions, ulcerations
• Urethra: discharge, lesions, ulcerations
• Skene's and Bartholin's glands: masses, discharge, tenderness
• Perineum: lesions, ulcerations, masses, induration, scars

Vagina
• Inflammation
• Atrophy
• Discharge
• Lesions, ulcerations, excoriation
• Masses
• Induration or nodularity
• Relaxation of perineum (ask client to bear down and observe for any bulging of vaginal walls)

Cervix (if present)
• Position, colour, shape, size, consistency (see below)
• Discharge
• Erosions, ulcerations
• Cervical tenderness
• Bleeding after contact
• Adnexal pain on movement of cervix or uterus (Chandelier's sign)

Consistency of cervical tissue: normal cervix is pink and feels firm, like the tip of the nose; in pregnancy, the cervix is bluish and feels softer, like the lips of the mouth

Uterus
• Position
• Size
• Contour
• Consistency of uterine tissue (within 1-2 weeks postpartum)
• Mobility
• Pain on movement
Adnexa

- Ovaries cannot usually be felt unless the client is very thin or the ovaries are enlarged.
- Tenderness
- Masses
- Consistency
- Contour
- Mobility
Common Women's Health Issues And Gynecological Problems

Abnormal Uterine Bleeding

Definition
Uterine bleeding that is abnormal in amount, duration or timing. The terms used to describe patterns of abnormal uterine bleeding are based on periodicity and quantity of flow (Tables 1 and 2).

Table 1: Terminology to describe abnormal uterine bleeding

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menorrhagia</td>
<td>Prolonged or excessive bleeding at regular intervals</td>
</tr>
<tr>
<td>Metrorrhagia</td>
<td>Irregular, frequent uterine bleeding of varying amounts but not excessive</td>
</tr>
<tr>
<td>Menometrorrhagia</td>
<td>Prolonged or excessive bleeding at irregular intervals</td>
</tr>
<tr>
<td>Polymenorrhea</td>
<td>Regular bleeding at intervals of less than 21 days</td>
</tr>
<tr>
<td>Oligomenorrhea</td>
<td>Bleeding at intervals greater than every 35 days</td>
</tr>
<tr>
<td>Amenorrhea</td>
<td>No uterine bleeding for at least 6 months</td>
</tr>
<tr>
<td>Intermenstrual bleeding</td>
<td>Uterine bleeding between regular cycles</td>
</tr>
</tbody>
</table>

Table 2: Differential diagnosis of abnormal uterine bleeding

<table>
<thead>
<tr>
<th>Type</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysfunctional uterine bleeding (e.g. menorrhagia)</td>
<td>Anovulatory cycles</td>
</tr>
<tr>
<td>Breakthrough bleeding while on OCP</td>
<td>Missed OCP, inadequate OCP absorption, OCP hormonal imbalance, insufficient OCP strength</td>
</tr>
<tr>
<td></td>
<td>Pelvic infection</td>
</tr>
<tr>
<td>Breakthrough bleeding in first half of cycle on OCP</td>
<td>Inadequate estrogenic activity of OCP</td>
</tr>
<tr>
<td>Breakthrough bleeding in second half of cycle on OCP</td>
<td>Inadequate progestational activity of OCP</td>
</tr>
<tr>
<td>Postcoital bleeding</td>
<td>Cervical disease Endometrial cancer</td>
</tr>
<tr>
<td>Postmenopausal bleeding</td>
<td>Cervical or atrophic vaginitis Endometrial cancer</td>
</tr>
<tr>
<td>Bleeding related to cervical disorders</td>
<td>Erosion, polyp, cervicitis, dysplasia, cancer</td>
</tr>
<tr>
<td>Bleeding related to endometrial disorders</td>
<td>Polyp, dysfunctional uterine bleeding, uterine fibroid, cancer (in postmenopausal women)</td>
</tr>
<tr>
<td>Bleeding related to intrauterine contraceptive devices</td>
<td>Irritation, infection</td>
</tr>
<tr>
<td>Bleeding related to infection</td>
<td>PID, cervicitis</td>
</tr>
<tr>
<td>Bleeding related to endocrine disorders</td>
<td>Hypothyroidism, hyperthyroidism, Cushing’s disease, hyperprolactinemia, stress (emotional, excessive exercise), polycystic ovarian syndrome, adrenal dysfunction or tumor</td>
</tr>
<tr>
<td>Bleeding related to hematological disturbances</td>
<td>Anticoagulation, blood dyscrasias</td>
</tr>
<tr>
<td>Bleeding related to complications of pregnancy</td>
<td>Ectopic pregnancy, spontaneous abortion, hydatidiform mole (molar pregnancy)</td>
</tr>
</tbody>
</table>
Dysfunctional Uterine Bleeding (DUB)

Definition
Abnormal uterine bleeding not caused by pelvic pathology, medications, systemic disease or pregnancy. It is the most common cause (in 90% of cases) of abnormal uterine bleeding but is a diagnosis of exclusion.

Causes
Usually related to one of three hormonal-imbalance conditions: estrogen breakthrough bleeding, estrogen withdrawal bleeding and progesterone breakthrough bleeding.

Anovulatory Dysfunctional Uterine Bleeding
Anovulation is the most common cause of DUB in reproductive-age women. It is especially common in adolescents. Up to 80% of menstrual cycles are anovulatory in the first year after menarche. Cycles become ovulatory an average of 18-20 months after menarche.

Some women still have anovulatory cycles after the hypothalamic-pituitary axis matures. Weight loss, eating disorders, stress, chronic illness or excessive exercise may all cause hypothalamic anovulation.

Another cause of anovulation is polycystic ovarian disease. This unopposed estrogen state increases the risk of endometrial hyperplasia and cancer.

Some women with chronic anovulation do not fall into any of the above categories and are considered to have idiopathic chronic anovulation.

All causes of anovulation represent a progesterone-deficient state.

Ovulatory Dysfunctional Uterine Bleeding
Although less common than anovulatory bleeding, ovulatory DUB may also occur. DUB in women with ovulatory cycles occurs as regular, cyclic bleeding.

Menorrhagia may signify a bleeding disorder or a structural lesion, such as uterine leiomyomas, adenomyosis or endometrial polyps. Up to 20% of adolescents who present with menorrhagia have a bleeding disorder such as von Willebrand's disease. Liver disease with resultant coagulation abnormalities and chronic renal failure may also cause menorrhagia.

Polymenorrhea is usually caused by an inadequate luteal phase or a short follicular phase.

Oligomenorrhea in an ovulating woman is usually caused by a prolonged follicular phase.

Intermenstrual bleeding may be caused by cervical disease or the presence of an intrauterine contraceptive device.

Midcycle spotting may result from the rapid decline in estrogen levels before ovulation.

For other causes of abnormal uterine bleeding, see Table 2, above, this chapter.

History
• Age (e.g. reproductive age or menopausal)
• Amount, duration, frequency, interval of bleeding
• Try to determine if cycles are ovulatory or anovulatory (see Table 3, this chapter)
• Date of last normal menstrual period
• Any contraception use (type, how used)
• Hormone replacement therapy if postmenopausal
• Possibility of pregnancy
• Signs of easy bleeding (e.g. gums) or bruising suggestive of coagulopathy
• Any pain associated with bleeding
• Past history of gynecological problems such as abnormal Papanicolaou (Pap) smear, fibroids, sexually transmitted diseases (STIs), gynecological malignancy, prior episodes of abnormal uterine bleeding
• Past history of thyroid, renal or hepatic disease
• History of strenuous physical exercise (which may cause DUB)
• Eating disorder, significant emotional or psychological stress
• Date and result of most recent Pap smear
• Date and result of most recent mammography

Physical Findings
DUB is a symptom, not a diagnosis. The findings are variable, depending upon underlying cause. The results of the examination may be deceptively normal or obviously abnormal.

A full gynecological examination, including determination of blood pressure and weight and examination of thyroid, breasts, abdomen and pelvic area (bimanual), should be performed.

The pelvic examination consists of careful inspection of the lower genital tract for lacerations, vulvar or vaginal pathology, and cervical lesions or polyps. Bimanual uterine examination may reveal enlargement from uterine fibroids, adenomyosis or endometrial carcinoma.

Table 3: Characteristics of Ovulatory and Anovulatory Menstrual Cycles

<table>
<thead>
<tr>
<th>Feature</th>
<th>Ovulatory cycle</th>
<th>Anovulatory cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle length</td>
<td>Regular</td>
<td>Unpredictable</td>
</tr>
<tr>
<td>Premenstrual symptoms</td>
<td>Present</td>
<td>None</td>
</tr>
<tr>
<td>Bleeding</td>
<td>Dysmenorrhea</td>
<td>Unpredictable bleeding pattern; frequent spotting; infrequent, heavy bleeding</td>
</tr>
<tr>
<td>Breasts</td>
<td>Tender</td>
<td>Non-tender</td>
</tr>
<tr>
<td>Basal temperature curve</td>
<td>Biphasic</td>
<td>Monophasic</td>
</tr>
<tr>
<td>Other</td>
<td>Change in cervical mucus Mittelschmerz</td>
<td></td>
</tr>
</tbody>
</table>

Differential Diagnosis
See Table 2, in "Abnormal Uterine Bleeding," above, this chapter.

Diagnostic Tests
• Urine pregnancy testing for all patients of reproductive age
• Complete blood count (to provide a measure of blood loss and adequacy of platelet count)
• Prothrombin time (PT) and partial thromboplastin time (PTT)
• Levels of thyroid-stimulating hormone (TSH) and prolactin
• Liver function tests (ALT and total bilirubin)
• Cervical and vaginal samples for culture
• Pap smear
• Pelvic ultrasonography if organic pathology is suspected

Refer for endometrial biopsy early in the investigation of any woman who is > 35 years of age, postmenopause, or who has a history of prolonged exposure to unopposed estrogen in whom there is no response to initial management strategies.

These tests would be ordered by a physician.

Endometrial biopsy and ultrasonography should be performed early in the investigation of bleeding in any postmenopausal woman.

Management
Goals of Treatment
• Rule out organic pathology
• Regulate menstrual cycles
• Prevent complications

Specific management depends on the underlying cause.

Premenopausal Women
If the reproductive-age woman is not pregnant, the results of the physical examination are normal, and all pathologic, structural and iatrogenic causes have been excluded, abnormal uterine bleeding is
usually dysfunctional in nature and can be managed with hormonal therapy. See Table 4, below, this chapter.

**Postmenopausal Women**
The most serious concern in postmenopausal women with abnormal uterine bleeding is endometrial carcinoma. Of all postmenopausal women with bleeding, 5% to 10% are found to have endometrial carcinoma. Other potential causes of bleeding are cervical cancer, cervicitis, atrophic vaginitis, endometrial atrophy, submucous fibroids, endometrial hyperplasia and endometrial polyps.

**Table 4: Pharmacologic treatment for dysfunctional uterine bleeding**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Treatment*</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premenopausal</td>
<td><strong>OCP</strong>&lt;br&gt;medroxyprogesterone 10 mg PO od for 10 days&lt;br&gt;or&lt;br&gt;medroxyprogesterone 150 mg IM q3months</td>
<td>Low-dose (35 mcg) monophasic or triphasic OCP can regulate cycles while providing contraception&lt;br&gt;If contraception is not an issue, medroxyprogesterone can be used to regulate cycles; in a woman who has amenorrhea or oligomenorrhea, medroxyprogesterone every 3 months can protect against endometrial hyperplasia</td>
</tr>
<tr>
<td>Perimenopausal</td>
<td>medroxyprogesterone 10 mg PO od for 10 days&lt;br&gt;OCP</td>
<td>May be used monthly to regulate bleeding pattern&lt;br&gt;Usually use 20 mcg pills; OCP can be continued until the woman has finished menopause, then change to HRT (OCP may be relatively contraindicated in women &gt; 35 years of age who smoke)</td>
</tr>
<tr>
<td>Postmenopausal (receiving HRT)</td>
<td><strong>Cyclic HRT</strong>&lt;br&gt;Continuous combined HRT (B class drug)</td>
<td>May consider increasing the progesterone dose if early withdrawal bleeding occurs; increase estrogen dose if intermenstrual bleeding is present&lt;br&gt;May increase the estrogen dose for 1-3 months to stabilize endometrium; may also try increasing the progesterone dose; if bleeding continues, consider changing regimen to cyclic HRT or using a different type of estrogen</td>
</tr>
</tbody>
</table>

*Hormonal drugs used as treatment for DUB and not as contraceptives are all B class drugs

**Women Receiving Hormone Replacement Therapy**
Women receiving hormone replacement therapy often present with abnormal bleeding and of these, 30% have uterine pathology. Other causes include cervical lesions, vaginal pathology or the hormone therapy itself.

Women receiving sequential hormone replacement therapy may experience midcycle breakthrough bleeding because of missed pills, medication interactions or malabsorption. If unscheduled bleeding occurs in two or more cycles, further evaluation is indicated.

**Appropriate Consultation**
Consult a physician before ordering diagnostic tests and for medication treatment options if urgent treatment is warranted.
**Monitoring and Follow-Up**
- Follow up monthly until cycles have become regular
- Monitor hemoglobin as needed if heavy bleeding continues despite therapy

**Referral**
- Refer electively any client (if she is stable) to a physician for thorough evaluation and treatment.
Dysmenorrhea

Definition
Painful menstruation.

Causes
• Primary dysmenorrhea: normal uterine contraction during menstruation
• Secondary dysmenorrhea: endometriosis, use of intrauterine contraceptive device (IUCD), pelvic inflammatory disease (PID)

History
Primary Dysmenorrhea
• Begins 6-12 months after menarche
• Pain in low abdomen and back
• Pain wavelike and cramping
• Lasts several hours to several days
• Begins before or at same time as menstrual flow
• Associated symptoms: nausea, diarrhea, headache, flushing, rarely syncope
• May increase in severity over several years
• Usually decreases in severity after birth of first child

Secondary Dysmenorrhea
• Begins several years after menarche (when woman is in late 20s to 40s)
• Development of moderate to severe pain
• May begin several days before onset of menses
• Pain may be constant or intermittent
• Aggravated by movement and straining at stool
• May be localized to one area or may radiate over lower abdomen
• Possible associated symptoms: nausea and vomiting, diarrhea or constipation, headache, painful intercourse, vaginal discharge, malaise
• Symptoms may be present throughout the cycle or may begin just before onset of menses and last throughout menstruation

Physical Findings
• Results of physical examination usually normal
• Temperature may be elevated in secondary dysmenorrhea (infection)
• Identify presence of vaginal infection, presence of IUCD strings
• Tenderness on movement of cervix and with palpation of uterus may be present
• Identify adnexal masses, enlargement of uterus, enlargement and tenderness of groin nodes

Differential Diagnosis
• PID
• Endometriosis
• IUCD irritation
• Cervical stenosis
• Hemorrhagic ovarian cyst

Diagnostic Tests
None.

Management
Goals of Treatment
• Differentiate primary from secondary dysmenorrhea
• Relieve symptoms
• Identify predisposing factors, underlying causes (e.g. STI screening)

Appropriate Consultation
If client is not responding to first-line therapies, arrange elective consultation with a physician.

Nonpharmacologic Interventions
In primary dysmenorrhea, reassure client that no pelvic disease exists and that the condition will likely resolve itself.

Client Education
• Help client to understand the physiology of the normal menstrual cycle and why pain may occur
• Counsel client about appropriate use of medications, e.g. over the counter NSAIDs (dose, frequency, side effects)
• Teach client pelvic tilt exercises, which may help to alleviate discomfort and backache
• Suggest that client use hot water bottles or warm towels to relieve discomfort
• Alternative birth control methods
• Increased activity e.g. walking

In a client with an IUCD, consider IUCD malposition or infection. The IUCD may have to be removed.
Pharmacologic Interventions
To manage mild symptoms of primary dysmenorrhea in the young, healthy client:

*ibuprofen (A class drug),* 200 mg, 1-2 tabs PO tid or qid prn

If client is young, healthy, sexually active and also requires birth control, *start OCP (A class drug).*

Refer to Tables 6-8 in this chapter for information about oral contraceptives.

Control moderate-to-severe symptoms with a nonsteroidal anti-inflammatory (NSAID) agent; for this menstrual cycle only, use the following: *naproxen (C class drug),* 250-mg tab, 2 tabs PO stat, then 1 tab PO tid or qid prn for 1 or 2 days

In a woman with moderate or severe dysmenorrhea, starting NSAID preparations before the start of menstrual flow results in better pain control.

These preparations are contraindicated in clients with allergy to acetylsalicylic acid (ASA) or previous history of peptic ulcer disease.

Monitoring and Follow-Up
Review symptoms in 6 months.

Referral
Refer to a physician if there is a suspicion of a secondary cause of dysmenorrhea or if treatment fails to control symptoms.
Breast Lumps

Definition
A mass or irregularity in breast. May be single or multiple.

Causes
• Fibrocystic breast changes
• Cyclic hormonal effects on normal breast tissue
• Benign breast disease
• Malignant disease
• Trauma (hematoma)
• Infection with duct obstruction

History
• Discovery of a lump in the breast
• Identify when in menstrual cycle lump was found (breasts may feel lumpy before or during menstruation)
• Identify previous history of breast lumps
• Inquire about pain, nipple discharge, redness of breast, skin changes, lactation
• Medication use (e.g. OCP)
• Past history of breast disease or family history (in first-degree female relatives) of breast disease
• Recent history of trauma to breast
• Presence of fever or systemic signs of illness

Physical Findings
• Inspect breasts with client sitting up, first with arms at sides, then with arms raised above the head
• Repeat inspection with client lying down
• Assess asymmetry with respect to size, shape, contour
• Check for redness, dimpling or thickening of skin
• Look for nipple discharge or crusting
• Palpate breast and axilla with client sitting and lying down
• Identify lumps, tenderness, warmth, nodes
• Have client show you where she felt the lump
• Describe lump in terms of size, discreteness, consistency (e.g. hard, firm, soft, fluid-like), contour, mobility and position

Differential Diagnosis
• Carcinoma
• Benign breast disease
• Mastitis with or without abscess

Diagnostic Tests
• Arrange mammography screening every 2 years from 50 to 69 years of age
• Screen more frequently if client is at higher risk
• Arrange diagnostic mammography or breast ultrasonography if a lump is discovered

Management
Goals of Treatment
• Rule out serious pathology

Appropriate Consultation
Consult a physician as soon as possible if a breast lump is discovered.

Nonpharmacologic Interventions
Client Education
• Regular mammographic screening: encourage screening mammography every 2 years for women 50-69 years of age (earlier for women with risk factors)
• Instruct client about proper breast self-examination
• Follow up benign breasts lumps at regular intervals and instruct client to return to clinic if changes noted
• Provide teaching and support before all investigative procedures

Referral
Arrange referral to surgeon after positive mammogram for definitive diagnosis.
Mastitis

Definition
Inflammation and infection of the breast.

Causes
• Usually Staphylococcus aureus, occasionally Streptococcus

Risk Factors
• Lactation with blocked milk ducts
• Poor breast hygiene
• Cracked nipples

History
• Recent parturition (2 weeks or more before presentation)
• Affected breast(s) hard and red
• Intense pain in breast
• Associated fever and chills

Physical Findings
• Temperature elevated
• Heart rate rapid
• Client in moderate distress
• Affected breast shows area of redness or streaking, as well as swelling
• Nipples may be excoriated, cracked or caked with milk
• Skin warm to touch
• Area of redness hard (indurated) and tender
• Fluctuance may be detected (which indicates an abscess)
• Axillary nodes enlarged and tender

Complications
• Abscess
• Cessation of breast-feeding because of pain, which may lead to further congestion of breast
• Sepsis

Diagnostic Tests
• Obtain sample of milk for culture and sensitivity

Management
Goals of Treatment
• Eradicate infection

Nonpharmacologic Interventions
• Warm compresses qid for comfort
• Regular emptying of involved breast q6h by a combination of nursing and manual expression

Client Education
• Counsel client about appropriate use of medications (dose, frequency)
• Recommend that client continue breast-feeding or use a breast pump to relieve engorgement and prevent further stagnation of milk
• Counsel client about breast hygiene to prevent further infection and relieve cracked nipples
• If breast feeding, counsel about appropriate technique
• Suggest application of nonscented lotion (Lanolin based only) to heal cracked nipples and prevent future cracking
• Suggest use of properly fitting support bra to reduce pain
• Prevent condition (through education about proper breast care)

Pharmacologic Interventions
Mild-to-Moderate Mastitis
Oral antibiotics:
cloxacillin (C class drug), 500 mg PO qid for 7-10 days
or cephalexin (C class drug) 500 mg PO qid for 7-10 days

For clients with allergy to penicillin:
erthyromycin (A class drug), 250 mg PO qid for 10 days

Antipyretics and analgesia for fever and pain:
acetaminophen (A drug class), 325 or 500 mg, 1-2 tabs PO q4-6h prn
or (if pain moderate to severe)
acetaminophen with codeine 8mg or 30 mg (C class drug), 1-2 tabs q4h prn (maximum 15 tabs) (not if breastfeeding)

Monitoring and Follow-Up
• Follow up in 24 and 48 hours
• Monitor for development of an abscess
Management Of Severe Mastitis
For any patient who appears acutely ill, with fever and malaise, the following recommendations apply.

Adjuvant Therapy
Start IV therapy with normal saline to keep vein open.

Appropriate Consultation and Pharmacologic Interventions
Consult physician about IV antibiotics.

Referral
Transfer to hospital, as surgical incision and drainage may be needed.
Vulvovaginitis

Definition
Inflammation and irritation of the vaginal mucosa.

Causes
• Most common causes: infection with *Candida*, *Trichomonas* or *Gardnerella vaginalis* (bacterial vaginosis)
• Less commonly: other anaerobic vaginal bacteria
• Other causes: atrophy of vaginal mucosa in postmenopausal women, chemical irritants, foreign body

History
• Vaginal discharge
• Vaginal irritation, itching or burning
• Secondary vulvar irritation, itching, burning
• Superficial dyspareunia (pain at the introitus during intercourse)

Symptoms may be recurrent
• Identify recent antibiotic use
• Urinary symptoms may be present
• Vaginal spotting may be present
• Determine IUCD use
• Also inquire about diabetes mellitus or symptoms associated with diabetes, steroid use, menopause or symptoms suggestive of menopause

Physical Findings
The physical findings associated with vulvovaginitis (various causes) are presented in Table 5.

Speculum and bimanual examination may be mildly to moderately irritating, depending on severity of vaginitis.

Table 5: Physical finding of vulvovaginitis

<table>
<thead>
<tr>
<th>Candidiasis</th>
<th>Trichomonas infection</th>
<th>Bacterial vaginosis</th>
<th>Atrophic vaginitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>External genitalia reddened; vaginal walls covered with adherent white exudate; when exudate is removed, underlying area may bleed</td>
<td>External genitalia reddened; copious frothy green, foul-smelling exudate; cervix excoriated and bleeds easily</td>
<td>Scant-to-moderate gray, foul smelling (“fishy”) discharge</td>
<td>Dry, thin, smooth, pale vaginal mucosa; tiny breaks in mucosal surface may be present</td>
</tr>
</tbody>
</table>

Laboratory Findings
• Microscopic: live trichomonads, *Candida* yeast buds or hyphae and Clue cells may be observed on normal saline wet-mount hanging-drop test

Differential Diagnosis
• Concurrent sexually transmitted infections (STIs)
• Atrophic vaginitis in postmenopausal women
• Cystitis

Management
**Goals of Treatment**
• Differentiate between various causes of vaginitis
• Relieve symptoms
• Identify predisposing factors

Diagnostic Tests
• Vaginal swab for routine culture and sensitivity, gonorrhea and Chlamydia
• Saline wet-mount (hanging drop): look for trichomonads, yeast buds, hyphae, Clue cells

Client Education
• Counsel client about appropriate use of medications (dose, frequency, compliance)
• Recommend abstinence from vaginal sexual intercourse, or use of condoms, until infection resolves

• Determine pH of discharge with pH strips, if available
• Urine sample for routine microscopy and culture and gonorrhea/chlamydia (if urine test available)
• Abstention from alcohol if metronidazole preparations are used
• Recommend lubricants if atrophic vaginitis is present
• Recommend avoidance of tightly fitting synthetic underwear if Candida infections are recurrent
• Teach client proper perineal hygiene to prevent recurrence

For Suspected Candida Infection

Pharmacologic Interventions
clotrimazole (A class drug), 1% cream or ovule
PV od, single dose or 3 days
or
miconazole (A class drug), 2% vaginal cream or
200 mg ovule PV od, single dose or 3 days

Monitoring and Follow-Up
• Instruct client to return if no resolution of symptoms. If one or 3 days treatment not successful a 7-day course may be indicated
• Check blood glucose level if yeast vaginitis is recurrent
• OCP may be a contributing factor
• For recurrent yeast vaginal infections of unknown cause, intravaginal plain yogurt may be of benefit to prevent recurrences (once course of cream or ovules is completed)
• Candida balanitis in the male sexual partner should be treated with a topical skin preparation of clotrimazole or miconazole

For Suspected Bacterial Vaginosis Infection

Pharmacologic Interventions
metronidazole (C class drug), 500 mg PO bid for 7 days

Instruct client to abstain from alcohol while taking metronidazole because of the antabuse-like side effects of this drug.

Do not use metronidazole in those with chronic alcoholism. Instead use:
amoxicillin (C class drug), 500 mg PO tid for 7 days

Monitoring and Follow-Up
• Follow up in 7-10 days, after completion of therapy
• Treatment of sexual partner is not usually indicated

For Suspected Trichomonas vaginalis Infection

Pharmacologic Interventions
metronidazole (C class drug), 2.0 g PO stat in a single dose
or
metronidazole (C class drug), 250 mg PO tid for 7 days

Instruct client to abstain from alcohol while taking metronidazole because of the antabuse-like side effects of this drug.

Do not use metronidazole in those with chronic alcoholism. Instead use:
clotrimazole (A class drug), 100 mg PV for 7 nights

Instruct client to abstain from intercourse for 3-4 days.

Treat sexual partner:
metronidazole (C class drug), 2.0 g PO stat in a single dose

Monitoring and Follow-Up
• Instruct client to return if no resolution of symptoms

Note: Metronidazole may be used safely in pregnant women, although some clinicians avoid use in first trimester. (Source: Canadian STI Guidelines, 1998)
Human Papillomavirus (HPV) (Genital Warts)

Definition
The human papillomavirus (HPV) is a sexually transmitted organism. Condylomata acuminate, genital warts and venereal warts are other names for HPV.

Causes
HPV, a slow-growing DNA virus of the papovavirus family, is the causative organism. Over 70 strains of the virus have been identified. Warts may appear as early as 1-2 months after exposure, but most infections remain subclinical.

Risk Factors
• First coitus at young age
• Multiple sexual partners
• History of transmitted infections

History
• Painless genital "bumps" or warts
• Pruritus
• Bleeding during or after coitus
• Malodorous vaginal discharge
• Dysuria

Physical Findings
To examine vaginal walls and cervix for lesions, apply 3% acetic acid (vinegar); the vinegar whitens the lesions and makes them visible to the eye.
• Wartlike growths on genital area that are elevated and rough or flat and smooth
• Lesions occurring singly or in clusters, from < 1 mm in diameter to cauliflower-like aggregates
• Papillomas that are pale pink in colour

Differential Diagnosis
• Condylomata
• Molluscum contagiosum
• Carcinoma

Diagnostic Tests
• Visual identification is adequate in most cases.
• Cytology: Pap smears are useful for screening; however Pap smear results of koilocytosis, dyskeratosis, keratinizing atypia, atypical inflammation and parakeratosis are all suggestive of HPV
• Histology: colposcopy with directed biopsy is diagnostic for subclinical lesions, dysplasia and malignancy

Management

Appropriate Consultation
Consult a physician for medication order to treat external warts.

Client Education
• Explain to client that therapy eliminates visible warts but does not eradicate the virus and that no therapy has been shown to be effective in eradicating HPV
• Stress that ablation of warts may decrease viral load and transmissibility
• Advise client to abstain from genital contact while lesions are present
• Use of female condom

Pharmacologic Interventions
• Therapy is not recommended for subclinical infections (absence of exophytic warts)

podophyllum resin (Podophyllin 25%) (B class drug) in tincture of benzoin compound is applied weekly to visible external warts by clinician until warts resolve

• Petroleum jelly may be applied to surrounding skin for protection of unaffected areas
• Advise patient to wash resin off after 4 hours
• Do not use in pregnancy
• If warts remain unresolved after six applications, consider other therapy

Monitoring and Follow-Up
• Short-term follow-up is not recommended if patient is asymptomatic after treatment
• Long-term follow-up should include annual Pap smears and pelvic exams
• Encourage patient to examine her own genitalia
There is a known association between HPV infection and later development of cancer of the cervix. Therefore, annual Pap smear screening is essential for women with HPV.

Referral
Consult or refer client to physician if lesions persist after six consecutive treatments or when cervical or rectal warts are diagnosed.
Pelvic Inflammatory Disease (PID)

Definition
Ascending infection of uterus and fallopian tubes. May be acute or chronic.

Causes
• Most common: *Neisseria gonorrhoeae, Chlamydia*
• Other: anaerobes, *Escherichia coli*, group B streptococci
• Often polymicrobial

Risk Factors
• Multiple sexual partners
• Client's partner has multiple sexual partners
• Use of IUCD
• Transcervical instrumentation (e.g. IUCD insertion)
• Late treated STI previously

History
• Usually younger, sexually active women
• Multiple sexual partners (fivefold increase)
• Use of IUCD for birth control
• Lower abdominal pain of recent onset
• Fever and chills
• Vaginal discharge may be present
• Menstrual disturbance or painful intercourse may be present
• Nausea and vomiting
• Anorexia
• Urinary symptoms

Physical Findings
• May present acutely or subacutely
• Temperature may be elevated
• Heart rate may be elevated
• Client in mild-to-severe distress
• Abdominal tenderness, with or without rebound
• Cervical discharge may be present
• Mild-to-severe tenderness on bimanual exam of cervix and uterus
• Cervical motion tenderness
• Adnexal tenderness
• Adnexal fullness, or a mass may be felt
• Signs of peritonitis may be present

Differential Diagnosis
• Cervicitis
• Ectopic pregnancy
• Adnexal mass with rupture or torsion (e.g. twisted ovarian cyst)
• Pyelonephritis
• Appendicitis
• Inflammatory bowel disease
• Diverticulitis

Complications
• Recurrent episodes (in 15% to 25% of cases)
• Tubo-ovarian abscess (in 15% of cases)
• Sepsis
• Infertility (prevalence of 12% after one episode)
• Chronic pelvic pain (in 20% of cases)
• Adhesions
• Increased risk of ectopic pregnancy (four-to eight-fold increase in risk)

Diagnostic Tests
• Complete blood count
• Vaginal and cervical swabs or urine (if test available) for culture and sensitivity (*N. gonorrhoeae and Chlamydia*)
• Urine pregnancy test

Management
Goals of Treatment
• Relieve symptoms
• Prevent complications

Appropriate Consultation
• Consult a physician, because first-line drug therapy must be ordered by a physician
• PID can be treated with antibiotics on either an inpatient or outpatient basis

Client Education
• Explain disease course, expected outcome and future complications
• Counsel client about appropriate use of medications (dose, frequency, importance of compliance)
• Recommend extra rest during acute phase
• Teach client proper perineal hygiene
• Recommend avoidance of sexual intercourse and avoidance of tampon use
• Counsel client about safe sexual activity (e.g. use of condoms to prevent future episodes)
• Advise client to return to clinic if symptoms worsen or do not improve within 48-72 hours

**Pharmacologic Interventions**
Outpatient oral antibiotic therapy:
- **cefixime (B class drug)** 800 mg PO stat and
doxycycline (A class drug), 100 mg PO bid for 14 days
or
tetracycline (A class drug), 500 mg PO qid for 14 days
or
erthyromycin (A class drug), 500 mg PO qid for 14 days

For clients with allergy to penicillin, use only doxycycline or tetracycline.

Analgesia and antipyretics for fever and pain:
- **acetaminophen (A class drug)**, 500 mg, 1-2 tabs PO q4h prn

**Monitoring and Follow-Up**
• Arrange follow-up in 24-48 hours and again in 7-10 days
• Instruct client to return to clinic if symptoms progress despite therapy
• All sexual partners should be assessed for symptoms of STIs

**Indications for Referral and Admission to Hospital**
• Failure of outpatient therapy
• Nulliparity, especially in women < 20 years of age
• Pregnancy
• Presence of tubo-ovarian abscess
• Presence of gastrointestinal symptoms
• Presence of an IUCD
• Client appears acutely ill
• Inability to rule out surgical emergencies as a cause (e.g. ectopic pregnancy or appendicitis)
• Unclear diagnosis
• Client intolerant of outpatient therapy
• Client unreliable, and noncompliance with therapy and follow-up is anticipated

**Adjuvant Therapy**
• Bed rest
• Start an IV with normal saline to keep vein open
• Draw blood for cultures

**Pharmacologic Interventions**
Consult a physician concerning choice of antibiotics.

**Monitoring and Follow-Up**
Monitor vital signs and symptoms frequently

**Referral**
Medevac as soon as possible.
Contraception

Definition
Prevention of pregnancy.

Counseling On Choice Of Contraceptive Method

Barrier Methods
- Assess client's comfort, motivation and compliance
- Explain proper use and application of condoms (male and female)
- Explain proper filling and insertion of applicators with gel and foam
- Demonstrate insertion and ask client to give return demonstration
- If available and able, fit client with an appropriate-size diaphragm, or refer to physician for fitting
- Relative contraindications to diaphragm use: recurrent cystitis and previous history of toxic shock syndrome

Preventing Ovulation - Oral Contraceptive Pill
- Prevents pregnancy by preventing release of ovum and causing changes in cervical mucus, endometrial lining and tubal motility
- Pap smear testing should be done annually
- Demonstrate how to perform a monthly breast self-examination
- Teach client how to take the OCP (she should take the pill at the same time each day and should not miss any pills)
- Instruct client to return to clinic if headaches, leg pain or swelling, amenorrhea or breakthrough bleeding develop
- Instruct client about "back-up": if she forgets to take her OCP for 2 days or more in a row, or has vomiting or diarrhea, a barrier method of birth control will be required for the remainder of that cycle, in addition to the OCP, to prevent pregnancy
- Must be taken at least one month before effective

Preventing Ovulation - Medroxyprogesterone (Depo-Provera®) (B class drug)
- Prevents pregnancy by suppressing ovulation
- Periods may be lighter, irregular or stop completely
- May have slight weight gain (counsel about healthy diet and lifestyle)
- Does not protect from STIs
- Pap smear testing should be done annually

Preventing Implantation--Intrauterine contraceptive device (IUCD)
- Explain how IUCD prevents pregnancy
- Absolute contraindications: past history of PID, active pelvic infection
- Usually contraindicated in nulliparous women
- Relative contraindications: history of repeated sexually transmitted infections, multiple partners, previous ectopic pregnancy, heavy periods and dysmenorrhea
- Pap smear testing should be done annually

Sterilization--Tubal Ligation and Vasectomy
- If this method is requested, both partners should be present for counseling if desired
- Clients must be absolutely certain that they do not desire any more children, as these procedures are, for all intents and purposes, irreversible
- Tubal ligation: with client under general anesthesia, air is pumped into the abdomen and fallopian tubes are cut and tied
- Vasectomy: vas deferens is cut and tied off (can be performed in the outpatients' department), usually under local anesthetic
- Both procedures involve some discomfort and risks, which must be explained.
Management

Table 6: Principles of oral contraceptive use

<table>
<thead>
<tr>
<th>History and physical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before OCP can be started, a thorough history and physical examination must be done</td>
</tr>
<tr>
<td>Obtain full medical, gynecological and obstetrical history (See “Assessment of the female reproductive system” above, this chapter)</td>
</tr>
<tr>
<td>In particular, identify chronic disease (e.g. cardiac disease, deep vein thrombosis, hypertension, migraines, pelvic disease, pelvic infection, pelvic surgery, epilepsy) or medications that might interfere with OCP</td>
</tr>
<tr>
<td>Review past use of birth control: methods, effectiveness, problems, reason for discontinuation, specific contraindications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laboratory testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAP smear and swabs/urine for Chlamydia and N. gonorrhoeae for any client who has had sexual intercourse</td>
</tr>
<tr>
<td>Urinalysis and pregnancy test</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Initial dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>For typical health young women, start OCP with daily dose of 30-35 mcg estrogen, combine with lowest possible dose of any given progestogen, to provide contraception and good cycle control</td>
</tr>
<tr>
<td>Medroxyprogesterone (A class drug), 150 mg IM q3months may be initiated by RN. Any OCP containing 50 mcg estrogen should not be started by the nurse</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In older women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client should continue using contraception until 1 year after clinical onset of menopause (i.e. periods absent for 1 year)</td>
</tr>
<tr>
<td>Low-estrogen (20 mcg) combination OCPs are useful, provided the woman is a nonsmoker with no contraindications for OCP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Postpartum: client not breastfeeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clients who are not breastfeeding can expect menstruation to resume about 6 weeks postpartum</td>
</tr>
<tr>
<td>OCP may be restarted any time after delivery</td>
</tr>
<tr>
<td>Medroxyprogesterone should not be given until 72 hours after delivery if client is planning to breastfeed</td>
</tr>
<tr>
<td>OCP-enhanced thrombotic episodes are minimal at this time</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Postpartum: client breastfeeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return of menstruation in women who are breastfeeding is highly variable</td>
</tr>
<tr>
<td>Ovulation may occur in the absence of menstruation</td>
</tr>
<tr>
<td>Lactating clients may be started on progesterone-only OCP (e.g. norethindrone [Micronor®] or medroxyprogesterone [Depo-Provera®] IM)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Special notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is unnecessary to give the client a “rest” from her OCP</td>
</tr>
<tr>
<td>OCPs may be taken (in the absence of untoward effects) until menopause, as long as any client over 35 who is taking OCP is a nonsmoker</td>
</tr>
<tr>
<td>Client should continue using contraception until 1 year after clinical onset of menopause (periods for about 1 year)</td>
</tr>
</tbody>
</table>
**Goals of Treatment**
- Prevent pregnancy
- Prevent sexually transmitted infection (barrier methods only)
- Identify and manage side effects
- Method of choice in healthy teenagers and young women is OCP or Depo Provera® injections

**Client Education**
- Discuss all methods of contraception: barrier methods, spermicidal agents, diaphragm, IUCD, OCP, medroxyprogesterone injections
- Because smoking increases risk of serious OCP-related complications, client should be offered smoking cessation counseling
- Encourage client to use condoms in addition to chosen method of contraception to prevent sexually transmitted infection

**Prescribing Oral Contraceptives**
Choice of OCP depends on a variety of factors:
- Contraindications to OCP use must be absent (refer to Table 7, below)
- Characteristics of usual menstrual flow (light, moderate or heavy) (refer to Table 8, below)
- Presence of dysmenorrhea
- Characteristics of skin (fair, oily, acne, hirsute)
- Body weight (slim, average or overweight)
- Choose OCP according to client's profile.

**Table 7: contraindications to oral contraceptive use**

<table>
<thead>
<tr>
<th>Absolute contraindications</th>
<th>Strong relative contraindications</th>
<th>Possible relative contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrombophlebitis, thromboembolic disorders</td>
<td>Severe headaches, particularly vascular or migraine</td>
<td>Strong family history of diabetes mellitus</td>
</tr>
<tr>
<td>Cerebrovascular disorders</td>
<td>Hypertension (blood pressure ≥140/90 mm Hg)</td>
<td>Previous cholestasis during pregnancy</td>
</tr>
<tr>
<td>Ischemic heart disease, coronary artery disease</td>
<td>Diabetes mellitus</td>
<td>Congenital hyperbilirubinemia (Gilbert’s disease)</td>
</tr>
<tr>
<td>Known or suspected cancer of the breast</td>
<td>Active gallbladder disease</td>
<td>Impaired liver function at the time of presentation or within the past year</td>
</tr>
<tr>
<td>Known or suspected pregnancy</td>
<td>Infectious mononucleosis, acute phase</td>
<td>Known unreliability and low likelihood of taking the pill correctly</td>
</tr>
<tr>
<td>Benign or malignant liver tumor</td>
<td>Sickle cell disease</td>
<td></td>
</tr>
<tr>
<td>Undiagnosed abnormal genital bleeding</td>
<td>Elective major surgery planned in the next 4 weeks or major surgery requiring immobilization</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long-leg cast or major injury to lower leg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40 years of age or older</td>
<td></td>
</tr>
<tr>
<td></td>
<td>At least 35 years of age and currently a heavy smoker (&gt;15 cigarettes/day)</td>
<td></td>
</tr>
</tbody>
</table>
Table 8: Oral contraceptive choices

<table>
<thead>
<tr>
<th>Client characteristics</th>
<th>Initial OCP*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light periods</td>
<td>Alesse, Triphasil, Ortho 0.5/35, Brevicon 0.5/35, Demulen 30</td>
</tr>
<tr>
<td>Moderate periods</td>
<td>Triphasil, Demulen 30, Ortho 10/11,</td>
</tr>
<tr>
<td>Heavy periods</td>
<td>LoEstrin 1.5/30, MinOvral Ortho 1/35, Brevicon 1/35, Ortho 10/11</td>
</tr>
<tr>
<td>Abnormally heavy periods (anovulatory cycles)</td>
<td>Consult physician</td>
</tr>
<tr>
<td>Dysmenorrhea</td>
<td>LoEstrin 1.5/30, MinOvral Ortho 1/35, Brevicon 1/35, Ortho 10/11</td>
</tr>
<tr>
<td>Tendency towards oily skin, acne, weight gain</td>
<td>Demulen 30, Triphasil, Ortho 0.5/35, Brevicon 0.5/35</td>
</tr>
<tr>
<td>or heavy hair growth</td>
<td></td>
</tr>
</tbody>
</table>

* Alesse® and Triphasil® are in the NWT formulary. All other OCPs given here are examples of what physician may prescribe.

Situations in which Close Monitoring is Needed

- History of depression
- History of epilepsy
- Family history of hyperlipidemia
- Family history of death of a parent or sibling due to myocardial infarction before the age of 50 years
- Consult a physician before starting OCP for clients who have "possible relative contraindications" (see Table 7) or for clients with any circumstance in which close monitoring is needed (see above).
- Do not start OCP for any client with any "strong relative contraindication" (see Table 7).
- Check CPS for drug interactions

Monitoring and Follow-up

- First follow-up examination should be done at 3 months
- Examinations, including Pap smears, should then be done annually for well women
- Encourage and teach breast self-examination

Referral

Refer to the physician all clients requesting IUCDs, Depo Provera® or sterilization.
Menopause

Definition
Cessation of menses for at least one full year in a previously menstruating female.

Causes
• Normal aging
• Premature ovarian failure (as in menopause before age 40)
• Surgery
• Chemical or medication
• Radiation

History
• Highly variable but usually occurs when a woman is between 45 and 55 years of age
• Irregular menstrual cycles
• Initially, cycles may be short, with occasional menorrhagia
• Later, cycles become longer and more spaced out, with scant menstrual flow
• Eventually, menstruation ceases altogether
• Hot flushes and night sweats may occur
• Vaginal dryness, irritation, itching may be present
• Painful intercourse may be present
• Urinary urgency, frequency and dysuria may be present (because of urethral atrophy)
• Mild-to-severe mood swings may be present
• Anxiety, nervousness
• Sleep disturbances
• Depression may occur
• Memory loss

Physical Findings
• Mood and affect: evidence of depression
• Breast atrophy
• Vaginal introitus smaller
• Vaginal walls smooth, thin, pale, dry
• Cervix small
• Uterus feels small
• Ovaries not palpable

Differential Diagnosis
• Abnormal vaginal bleeding
• Infectious cystitis
• Infectious vaginitis

Complications
• Difficulties in adjusting to this new stage of life (anxiety or depression)
• Osteoporosis

Diagnostic Tests
• Determine levels of follicle-stimulating hormone (FSH) and thyroid-stimulating hormone (TSH) (if diagnosis is unclear or if the client is less than 40 years of age)

Management

Goals of Treatment
• Offer support and reassurance
• Prevent complications

Appropriate Consultation
Arrange elective consultation with a physician if symptoms are severe, complications are present, client is less than 40 years of age or client desires hormone replacement therapy (HRT).

Client Education
• Explain process as a normal part of aging
• Assess client's feelings about aging
• Provide a supportive environment rather than dismissing symptoms, as these symptoms are real to the client
• Discuss the risks and benefits of HRT
• Encourage balanced nutrition and regular physical activity for physical and mental well-being
• Advise client to return to clinic if vaginal bleeding occurs at any time after menopause
• Suggest use of lubricants before coitus if intercourse is painful

Pharmacologic Interventions

Herbs and Vitamins that May Be Useful in Menopause

Evening Primrose (Primrose Oil)
Active ingredients: gamma-linolenic acid (GLA) and linoleic acid
The seed oil is a good source of GLA, which is an essential fatty acid (a nutrient that the body cannot make but that is essential to good health). Evening primrose oil has been used for premenstrual syndrome (PMS) and mastalgia (sore breasts). There are no known contraindications or drug interactions.

**Flaxseed Oil** (Linseed Oil)

**Active ingredients:** fatty acids (palmitic, steric, oleic, linoleic and linolenic acids)

Flaxseed oil is a good source of essential fatty acids (a nutrient that the body cannot make but that is essential to good health). Flaxseed oil is rich in GLA and is used by many for PMS and breast tenderness. There are no reports of toxic effects when used at recommended doses.

**Vitamin E** (400-1200 IU/day)

**Food sources:** polyunsaturated vegetable oil, seeds and nuts

Vitamin E is an antioxidant. Studies done in the late 1940s showed that vitamin E relieved hot flashes and postmenopausal vaginal dryness, but more recent studies are lacking. There are other benefits. It is known from the Nurses Health Study that women who took vitamin E over a 2-year period reduced their risk of fatal heart attacks by 40%.

Vitamin E potentiates (causes a greater effect of) anticoagulant drugs such as coumadin and acetylsalicylic acid (ASA).

**Vitamin B₆** (50 mg PO, once daily)

**Food sources:** whole grains, bananas, potatoes, nuts and seeds, cauliflower

Pyridoxine is involved in the production of brain hormones (neurotransmitters). More than 50 other chemical processes in the body depend on pyridoxine. Vitamin B6 levels can be low in people with depression and in women taking estrogen in the form of birth control pills or hormone replacement therapy. It is safe to use when taken in recommended doses.

**Calcium** (500 mg PO, 1-3 times/day) and **vitamin D** (400-800 IU PO od) are recommended if diet is inadequate in calcium-rich foods.

Calcium may be contraindicated in patients with a history of renal stones.

Source: Canadian Consensus Conference on Menopause and Osteoporosis (Society of Obstetricians and Gynecologists of Canada, 1998)

**Phytoestrogens** - source soya products

**Hormone Replacement Therapy**

HRT is initiated by a physician. Frank discussion between the physician and the client regarding the risks and benefits of HRT should occur.

**Monitoring and Follow-Up**

- Follow-up 1-2 months after beginning any therapy for menopause, then follow every 6 months
- Encourage presenting annually for Pap smear
- Monitor for signs of osteoporosis, abnormal uterine bleeding

**Referral**

Unnecessary unless complications arise.
Gynecological Emergencies

Acute Pelvic Pain Of Gynecological Origin

Definition
Acute abdominal pain due to dysfunction or disease of reproductive tract

Causes
• Unsuspected ectopic pregnancy
• Ruptured or twisted ovarian cyst
• Acute pelvic inflammatory disease
• Severe dysmenorrhea

History
• Abdominal pain of sudden or gradual onset
• Pain becoming increasingly severe
• Pain made worse with cough, straining at stool or urination
• Pain may be referred to the shoulder tip (e.g. in ectopic pregnancy)
• Abnormal vaginal bleeding may have occurred
• Fever, chills and vaginal discharge may be present
• Nausea and vomiting may be present
• Syncope may have occurred

Physical Findings
• Temperature may be elevated
• Heart rate rapid
• Blood pressure may be normal, reduced or hypotensive
• Client appears in moderate-to-acute distress
• Client may walk slowly, bent over and holding abdomen
• Abdomen appears normal
• Vaginal examination may reveal pus from cervix or bleeding
• Bowel sounds may be reduced or absent
• Lower abdominal tenderness
• Signs of localized or generalized peritonitis may be present
• Bimanual pelvic examination reveals acute cervical motion tenderness
• Adnexal tenderness or mass may be present
• Pregnancy test may be positive

Differential Diagnosis
• Ectopic pregnancy
• Spontaneous abortion
• Pelvic inflammatory disease
• Bleeding corpus luteum cyst
• Adnexal torsion
• Mittelschmerz
• Endometriosis
• Dysmenorrhea
• Cystitis
• Pyelonephritis
• Ureteral stone
• Inflammatory bowel disease
• Irritable bowel
• Bowel obstruction

Complications
• Internal hemorrhage with hypovolemic shock
• Sepsis

Diagnostic Tests
• Hemoglobin
• Urine sample for urinalysis and culture; urine pregnancy test
• Swabs (pv) if purulent discharge

Management

Goals of Treatment
• Relieve pain
• Prevent complications

If pelvic inflammatory disease is suspected, see "Pelvic Inflammatory Disease," above, this chapter.

If ectopic pregnancy is suspected, see "Ectopic Pregnancy," in chapter 12, "Obstetrics"

Appropriate Consultation
Consult a physician as soon as possible, unless a minor cause has been definitively identified (e.g. Mittelschmerz or dysmenorrhea).
**Nonpharmacologic Interventions**

- Nothing by mouth
- Bed rest
- Consider inserting nasogastric tube if there are signs of peritonitis or bowel obstruction
- Consider inserting a Foley catheter if patient is hemodynamically unstable

**Adjuvant Therapy**

- Start large-bore IV (14- or 16-gauge) with normal saline
- Adjust rate according to age and state of hydration
- Oxygen by mask prn if client is in shock; keep oxygen saturation ≥ 97%

**Pharmacologic Interventions**

Analgesia for pain: 
meperidine (*D class drug*), 50-100 mg IM

**Monitoring and Follow-Up**

Monitor ABC (airway, breathing and circulation), vital signs, and intake and output.

**Referral**

Medevac as soon as possible.
Chapter 14- General Emergencies and Major Trauma

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Emergency Assessment And Treatment Of Major Trauma

General Principles
Mobilize resources quickly and staff permitting:
• Designate one person to take charge of assessment
• Designate one person to begin resuscitation interventions
• Designate one person to make phone calls

Primary Survey
This assessment should proceed quickly, within 1-2 minutes of client's arrival. Nothing should interrupt this assessment except treatment of airway obstruction or cardiac arrest.

Assessment priorities of 2-minute primary survey
1. Total overview of patient situation while approaching patient
2. Evaluation of airway, C-spine control, and initial LOC
3. Evaluation of breathing
4. Evaluation of circulation
5. Brief examination of abdomen, pelvis, extremities

Scene Size-Up
• Which BSI (body Substance Isolation) precaution do I need to take?
• Do I see, hear, or smell anything dangerous? Do we need help?
• Mechanisms of injury
• Is it generalizes or focused?
• Is it potentially life threatening?
• Do I need help?

Initial Assessment
General impression of the patient.

Level Of Consciousness (AVPU)
Alert
Responds to Verbal stimuli
Responds to Painful stimuli
Unresponsiveness

Airway
• Patent or obstructed

Breathing
• Breathing or not?
• Is it easy, labored, shallow?
• Rate

Ventilation
(See definitive care section)
Rapid Trauma Survey

**Circulation**

*Pulse*
- Rate at neck and wrist
- Quality at neck and wrist - strong, weak absent
- Is major bleeding present?

**Skin**
- Colour - good, pale, cyanotic, mottled
- Condition - dry or moist
- Temperature - cool or warm

**Decision**
- Is this a critical situation?
- Is it a rapid trauma survey or a forced exam?
- Are there interventions that I must do now?

**Head And Neck**
- Inspection and palpation - deformities, contusions, abrasions, penetrations, burns, lacerations, swelling of neck, any tenderness of neck
- Neck veins - flat or distended
- Trachea - midline or deviated right or left

**Chest**
- Inspection and palpation - deformities, contusions, abrasions, penetrations, burns, lacerations, swelling, tenderness, instability, crepitations

**Abdomen**
- Inspection and palpation - deformities, contusions, abrasions, penetrations, burns, lacerations, swelling, soft or rigid, tenderness

**Pelvis**
- Inspection and palpation - deformities, contusions, abrasions, penetrations, burns, lacerations, swelling, tenderness, instability, crepitations

**Extremities**
- Inspection and palpation - deformities, contusions, abrasions, penetrations, burns, lacerations, swelling, pulses, motor function, sensation - normal or abnormal, left or right

**Exam Of Posterior (done during transfer to the backboard)**
- Inspection and palpation while moving on to stretcher - deformities, contusions, abrasions, penetrations, burns, lacerations, swelling, tenderness, instability, crepitations

**Decision**
- Is it a critical situation?
- Are there interventions that must be done now?

**History**
- *SAMPLE* history from a conscious client:
  - S for symptoms
  - A for allergies
  - M for medications
  - P for past history
  - L for last meal
  - E for events or environment related to the injury

**Vital Signs**
- Check vital signs and pulse oximetry
- Are the vital signs normal?

**Disability**
(Perform this exam now if there is an altered mental status. Otherwise, postpone this exam until you perform the detailed exam)
- Are the pupils equal and reactive? (Glasgow Coma Score)
- Are there signs of cerebral herniation (unconsciousness, dilated pupil(s), hypertension, bradycardia, posturing)?
- Does the patient have a medical alert tag?

**Focused Exam**
If the mechanism is limited to a certain area of the body, then you may only need to focus on the affected area, obtain a SAMPLE history, and check baseline vital signs. You would then have enough information to make a decision about urgency of transportation and what interventions need to be done immediately.
Secondary Survey: Ongoing Exam And Detailed Exam

Ongoing Exam
This is the reassessment survey that gathers critical information for decision making and interventions.

Subjective Changes
• Are you feeling better or worse now?

Mental Status
• What is the LOC?
• Pupils – size, equal, reaction to light
• Glasgow Coma Score

Reassess ABC’s

Neck
• Is the trachea midline or deviated?
• Are the neck veins normal, flat or distended?
• Is there increased swelling of the neck?

Chest
• Are the breath sounds present and equal?
• If the breath sounds are unequal, is the chest hyperresonant or dull?

Abdomen
• Is there ant tenderness?
• Is the abdomen soft, rigid or distended?

Assessment Of Identified Injuries
• What is the LOC?
• Pupils – size, equal, reaction to light
• Glasgow Coma Score

Check Interventions
(See Deifinitive Care Section)

Detailed Exam
Head And Neck
• Reassess ABC
• Inspect and palpate skull and face for deformities, contusions, abrasions, penetration, burns, lacerations and swelling
• Feel for tenderness, instability and crepitations

Check for the following which may indicate basal skull fracture:
• Battle's sign (bluish discoloration over mastoid process)
• Raccoon-like eyes
• Clear nasal discharge indicates cerebrospinal fluid (CSF) rhinorrhea
• Blood in ear canals or hemotympanum (bluish purple colour behind ear drum, due to presence of blood)
• Check for pallor, cyanosis, diaphoresis

Neck
• Apply a cervical hard collar if not already done!
• Check the neck again for deformities, contusions, abrasions, penetration, burns, lacerations and swelling
• Check JVP
• Check carotid pulse again
• Inspect for distension of neck veins (indicating tension pneumothorax or cardiac tamponade), tracheal deviation
• Assume injury to the cervical spine if trauma has occurred above clavicle

Chest
Inspection
• Respiratory effort
• Equality of chest movement
• Deformity
• Bruising
• Lacerations
• Penetrating wounds

Palpation
• Equality of chest movement
• Position of trachea
• Crepitus, deformity
• Fractures of the lower ribs (splenic or kidney injury may also be present)

Percussion
• Area of dullness

Auscultation
• Air entry
• Quality of breath sounds
• Equality of breath sounds
**Cardiovascular System**

- Auscultate heart for heart sounds: presence, quality, faintness of sounds

**Abdomen**

**Inspection**

- Penetrating wounds, blunt trauma, lacerations
- Bruising (anterior, sides)
- Bleeding
- Distension

**Auscultation**

- For bowel sounds

**Palpation**

- Abdominal guarding, rigidity, rebound
- Tenderness
- Fractures of lower ribs (ruptured spleen, possible penetrating wound, bowel injury and intra-abdominal hemorrhage possible)

**Pelvis And Genitalia**

**Inspection**

- Blood coming from urethral meatus

**Palpation**

- Tenderness of iliac crest and symphysis pubis (indicating pelvic fracture)
- Distension of bladder
- Rectal exam to assess rectal tone

Remember that pelvic and femoral fractures can result in significant loss of blood.

**Extremities**

**Inspection**

- Bleeding, lacerations, bruising, swelling, deformity, burns
- Leg position: unusual external rotation of a leg may indicate fracture of the femoral neck or the limb
- Movement of limbs

**Palpation**

- Sensation

- Tenderness, crepitus
- Muscle tone
- Distal pulses
- Reflexes: presence, quality

Remember that pelvic and femoral fractures can result in significant loss of blood.

**Back**

Perform log roll maneuver with spine precautions to assess back and rectum.

**Inspection**

- Lacerations
- Bleeding
- Burns
- Bruising: posterior chest wall, flanks, low back, buttocks
- Swelling

**Palpation**

- Tenderness
- Deformity
- Crepitus

**Neurological System**

Do brief neurological assessment to evaluate client's presenting level of consciousness, pupillary size and reaction, lateralized limb weakness.

Describe level of consciousness according to AVPU method (see Primary Survey above). In addition, assess the following aspects:

- Pupil for abnormalities: position, equality, reactivity
- Motor function: voluntary movement of fingers and toes
- Sensation: can client feel it when you touch his or her fingers and toes?

Perform detailed neurological examination and assess client according to the Glasgow Coma Scale after initial evaluation is complete.
Table 1: Glasgow Coma Score
The GCS is scored between 3 and 15, 3 being the worst, and 15 the best. It is composed of three parameters: Best Eye Response, Best Verbal Response, Best Motor Response, as given below:

<table>
<thead>
<tr>
<th>Eye Opening (E)</th>
<th>Verbal Response (V)</th>
<th>Motor Response (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 = Spontaneous</td>
<td>5 = Normal conversation</td>
<td>6 = Normal</td>
</tr>
<tr>
<td>3 = To voice</td>
<td>4 = Disoriented conversation</td>
<td>5 = Localizes to pain</td>
</tr>
<tr>
<td>2 = To pain</td>
<td>3 = Words, but not coherent</td>
<td>4 = Withdraws to pain</td>
</tr>
<tr>
<td>1 = None</td>
<td>2 = No words...only sounds</td>
<td>3 = Decorticate posture</td>
</tr>
<tr>
<td></td>
<td>1 = None</td>
<td>2 = Decerebrate</td>
</tr>
</tbody>
</table>

Total = E + V + M

Note that the phrase 'GCS of 11' is essentially meaningless, and it is important to break the figure down into its components, such as E3V3M5 = GCS 11. A Coma Score of 13 or higher correlates with a mild brain injury, 9 to 12 is a moderate injury and 8 or less a severe brain injury.


Definitive Care

- Resuscitative measures initiated earlier should be continued (e.g. airway, IV therapy, oxygen)
- Identified conditions should be managed according to their priority
- Ensure airway is protected in unconscious client
- Apply suction as needed
- Administer supplemental oxygen, even if breathing appears adequate
- Treat hypotension aggressively with IV fluid replacement (see "Shock," below, this chapter)
- Insert Foley catheter (if no contraindications)
- Contraindications to catheterization: blood at urethral meatus, blood in scrotum, obvious pelvic fracture

Bandaging And Splinting

- If necessary, finish bandaging and splinting injuries
- Angulated fractures of the upper extremities are best splinted as found
- Fractures of the lower extremities should be gently straightened with traction splints (Thomas splints) or air splints (if available)
- Check colour, sensation, warmth and movement before and after all limb procedures

Monitoring And Follow-Up

- Monitor and reassess ABC q15min if stable, q5min if unstable
- Monitor hourly urine output

Checklist

- Check airway tubes for patency
- Check oxygen rate
- Check IV lines for patency and rate of infusion
- Add normal saline to catheter balloon and endotracheal tube cuff for transport
- Check for patency of decompression needle for tension pneumothorax, if inserted
- Check splints and dressings
- Check rate of hyperventilation of client with decreased level of consciousness
- Check position of pregnant clients; tilt spine board slightly to the left

Consultation

Consult a physician as soon as possible

Referral

- Medevac as soon as possible.
- Pressure effects on certain injuries are accentuated in unpressurized aircraft; maximum flying altitudes are applicable (see Medevac Guidelines in use)
Major Trauma Situations

Head Trauma

Definition
Blunt, forceful injury to the soft tissues or bony structures of the scalp, skull or brain.

The initial response of the bruised brain is swelling. Bruising causes vasodilation through increased blood flow to the injured area; because there is no extra space within the skull, an accumulation of blood takes up space and exerts pressure on the surrounding brain tissue. This pressure results in deceased blood flow to uninjured areas of the brain. Cerebral edema does not occur immediately but develops over 24-48 hours. Early efforts to decrease the initial vasodilation in the injured area can save the person's life.

Types Of Head Injuries
Scalp wounds (lacerations)
Skull injury (fracture)
Brain injuries:
• Concussion: no significant injury to brain, brief period of unconsciousness then return to normal; short-term retrograde amnesia, dizziness, headache, nausea, ringing in ears
• Cerebral contusion: prolonged unconsciousness or serious alteration in level of consciousness; may have focal neurological signs
• Intracranial hemorrhage: bleeding into brain tissue including acute epidural hematoma and acute subdural hemorrhage and intracerebral hemorrhage

History And Physical Findings

Mild Injuries
• Criteria: Minor trauma, scalp wounds, no signs of intracranial injury, no loss of consciousness
• Treatment: Observe for any signs or symptoms of brain injury; must discharge to a reliable observer who will continue observation at home
• Give and explain Head Injury Sheet

Moderate Injuries
• Criteria: Symptoms consistent with intracranial injury, including vomiting, transient loss of consciousness, severe headache, post-traumatic seizures, amnesia, evidence of basilar skull fracture (CSF rhinorrhea, Battle's sign, raccoon eyes, hemotympanum, non-focal neurologic signs)

Severe Injuries
• Criteria: Depressed level of consciousness, focal neurologic signs, penetrating injury of skull or palpable, depressed skull fractures

Other Considerations
The initial neurological assessment is critical as a baseline.
• Head injury is frequently associated with other severe trauma
• Hypotension in adults is never caused by an isolated head injury, except if the client is near death; look for other injuries, including spinal cord injuries
• Physical examination should include a complete neurologic exam, as well as inspection for evidence of basilar skull fracture (e.g. CSF rhinorrhea, Battle's sign, raccoon eyes, hemotympanum)
• Assume injury to the cervical spine in all cases of head trauma
• Remember that multiple trauma may be present

In cases of head injury, the clinical picture will evolve. The client is either improving or deteriorating over time; frequent reassessment is therefore critical.

Glasgow Coma Scale
The Glasgow Coma Scale (see Table 1) is used to assess the severity of coma.
• Assess client frequently
• Monitor for a drop in the score
• Any drop in the score is a danger sign

Interpretation of Score
• Score < 9: severe head injury
• Score 9-12: moderate head injury
• Score 13-15: minor head injury
Complications

• Seizures
• Airway obstruction
• Shock
• Rapidly deteriorating condition
• Metabolic abnormality

Diagnostic Tests
None.

Management
Remember, ABC takes priority: saving only the head will not save the patient.
• Characteristics: No signs of intracranial injury, no loss of consciousness
• Treatment: Observe for 12-24 hours for any sign or symptom of brain injury; discharge to a reliable observer who will continue observations at home

Adjuvant Therapy
• Secure the airway and provide supplemental oxygen at 10-12 L/min
• These measures maintain adequate oxygenation and reduce intracranial pressure
• Stabilize client on a spine board
• The neck should be immobilized in a rigid collar and a padded head motion restriction device
• Elevate head of bed to 30° unless contraindicated (e.g. in cases of shock or back injury)

• Avoid tight cervical collar (any pressure on the external jugular veins will increase the intracranial pressure)
• Keep nil by mouth

Monitoring and follow-up
• Record baseline observations
• Record blood pressure, respirations, shape, accommodation, reactivity and size of pupils, sensation and voluntary motor activity
• Check neurological signs frequently
• Perform trauma score

Non-pharmacological interventions
• Start IV therapy to keep vein open
• Fluids are generally restricted in clients with closed-head trauma
• Maintain normal cardiac output
• If hypotensive, suspect hemorrhage or spinal injury (see "Shock," below, this chapter)
• Insert Foley catheter if client is unconscious (normal saline in catheter balloon)
• Monitor output hourly

Complications
• Consult a physician as soon as able

Referral
• Medevac as quickly as possible
• Review recommended precautions for flight for a person with head injury (see Medevac Guidelines in use)
Cervical Spine And Spinal Cord Trauma

Description

Spine Injury
A sudden movement of the head or trunk that produces flexion, extension, or lateral stressors that may damage the bony or connective tissues of the spinal column (BTLS)

Spinal Cord Injury
Look for paralysis and other signs of cord injury, including priapism, urinary retention, fecal incontinence, paralytic ileus, immediate loss of all sensation and reflex activity below the level of the injury.

Causes

• Motor vehicle crash
• Falls
• Sports
• Acts of violence
• Blunt trauma above the clavicles
• Diving accident
• Motor vehicle or bicycle crash
• Fall
• Stabbing or impalement near the spinal column
• Shooting or blast injury to the torso

Physical Findings

• Tachycardia
• Tachypnea
• Blood pressure may be low if in shock
• Pulse oximetry may be desaturating if in shock
• Tenderness on palpation or movement of the spinal column
• Obvious deformity of the back or spinal column
• Loss of sensation
• Weakness or flaccidity of muscle groups
• Loss of bladder or bowel control
• Priapism (sustained penile erection)
• Spinal neurogenic shock leads to vasomotor instability from loss of autonomic tone and may lead to hypotension or temperature instability
• Client may have hypoxia or hypoventilation if fracture or compression occurs above C5
• Symptoms of neck or back pain, numbness or tingling in the limbs, weakness or paralysis of the limbs

"Spinal shock" is a separate neurologic entity occurring as a result of cord injury; it presents with flaccid paralysis and the client usually recovers in hours to weeks. It frequently occurs in children without associated cervical spine fractures.

Complications

• Permanent paralysis
• Respiratory arrest
• Spinal shock
• Death

Diagnostic Tests
None.

Management

Initial care of the client who may have spinal injury is based on the suspicion of injury, stabilization of the spine and prevention of further neurological injury.

Goals of Treatment

• Stabilize spine
• Prevent further damage
• Prevent complications

Initial Treatment

• Assess and stabilize ABC
• Life-threatening injuries associated with spinal injuries must be addressed first, but the spine must not be put at risk during these maneuvers
• If there is penetrating neck trauma, do not remove foreign body
• Immobilize neck in neutral position and restrain chest to properly immobilize the cervical spine (sand bags are not a good tool for this purpose, because if you later want to move the client onto a spine board, the bags may fall against the neck and cause further injury; instead, use soft rolled supports at the sides of the head, e.g. rolled blankets)

Stabilization of Cervical Spine

• All multitrauma clients should be placed on a spine board with a spinal motion restriction device.
To complete immobilization of the cervical spine, the client must be fixed as a "package" to the spine board; tape should be placed from board to forehead and back to the other side of the board.

Restraints should also be placed across the client's shoulders.

Taping across the chin forces the mandible posteriorly and may obstruct the airway.

Adults and older children may require 1-2 inches (2.5-5 cm) of padding under the head to approximate a neutral position.

Prolonged immobilization (even < 30 minutes) on a spine board will cause occipital headache and lumbosacral pain in most people, regardless of underlying trauma.

**Adjuvant Therapy**
- Give oxygen 10-12 L/min by mask; keep oxygen saturation ≥ 97%
- Start IV therapy with normal saline to keep vein open

**Nonpharmacologic Interventions**
- Nothing by mouth
- Insert nasogastric tube unless there is suspicion of associated basilar skull fracture or facial trauma
- Insert Foley catheter

**Pharmacologic Interventions**
None.

**Monitoring and Follow-Up**
Monitor ABC, vital signs, oxygen saturation (if available), level of consciousness, respiratory status and sensory motor deficits frequently.

**Appropriate Consultation**
Consult a physician as soon as possible.

**Referral**
Medevac as soon as possible.
Flail Chest

**Definition**
Unstable segment of the bony chest wall.

**Cause**
Chest wall trauma with fracture of three or more adjacent ribs in at least two places. The result is a segment of the chest wall that is not in continuity with the thorax.

Lateral flail chest or anterior flail chest (sternal separation) may occur. The flail segment moves with paradoxical motion relative to the rest of the chest wall.

**History**
- Multiple trauma (motor vehicle or other accident)
- Severe chest wall pain
- Pain aggravated by movement and respiration
- Shortness of breath

**Physical Findings**
The physical findings depend on the severity of damage to the underlying lung tissue and the presence of associated injuries.
- Perform primary survey  
  *(see "Primary Survey," above, this chapter)*
- Carry out emergency interventions as necessary
- Perform secondary survey  
  *(see "Secondary Survey," above, this chapter)*
- Assume C-spine injury

**Vital Signs**
- Heart rate
- Respiration
- Blood pressure
- Oxygen saturation

**Inspection**
- Respiratory distress
- Sweating
- Cyanosis may be present
- Chest wall bruising
- Abnormal chest wall motion (paradoxical movement of chest wall) easily seen in unconscious client, less apparent in conscious client

**Palpation**
- Tenderness in injured area
- Crepitus may be felt
- Abnormal movement of chest wall may be palpable

**Percussion**
- Hyperresonance if pneumothorax present
- Dull if hemothorax, pulmonary contusion present

**Auscultation**
- Air entry reduced or absent in injured area
- Crackles may be present

**Differential Diagnosis**
- Chest wall contusion
- Simple rib fractures

**Complications**
- Hypoxia
- Hypovolemia
- Pneumothorax
- Hemothorax
- Pulmonary contusion
- Myocardial contusion
- Cardiac tamponade
- Lacerated liver/spleen

**Management**

**Goals of Treatment**
- Ensure patency of airway
- Improve oxygenation
- Replace fluid loss
- Identify and treat associated injuries

**Appropriate Consultation**
Consult a physician as soon as possible.

**Nonpharmacologic Interventions**
Priority is ABC.
- Control airway
- Ensure adequate ventilation
- Protect cervical spine
- Control pain by gently splinting chest with a pillow. Do not splint aggressively
**Adjuvant Therapy**

- Give oxygen 10-12 L/min by mask
- Start two large-bore IV lines (16-gauge or larger) with normal saline
- Adjust IV rate according to heart rate, blood pressure and clinical response

*See "Shock," below, this chapter, for further details.*

**Monitoring and Follow-Up**

- Monitor mental status, vital signs, pulse oximetry, and heart and lung sounds frequently
- Confusion, agitation may be signs of hypoxia

**Referral**

Medevac as soon as possible.
Pelvic Fracture

Definition
Disruption of the bony structure of the pelvis.

Causes
Such a fracture generally requires substantial force, such as a motor vehicle collision or a fall from a significant height.

Because of the tremendous force necessary to cause most pelvic fractures, concomitant severe injuries are common.

History
The basic mechanism of significant blunt trauma should prompt consideration of a pelvic fracture.  
• Pain  
• Loss of function  
• Symptoms of shock

Physical Findings
• Tenderness over the pelvis that can be appreciated with pelvic springing, which involves applying alternating gentle compression and distraction over the iliac wings  
• Palpable instability of the pelvis on bimanual compression or distraction of the iliac wings. It is important to be very gentle when pelvic tenderness is appreciated; do not rock or apply great force until skeletally unstable pelvic fractures have been excluded by x-ray, an overly aggressive exam can unnecessarily increase hemorrhage  
• Instability on hip adduction (pain on any hip motion suggests the possibility of an acetabular fracture, in addition to a possible hip fracture)  
• Signs of urethral injury in the male, such as scrotal hematoma or blood at the urethral meatus  
• Vaginal bleeding in a female  
• Hematuria  
• Check for rectal bleeding (Earle's sign)  
• Grey-Turner's sign, a flank ecchymosis (associated with retroperitoneal bleeding)  
• Neurovascular deficits of the lower extremities

Differential Diagnosis
• Hip dislocation or fracture  
• Femur fracture

Complications
• Continued bleeding from the fracture or injury to the pelvic vasculature  
• Shock  
• Genitourinary problems from bladder, urethral, prostate or vaginal injuries  
• Infections from disruption of the bowel or urinary system  
• Deep vein thrombosis  
• Death

A pregnant woman is at increased risk of complications from pelvic fracture, and there is great risk of placental abruption and uterine rupture

Diagnostic Tests
• Urinalysis  
• Complete blood count, electrolytes

Management
Goals of Treatment
• Stabilize fracture  
• Prevent and treat complications

Appropriate Consultation
Consult a physician as soon as possible when a pelvic fracture is suspected or diagnosed.

Nonpharmacologic Interventions
• Priority is to assess and stabilize ABC (see "Emergency Assessment and Treatment of Major Trauma," above, this chapter)  
• Address acute, life-threatening conditions  
• Avoid excessive movement of the pelvis  
• Consider gentle wrapping of pelvis circumferentially with a sheet or pelvic sling to maintain anatomical position and minimize internal bleeding  
• Transport on a backboard

Do not insert a urinary catheter until you have confirmed that there is no urethral injury (by physical exam).
Adjuvant Therapy
• Obtain large-bore IV access and administer normal saline as needed (see "Shock," above, this chapter)
• Give oxygen by mask; keep oxygen saturation $\geq 97$

Pharmacologic Interventions
Treat pain with narcotic analgesics after consultation with physician

Monitoring and Follow-Up
• Closely monitor vital signs and pulse oximetry
• Monitor the client for signs of ongoing blood loss and signs of infection
• Monitor for development of neurovascular problems in the lower extremities

Referral
• Medevac
General Emergency Situations

Anaphylaxis

Definition
Rare and potentially life-threatening allergic reaction. The symptoms develop over several minutes, may involve multiple body systems (e.g. skin, respiratory system, circulatory system) and may progress to unconsciousness only as a late event in severe cases. Rarely is unconsciousness the sole manifestation of anaphylaxis.

Anaphylaxis must be distinguished from fainting (vasovagal syncope), which is a more common and benign occurrence. Rapidity of onset is a key difference. When a person faints, the change from a normal to an unconscious state occurs within seconds. Fainting is managed simply by placing the patient in a recumbent position. Fainting is sometimes accompanied by brief clonic seizure activity, but this generally requires no specific treatment or investigation.

Causes
• Vaccines
• Injectable drugs
• Insect sting/bite (e.g. bee, spider)
• Medication (e.g. penicillin)
• Inhalation
• Food substance
• Latex rubber

History
Anaphylaxis usually begins a few minutes after injection or ingestion of the offending substance and is usually evident within 15 minutes. The symptoms may include the following:
• Sneezing
• Coughing
• Itching
• "Pins-and-needles" sensation of the skin
• Flushing of the skin
• Facial edema (perioral, oral or periorbital urticaria)
• Anxiety
• Nausea, vomiting

• Early respiratory difficulties (e.g. wheezing, dyspnea, tightness of the chest)
• Palpitations
• Hypotension, which may progress to shock and collapse

Cardiovascular collapse can occur without respiratory symptoms.

Severe Reaction
• Severe respiratory distress (lower respiratory obstruction characterized by high-pitched wheezing, upper airway obstruction characterized by stridor)
• Difficulty speaking
• Difficulty swallowing
• Agitation
• Shock
• Loss of consciousness

Physical Findings
• Tachycardia
• Tachypnea, labored respiration
• Blood pressure low normal (client hypotensive if in shock)
• Pulse oximetry may show hypoxia
• Client in moderate-to-severe distress
• Use of accessory muscles of respiration
• Chest: air entry reduced, mild-to-severe wheezing
• Client flushed and diaphoretic
• Generalized urticaria (hives)
• Facial edema
• Diminished level of consciousness
• Skin feels cool and clammy

Differential Diagnosis
• Asthma
• Foreign-body aspiration
• Angioedema
• Pulmonary embolism
• Vasovagal syncope (fainting)
Complications
• Hypoxia
• Shock
• Airway obstruction due to edema of upper airway
• Convulsions
• Aspiration
• Death

Diagnostic Tests
None.

Management

Goals of Treatment
• Improve oxygenation
• Alleviate symptoms
• Prevent complications
• Prevent recurrence

Early recognition and treatment of anaphylaxis is vital.

Nonpharmacologic Interventions
• Place the client in a recumbent position (elevating the feet if possible)
• Establish an oral airway if necessary
• If anaphylaxis was caused by injected substance, place a tourniquet (when possible) above the site of injection; release for 1 minute every 3 minutes

Adjuvant Therapy

Severe Anaphylaxis
• Give oxygen by mask; keep oxygen saturations ≥ 97%
• Start IV therapy with normal saline to keep vein open, unless severe anaphylaxis and signs of shock are evident (refer to "Shock," below, this chapter, for details of fluid resuscitation in shock)

Pharmacologic Interventions
Promptly administer:

aqueous epinephrine (D class drug), 1:1,000, 0.01 mL/kg (maximum dose 0.5 mL) SC or IM (in the limb opposite that in which the original injection was given, if anaphylaxis was caused by injected substance or immunization)

SC epinephrine injection is appropriate for mild cases or those treated early. A single SC injection is usually sufficient for mild or early anaphylaxis.

In severe cases, an IM injection should be given because this route leads more quickly to generalized distribution of the drug.

Epinephrine can be repeated twice at 20-minute intervals, if necessary. In severe reactions it may be necessary to give these repeat doses at shorter intervals (10-15 minutes).

If anaphylaxis was caused by a vaccine given subcutaneously, an additional dose of 0.005 mL/kg (maximum 0.3 mL) of aqueous epinephrine (1:1,000) can be injected at the vaccination site to slow absorption of the vaccine. This should be given shortly after the initial dose of epinephrine in moderate to severe cases. Local injection of epinephrine into an intramuscular vaccination site is contraindicated because it dilates vessels and speeds absorption of the vaccine. (Health Canada [2002] Canadian Immunization Guide, 6th Ed)

Speedy intervention is of paramount importance. Failure to use epinephrine promptly is more dangerous than using it quickly but improperly.

Epinephrine Dose
The epinephrine dose should be carefully determined. Calculations based on body weight are preferred when weight is known. When body weight is not known, the dose of epinephrine (1:1,000) can be approximated from the subject's age (Table 2).

Excessive doses of epinephrine can compound a subject's distress by causing palpitations, tachycardia, flushing and headache. Although unpleasant, such side effects pose little danger. Cardiac dysrhythmias may occur in older adults but are rare in otherwise healthy children and young adults.
Table 2: Appropriate dose of epinephrine 1:1,000 according to age

<table>
<thead>
<tr>
<th>Age</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 to 6 months*</td>
<td>0.07 ml</td>
</tr>
<tr>
<td>12 months*</td>
<td>0.10 ml</td>
</tr>
<tr>
<td>18 months* to 4 years</td>
<td>0.15 ml</td>
</tr>
<tr>
<td>5 years</td>
<td>0.20 ml</td>
</tr>
<tr>
<td>6-9 years</td>
<td>0.30 ml</td>
</tr>
<tr>
<td>10-13 years</td>
<td>0.40 ml **</td>
</tr>
<tr>
<td>≥ 14 years</td>
<td>0.50 ml **</td>
</tr>
</tbody>
</table>

* Dose for children between the ages shown should be approximated, the volume being intermediate between the values shown or increased to the next larger dose, depending on practicability.

** For a mild reaction a dose of 0.3ml can be considered


**Severe Anaphylaxis**

In addition to the epinephrine, give the following: *diphenhydramine hydrochloride (A class drug)*

The approximate doses of diphenhydramine for injection (50 mg/mL solution) are shown in Table 3.

Table 3: Appropriate dose by injection of diphenhydramine hydrochloride (50mg/mL solution)

<table>
<thead>
<tr>
<th>Age</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2 years</td>
<td>0.25 mL</td>
</tr>
<tr>
<td>2-4 years</td>
<td>0.5 mL</td>
</tr>
<tr>
<td>5-11 years</td>
<td>1 mL</td>
</tr>
<tr>
<td>≥ 12 years</td>
<td>1 – 2 mL</td>
</tr>
</tbody>
</table>


Oral administration of diphenhydramine is preferred for conscious clients who are not seriously ill, because pain results when the drug is given intramuscularly. This drug has a high safety margin, which means that precise dosing is less important.

**For Bronchospasm**

*dilbutamol (C class drug), 4-8 puffs q15-20min (three times) via metered dose inhaler (MDI) (maximum 20 puffs; otherwise, intolerable side effects will develop)*

**Monitoring and Follow-up**

*Severe Anaphylaxis*

Monitor airway, breathing and circulation (ABC), vital signs and cardiorespiratory status frequently.

*Appropriate Consultation*  
**Any Anaphylaxis**

Consult a physician as soon as possible; discuss use of IV steroids.

**Referral**

Medevac as soon as possible, in all but the mildest cases.

Because anaphylaxis is rare, epinephrine vials and other emergency supplies should be checked monthly and should be replaced if outdated.
**Shock**

**Definition**
A condition that occurs when perfusion of tissue with oxygen becomes inadequate. As a result, the cells of the body undergo shock, and grave cellular changes occur. Eventually cell death follows.

Shock is categorized in several ways, for example, according to the state of physiologic progression that has occurred.

Arterial blood pressure is often preserved by compensatory vasoconstrictive mechanisms until very late in shock. An over-reliance on arterial blood pressure readings can delay recognition and timely treatment of shock.

**History**
- Nausea
- Lightheadedness, faintness
- Thirst
- Loss of consciousness

Other symptoms depend upon underlying cause.

**Physical Findings**
Remember: "ABCs" (airway, breathing and circulation) are the priority.

Physical findings depend on whether the client is in early or late shock.

**Early Shock**
Loss of approximately 15% to 25% of blood volume is enough to stimulate early shock.
- Tachycardia (slight to moderate)
- Blood pressure normal
- Postural blood pressure drop present
- Narrowed pulse pressure
- Pallor
- Thirst
- Diaphoresis
- Delayed capillary refill possible
- Anxiousness, restlessness

**Late Shock**
Caused by loss of 30% to 45% of blood volume.
- Hypotension
- Tachycardia more pronounced
- Pulse weak and thready
- Oxygen saturation decreased

Tachycardia is one of the early indicators of volume depletion. It may not be as apparent in elderly clients as in younger ones. Tachycardia may be mild if the client is taking certain medications (e.g. β-blockers, calcium-channel blockers).

**Differential Diagnosis**
- Sepsis
- Myocardial infarction
- Pulmonary embolism
- Anaphylaxis
- Status asthmaticus

**Complications**
- Angina
- Myocardial ischemia or infarction
- Renal failure
- Death

**Diagnostic Tests**
- Pulse oximetry (oxygen saturation)

**Management**
Remember: "ABCs" (airway, breathing and circulation) are the priority.

**Goals of Treatment**
- Restore circulating blood volume
- Improve oxygenation of vital tissues
- Prevent ongoing volume losses

**Appropriate Consultation**
- Consult physician as soon as possible

**Nonpharmacologic Interventions**
- Assess and stabilize ABC
- Ensure that airway is patent and ventilation is adequate (use oxygen as needed)
- Insert oral airway and ventilate with Ambu bag (using oxygen), as needed
• Control any external bleeding; use direct pressure to control bleeding from external wounds
• Put in head-down position

**Adjuvant Therapy**
• Give oxygen to keep saturation ≥ 97%
• Start 2 large-bore IV lines (14- or 16-gauge or greater) with normal saline
• Give 20 mL/kg IV fluid rapidly as a bolus over 15 minutes
• Reassess for signs of continuing shock
• If shock persists, continue to administer fluid in 20 mL/kg boluses and reassess after each bolus
• Adjust IV rate according to clinical response
• Ongoing IV therapy is based on response to initial fluid resuscitation, continuing losses and underlying cause
• Aim for heart rate < 100 bpm, systolic blood pressure > 90 mm Hg

The amount of fluid required for resuscitation is difficult to predict on initial assessment.

**Caution in Cases of Internal Hemorrhage**
The use of large amounts of IV fluids in a client with uncontrolled internal hemorrhage from blunt or penetrating trauma may increase internal bleeding and ultimately lead to death. Administration of IV fluids while increasing blood pressure will also dilute clotting factors and cause more hemorrhage. Use fluids judiciously to maintain peripheral perfusion. Early blood transfusion and surgical intervention to achieve homeostasis is very important in this situation.

**After Initial Resuscitation**
• Insert indwelling urinary catheter
• Insert a nasogastric tube prn

**Monitoring and Follow-Up**
• Monitor ABC, vital signs (including pulse oximetry) and level of consciousness as often as possible until condition is stable
• Frequent reassessment for continuing blood loss is important
• Monitor hourly intake and urine output
• Identify and manage underlying cause of hypovolemia
• Assess stability of pre-existing medical problems (e.g. diabetes mellitus)

**Referral**
Medevac as soon as possible.
Coma

Definition
Altered level of consciousness indicating diffuse or bilateral cortical impairment of cerebral function, failure of brainstem-activating mechanisms (or both).

Causes
Coma can be caused only by:
• Bilateral cortical disease
• Compromise of reticular-activating system See "Differential Diagnosis," below.

Tips
T - trauma, temperature
I - infection
P - psychiatric
S - space-occupying lesions, stroke, subarachnoid hemorrhage, shock

Vowels
A - alcohol and other drugs
E - endocrine, exocrine, electrolytes
I - insulin (diabetes)
O - oxygen (lack of), opiates
U - uremia

Initial Approach To Client With Coma Of Unknown Origin
Perform primary survey (see "Primary Survey," above, this chapter)

Nonpharmacologic Interventions
• Assess and stabilize ABC
• Insert oral airway
• Place in recovery position, unless there are contraindications
• Check glucose

Adjuvant Therapy
• Give oxygen to keep oxygen ≥ 97%
• Start IV therapy with normal saline to keep vein open

Pharmacologic Interventions
Consult physician. Treatment as per physician's order.

Once the immediate life-threatening concerns have been addressed, the secondary survey can be carried out (see "Secondary Survey," above, this chapter)

• Monitor vital signs, including pulse oximetry (if available)
• Obtain abbreviated, targeted history
• In particular, determine if person has had any recent illness, antecedent fever, rash, vomiting or trauma or has any chronic illnesses; explore recent exposure to infection, medication or intoxicants

Past medical history and family history should be obtained when time permits.

Observations in the secondary survey should attempt to uncover signs of occult infection, trauma, or toxic or metabolic derangements.

Signs suggestive of specific toxidromes should be sought (see "Overdoses, Poisonings and Toxidromes," below, this chapter).

Physical Findings
Level of Consciousness
• Assess level of consciousness using the Glasgow coma scale (see Table 1, in "Head Trauma," above, this chapter).

Respiratory Pattern
• Control of breathing is centered in the brain, lower pons and medulla and is modulated by the cortical centers in the forebrain
• Respiratory abnormalities signify either metabolic derangement or neurological insult
• Several patterns exist (e.g. Cheyne-Stokes respiration, apneustic breathing, post-ventilation apnea)

Eye Findings
Pupillary Signs
• Pupils generally resistant to metabolic insult
• Remember that dilatation of pupils may be secondary to topical or systemic drugs
• Dilatation of pupils in an alert person is not likely attributable to increased intracranial pressure and herniation
• Dilatation of pupils in an unconscious patient may herald imminent uncal herniation
• Small reactive pupils generally indicate metabolic problem or diencephalic lesion
• Unilateral, dilated, fixed pupils indicate lesion of third nerve or uncal lesion
• Bilateral pinpoint pupils indicate pontine lesion
• Pupils fixed in midposition indicate midbrain lesion
• Bilateral large, fixed pupils indicate tectal lesion

With cerebral lesions, the eyes will deviate toward the side of the lesion, whereas with brain-stem lesions, the eyes deviate away from the lesion.

About 5% of the normal population has anisocoria (asymmetric pupils).

A brief funduscopic exam may reveal papilledema or retinal hemorrhage.

Motor Examination
• Try to elicit motor response to verbal or physical stimuli
• Assess muscle tone, strength and reflexes for normality and symmetry
• Ability of client to localize, as well as absence or presence of abnormal posture, helps in assessment of severity of involvement
• Decorticate posturing (flexion of the upper extremities with extension of the lower extremities) suggests involvement of the cerebral cortex and subcortical white matter
• Decerebrate posturing (rigid extension of the arms and legs) usually represents added brain-stem involvement at the level of the pons

Differential Diagnosis
Coma with no localizing central nervous system signs may be caused by:
• Metabolic insult, including hypoglycemia, uremia, Addison's disease, diabetic ketoacidosis, hypothyroidism, liver disease
• Children and young adults will often experience hypoglycemia and may present with coma after ingesting alcohol, including mouthwash

• Respiratory problems, including hypoxia, hypercapnia
• Intoxication, including that caused by barbiturates, alcohol, opiates, carbon monoxide, benzodiazepines
• Infections (severe, systemic), including sepsis, pneumonia, typhoid fever
• Shock, including hypovolemic, cardiogenic, septic, anaphylactic
• Epilepsy
• Hypertensive encephalopathy
• Hyperthermia (heat stroke), hypothermia

Coma with meningeal irritation but without localizing signs may be caused by:
• Meningitis
• Subarachnoid hemorrhage from ruptured aneurysm, arteriovenous malformation

Coma with focal brain stem or lateralizing signs may be caused by:
• Pontine hemorrhage
• Stroke (cerebrovascular accident [CVA])
• Brain abscess
• Subdural or epidural hemorrhage

Coma in which client appears awake but is unresponsive may be caused by:
• Abulic state: frontal lobe function depressed, so client may take several minutes to answer a question
• Locked-in syndrome: destruction of pontine motor tracts; is able to look upward
• Psychogenic state: unresponsive

Diagnostic Tests
• Determine blood glucose level
• Blood cultures as applicable

Management
Nonpharmacologic Interventions
• Nothing by mouth
• Insert nasogastric tube unless there is suspicion of associated basilar skull fracture or facial trauma
• Insert Foley catheter
Pharmacologic Interventions
If you suspect meningitis, do not withhold antibiotics. Antibiotics should be started before the client goes to the hospital. Discuss antibiotic therapy with physician.

Monitoring and Follow-Up
Monitor ABC, vital signs, pulse oximetry, level of consciousness, respiratory status and sensory motor deficits frequently.

Appropriate Consultation
Consult a physician as soon as possible.

Referral
Medevac as soon as possible.
Overdoses, Poisonings And Toxidromes

Definition
Ingestion of a substance in sufficient quantity to induce symptom complexes associated with toxic effects.

Specific Poisonings And Clinical Toxidromes

Acetaminophen
- Main toxic effects: hepatic, occurring 24-72 hours after ingestion
- Client may also have nausea and vomiting

Carbon Monoxide
- Main toxic effects: central nervous system effects, including confusion, coma, seizures, headache, fatigue and nausea; arrhythmias or cardiac ischemia possible
- Diagnosis: clinical background (e.g. exposure to furnace or car exhaust [especially in children who have been riding in the back of pick-up trucks]); level of carboxyhemoglobin needed to confirm
- Arterial oxygen saturation as measured by pulse oximetry is frequently normal in cases of carbon monoxide poisoning.

Caustic Agents
- Examples: alkaline (drain cleaner), bleach and battery acid (household bleach is usually not a problem, except for superficial burns)
- Main toxic effects: local tissue necrosis of the esophagus with alkali and of the stomach with acids, as well as respiratory distress; obvious facial or oral burns and emesis; hoarseness and stridor reflecting epiglottic edema (especially with acids)

Cocaine
- Main toxic effects: seizures, hypertension, tachycardia, paranoid behavior or other alterations in mentation, rhabdomyolysis, myocardial infarction and stroke (CVA)

Opiates
- Examples: heroin, morphine, clonidine, codeine, diphenoxylate
- Toxidrome characterized by sedation, hypotension, bradycardia, respiratory depression, usually pinpoint pupils (may not be present with mixed overdose)

Petroleum Distillates
- Examples: gasoline, fuel oil, model airplane glue
- Main toxic effect: pulmonary (from inhalation)

Salicylates (e.g. Aspirin)
- Main toxic effects: tinnitus, nausea, vomiting, hyperventilation (primary respiratory alkalosis), metabolic acidosis, fever, hypokalemia, hypoglycemia, seizures and coma
- Many patients are misdiagnosed on initial presentation as having sepsis or gastroenteritis (because of fever, acidosis, vomiting and other symptoms). This misdiagnosis is particularly common in the elderly.

Tricyclic Antidepressants
- Main toxic effects: cardiac arrhythmias, anticholinergic effects (see toxidrome for opiate poisoning, above), vomiting, hypotension, confusion and seizures
- Cardiac complications: prolonged QRS and QT intervals, other arrhythmias
- Neurologic complications: agitation, seizures
- Hypotension: Treat initially with IV fluids (see "Shock," above, this chapter)

The client may appear fine and then rapidly deteriorate. He or she will need to be admitted to a monitored unit. Be prepared to manage the client's airway. Even if the client is asymptomatic 6 hours after ingestion, he or she must be admitted to hospital for psychiatric examination.

Assessment And Management: General Approach
Remember: your first priority is ABC
- Remember to decontaminate gut (see procedure below), clothing, skin and environment
- If client is unconscious, see "Coma (Not Yet Diagnosed)," above, this chapter
- Determine to the best of your ability what was ingested
For any client with overdose, draw blood sample for determination of serum acetaminophen level (see "Acetaminophen" above, this section) and toxicology screen. Contact the nearest poison control center for further information about the toxin in question.

**Appropriate Consultation**
Consult a physician as soon as you are able after the initial assessment and stabilization of ABC.

**Gut Decontamination**

**Activated Charcoal (A class drug)**
- Treatment of choice in most overdoses involving ingestion
- May be indicated for overdose with theophylline, tricyclic antidepressants, phenobarbital, phenytoin, digoxin
- Does not work for metals such as iron or lithium
- Administer 10-25 g for children, 50-100 g for adults (1 g/kg)
- A sorbitol mixture reduces transit time but should be used only with the first dose if multiple doses of charcoal will be used
- If client will drink the mixture, this mode of administration is acceptable; otherwise, administer by nasogastric tube
- 30% of clients will vomit after administration of charcoal; in this case, charcoal can be administered again
- Use of multiple-dose charcoal is still controversial

**Polyethylene Glycol (PEG) and Electrolytes (B class drug)**
- Used for sustained release medication overdoses
- Promotes catharsis
- Consult poison control centre for specific dosing advice

**Ipecac**
Ipecac is a non-formulary item and rarely used now in cases of overdose or poisoning.

Ipecac is only partially effective in emptying gastric contents and may propel pills beyond the pylorus. Because of the risk of aspiration, ipecac is contraindicated in obtunded patients and those unable to protect the airway, in cases of ingestion of caustic materials or petroleum distillates, and in cases of overdose with tricyclic antidepressants, theophylline or any agent that might cause a change in mental status.

Ipecac inhibits retention of charcoal and thus delays administration of charcoal.

The dose is 30 mL for an adult, followed with water.

**Gastric Lavage**
- May remove more stomach contents than ipecac
- Not effective beyond 1.5 hours after ingestion, but you may want to try it in severely ill clients
- Use largest nasogastric tube available or orogastric tube
- Most effective if charcoal is given 20-30 minutes before lavage; repeat charcoal when lavage is finished
- Airway protection is recommended (client should be fully conscious)
- Instill 300-mL aliquots (amounts) of saline, then remove until saline is clear on removal or until 5 L of fluid has been used for irrigation
- Lavage alone is not adequate for gastric emptying and delays administration of charcoal

**Management Of Specific Overdoses And Toxidromes**

**Acetaminophen**
- Toxic dose: 140 mg/kg or >10 g in adults (in alcoholic clients, the toxic dose is often much less if the client is taking acetaminophen regularly, even as little as 4 g/day)
- Vomiting and unable to keep down charcoal, consider metoclopramide (B class drug)
- If ingestion is in toxic range, treat with: N-acetylcysteine (D class drug), 20% 140 mg/kg PO or IV and then 70 mg/kg every 4 hours for 17 doses; repeat any doses vomited within 1 hour of administration (72-hour PO protocol)
- Do not withhold N-acetylcysteine even if 24-26 hours after ingestion; late administration, though not as effective as early administration, still reduces mortality
• Charcoal use is acceptable in acetaminophen overdose and only minimally interferes with N-acetylcysteine;  
• charcoal should be given early and N-acetylcysteine at least 4 hours later

**Carbon Monoxide**  
• Administration of 100% oxygen (to displace carbon monoxide from hemoglobin) for 90-120 minutes  
• Giving fresh air only – takes 7 hours to displace carbon monoxide from the hemoglobin  
• Hyperbaric oxygen for 30 minutes reduces long term sequelae  
• Even if client seems well or is recovering from CNS insult, consult physician and transfer patient to hospital

**Caustic Materials**  
• Do not induce emesis or perform lavage  
• Charcoal is not indicated  
• If the client has visible burns, he or she has a 50% chance of lower burns of significance; however, absence of visible lesions does not rule out significant injury (10% to 30% will have burns beyond the mucosa)

**Cocaine**  
• Cocaine has a relatively short half-life, so most symptoms are self-limited  
• For coronary vasospasm, hypertension or tachycardia, observation is probably adequate, because of the short half-life  
• For other cases, treat as for myocardial infarction  
• Myocardial infarction and CVA may occur up to 72 hours after cocaine use  
• Concurrent use of alcohol increases the likelihood of cardiac vasospasm  
• Not all chest pain represents myocardial infarction (e.g. pneumomediastinum in crack use, bronchospasm).  
• Seizures are generally self-limited but will respond to normal seizure treatment (see "Status Epilepticus (Acute Grand Mal Seizure)," in chapter 8, "Central Nervous System")  
• CNS symptoms such as agitation and paranoia can be treated with diazepam or lorazepam

**Opiates**  
Use the following drug with caution in those who are narcotic addicts, as it may precipitate acute opiate withdrawal. If this is a concern, the client's airway must be supported until the narcotic wears off.

Always observe the client until there is no chance of further respiratory depression.

This is especially important with naloxone, which has a relatively short half-life.  

naloxone (*D class drug*), 5 MCG/kg IV (usually start with 0.4-2 mg in adults); dose may be repeated if needed, up to a maximum of 10 mg  

This is a short-acting drug (half-life 1.1 hours).

Client may have recurrent narcotization when naloxone wears off.

**Petroleum Distillates**  
• Do not perform lavage or induce vomiting if swallowed  
• If no symptoms within 6 hours, no need for further observation

**Salicylates (e.g. Aspirin)**  
• Toxic dose: 150 mg/kg (300 mg/kg is highly toxic)  
• IV administration of normal saline to maintain blood pressure (see "Shock," above, this chapter)  
• Urine alkalinization (to promote excretion of salicylates)

**Tricyclic Antidepressants**  
• Avoid emesis (client may aspirate)  
• Charcoal and lavage are mainstays of treatment (see "Gut Decontamination," above, this section)  
• Client may appear fine and then rapidly deteriorate  
• Client should be admitted to a monitored unit  
• Be prepared to manage client's airway  
• If client is asymptomatic 6 hours after ingestion, he or she should still be admitted to hospital for psychiatric evaluation and care
• Cardiac complications: prolonged QRS, QT interval, other arrhythmias
• Neurologic complications: agitation, seizures
• Seizures usually brief and self-limited; treat as outlined in "Status Epilepticus (Acute Grand Mal Seizure)," in chapter 8, "Central Nervous System"
• Avoid phenytoin
• If hypotension occurs, treat initially with IV fluids (see "Shock," above, this chapter)

**Monitoring and Follow-Up**
Monitor ABC, level of consciousness, vital signs, oxygen saturation, intake and urine output frequently until the client is stable.

**Referral**
Medevac as soon as possible.
Hypothermia

Definition
Core temperature of \( \leq 35^\circ C \).

Risk Factors
- Endocrine or metabolic disorders (e.g. hypoglycemia)
- Infection (e.g. meningitis, sepsis)
- Intoxication
- Intracranial pathology (e.g. head trauma)
- Submersion
- Environmental exposure
- Major burns
- Iatrogenic (cold IV fluids, exposure during treatment)

History
The evaluation and treatment of hypothermia is essentially the same whether the client is wet or dry, on land or in water.

- One or more of above risk factors
- The hypothermic client should be assessed carefully for coexisting injury or illness
- Signs and symptoms of hypothermia may be mimicked by alcohol, diabetes mellitus, altitude sickness, overdose and other conditions; therefore, thorough assessment is imperative
- Associated significant illness or injury may exacerbate hypothermia

Physical Findings
In the cold client, rectal temperature is one of the vital signs.

In terms of the "ABCs," think A, B, C and D for hypothermic clients:
A for airway
B for breathing
C for circulation
D for degrees (body-core temperature)

In the cold client, body-core temperature is an important sign. Although obtaining the body-core temperature is useful for assessing and treating hypothermia, there is tremendous variability in individual physiologic responses at specific temperatures.

Assessment of Temperature
Axillary and oral measurements are poor measures of core temperature. Rectal temperature more closely approximates the core temperature and is a practical method for use in the field.

For clients with cold skin, rectal temperature should be determined with a low-reading thermometer (i.e. capable of measuring temperatures as low as \( 21^\circ C \)).

Core Temperature 35°C to 36°C
Client feels cold, is shivering

Core Temperature 32°C to 35°C
- Slowing of mental faculties
- Slurred speech
- Mild in coordination
- Muscle stiffness
- Inappropriate judgment
- Irritability
- Shivering apparent

Core Temperature 32°C
Shivering stops

Core Temperature \( \leq 31^\circ C \)
- Semi-comatose
- Progressive decrease in level of consciousness
- Coma likely at temperatures \( \leq 30^\circ C \)
- Cyanosis
- Tissue edema

Core Temperature 29°C
- Respiratory activity slow, may be difficult to detect
- Heart rate slow; pulse may be difficult to palpate

Core Temperature \( \leq 28^\circ C \)
- Vital signs absent
- Pupils dilated and unresponsive
- Respiratory arrest
- Ventricular fibrillation
Management

Goals of Treatment
• Rewarm core
• Prevent or manage complications

General Principles
The client with severe hypothermia must be handled very gently. The cold heart is highly prone to cardiac arrest, and even cautious movement of the client may induce cardiac arrest.

• Ensure that any items, oxygen or fluids (both oral and IV) coming into contact with the client are warmed beforehand
• Oxygen should be heated to 40.5°C to 42.2°C and humidified, if possible
• Because cold skin is easily injured, avoid direct application of hot objects or excessive pressure (e.g. uninsulated hot water bottles)
• The inside of a vehicle and any rooms where hypothermic clients are treated should be warm enough to prevent further heat loss (ideally above 26.7°C)
• Splinting should be performed, when indicated and with caution, to prevent additional injuries to frostbitten tissues
• Do not give caffeine or alcohol

Cardiopulmonary resuscitation (CPR) has no significant effect on survival of hypothermic clients in the following situations and should not be initiated:
• Cold-water submersion for > 1 hour
• Core temperature < 15.5°C
• Obvious fatal injuries
• Client frozen (e.g. formation of ice in airway)
• Chest wall so stiff that compression is impossible
• Rescuers are exhausted or in danger

Rise in core temperature may lag behind change in skin temperature and may continue to drop, so monitor rectal temperature frequently.

Basic Treatment for All Cases of Hypothermia
Prevent further heat loss: insulate from the ground, protect from the wind, eliminate evaporative heat loss by removing wet clothing or by covering client with a vapor barrier (such as a plastic garbage bag), cover the head and neck, and move the client to a warm environment; consider covering client’s mouth and nose with light fabric to reduce heat loss through respiration.

Mild Hypothermia
Rewarm passively and gradually:

Step 1: Place client in as warm an environment as possible

Step 2: Increase heat production through exercise (without sweating) and fluid replacement with high-calorie, warm, sweet fluid; this method of adding heat is particularly important when emergency care is not readily available, as in remote or prolonged-transport environment

Step 3: Rewarm passively through application of insulated heat packs to high heat transfer-loss areas such as the head, neck, underarms, sides of the chest wall and groin; apply heavy insulation to the same areas to prevent further heat loss (goal is to increase temperature by 1°C to 2°C per hour)

Step 4: Consider warm shower or bath if the client is alert

Do not leave client alone.

Severe Hypothermia with Signs of Life (e.g. Pulse and Respiration)
Treat the client as outlined in steps 2 and 3 above, with the following exceptions:
• Do not put a severely hypothermic client in a shower or bath
• Do not give a client fluids by mouth unless he or she is capable of swallowing and protecting the airway
• Treat hypothermic clients very gently (do not rub or manipulate or apply direct heat to extremities)

In addition, the following measures should be taken:
• Reassess ABC and vital signs frequently
• Give warm, humidified oxygen at 10-12 L/min or more
• Administer warmed (to 37°C) normal saline by IV
• Clients with moderate-to-severe hypothermia may have a large amount of fluid sequestration and may need aggressive fluid resuscitation; an initial bolus of 20 mL/kg is indicated; repeat as necessary, but do not overload with IV fluids
• Consider instillation of warm fluids via Foley catheter

**Severe Hypothermia with No Signs of Life**
• If no pulse (after checking for up to 45 seconds), no respiration and no contraindications, start CPR unless contraindicated
• Ventilate with Ambu bag with 50% warm, humidified oxygen; aim for 12-15 ventilations and 80-100 compressions; continue as long as you can
• Administer warmed (to 37°C) normal saline by IV

• Clients with moderate-to-severe hypothermia may have large amount of fluid sequestration and may need aggressive fluid resuscitation; an initial bolus of 20 mL/kg is indicated; repeat as necessary
• Rewarm passively as outlined above

No drugs are used in resuscitation unless core temperature > 32°C and drugs are ordered by a physician.

**Consultation**
If resuscitation has been provided in conjunction with rewarming techniques without the return of spontaneous pulse or respiration, and core temperature is > 34°C continue efforts but contact the physician for recommendations.

**Referral**
Medevac as soon as possible.
Chapter 15- Mental Health

Foreword

This chapter was originally written for First Nations and Inuit Health Branch by J.P. Kehoe, Director, Mental Health Services, Yukon Region. The 2000 revision was prepared by Dr. S. Callaghan and C. Sargo, RN(EC), Nurse Practitioner. This chapter has been reviewed by Dr Ross Wheeler, Mental Health Services, Yellowknife.

Please refer also to the "Mental Health Act", Information for Health Centres (August 2001) binder.

Each Health Centre should have a copy of the Mental Health Act, NWT (1988) available at http://www.canlii.org/nt/sta/pdf/type181a.pdf for reference.

In dealing with mental health issues in a community, it is essential that nurses develop good working relationships with the multidisciplinary team available in the local community. This may include mental health workers, social workers, registered psychiatric nurses, addictions workers, counselors, elders and RCMP.
General Information

Definitions

Mental Health
Mental health is a difficult concept to define. There is, however, some agreement in the literature that mental health is evident in the following personal characteristics:
• self-awareness and accurate self-perception
• self-actualization (realizing one's full potential)
• autonomy (independence in thought and action)
• accurate perception of reality
• commitment
• possession of "mastery" skills (social and occupational ability to deal with the environment)
• openness and flexibility.

Mental Illness
Mental illness refers to the behavior of a person who displays some or all of the following characteristics:
• social maladjustment
• impaired reasoning or intellectual functioning
• disorders of thinking, memory or orientation
• delusions or disorders of perception
• exaggerated, inappropriate or otherwise impaired emotional responsiveness
• impaired judgment or impulse control
• unrealistic self-appraisal.

Unlike the diagnosis of most physical disorders, diagnosis of a mental illness does not often imply a specific cause.

Cultural Roots Of Mental Illness And Mental Health

Concepts Of Abnormality
Beliefs about mental illness are intimately linked with concepts of religion, social values, norms and ideals of human relationships. This is true of any culture.

These shared beliefs determine the nature of traditional medicine and provide the framework for interpreting symptoms and guiding action in response to them. "Western" medicine and psychiatry are premised on the belief that mental illness is caused by biological and experiential events; many other cultures ascribe a metaphysical or spiritual cause as well.

Members of any culture rarely have insight into their own culturally learned ideas and values regarding normal and abnormal behavior; typically these values are seen as correct and proper for everyone (ethnocentrism). The expression of mental illness is heavily determined by culture. Symptoms of a disorder that are prominent in one culture may be insignificant or absent in another and may even be interpreted as normal in a third.

Some disorders may be exotic and specific to a particular culture (e.g. Windigo among the Cree and Ojibwa; Pibloktog among the Inuit). Attempts have been made to reconcile these disorders with the scientific classifications of mental disorders, with the unusual symptoms being attributed to cultural determinations and the underlying process thought to be the same across cultures.

Some disorders may fit neither classification system and may be a recent development in response to cultural change. The "totally discouraged" syndrome (depression, alcoholism, lack of social responsibility, neglect of family, suicidal behavior) described for the Sioux may be such a disorder.

The "labeling process" (diagnosis and interpretation) provides a language for both the patient and the therapist by which they each can conceptualize the distress. This process gives reassurance, dictates treatment and assigns meaning. Where the two do not share the same "world view" (concept of normal and abnormal behavior, concepts of cause and effect in interpersonal behavior, ideas and appropriate treatment), the treatment is likely to fail or to be
less than maximally effective. The intervention
must be culturally relevant.

**Prevalence And Expression Of Mental Illness**
Rates of specific disorders appear to vary from
culture to culture and are influenced by cultural
variations in stress inducers, cultural differences in
defining abnormality and cultural variations in
personality (i.e. certain personality patterns may
be more or less resistant to stress by virtue of
temperamental type, cognitive styles and
physiological coping patterns).

Culturally related stresses that have been identified
include the following:
• *Value conflict:* conflicts causing uncertainty and
  confusion with no stable frame of reference
• *Social change:* habitual forms of adaptation are
  challenged
• *Acculturation stress:* social change set in motion
  by different cultures coming into contact
• *Life events:* the greater the number of life
  adjustments (e.g. deaths in the family, financial
  stress, trouble with the law, marital problems)
  and the greater their impact, the greater the
  stress
• *Goal-striving discrepancy:* rising expectations
  with little hope of their being realized
• *Role discrimination:* stress applied especially to
  certain social strata (e.g. age group, gender),
  which causes feelings of inadequacy and lack of
  self-worth
• *Role conflict:* being required to switch back and
  forth from one role to another

The manifestation of mental health disorders
varies across cultures, but there is a fair degree of
agreement that some behaviors, such as extreme
sadness, motor retardation and agitation, are signs
of mental disturbance.

**Values And Ethics Of A Culture**
Ethics refers to the rules of behavior—what is
customary or expected in a society. To understand
a client, it is necessary to have a basic
understanding of that person's values and his or
her expectations of self and others. It is important
to remember at this point that the practitioner
should have developed an insight into his or her

own culturally learned ideas and values in order to
be able to appreciate the client's ideas and values
and offer appropriate assistance.

Failing to understand these often subtle differences
in behavioral norms can easily lead to major
misunderstandings, loss of credibility, anger and
frustration on both sides.

Because values and ideals vary from culture to
culture, it is impossible to enumerate all the
possible differences. Mainly for purposes of
illustration, some commonly cited values of First
Nations and Inuit people are given below.

It must be emphasized that these values do not
necessarily hold true for all First Nations and
Inuit, but they do alert the healthcare practitioner
to the kinds of differences that can exist and to the
possible consequences, for both understanding the
client and providing a mental health service, if
these differences are not recognized.

**Non-Interference**
A high degree of respect for a person's
independence leads to the view that giving
instructions, coercing or even persuading another
person, including a child, is inappropriate. This
ethic may be perceived by another culture as
apathy, neglect, indifference, lack of social
responsibility or evasiveness.

**Anger**
Displays of anger could jeopardize the voluntary
cooperation essential to survival of a close-knit
group. Hostility must be suppressed. It has been
suggested that this practice may lead to a
particular vulnerability to depression.

**Time**
Time is a personal, flexible concept and is not
related to the clock so much as to feeling ready to
act.

**Sharing**
Group survival is more important than personal
prosperity. Sharing assures the survival of the
group.
Cooperation
Competition can interfere with group cohesiveness. Cooperation increases the sense of solidarity and pools effort, talent and resources.

Excellence
Gratitude is rarely shown or verbalized because each individual is expected to behave at a "normal" (i.e. excellent) level.

Teaching and Learning
Teaching is based on modeling rather than deliberate instruction. Practice and observation occur spontaneously in the learner who is ready to learn.

A Cultural Accommodation Approach
The scientifically trained professional is often best cast in the role of consultant rather than primary therapist. The consultant then provides his or her expertise though more natural and mutually acceptable resources, usually those within the client's own culture.

The mental health service should be integrated as completely as possible into the helping systems currently accepted by the culture.

An attempt should be made to learn:
• what the culture considers normal and abnormal
• what the sociocultural causes of disorders are assumed to be
• what the sociocultural responses are to the disorder, including traditional or folk healing practices and networks
• what the community expects of you and your agency.

This assessment process may be informal or formal and should include consultation with "culture-brokers," those who are able to operate in both cultures.

Ideally, culture-specific profiles of disordered behavior should be developed, along with a description of how the behavior is perceived to relate to various sociopsychological factors.

Be aware that in some cultures and with some disorders, the individual is not held responsible, and the family and community provide support. In others, particularly when the person has been violent or has caused others to suffer, the disruption to community well-being may lead to rejection, including subtle forms of banishment. In such cases, the individual may assume a "sick role," and the prognosis is less favorable.

Look at the helping network and learn how the means of social influence usually employed bring about resocialization to community norms and goals.

Members of any culture have expectations about techniques of healing. These expectations should be tapped and included in treatment or management plans.

Some members of a community will have a sanctioned role as folk healer, shaman, "doctor" or wise elder. These and other people who have special relationships with the client may be the primary agents for dealing with the client.

The particular role of an indigenous healer or therapist as either direct therapist or consultant must be carefully considered in each case. Firm guidelines cannot be provided, but the following should be evaluated in establishing the respective role of the indigenous healer and the professional:
• the type of illness (disorders in which the cause is assumed to have a large sociocultural component are probably more responsive to the indigenous healer)
• the need for chemotherapy or other physical therapy and the need for surveillance of the response to medications
• degree of risk to the client, the healer and the community presented by each option, and community expectations regarding responsibility for care of the client
• acceptability of each alternative to the client
• potential for harm from the expected choice of techniques of the indigenous healer
• ability of the indigenous healer and the medical staff to work together

Traditional and folk healing techniques as applied to mental illness should be respected even though they appear to be at variance with scientifically
based practices. Non-specific factors in the healing process may be operative in any approach and may have a significant effect, especially if the client identifies the treatment as appropriate.

Unless the "scientific" technique is demonstrably more effective, and more effective in the cross-cultural context specifically, the indigenous healer should be a significant part of the treatment plan, given that such practice has cultural support and is desired by the client.

Notwithstanding the above cautionary note, collaboration with native or folk healers does provide an opportunity for exchange of knowledge and perceptions, which may work both ways. All forms of healing are dynamic and changing, including the scientific approach, and this is particularly true in mental health.

Assume that the client has competencies and resources for "self-righting" during difficulties (i.e. do not be paternalistic or encourage dependency). Be aware of your own values and expectations and any points of conflict with the other culture.

Other individuals in relationships with the client may also be able to supply social influence to the benefit of the client.

Involve the target population or members of the community generally in development of programs and services. Community ownership of services increases their acceptability and appropriateness.

**Communication**

In communication with someone of another culture, it can be expected that there will be numerous sources of misunderstanding, even if the two parties are speaking the same language. Cultural training, and perhaps even language itself (Whorfian hypothesis), structures one's perception of reality.

In mental health services, it is especially important to communicate effectively for the following reasons:
- A clear understanding of the client's symptoms, circumstances and perception of the problem is necessary.
- Many mental disorders are diagnosed by disturbances of thinking and perception, which can only be determined verbally and must be differentiated from culturally normal ideas.
- To the extent that verbal techniques are used in treatment, communication must be effective.

The following are some of the considerations that should routinely be taken into account in communicating and counseling in a cross-cultural situation.

- Words, even in the same language, can have different cultural meanings. Paraphrase and question the client to be sure of mutual understanding.
- Gauge the level of the client's vocabulary and respond accordingly.
- Be alert to non-verbal cues and to the fact that gestures can have different meanings in different cultures.
- Some emotional subjects are taboo and must be handled tactfully or indirectly.
- Some questions may be inappropriate and offensive for certain groups of people, such as pubescent girls, elderly people or married women. This factor may depend also on the age and gender of the inquirer.
- Cultures vary widely in terms of appropriate distances between speakers (personal space), depending upon their relationship and the topic and purpose of the conversation. Standing or approaching too close might be perceived as being "pushy" or aggressive; someone standing too distant may be interpreted as cold, impersonal or anxious.
- An interpreter is obviously necessary when a different language is spoken, but he or she can also be helpful in providing a "cultural" interpretation, clarifying and explaining for both parties (see "Use of an Interpreter," below, this chapter).
- The communication "style" varies from culture to culture (e.g. opening exchanges, getting to the point, directness, bluntness, self-disclosure by the interviewer).
• It may be advisable for the counselor (interviewer, therapist, nurse) to explain his or her point of view, values and assumptions.
• The degree to which each client identifies with his or her culture must be assessed.
• The client's environment should be kept as the focus of the interview; attempt to address the problem and understand it from the client's perspective.
• The interviewer must be prepared to be flexible to meet the client's expectations of where the interview should lead.
• Interest and genuineness are traits of the interviewer that can be recognized readily by clients of almost any culture.

Some of these items require an in-depth knowledge of the culture. Consult experienced healthcare and social service professionals and para-professionals, elders, cross-cultural workers, interpreters and other members of the community itself.

Firsthand experience and knowledge are best, but do not overlook the anthropological and historical literature on your area and its people.

Use Of An Interpreter
Communication is most effective when the participants share a common tongue and culture, so that verbal and nonverbal messages are congruent and cultural meanings are clear. The following guidelines can be expected to compensate only partially for the degrees of difference between speakers.

• Be respectful and polite. Maintain eye contact if it does not appear to make the interpreter uncomfortable. Use the person's name (remember that self-esteem is in part tied to one's name). Speak slowly, but do not shout. Volume does not compensate for difficulty with vocabulary or syntax.
• Discuss confidentiality. Be sure that you understand the interpreter's relationship to the client and that it does not pose a problem.
• Ask the interpreter for feedback at each step to be sure that communication takes place. As appropriate, ask for brief summaries to ensure that all three parties have a mutual understanding of what has been discussed.
• Explain to the interpreter that impressions of feelings and emotions should be described, in addition to the client's verbalizations.
• If appropriate, ask the client for a summary of what has been discussed.
• Be alert for incongruence between verbal and non-verbal communication, and ask the interpreter to check out any suspected problems.
• Have the interpreter choose the appropriate words for possibly sensitive or taboo subjects, such as sex, and indicate to him or her that you are not expecting a literal translation. Ask for a translation of what was said to be sure that the translator's interpretation was close enough to the intended meaning.
• Ask the interpreter about correct protocol (dress, handshakes, type of questions that may be asked, "personal space," use of first names, presence of the interpreter).
• The interpreter is a professional and should be acknowledged appropriately for the service provided.

Mental Illness Prevention And Mental Health Promotion

General
To lessen the incidence of mental disorders and to promote the achievement of self-actualization, competency and well-being are the two sides of the prevention-promotion coin.

Mental illness prevention attempts to set the stage for the realization of mental health by tackling the predisposing and precipitating factors of mental illness. It addresses both the high-risk populations (predisposing factors) and the high-risk situations (precipitating factors, such as stress).

Mental health promotion seeks to stimulate and encourage the development of skills and attitudes conducive to positive mental health, and is thus more than just the avoidance of mental illness.
Widespread disorders affecting large numbers of people are practically never brought under control by attempts to treat each individual afflicted. Prevention and health promotion are theoretically much more cost-effective, although the results are not always as quickly apparent as in one-to-one treatment. Such approaches also often require social and environmental change that is not so readily accepted (e.g. changing child-rearing practices; providing sex education; eliminating poverty, discrimination, poor housing and unemployment; and "humanizing" social institutions).

Prevention in mental health cannot be as disease-specific as in physical health, with a few exceptions (see "Preventable Psychiatric Disorders," below, this chapter).

Certain conditions do not inevitably lead to specific mental disorders, except in the few cases noted. Prevention is often a "shot in the dark" in this sense. Health promotion, on the other hand, has a more tangible and identifiable target, namely the improvement or development of observable skills and behaviors identified as mentally healthy.

General strategies applied in preventing mental illness:
• case-finding through surveys, routine medical or developmental assessments, or other agency referral
• early psychosocial intervention
• prompt diagnosis and referral for treatment
• examination of the social and environmental correlates of mental illnesses and the psychosocial stressors
• provision of services and promotion of social and environmental change.

Both the prevention and health-promotion strategies of healthcare call for a change in caregiver attitudes concerning causation, away from an individualistic and individual pathology model and toward a more socially and community-oriented approach to causation and intervention.

Prevention and mental health promotion are best achieved by a coordinated network of services and agencies. Responsibility for mental health is ultimately diffused throughout the community, and the tasks of mental health workers are to convey this message to the community and to activate its members.

A caution should be observed in initiating any community program. No matter how apparently benign, any intervention that is powerful or comprehensive enough to produce beneficial outcomes may also produce undesirable side effects. Smaller, less ambitious interventions are perhaps safer if for no other reason than that their potential for harm is less.

**Preventable Psychiatric Disorders**
Genuine disease-specific prevention of mental disorders is recognized as possible in about five categories of disease, and this is true in part only because the causes are known in these instances.

**Acute and Chronic Poisoning**
• Acute poisoning: intentional or accidental ingestion of drugs, inhalants or solvents
• Chronic poisoning: prolonged exposure to industrial toxins or prolonged use of medications or addicting drugs
• Fetal poisoning by maternal use of alcohol or drugs

**Preventive Measures**
• Change in environment
• Change in lifestyle
• Change in healthcare system (storage of drugs; prescribing and dispensing practices)
• Reduction in exposure to industrial poisons
• Better safety standards and monitoring
• Better labeling of household and industrial poisons
• Establishment of poison control centers
• Public health education

**Infections Damaging to Central Nervous System (CNS)**
• Infection during fetal period (e.g. rubella, syphilis, toxoplasmosis)
• Infectious diseases during childhood (e.g. pertussis, influenza, measles, meningitis, mumps, tuberculosis)
Preventive Measures
- Good prenatal care
- Treatment of maternal infections
- Immunization

Genetically Transmitted Disorders
- Tay-Sachs disease
- Phenylketonuria
- Galactosemia
- Tuberous sclerosis
- Huntington's chorea

Preventive Measures
- Genetic counseling
- Screening and early detection
- Special diet (for phenylketonuria and galactosemia)

Nutritional Deficiencies
- Wernicke's encephalopathy
- Beriberi
- Kwashiorkor
- Pellagra
- Anorexia
- General nutritional deficiencies

Preventive Measures
- Dietary supplementation
- Nutritional education

Injuries and Systemic Disorders Affecting the CNS
- Injuries (e.g. falls, gunshot wounds, motor vehicle crashes)
- General systemic disorders (e.g. erythroblastosis fetalis, hyperthyroidism, cretinism, intracranial masses, prematurity)

Preventive Measures
- Legislation affecting legal driving age, use of protective equipment (e.g. helmets), use of seatbelts, highway speed limits
- Improvements to industrial safety
- Legislation affecting gun control
- Public education promoting safe practices
- Early diagnosis and treatment (e.g. hyperthyroidism and intracranial masses)
- Good prenatal care

Mental Health Promotion

General
Promoting mental health means enhancing the competencies and well-being of individuals, groups and communities. This concept differs from the traditional public health model of prevention, which distinguishes three spheres of intervention: primary and secondary prevention, which are designed to reduce the prevalence of a disorder, and tertiary prevention, which is aimed at reducing the severity of chronic disorders. Although this model has been effective in preventing a range of communicable and nutritional diseases, it has not been as successful in preventing mental and behavioral disorders.

The mental health promotion model is based on the premise that psychosocial stressors increase susceptibility to mental ill health but do not inevitably lead to a specific disorder.

Therefore, the goal of mental health promotion interventions is to improve the well-being and personal strengths of both at-risk and normal populations and to modify the social and environmental factors that impair mental health and well-being.

The target for an intervention may be individuals, groups or even systems.

Strategies for Promoting Mental Health

Promoting Natural Social Support Systems
Social support systems (relatives, friends) are effective buffers protecting the individual from the effects of external stressors, including personal loss, psychosocial transitions or crises.

Their impact can be strengthened by systematic reinforcement through the following steps:
- Identify the high-risk populations (e.g. young mothers, unemployed men, recently divorced women, children of divorce and mentally handicapped children).
- Assess the informal or natural social resources potentially available.
- Identify the natural helpers: those who have or could learn the skill or competency and who have access to the at-risk population.
• Give them the necessary assistance, training and consultation support and continue to do so as long as necessary.

**Enhancing Caregiver Competence**
Increasing the skills and knowledge of professional and para-professional caregivers increases the probability that those individuals will positively affect the mental health of the broader population.

This goal can be achieved through a variety of strategies, including case conferencing, inter-agency workshops, conferences, in-service training programs, sharing of audiovisual materials, study groups, "think-tanks," task forces and joint sponsorship of consultation or training sessions by experts.

**Building Community Networks**
The "competent community" is analogous to the competent, mentally healthy individual.

There exists a sense of autonomy, control and self-worth. Insofar as mental health is concerned, this state is promoted through the development of community networks, which foster inter-agency cooperation, coordination of effort and community involvement in matters related to mental health.

**Providing Mental Health Education**
Mental health education seeks to assist the public and professionals to acquire the knowledge, skills and attitudes that will contribute directly to their own mental health and the mental health of others. It makes them more knowledgeable consumers of mental health (and related) services, as well as increasing their ability to provide care and support and to recognize mental health problems. It ultimately influences public policies that affect the mental health of individuals and groups in the community.

**Program Consultation**
Informed consultation, especially to human services agencies, can help create a more responsive system for addressing mental health problems and for promoting mental health. Schools, the courts, social welfare agencies, day-care services, senior citizen homes and the media are just some of the agencies that can have a powerful impact on an individual's immediate or eventual mental health.

Consultation may be aimed at:
• increasing awareness of mental health concerns
• improving access to services
• encouraging mental health promotion activities within the agency (e.g. mental health programs in the schools)
• changing the system to meet the needs of the population served.

Insights into mental health problems gained from the health services perspective should be shared with other agencies, either formally or informally.

**Strategies For Prevention And Mental Health Promotion**

**Pre-School Child and Maternal Mental Health**
Prenatal and postnatal care programs have been shown to significantly improve the health of both mother and child and to reduce the risk of a variety of mentally impairing disorders linked to the physical dimension of health (e.g. phenylketonuria and conditions affecting the brain), but such programs are also valuable for psychological phenomena such as bonding and postnatal maternal depression.

It is important to identify and intervene with children who are at risk or vulnerable because of a living situation that is hazardous to mental health, such as parental neglect, inadequate housing, lack of stimulation, or abusive parents or siblings.

Day care and "Moms' Groups" provide relief for mothers from child-care pressures and responsibilities and permit a natural exchange of mutual support and parenting skills between mothers.

Routine developmental assessment aims to identify children who are not maturing at a normal level (a variety of developmental spheres are examined, so that appropriate medical and other attention can be provided).
Children should have facilities and resources available for exercising their bodies, their creativity and their minds and for learning social skills.

**Mental Health in the School**

A number of affective and social education kits are available for teaching awareness, acceptance of feelings, attitudes, values and development of social and interpersonal skills.

Social and interpersonal problem-solving can be taught as a curriculum item. Numerous programs are available for the entire range of grades from kindergarten to high school. Children can be taught to:

- analyze interpersonal problems
- generate solutions for consideration
- determine suitable means of implementing a solution or achieving a goal
- recognize the consequences of the various alternative solutions.

There is often a correlation between academic problems and mental and behavioral disorders. Early identification and remediation of learning disabilities would help to prevent later development of problems related to low self-esteem, lack of confidence, and social or vocational deficiencies.

Programs can be developed specifically for high-risk students, who are often identifiable in the early school years.

Preventive programs may be child-focused, formal curriculum courses or may be implemented informally as opportunity presents. In either case, there is a need for programs of teacher training in affective education and social skills.

Parent-teacher study groups, teacher "think-tanks," peer tutoring and student self-help groups are innovative approaches that have been used for mental health promotion within the school.

Although their long-term effectiveness is yet to be solidly demonstrated, family life education, sex education, and alcohol and drug abuse programs in the school are presumed to have a preventive function.

**Life Change and Crisis**

Bereavement counseling aims at giving support, particularly to high-risk groups, such as parents who have experienced the death of a child and anyone whose spouse or parent has died. The latter situations (death of a spouse or parent) have been identified as factors increasing the risk of suicide either immediately, in the case of death of a spouse, or in later life, in the case of death of a parent.

Planning for retirement assists the individual to adjust to the many changes that take place upon retirement. Counseling themes include finances in retirement, use of leisure time, changing health, accommodations and changing relationships.

Divorce is a stressful time for the separating adults and the children involved. Children of divorce are known to have more mental health problems than children in intact marriages. Counseling to facilitate divorce and to support the children affected are both identified as valuable preventive programs.

Premarital and marriage enhancement courses or counseling prepare couples for stresses in marriage and encourage constructive problem-solving and mutual support.

Parenting courses are available in a number of forms and focus on various age groups of children. Parent support and self-help groups serve a similar function. In some programs, observation nurseries have been used to teach parents of preschoolers in a more immediate and practical fashion.

Programs aimed at preventing the sexual abuse of children have been developed for use in a variety of settings, including the school.

Single parent counseling and self-help groups support the parent who must play usual roles while providing for his or her children.

Programs are available for children facing hospitalization and surgery. These programs reduce the stress of separation and the uncertainties and fears associated with entering hospital.
Distress phone-in lines or counseling services for people in acute crisis, such as suicidal or distraught individuals, prevent further breakdown of the person's ability to cope. Whether or not such services actually prevent suicide is uncertain; thus, suicide prevention should probably not be their main purpose.

Violence can be prevented through a number of strategies, beginning with intervention and services to the victims and offenders. These services include support, legal counseling, protection for victims and treatment for the offender. At another level, preventive efforts might address the inappropriate socialization that some children receive, the prosecution of offenders to underline society's disapproval, and the media, institutional, and public attitudes that support and encourage violence in general.

**General Population**

Stress management courses are often available through employers or community agencies and are purely preventive in intent.

Assertion training provides an opportunity to learn a social skill that significantly reduces stress and anxiety in interpersonal relations.

Mental health education raises the level of consciousness and helps the community and individuals to identify the mental health problems in their environments.

Community development programs mobilize the community itself, focus attention on services or mental health promotion, and often directly involve those who are at risk in the solution to what is or could be their problem.
Mental Health Assessment

Clinical Assessment And Management

General
The purpose of mental health assessment is to provide specific information about a client's behavior, thoughts and feelings and the relation of these factors to the client's background, experiences and present circumstances. It provides the database for describing, diagnosing and eventually treating problems. The information may be gathered from direct interviews with the client or from material provided by relatives or referring agencies.

History
Client Profile
General description of the client:
• Age
• Sex
• Ethnic origin
• Marital status
• Number and age of siblings or children
• Spouse or parents
• Living arrangements
• Occupation
• Education

History of Presenting Problem
Client's perception of problems in daily living.

Difficulties or changes in:
• relationships
• usual level of functioning
• behavior
• perceptions
• cognitive abilities

Increase in feelings of:
• depression, helplessness
• anxiety
• being overwhelmed
• suspiciousness
• confusion

Somatic changes:
• gastrointestinal
• insomnia
• lethargy, fatigue
• weight loss or gain, loss of appetite (anorexia)
• palpitations
• nausea, vomiting
• headaches

Integrative patterns and client's relations to:
• others
• self
• things and ideas
• present situation
• reality

Relevant History
Personal--Sketch of Life History
• Stays in hospital and illnesses
• Education
• Occupational background
• Social adjustment
• Sexual history
• Interests, hobbies, recreation
• Substance abuse
• Outstanding life events
• Suicidal, homicidal or violent behavior

Familial--Sketch of Family and Placement within Family
• Birth order
• Relationships with siblings
• Integrity of family unit
• Mental health of family members
• Perceived place within family
• Relationship with parents

Clinical Examination
Mental and Emotional Status
Appearance
• Physical condition and general health
• Dress
• Eye contact
• Posture
• Relatedness to interviewer
Behavior
• Motor activity
• General level
• Gait
• Gestures and mannerisms
• Awareness of environment

Speech
• Sound and volume
• Rate
• Barriers to communication

Mood
• Appropriateness
• Overall impression (e.g. depressed, anxious, angry, apprehensive, apathetic)
• Affect (and its appropriateness)
• Emotionality (dominant emotion, range of emotions, liability)

Thought Processes
• Quality
• Appropriate
• Tangential
• Concrete or abstract
• Flight of ideas (stereotypic)
• "Word salad," confusion
• Neologisms (words created by client)
• Confabulation (fabrication of events or facts due to memory impairment; not lying)
• Idiosyncratic or unusual word usage
• Cognitive ability: concept formation, level of intelligence, articulateness (precision, vocabulary level)
• General characteristics: speed of thought, spontaneity, flexibility or rigidity, distractibility, continuity, alertness, blocking (interruptions in train of thought), attention and retention

Thought Content
• Central themes
• Self-concept
• Insight and awareness
• Judgment
• Suicidal or homicidal ideation

Special Preoccupations
• Hallucinations (any modality)
• Delusions
• Illusions
• Depersonalization (one's reality is lost)
• Derealization (things do not seem real)
• Hypochondriacal
• Obsessions
• Rituals or compulsions
• Fears and phobias
• Sense of grandiosity or worthlessness
• Nihilism (the order of things has disappeared)
• Morbid thought
• Religiosity

Reality Orientation
• Knowledge of time, place, month and year
• Remote and recent memory
• Ability to distinguish between internal and external stimuli

Suicidal or Homicidal Risk
See "Suicidal Behavior," below, this chapter.

Evaluation and Interpretation
Determine need for emergency actions:
• Overt homicidal or violent impulses
• Potential suicide
• Inability to function
Identify strengths.
Make provisional diagnosis.

Possible Goals Of Treatment
• Remove symptoms (e.g. reduce anxiety)
• Change attitude
• Change behavior (e.g. cessation of compulsive hand-washing, habit change, self-control)
• Develop insight (e.g. an understanding of one's motivation, the reasons for emotional response or the causes of disordered behavior)
• Improve interpersonal relationships (e.g. getting along with one's family, overcoming social anxiety or shyness, controlling anger)
• Improve personal efficiency (e.g. increase ability to accept responsibility, be productive)
• Improve social efficiency (e.g. improve ability to function socially within the community)
• Prevent and educate (e.g. increase ability to adapt and cope in the future)

**Treatment Methods**

**General**
Apart from the physical and medical treatments provided to mental health clients, there are a number of psychological means by which medical and health personnel can influence a client's behavior in a therapeutic manner. The goal of this psychosocial influence may be to:
• directly affect emotional response in the client (e.g. relaxation training, reassurance, confrontation)
• change the client's self-perceptions (e.g. by challenging unrealistic beliefs or faulty reasoning or through vocational counseling)
• provide an opportunity for learning new coping or self-enhancing (confidence-building) skills (e.g. vocational rehabilitation, assertiveness training, social skills training) or parenting skills
• directly teach new behaviors to replace or counter the maladaptive ones (e.g. systematic desensitization for phobias, training in anger management or other forms of self-control).

**Means of Influence**

**Providing "Expert" Testimony**
Communications from an individual recognized by the client as having special knowledge or expertise:
• "naming" the disorder
• providing feedback
• assisting the client to reflect on, interpret and confront the problem(s)
• evaluating the situation

**Providing "Expert" Directions**
Getting the client to do something through one or more of the following means:
• verbal instructions
• orders
• recommendations
• suggestions
• limit-setting
• policy statements
• permission

**Expert "Placebo Effect"**
Persuasion and influence through personal qualities of the helper:
• caring and compassion
• manner
• confidence
• warmth
• genuineness
• empathy

**Modeling**
Providing an appropriate example or model of the desired behavior. This may require guided practice by the patient under optimal, non-threatening conditions (e.g. as in treatment of phobias, social anxiety or lack of assertiveness).

**Basic Learning Principles**
Systematic use of positive reinforcement, extinction, punishment and other learning principles to increase or decrease behaviors.

**Prior Practicing**
Role playing and rehearsal of desired behavior.

**Environmental Restructuring**
Establishing or altering either the physical or the social environment so as to permit or encourage a desired change in behavior.

**Human Services and Resources Coordination**
Referring clients to other professionals or bringing them into contact with a wider variety of resources.

**Mobilizing the Client's Own Resources**
Creating internal states that are conducive to behavior change (e.g. sleep, rest, deep muscle relaxation, nutrition, fitness).

**Patient Evacuation**
See "Hospitalization and Medical Evacuation," under "Psychotic Disorders," below, this chapter.

**Involuntary Admission**
See "Involuntary Admission," under "Psychotic Disorders," below, this chapter.
Records And Confidentiality

General

Medical records and information about medical and psychosocial interventions for mental health problems require the utmost care to ensure confidentiality. In many cases these records contain personal information of the same degree of sensitivity as pertains to such medicosocial problems as abortion, sexually transmitted infections, unplanned births, addictions and forensic examinations.

These records should be treated with great care. Medical and psychiatric information should not be shared with family (including spouse or children), friends or other healthcare professionals unless the client has provided informed consent, preferably in writing.

There are a number of respects in which breaching the confidentiality of mental health records can be particularly damaging.

- Clients presenting with mental health problems are more vulnerable to public embarrassment and to the prejudices and biases of others, including employers.
- Because of the personal and social nature of mental health problems, disclosure may have an impact on others besides the client involved.
- Legal issues may be involved, and the client may be compromised.
- Disclosure would undermine public confidence in the service, the personnel and the agency.
- Some clients, because of personality disorders or mental illness, are more likely to try to gain access to information or to misuse anything learned.

Guidelines

Doctor-client or nurse-client "privileged communication" does not exist in Canada. All medical personnel are required by law to give evidence if subpoenaed for that purpose. There is no clear statement in common law with regard to breach of confidentiality, which means that each case would be contested on the basis of principles other than common law precedent.

Confidentiality of a client's medical records or the purpose and content of any medical intervention (even the fact that the client has been seen) is guaranteed under the Privacy Act of Canada. If any voluntary disclosure is made without the client's consent, such as reporting a criminal offence, the Commissioner of the Privacy Act must be notified in writing and the Commissioner may choose to disclose the informant's name to the client.

There is no requirement under the law to report the commission of an offence or the intent to commit an offence. Such a decision must be based on ethical and moral principles, such as the safety of individuals, including the client, especially where the potential exists for homicide, suicide or physical assault. It is advisable to get a second opinion in such cases by consulting an experienced professional, discussing the alternatives and clarifying the facts and principles that will guide your decision.

The Access to Information Act permits clients to have copies of their medical records, but the director of an institution or program may refuse to disclose the records if it is deemed to be not in the best interest of the individual.

No written or verbal information regarding a client should be given to any individual, including the police, without either the written consent of the client or presentation of a subpoena.

Information requested by human services agencies having legal guardianship of a child may be granted without consent of the natural parents.

All material in client records is the permanent property of the Government of the Northwest Territories, Department of Health and Social Services. Requests by a client for copies of or access to such records should be in writing and should be directed to the responsible managerial level.

Deliberate or unwarranted violation of patient confidentiality is subject to disciplinary action up to and including summary dismissal for cause.

In many jurisdictions, legislation requires disclosure of certain offences or suspected offences. For example, child abuse must be reported in all of the provinces and territories.
**Age of Consent**
Minors are those under the legal age to give consent for treatment. The age at which consent can be legally given varies from province to province and is usually between 16 and 20 years. It is advisable for the nurse to review the relevant age-of-consent legislation for the province or territory of employment.

The issue of age of consent is of concern in the delivery of mental health services because, technically, it can affect the availability of confidential mental health consultation and treatment to someone deemed not medically competent. For example, must the parent or guardian of a minor be advised of the request for service? Should the parent or guardian have access to records or information pertaining to the contact? Is parental consent required to accept a minor for counseling or treatment?

In the absence of firm guidelines, general principles might be taken from a statement on age of consent for use by physicians:

- Clients ≥ 16 years of age should be entitled to consent to their own surgical, medical or dental treatment.
- Clients < 16 years of age should be able to consent to their own treatment only if the physician has ascertained that the client is able to understand and appreciate the nature and consequences of the proposed procedure.
- In cases in which physicians have decided that a client < 16 years of age has the maturity and ability to understand the consequences of the proposed procedure, and thus may give consent to his or her own treatment, the physicians are advised to prepare written notes to substantiate this decision.
- Special protection must be provided for minors, regardless of whether they have reached 16 years of age, whose physical or mental disability precludes their having the capacity to consent to treatment.

A decision about ability to give consent is also based on the providers' assessment of the client's competence to understand the issues and implications of the illness or situation and the consequences of treating or not treating.

**Maintaining Confidentiality**
As with all medical records, vigilance must be exercised to ensure that confidentiality is not breached, whether deliberately or accidentally.

Medical charts should be in secure storage when not in use.

Care should be taken that documents of any sort that could identify a client as having a mental health problem, or any information related to that fact, are not within view of the public, other clients or staff not directly concerned with the client in question. Even appointment calendars can be inadvertently disclosing.

Anyone who inquires about a mental health client should be politely refused any information, unless disclosure of the information is authorized by the client.

Telephone conversations with respect to a client should be conducted where they will not be heard. Similarly, client interviews or consultations should be held in private.

When some risk exists to a client (or to others) and the family is providing for the safety and security of the client, the facts necessary to reduce the risk should be disclosed. No more information than is necessary should be volunteered without the client's knowledge.
Common Mental Health And Psychiatric Problems

**Violent Or Acutely Agitated Psychiatric Clients**

Most psychiatric clients are not particularly dangerous or violent. However, clients with the following conditions may demonstrate violent behavior:
- Personality disorders
- Substance abuse
- Organic brain disorders or states with impaired impulse control
- Acute-phase manic disorders
- Paranoid psychiatric disorders
- Organic functional disorders in which delusions or hallucinations are present

When clients behave violently, the behavior is often unpredictable and irrational, since it is a product of the client's psychopathology. The true source of anger may not be apparent and actions may be illogical, as in the case of persecutory delusions, or actions may be abrupt and unexpected, as in hallucinatory states.

**Causes**
The causes of violence in mentally ill clients are the same as in those without mental illness:
- Fear
- Frustration
- Disappointment
- Feelings of inferiority
- Invasion of personal space
- Loss of self-esteem
- Feelings of humiliation
- Defense against a perceived threat (real or imaginary)

**Differential Diagnosis Of Potential Underlying Disorders**

**Functional Psychoses**
Functional psychoses may be related to:
- Bipolar disorder
- Schizophrenic disorder
- Brief reaction psychoses

**Toxic Psychoses**
- Alcohol intoxication
- Stimulant intoxication
- Hallucinogenic intoxication
- PCP (phencyclidine) intoxication

**Withdrawal Delirium**
- Alcohol
- Other chemical substance

**Personality Disorders**
- Borderline
- Paranoid
- Histrionic
- Antisocial

**Disorders of Impulse**
- Explosive disorder
- Control

**Organic Disorders**
- Acute brain syndrome
- Chronic brain syndrome
- Dementia
- Delirium

**Management**
These guidelines for the management of violence assume that the violent person is a bona fide psychiatric or medical patient. In some cases, the individual may have a personality disorder for which emergency treatment is not possible or appropriate. In this situation, the violence is best viewed as a matter for the police.

Ultimately, you must use your own judgment to determine if and when to intervene with a potentially violent patient. Trust your feelings and judgment. If you feel threatened, act accordingly.

**Goals of Treatment**
In order of priority:
- Protect yourself, others and the client
• Avoid or minimize an outburst of physical violence
• Recognize and reduce anxiety and fear in the client

**Appropriate Consultation**
Whenever possible, medical consultation and assistance should be sought in dealing with violent clients. When circumstances make this impossible at the critical moment, the physician should be consulted as soon as possible afterward to discuss the action taken and the choice and dosage of any medication given. The correct diagnosis is very important in the case of the violent client, and a consultation is an essential part of the management procedure.

**Nonpharmacologic Interventions**

**Prevention**
Consider creating a crisis protocol in advance:
• If circumstances permit, call for assistance before becoming involved with the client.
• Know how to use approved physical interventions to restrain the client or defend yourself.
• Be familiar with escape routes that you might need.
• Keep potential weapons (e.g. scissors, scalpels, letter openers) out of reach of clients.

Whenever possible, try to predict and prepare for the disturbed behavior by noting the following:
• Changes in the client's personality
• Indicators such as increasing verbal aggression, postural tension, facial expression, tone of voice and belligerence
• Any previous history of violence, assaultive, homicidal or suicidal behavior, or threats to kill or injure self or others
• State of intoxication or impairment by drugs or history of substance abuse
• Extreme agitation, fearfulness or pacing
• Any record of interventions or actions that have been effective for managing the client in the past

Anticipating and preventing violent behavior is always the best strategy.

**Acute Situation: General Guidelines for Management**
If you are concerned, try not to see the client alone and avoid standing too close to the client, as this may be perceived as a violation of personal space and add to the problem. Keep the door open and ensure that both you and the client have an unobstructed path to the door, so that either of you can escape from the room if the situation is perceived as dangerous.

Do not see the client if he or she has a weapon of any sort. Call for assistance.

Do not hesitate to call the police if the client becomes too threatening.

Do not argue with or otherwise threaten the client's self-esteem.

Do not threaten to use force unless it is immediately available.

Approach the client calmly and quietly, in a professional, confident and friendly manner. Be as relaxed and reassuring as possible.

Use non-verbal methods to control the client as much as possible, for example, through careful use of "personal space" boundaries, firmness, tone of voice and eye contact.

Care must be exercised to observe and judge the effects of these actions, since what may be psychologically subduing or calming to one client may be provocative to another. Attempts to "talk a client down" may even increase some clients' agitation.

Show interest in the client's complaint, fear or suspicion. Acknowledge it, but do not agree or disagree. Indicate that your purpose is to try to help the client deal with the problem.

Attempt to determine the reason for the anger or violence and respond accordingly.

Watch for signs of organic brain disorder, substance abuse, suicide attempts (e.g. scars on wrists) or fighting and for evidence of a weapon.
Do not respond to anger with anger: approach the situation with a non-threatening, non-punitive and non-judgmental attitude. Do not take personally or respond to insults or abusive language.

**Physical Restraints**

Involuntary restraint and involuntary hospitalization are covered under the respective ordinances of the province and territories. These pieces of legislation should be referred to and their implications clearly understood. To restrain someone or to force them to involuntarily undergo treatment in ways other than provided for by legislation can lead to civil litigation and criminal assault charges.

If medication is contraindicated, inappropriate or insufficient, and physical restraints are deemed necessary:

- Use restraints as a last resort when a client cannot be controlled by verbal or non-verbal communication and is a threat to himself or herself or others or is destructive of property.
- Inform the client of your intentions, explaining that the restraints will be applied because the client is unable to control himself or herself.
- To ensure your safety and the safety of the client, three or more people are needed. The mere show of force may prove sufficient to allow the client to calm down without the use of force.
- Explain the procedure in advance and continue talking reassuringly to the client throughout.
- Have a clear plan of action. Decide who will do what and, if possible, assign at least one person to each limb.
- Remove glasses, watches, jewelry or anything else that might be used as a weapon or could cause accidental injury.
- If the client is armed with a potential weapon, defend yourself with objects (e.g. hold a mattress in front of you or throw a blanket over the client).
- Place the client face down, if possible, as the range of motion is limited in this position; otherwise, keep the client off balance.
- Do not count on your own strength equaling that of the client. A disturbed, violent person can be surprisingly strong.
- Place one limb at a time into restraints.
- Ensure that the restraints are snug enough to hold the client, but not so tight as to cause injury or cut off circulation.
- Beware of being bitten.
- Remain aware of your own feelings throughout. Violent psychiatric clients may not know who you are or where they are. They may be terrified and have no definite target for their rage. Above all, do not respond with anger or take personally what the unstable person may do or say to you. Remember as well that the unstable person is quite likely to remember what was said during an outburst of this sort. Unprofessional language or conduct is inappropriate at any time.

**Types of Restraints and Their Application**

Leather wrist and ankle restraints are preferred to body restraint with a Posey jacket because of the danger of strangulation with the latter.

- Leather wrist and ankle restraints:
  - are easy to apply
  - require three or more people to place them
  - should be applied with the client in a face-down position.

Restrain the client's arms at his or her sides and secure the tie-ends to the stretcher or bed. Restrain the legs straight out, and beware of being kicked.

**Pharmacologic Interventions**

If it is deemed in the client's best interest because he or she is at risk of injuring self, others or property, or is likely to leave the premises before adequate treatment, chemical sedation should be considered. If possible, consult a physician first. Otherwise, give:

- lorazepam, 1 mg PO (C class drug) or 1-2 mg IM (D class drug)

Do not use benzodiazepines such as lorazepam in a person acutely intoxicated with alcohol, as these drugs are additive for respiratory depression.

**Monitoring of a Client Who is Medicated or Restrained**

After Restraints Are Applied

- Check distal circulation frequently.
- Remove any remaining potentially dangerous items from the client, including jewelry, glasses, belt, shoes, matches and contents of pockets.
• Examine client for weapons concealed in the hands (e.g. small, sharp objects such as broken glass, which may have been grabbed during application of the restraints).
• Evaluate regularly the need for hydration, nutrition and elimination.
• Provide assistance with personal hygiene and grooming.

**Other Aspects of Monitoring**
Watch for side effects of psychotropic medications and explain them to the client.

Evaluate the client's self-control and capacity for appropriate behavior on a continuing basis.

Remove restraints when the person is sedated or calmed.

Remove the restraints one limb at a time, using the same precautions as when they were applied.

Watch for flare-ups of violent behavior.

If a secure room is used for confining a violent person after removal of restraints:
• Exit the room with the same care as you would use in approaching the client.
• Do not let the client get between you and the door.
• Never enter alone.
• Visit frequently to provide human contact and reality testing.
• Always announce your intentions when you enter the room.
• Be cautious with utensils and hot liquids when serving meals.
• Do not leave potentially dangerous items in the room.

**Referral: Hospitalization and Medical Evacuation**
The decision as to whether to admit to a local hospital, treat on an outpatient basis or evacuate to a psychiatric hospital depends on several factors and should, of course, be made in consultation with the best qualified available physician, preferably a psychiatrist.
Alcohol Withdrawal

Definition
Syndrome experienced after cessation of or reduction in alcohol ingestion by a person who has been drinking for several days or longer. Most alcohol-dependent individuals experience their first withdrawal symptoms after 10-15 years of alcohol abuse.

Symptoms begin within 3-6 hours after cessation or reduction in drinking and may last 2-3 days. Malnutrition, fatigue, depression or physical illness may aggravate the symptoms.

Symptoms include coarse tremor of hands, tongue and eyelids and at least one of the following:
- Nausea and vomiting
- Malaise or weakness
- Autonomic hyperactivity (tachycardia, sweating, elevated blood pressure)
- Anxiety
- Depressed mood or irritability
- Orthostatic hypotension

Associated Symptoms
- Headache and dry mouth
- Complexion often puffy and blotchy
- May have mild peripheral edema
- Gastritis
- Fitful sleep
- Misperceptions and illusions
- Brief, poorly formed hallucinations (in any modality) may be experienced

Major motor seizures occur in 5% to 10% of cases of alcohol withdrawal (usually one or two grand mal seizures in the first 48 hours).

People with a history of epilepsy are likely to experience withdrawal seizures.

The symptoms of alcohol withdrawal may progress to delirium tremens (see "Alcohol Withdrawal Delirium," next section, this chapter)

See Fig 1, page 24-25 for diagnosis of alcohol withdrawal.

Management
Consultation
If possible, consult a physician before instituting medications.

Nonpharmacologic Interventions
- For client with mild symptoms good psychological support may be sufficient (time spent with client listening and supporting through physical symptoms
- Increased rest
- Hydration and nutrition: high-protein, high-carbohydrate diet and adequate fluid intake
- For client with moderate-to-severe symptoms, IV therapy with normal saline may be necessary, depending on the severity of symptoms and dehydration; adjust rate appropriately to correct or prevent dehydration (for details, see "Dehydration (Hypovolemia)," in chapter 5, "Gastrointestinal System")

Psychological Support for Client
Moderate-to-Severe Symptoms
- Calm, firm direction in response to demanding or volatile patient (see "Violent or Acutely Agitated Psychiatric Clients," previous section, this chapter)
- Presence of a supportive person helps to decrease anxiety and agitation and increase safety
- Diversionary activities and conversation help to direct attention away from symptoms
- Quiet, calm environment decreases irritability and promotes rest
- Respond to hallucinations and misperceptions by reassuring the client of reality and identifying misperceptions as symptoms of withdrawal; avoid arguing with or validating misperceptions

Pharmacologic Interventions
Consult with physician if sedation is required.

Physician may prescribe
diazepam (C class drug) 20mg PO
or
lorazepam (C class drug) 4mg PO/SL and
thiamine (D class drug), 100 mg IM od for 3 days
**Moderate-to-Severe Symptoms**
Treatment with medication on an outpatient basis is complicated by the danger of the alcohol abuser mixing alcohol with the medication or indiscriminately "sharing" the drugs with other community members.

Discretion should be used unless the client can be closely monitored.

**Monitoring and Follow-Up**
Monitor for seizure activity.

**Referral**
Medevac. Detoxification should take place in a supervised setting to monitor medication use (if medication is used), maximize safety and observe for signs of withdrawal seizures or delirium tremens (see "Alcohol Withdrawal Delirium," next section, this chapter).

---

**Fig 1: Diagnosis and Management of Alcohol Withdrawal**

<table>
<thead>
<tr>
<th>Addiction Research Foundation Clinical Institute Withdrawal Assessment for Alcohol (CIWA-Ar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient __________________________ Date <em><strong>/</strong></em>/___ y m d</td>
</tr>
<tr>
<td>Time _____ : _____ (24-hour clock, midnight = 00:00)</td>
</tr>
<tr>
<td>Pulse or heart rate, taken for 1 minute: __________</td>
</tr>
<tr>
<td>Blood pressure: __________ / __________</td>
</tr>
</tbody>
</table>

**NAUSEA AND VOMITING** — Ask "Do you feel sick to your stomach? Have you vomited?" Observation.
0 no nausea and no vomiting
1 mild nausea with no vomiting
2
3
4 intermittent nausea with dry heaves
5
6
7 constant nausea, frequent dry heaves and vomiting

**TREMOR** — Arms extended and fingers spread apart. Observation.
0 no tremor
1 not visible, but can be felt fingertip to fingertip
2
3
4 moderate, with patient's arms extended
5
6
7 severe, even with arms not extended

**PAROXYSMAL SWEATS** — Observation.
0 no sweat visible
1 barely perceptible sweating, palms moist
2
3
4 beads of sweat obvious on forehead
5
6
7 drenching sweats
<table>
<thead>
<tr>
<th>ANXIETY — Ask &quot;Do you feel nervous?&quot; Observation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0  no anxiety, at ease</td>
</tr>
<tr>
<td>1  mildly anxious</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4  moderately anxious, or guarded, so anxiety is inferred</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7  equivalent to acute panic states as seen in severe delirium or acute schizophrenic reactions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AGITATION — Observation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0  normal activity</td>
</tr>
<tr>
<td>1  somewhat more than normal activity</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4  moderately fidgety and restless</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7  paces back and forth during most of the interview, or constantly thrashes about</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TACTILE DISTURBANCES — Ask &quot;Have you any itching, pins and needles sensations, burning sensations, numbness or do you feel bugs crawling on or under your skin?&quot; Observation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0  none</td>
</tr>
<tr>
<td>1  very mild itching, pins and needles, burning or numbness</td>
</tr>
<tr>
<td>2  mild itching, pins and needles, burning or numbness</td>
</tr>
<tr>
<td>3  moderate itching, pins and needles, burning or numbness</td>
</tr>
<tr>
<td>4  moderately severe hallucinations</td>
</tr>
<tr>
<td>5  severe hallucinations</td>
</tr>
<tr>
<td>6  extremely severe hallucinations</td>
</tr>
<tr>
<td>7  continuous hallucinations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AUDITORY DISTURBANCES — Ask &quot;Are you more aware of sounds around you? Are they harsh? Do they frighten you? Are you hearing anything that is disturbing to you? Are you hearing things you know are not there?&quot; Observation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0  not present</td>
</tr>
<tr>
<td>1  very mild harshness or ability to frighten</td>
</tr>
<tr>
<td>2  mild harshness or ability to frighten</td>
</tr>
<tr>
<td>3  moderate harshness or ability to frighten</td>
</tr>
<tr>
<td>4  moderately severe hallucinations</td>
</tr>
<tr>
<td>5  severe hallucinations</td>
</tr>
<tr>
<td>6  extremely severe hallucinations</td>
</tr>
<tr>
<td>7  continuous hallucinations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VISUAL DISTURBANCES — Ask &quot;Does the light appear to be too bright? Is its colour different? Does it hurt your eyes? Are you seeing anything that is disturbing to you? Are you seeing things you know are not there?&quot; Observation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0  not present</td>
</tr>
<tr>
<td>1  very mild sensitivity</td>
</tr>
<tr>
<td>2  mild sensitivity</td>
</tr>
<tr>
<td>3  moderate sensitivity</td>
</tr>
<tr>
<td>4  moderately severe hallucinations</td>
</tr>
<tr>
<td>5  severe hallucinations</td>
</tr>
<tr>
<td>6  extremely severe hallucinations</td>
</tr>
<tr>
<td>7  continuous hallucinations</td>
</tr>
</tbody>
</table>
HEADACHE, FULLNESS IN HEAD — Ask "Does your head feel different? Does it feel as if there is a band around your head?" Do not rate for dizziness or lightheadedness. Otherwise, rate severity.

0 not present
1 very mild
2 mild
3 moderately severe
4 severe
5 very severe
6 extremely severe

ORIENTATION AND CLOUDING OF SENSORIUM — Ask "What day is this? Where are you? Who am I?"

0 oriented and can do serial additions
1 cannot do serial additions or is uncertain about date
2 disoriented for date by no more than 2 calendar days
3 disoriented for date by more than 2 calendar days
4 disoriented for place and/or person

Total CIWA-Ar score: ______
Rater's initials: ______
Maximum possible score: 67

This scale is not copyrighted and may be used freely.

**Fig 2: Diagnosis and management of acute alcohol withdrawal**

<table>
<thead>
<tr>
<th>Severity of withdrawal (CIWA-Ar score)</th>
<th>Monitoring</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild (≤ 15)</td>
<td>Assess symptoms with CIWA-Ar scale every 4 hours</td>
<td>Thiamine use and supportive care are sufficient if patient has a CIWA-Ar score ≤ 10 and no hallucinations or disorientation. Benzodiazepine therapy may be indicated if score is &gt; 10. The goal is a CIWA-Ar score below 8 for 2 consecutive readings</td>
</tr>
<tr>
<td>Moderate (16–20)</td>
<td>Assess symptoms with CIWA-Ar scale at and 1 hour after each benzodiazepine dose; once score is &lt; 10, then reassess every 4 hours</td>
<td>Benzodiazepine every hour, up to 3 doses, until CIWA-Ar score is &lt; 10. If no improvement, reassess diagnosis and benzodiazepine dose. Respiratory monitoring advised</td>
</tr>
<tr>
<td>Severe (&gt; 20)</td>
<td>As for moderate withdrawal</td>
<td>As for moderate withdrawal</td>
</tr>
</tbody>
</table>

Note: CIWA-Ar = Clinical Institute Withdrawal Assessment for Alcohol.

Alcohol Withdrawal Delirium

Alcohol withdrawal delirium is also known as "delirium tremens" or "the DTs."

This condition can be differentiated from alcohol withdrawal by the presence of symptoms of delirium (see "Alcohol Withdrawal," previous section, this chapter). See also Fig 1, this chapter, for CIWA-Ar scoring.

This condition should be regarded as a medical emergency.

Definition
An acute, potentially life-threatening, organic, psychotic reaction involving delirium. The cause involves the cumulative toxic effects of excessive alcohol intake and chronic nutritional deficiencies over an extended period (5-15 years). The most common precipitating factor is cessation or reduction in drinking, although the condition may also result from acute infection or injury, dehydration or emotional trauma in a person who continues to drink.

Course
Onset usually occurs the second or third day after cessation or reduction in drinking, although it occasionally occurs earlier.

Clinical features develop over a short period and fluctuate over the course of a day. Exacerbations often occur at night.

The condition usually runs its course in 2-5 days but may persist for several weeks depending on premorbid personality, physical condition, severity of complications, and promptness and thoroughness of treatment.

Signs And Symptoms
• Autonomic hyperactivity: tachycardia, sweating and elevated blood pressure
• Fever may be present

Delirium
• Clouded consciousness (reduced awareness of environment), disorientation, confusion, distractibility
• Memory disturbances, amnesia for period of DTs
• Perceptual disturbances: illusions, delusions and hallucinations, usually of a disturbing nature
• Hallucinations are usually visual but may involve any of the senses; often suggestive (e.g. client may accept imaginary drinks)
• Restlessness, agitation, irritability, anxiety; may reach state of panic (or may exhibit opposite extreme, with psychomotor retardation)
• Speech disjointed and incoherent at times; speech may be pressured or retarded
• Sleep-wakefulness cycle disrupted
• Coarse, irregular tremor, especially of hands
• Emotional disturbances: fear, anxiety, depression, anger, euphoria and emotional lability
• May become self-destructive
• Seizures (grand mal): always precede the development of delirium

Management
Assess and stabilize ABC (airway, breathing and circulation) and treat presenting seizures first, as necessary (see "Status Epilepticus (Acute Grand Mal Seizure)," in chapter 8, "Central Nervous System")

Appropriate Consultation
Consult a physician as soon as you are able to do so.

Nonpharmacologic Interventions
Hydration and Nutrition
• Encourage high fluid intake if client is alert and airway and gag reflex are patent.
• Start IV therapy with normal saline, if necessary.
• Adjust rate according to level of hydration.
• Give high-protein, high-carbohydrate, low-fat diet (in frequent small meals).

Encourage Orientation
• Keep room well lighted to avoid misinterpretation of shadows (use a night light after dark).
• Explain to client where he or she is and what is happening.
• The presence of a familiar environment or person is often helpful.

**Decrease Anxiety**
• Speak in a calm, firm manner.
• Allow the client some control over environment by permitting movement and actions within safe limits.
• Offer gentle reassurances and direction; give advance warning of any nursing intervention.
• Minimize stimulation in environment (the area should be quiet and uncluttered, away from outside activities).

**Hallucinations, Delusions, Illusions**
• Avoid arguing about misperceptions, but also avoid validating or supporting them.
• Gently reassure client of your reality, but don't expect acceptance of this.
• Forewarn client before touching him or her; the client may be startled and frightened by your touch and may lash out to protect himself or herself.
• Be aware that the client will respond to delusions and hallucinations as if they were real.
• Avoid low-voiced conversations within earshot of the client, as he or she may misinterpret them in a paranoid way. If you are frightened by the client, seek assistance, as clients are often sensitive to your fears and anxieties.

**Rest**
• Provide a calm, quiet environment.
• Sedate early; avoid allowing agitation to reach crisis level.
• Prohibit visitors other than calming friends or family members.
• Sponging and back rubs can be used to induce relaxation.

**Safety**
• Continuous supervision.
• Restrain physically only when absolutely necessary (see information about use of physical restraints in "Violent or Acutely Agitated Psychiatric Clients," above, this chapter).
• Remove dangerous objects.
• Use a calm, firm approach.
• Seek assistance if problems arise; even when delirious, the client will often respond to a show of strength.

**Pharmacologic Interventions**
Consult a physician for medications which may include:

- **Sedatives:**
  - diazepam (D class drug), 5-10 mg IV
  - diazepam (C class drug), oral administration

- For hallucinations and delusions:
  - haloperidol (B class drug), 2-5 mg IM q4-8h prn
  - benztropine (B class drug) 1-2mg PO, IM, IV
  - thiamine (A class drug), 100 mg IM od for 3 days

**Monitoring and Follow-Up**
• Client is often in poor physical condition and may require treatment of concomitant health problems
• Maintain record of vital signs q15min until stable
• Monitor hourly intake and output; care must be taken not to overload the system
• Keep client under careful observation—see "Violent or Acutely Agitated Psychiatric Clients," above, this chapter
• The client is at risk of impulsive destructive behavior because of anxiety, impaired judgment and disorientation

**Referral**
Medevac. Hospitalization is recommended to ensure safety and supervision, full medical management and avoidance of further alcohol consumption.
Affective Disorders

Definition
A disturbance of moods, usually recurrent, in which either a full or partial manic episode or a major depressive syndrome (not due to other physical or mental disorder) is present.

Types
Bipolar disorder: the full characteristic syndrome, either mania or depression, is present

Major depression

Other and atypical affective disorders: the syndrome is only partially present or is atypical in terms of severity or duration
- Schizoaffective disorder
- Dysthymic disorder (depressive neurosis)
- Seasonal affective disorder

Criteria For Manic Episode
One or more periods of predominantly elevated, expansive or irritable mood (the so-called "high"), lasting at least 1 week.

Presence of three or more of the following signs and symptoms (when not impaired):
- Hyperactivity, restlessness, excessive participation in multiple activities, increased activity (work, social, sexual)
- Pressure of speech (unusually talkative and apparently unable to control it); speech loud, rapid and difficult to interpret
- Flight of ideas (thoughts racing and changing quickly, loose associations)
- Inflated self-esteem, grandiosity (may be delusional)
- Decreased need for sleep; excessive energy
- Distractibility (evident in speech or activity)
- Poor judgment (e.g. buying sprees, sexual indiscretions, reckless investment, behavior that is out of character)

Neither bizarre behavior nor delusions or hallucinations are present in the premorbid condition or after remission. The disorder is not due to any organic mental disorder, such as substance intoxication (has client just been put on antidepressants?) or multiple sclerosis.

Criteria For Major Depression
At least one episode of dysphoric mood and/or loss of interest or pleasure in all or almost all usual activities and pastimes, sufficient to disturb normal function or to cause distress. Dysphoric mood is characterized by depression, sadness, hopelessness and irritability. The mood disturbance must be prominent, pervasive and relatively persistent.

At least five of the following symptoms present nearly every day for a period of at least 2 weeks:
- Change in appetite or weight (increase or decrease)
- Insomnia at any stage of sleep but especially in morning, early awakening
- Increased sleeping (hypersomnia)
- Psychomotor agitation (inability to sit still, pacing, hand-wringing) or retardation (slowed speech, long pauses before answering, low or monotonous speech, lowed body movements, decreased amount of speech)
- Loss of interest or pleasure in sex, decrease in libido
- Anhedonia - loss of pleasure, decrease in activities as unable to enjoy
- Loss of energy
- Wants to cry but can't
- Fatigue
- Feelings of worthlessness, self-reproach, or excessive or inappropriate guilt (may be of delusional nature and proportions)
- Complaints or evidence of diminished ability to think or concentrate (slowed thinking, indecisiveness, can't read a book or follow TV) and recurrent thoughts of death, suicidal ideation, wishes to be dead or suicide attempt

Absence of bizarre behavior and inappropriate mood (mood inconsistent with content of delusions or hallucinations).

Not due to or superimposed on schizophrenia, paranoid disorders, organic mental disorder, bereavement, infectious disease, hypothyroidism, substances such as reserpine, alcohol dependence or other chronic mental disorder.
Severity and duration must be sufficient to warrant label of "major" depression, as distinct from more chronic, less severe, periodic mood disorders (see "Dysthymic Disorder (Depressive Neurosis)," below, this section).

**Age Considerations in Depression**

**Prepubertal Children**
- Mood disorder may be inferred from behavior (withdrawn posture, facial expression)
- Mood should have persisted for 3-4 weeks
- Child may fail to gain expected weight rather than losing weight
- Psychomotor retardation may appear as hypoactivity (underactive)
- Mood change may appear as apathy, loneliness, sullenness, irritability, crying

**Adolescent Children**
- Negativistic or frankly antisocial behavior may appear as an equivalent of mood disorder
- Sulkiness, withdrawal from family and social activities, and retreat to his or her room are frequent
- Loss of self-confidence, loss of interest, somatic complaints, and expression of unhappiness or hopelessness are common in both adults and adolescents
- School difficulties are common
- May be particularly sensitive to rejection

**Elderly Adults**
- Disorientation, memory loss, distractibility, apathy and difficulty in concentrating may be signs of dementia or major depression or both
- In doubtful cases, treat as depression and consider failure to respond as further evidence of the alternative diagnosis or consider wrong drug and consult.

**Bipolar Disorders**
A bipolar disorder is a major affective disorder that may present as predominantly manic, predominantly depressed or mixed.

**Prevalence**
- Bipolar disorder occurs in less than 2% of the general population
- The sex distribution is equal for bipolar disorder
- The course of bipolar major affective disorders is variable
- Episodes may be separated by many years of normal functioning
- Episodes may occur in clusters
- In 20% to 35% of cases there is chronic impairment of social and occupational functioning
- Episodes frequently follow a psychosocial stressor

**History**
- Client has had one or more manic episodes
- Current condition, if depressed, meets criteria for a major depressive episode

**Age at Onset**
- First manic episode usually occurs before age 30, second episodes cluster around age 50
- Major depression may occur at any age, including childhood

**Course of Manic Episodes**
- Episodes typically begin suddenly
- Rapid escalation over a few days
- Duration from a few days to months
- Most individuals experiencing manic episodes will eventually have a major depressive episode
- Initial episode in bipolar disorder is often manic

**Course of Depressive Episodes**
- Onset is variable, often unnoticed
- Symptoms develop over a period of days to weeks but may occur suddenly
- Prodromal symptoms (anxiety, phobias, mild depression) may occur over a longer period
- Approximately half of all individuals experiencing a major depressive episode will have a recurrence

**Dysthymic Disorder (Depressive Neurosis)**

**Definition**
Chronic disturbance of mood involving either depressed mood or loss of interest or pleasure; not of sufficient severity or duration to meet criteria for a major depressive episode.
Prevalence
• Common, perhaps affecting up to 25% of general population at some time in their lives to a degree warranting clinical aid
• In adult population, more common in females; sex ratio equal in children and adolescents

Criteria for Dysthymic Disorder
Presence of depressed mood more often than not, with symptoms characteristic of depression syndrome but not as severe as major depressive episode.

Duration of 2 years, relatively persistent or intermittent, and may be separated by normal periods lasting up to a few weeks but not more than a few months at a time.

In children and adolescents, duration of 1 year.

During the periods of depression, at least two of the following symptoms are present:
• Insomnia or hypersomnia
• Low energy level or chronic tiredness
• Feelings of inadequacy, loss of self-esteem or self-depreciation
• Decreased effectiveness or productivity at school, work or home
• Difficulty with concentration or difficulty in thinking clearly
• Social withdrawal
• Loss of interest in or enjoyment of pleasurable activities
• Irritability or excessive anger
• Inability to respond with pleasure to praise or rewards
• Less active than usual; pessimistic, brooding, feeling sorry for self
• Fearfulness or crying
• Recurrent thoughts of death or suicide

Absence of psychotic features, such as delusions, hallucination, incoherence or loosening of thought associations.

The depressed mood is clearly distinguishable from the individual's usual mood by virtue of its intensity or effect on functioning.

May be superimposed upon or secondary to chronic mental disorder, personality disorder or organic mental disorder.

History
Age at Onset
• Usually begins in early adult life
• May begin at any age
• May follow an episode of major depression

Course of Dysthymic Disorder
• Usually no clear onset
• Has a chronic course

Other Disorders In Which Depression Is Present
Unhappiness, fearfulness and hopelessness can appear as symptoms in a number of mental disorders, as well as in healthy people undergoing periods of stress. Whether the symptoms constitute a genuine mental disorder is in part determined by the severity, duration and resulting degree of impairment.

Uncomplicated Bereavement
• Signs and symptoms of a full depressive syndrome may be present
• Guilt, if present, is chiefly about things done or not done by the survivor
• The survivor may wish that he or she had died with the deceased
• The survivor regards the depressed mood as normal
• The reaction may be delayed but rarely occurs later than the first 2 or 3 months after the death
• The duration of "normal" bereavement varies considerably among different cultural and subcultural groups; abnormally long, intense or debilitating bereavement is viewed as such by others of the same group
• Morbid preoccupation with worthlessness, prolonged and marked functional impairment, and marked psychomotor retardation suggest major depression rather than single bereavement

Management
Describe for the bereaved the frequently observed or expected stages of bereavement: anger, despair, guilt, depression, acceptance.
Allow time to grieve and do not force acceptance of the death, which may take 1 or 2 years to be fully achieved. The person should be permitted and even encouraged to talk about the death and feelings related to it.

Members of the family can be expected to go through the grieving process at different rates, and will have certain reactions to that fact. They may be upset by each other or may attempt to protect each other from the unhappy feeling. Some members may feel guilt with regard to loving or enjoying other people or having fun while other members of the family are still grieving.

The person may be experiencing guilt over a number of things, including past unresolved issues, being a survivor or experiencing enjoyment. Similarly, anger is a common reaction, because life goes on for others.

There is a tendency to idealize the deceased person, which may create problems for other family members, particularly the surviving parent, who may be unfavorably compared with the deceased.

The bereaved person often becomes suddenly aware of his or her own mortality, which heightens any sense of insecurity.

The bereaved person could be forewarned of the "anniversary phenomenon," in which the loss is re-experienced 1 year later. This is a normal experience and can be used to deal with unresolved grief in a constructive way.

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The belief systems of the person with respect to life after death should not be challenged, nor should the person be persuaded toward any particular belief. The person should simply be supported in his or her beliefs if they provide comfort and support.

**Adjustment Disorder with Depressed Mood**
- Identifiable psychosocial stressor occurred within 3 months of onset of disorder
- Maladaptive reaction consists of impairment of social or occupational functioning or symptoms in excess of the normal and expected reaction to the stressor
- Disturbance is not part of a pattern of such disturbances
- Disturbance eventually remits after the stressor ceases

**Management**
Supportive counseling, including:
- Explanation of the reaction for the individual, stressing its transient nature
- Mobilization of natural supports (family, friends)
- Encouragement of a realistic sense of competency
- Mobilization of the individual's personal resources and strengths

Evaluation of suicide potential (see "Suicidal Behavior," below, this chapter)

**Management Of Affective Disorders Manic Phase (Bipolar Disorder)**
**Nonpharmacologic Interventions**
Management of clients in the manic phase of an affective disorder is usually difficult, trying and stressful for everyone involved: the client, the family and the helping professional. Manic clients seldom have insight into the mood disturbance and feel better than ever. They resent the idea that they need treatment, particularly any treatment that includes bringing them down from the "high" and placing external controls on their movements.

The manic client is usually coerced into attending a healthcare professional by family or police officers and is usually hostile, agitated and perhaps belligerent.

The client will attempt to tone down the feelings of excitement and grandiosity in order to appear normal and will rationalize or deny symptomatic behavior. The history presented by family or others should be given considerable weight in making a diagnosis and deciding about treatment and management.

The basis of management is sensitivity and firmness. The helping person should be sensitive to the fact that the client is frightened and will do
almost anything to defend against attacks, whether real or imagined, on his or her self-esteem.

Avoid reacting to the client's defensive assaults. The professional should recognize the source of the client's anger, be concerned and respond calmly. Such a response will reassure the client that there is no need to fear counterattack by the professional.

The professional's firmness indicates to the client that external controls will be used if the client is unable to exercise restraint or is overwhelmed by impulses. The client may respond by testing the professional's determination. Seek help from the RCMP if at all necessary.

In the initial stages of management, it is often necessary to employ the services of other staff or police officers, who would be capable of subduing and restraining the client. Do not hesitate to call for reinforcements. (See "Violent or Acutely Agitated Psychiatric Clients," above, this chapter.)

Appropriate Consultation
If possible, consult a physician before giving any medication.

Pharmacologic Interventions
Medication is essential to control the disordered behavior, to alleviate stress and to treat the underlying disorder. Initial treatment is with a major tranquilizer:

*lorazepam, 1 mg SL (C class drug) or 2-4 mg IM (D class drug)*

In severe cases, neuroleptic tranquilizers may be necessary (but you must consult with a physician first):

*haloperidol (B class drug), 0.5-5.0 mg PO bid to tid prn or 2-5 mg IM q4-8h prn*

An antiparkinsonian agent may have to be added to counteract extrapyramidal side effects caused by the haloperidol.

Treatment with *lithium carbonate (B class drug)* may also be instituted, but the therapeutic effects of this agent do not begin to take hold until after a week or more of treatment.

Consideration might be given to long-term lithium maintenance therapy, as this medication is of great benefit in preventing or dampening future manic attacks.

Before lithium therapy is started, the following baseline diagnostic tests should be done:

- Complete blood count
- Electrolytes
- Renal function
- Liver function
- Thyroid
- Electrocardiography (ECG) should be done

Occasionally, high doses of medication fail to settle a highly agitated manic client, and the client is in danger of physical collapse or poses a danger to staff or other patients.

**Monitoring and Follow-Up**

- Follow up weekly until the client is stable, then monthly (as symptoms abate, medication doses can be tapered, often to the point of discontinuation)
- Follow-up with regular, widely spaced appointments allows for working through certain psychological issues, such as the client's vulnerability to future episodes and the need for medication
- If the client is on long-term lithium therapy, blood samples should be taken every 6 months for complete blood count, electrolyte levels, and renal, liver and thyroid function; similarly, ECG, if available, should be done every 6 months for these clients
- Both the client and the family should be educated with regard to bipolar disorder, and the early signals of manic relapse and the course to take should be fully discussed

**Referral**

- Most manic clients are best treated in the relatively controlled and safe environment of the hospital
- Outpatient treatment runs risks arising from the client's impaired judgment and erratic, unpredictable moods and behavior
- Involuntary hospitalization may have to be considered (through the justice of the peace, a police officer or a physician, if available, for a
"Form 1" admission) and may in fact be the best course because of the client's unpredictability and the likelihood of a change of mind after voluntary admission

**Depressive Phase (Bipolar Disorder and Major Depressive Disorder)**

**Appropriate Consultation**
Consult a physician for all depressed clients.

**Nonpharmacologic Interventions**
The depressed client usually seeks help of his or her own accord, perhaps with some coaxing from family or friends. The client will usually be cooperative with those in a position to offer relief and escape from misery. Be sensitive to the possibility that the client may, nonetheless, find the experience of needing help quite humbling. Adolescents are usually especially reluctant because of fear of what their peers might think or the possibility that they are "crazy". Such fears should be dealt with directly and realistically.

Milder depressive episodes and "situation" or "reactive" depression can often be treated without medication. Treatment of these cases involves providing support (professional or otherwise), working through conflicts, altering relationships and developing counter-depressive attitudes and skills.

**Pharmacologic Interventions**
The more depressed client may be unable to engage in useful therapeutic work with the treating professional; in this case, medication is indicated. Treatment usually begins with selective serotonin re-uptake inhibitors (SSRI) antidepressants (*e.g.* paroxetine, fluvoxamine maleate or sertraline), to which 70% to 80% of clients will have a favorable response. Consult a physician to order these medications.

The antidepressant effects of these medications often take 3 weeks or longer to become apparent. These drugs may cause troublesome side effects such as nausea, headache and diarrhea. They are the safest of the antidepressants if taken as an overdose.

Sleep medications are rarely indicated, except for short-term use, as insomnia secondary to depression usually responds to nighttime antidepressant medication.

**Monitoring and Follow-Up**
It is customary to continue the prescription of antidepressants for some 6-9 months after the depressive episode has remitted.

Medication doses are then tapered gradually, and the medication can be discontinued, provided there are no signs of relapse.

Some depressive episodes do not remit completely and the residual milder depressive symptoms can be treated with longer-term antidepressant therapy.

Patients with a high rate of relapse may be given longer-term antidepressant treatment.

Lithium maintenance therapy is effective in many patients with recurrent depressive disorders.

The prescription of medication always occurs in the context of a working alliance between the client and the professional. It does not obviate the need for support, the resolving of psychological and interpersonal difficulties, and education about the nature of the affective disorders.

**Referral**
Most depressed patients can be managed on an outpatient basis. The decision to hospitalize will hinge on a variety of factors, including the following:

- Suicidal tendencies (*see"Suicidal Behavior," below, this chapter*)
- Degree of functional impairment
- Intensity of suffering
- Availability of family and community supports
- The nature of the hospital program
- The wishes of the client

**Dysthymic Disorder**
Treatment is often lengthy and the results mixed.
**Nonpharmacologic Interventions**
The thrust of treatment will be psychotherapeutic. Insight-oriented, psycho-educative, supportive and behavioral approaches are most frequently used.

The client should be encouraged to look at self-defeating, depressogenic patterns of behavior and the anxieties, guilt and anger associated with them.

Clients may be taught to be assertive rather than controlling in passive ways and to confront rather than avoid frightening or personally threatening situations. The sense of mastery and the experience of positive feelings and gratification counter the depressive feelings.

Self-help groups may be useful for dysthymic clients for learning how to cope and for the support provided by other members.

Behavioral treatment is usually aimed at the specific behavioral variables affecting depressive symptoms, particularly the behaviors that are currently punished (e.g. ignored or coercively controlled) and those that are reinforced or encouraged (e.g. well-meaning attention inadvertently supporting depressive symptoms).

Some possible causes for depression and examples of behavioral treatment responses are given in Table 1 to illustrate some of the possibilities of outpatient treatment of depression.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inability or reluctance to express one’s opinions or to initiate suggestion</td>
<td>Assertiveness training</td>
</tr>
<tr>
<td>Indecision, poor planning, poor coping strategies</td>
<td>Decision-making and problem-solving skills</td>
</tr>
<tr>
<td>Unrewarding social interactions, anxiety about social contact, social withdrawal</td>
<td>Social skills training, relaxation training</td>
</tr>
<tr>
<td>Marital problems, coercive control by spouse</td>
<td>Marital counseling, communication skills training, assertiveness training</td>
</tr>
<tr>
<td>Rumination over past events, negative self-evaluation, worry</td>
<td>Cognitive self-control, “thought-stopping’ techniques</td>
</tr>
<tr>
<td>Feeling of helplessness, that there is no use trying</td>
<td>Retraining in mastery and personal effectiveness strategies</td>
</tr>
<tr>
<td>Lack of enjoyment, gradual loss of interest</td>
<td>“Reinforcement sampling”, re-exposure to potentially rewarding activities, increasing pleasant activities</td>
</tr>
<tr>
<td>Loss of behavioral productivity</td>
<td>Performance of graduated tasks, planning or rewards for successful performance</td>
</tr>
</tbody>
</table>

**Pharmacologic Interventions**
Dysthymic clients may respond to antidepressant medication (especially SSRIs, as outlined above), but the response is less predictable and less complete than in major depressive disorder. If symptoms intensify, a trial of medication may be indicated.

Minor tranquilizers (e.g. lorazepam) may be prescribed by the physician for very brief periods (7-10 days) from time to time to counter associated anxiety, panic or phobic symptoms and the avoidance and withdrawal that they engender.

A considerable proportion of dysthymic clients become psychologically dependent on their medications. Thus, medications should be used judiciously, and efforts should be made periodically to discontinue them.

**Monitoring and Follow-Up**
Regular follow-up is important, to monitor progress in behavioral changes and to offer encouragement and support.

**Referral**
Refer to a physician for follow-up as needed, especially if the client is on medication or there is no response to treatment after a reasonable trial.
Psychotic Disorders

General
Psychosis can present as delusions, hallucinations, disorganized speech, bizarre behavior, catatonia, withdrawal and downward social drift.

The psychotic episode may be an accompanying symptom of underlying psychiatric illness of which mania, depression and schizophrenia are the most common.

Other psychotic disorders include delusional disorder, brief psychotic disorder and schizoaffective disorder.

Schizophrenia
Schizophrenia is the most common chronic psychotic disorder, with a lifetime prevalence of 0.5% to 1%, occurring equally among men and women. Onset is usually in adolescence or young adulthood. A higher prevalence is noted among family members of people with schizophrenia, and there is a higher concordance rate in monozygotic than dizygotic twins. Although genetic factors are involved, nongenetic factors are thought to be important.

The condition may present with insidious onset, or onset may seem sudden, with an acute psychotic break; however, prodromal symptoms are often identified retrospectively.

Essential Features
• Presence of certain psychotic features with characteristic symptoms involving multiple psychological processes
• Deterioration from a previous level of functioning
• Onset before age 45
• Duration of at least 6 months

Types of Schizophrenic Disorders
Schizophrenic disorders with overt psychotic features are currently differentiated into several types based on the predominant symptoms. Of these, three are most distinctive and are classically described:
• Disorganized type (also know as hebephrenic type)
• Catatonic type
• Paranoid type

History and Physical Findings
The typical client will present in an excited, agitated state, often with fearfulness or hostility, hallucinations and delusions, confusion and disorganization, vigilance and over-activity. Mood is often labile and behavior unpredictable.

First, assess for medical conditions that might account for the symptoms and any accompanying delirium or dementia.

Ascertain the role of any substance use (intoxication or withdrawal) or medication.

Characteristic Symptoms
Content of Thought (Delusions and Preoccupation)
• Persecutory: beliefs that others are spying on, plotting against or spreading rumors about the person
• Delusions of reference: events or objects are given peculiar and unusual significance, such as believing that the radio announcer is directing comments to the individual personally
• Thought broadcasting: belief that one's thoughts are broadcast to the external world
• Thought insertion: belief that thoughts that are not one's own are being inserted into one's head
• Delusions of being controlled: belief that one's feelings, impulses or actions are being imposed from external sources
• Other somatic, grandiose, religious or nihilistic delusions; markedly illogical thinking; or preoccupation with certain ideas

Form of Thought (Formal Thought Disorder)
• Loosening of associations: ideas shift from one unrelated thought to another
• Speech may be incoherent and incomprehensible
• Speech may be vague, overly abstract, overly concrete, repetitive or stereotyped
• New words (neologisms) may be created, ideas may be repeated as if the person is stuck on one track (perservation), train of speech may be interrupted (blocking) or sounds rather than
meaningful concepts may govern word choice, which results in meaningless rhyming or punning ("clanging").

**Perception**
- Auditory hallucinations: the most common form; usually of voices speaking directly to the individual and occasionally giving commands, which may create danger for the individual or others
- Tactile hallucinations: typically involve electrical, tingling or burning sensations
- Somatic hallucination: sensation of snakes or insects crawling inside the abdomen or other bizarre internal sensations
- Visual, gustatory and olfactory hallucination: such hallucinations may occur in schizophrenia, but in the absence of auditory hallucinations, they raise the possibility of organic mental disorder

**Affect**
- Blunting of affect: severe reduction of intensity of emotional expression
- Flattening: virtually no signs of affective expression
- Inappropriate affect: affect and speech or ideation are discordant

**Sense of Self**
- "Loss of boundaries": extreme confusion about one's identity and the meaning of existence
- May be manifested in delusions of control by outside force

**Volition**
- Inadequate interest or drive
- Inability to follow a course of action to its conclusion
- Extreme ambivalence about alternative courses of action, which leads to inaction

**Relationship to External World**
- Withdrawal from involvement with external world
- Preoccupation with egocentric and illogical ideas and fantasies (client "living in his or her own world")
- Emotional detachment

**Psychomotor Behavior**
- Observed especially in chronically severe and actively florid forms
- Catatonic posturing: rigid, bizarre posturing
- Catatonic excitement: purposeless, stereotyped, excited movement unrelated to external stimuli
- Catatonic stupor: client appears unaware of the environment
- Catatonic negativism: client actively counteracts or resists instructions or attempts to be moved
- Mannerisms, grimacing or waxy flexibility (remains passively in any position in which he or she is placed)

**Criteria for Schizophrenic Disorder**
- At least two of the following during active phase of the disorder (lasting at least 1 month):
  - Delusions: this alone will suffice for the diagnosis if delusions are bizarre (somatic, grandiose, religious, nihilistic, persecutory or jealous)
  - Hallucinations: this alone will suffice for the diagnosis if hallucinations include voices, speaking to one another or providing commentary
  - Disorganized speech: incoherence, marked loosening of associations, markedly illogical
  - Catatonic or grossly disorganized behavior.
  - Negative symptoms (ambivalence, flattened affect, avolition, anhedonia, asociality, apathy)
  - Deterioration from previous level of functioning in such areas as work, social relations and self-care
  - Duration of disturbance of at least 6 months, with 1 month of active phase, at some time during the person's life
  - Onset before age 45 years
  - Not due to an organic mental disorder or mental retardation, mood disorder, substance use or medical condition
  - Symptoms occurring before (prodromal) and after (residual) the active phase of the illness should be considered in calculating the duration of the disorder:
    - social isolation or withdrawal
    - marked impairment in role functioning as wage-earner, student or homemaker
    - markedly peculiar behavior (e.g. collecting garbage, hoarding food)
• marked impairment in personal hygiene and grooming
• speech digressive, vague, over-elaborate, circumstantial (not getting to the point) or metaphorical
• odd or bizarre ideas, magical thinking, ideas of reference, over-valuing one's importance
• unusual perceptual experiences (e.g. sensing the presence of a force or person not actually present)

Course
• Active phase usually preceded by a prodromal phase (anxiety, phobias, mild depression); change in personality often noted by friends and relatives; length of prodromal stage highly variable, and prognosis worse for the slowly developing disorder
• Onset of active phase often precipitated by a psychosocial disorder
• Residual phase usually follows active phase; clinical picture resembles prodromal phase, although some of the psychotic symptoms may persist
• Return to premorbid functioning is unusual, and acute exacerbations with increasing residual impairment between episodes is common

Differential Diagnosis
• Affective disorders (mania and depression)
• Organic or toxic psychosis (induced by drugs or medical illness)

Management of Acute Psychotic State
The acutely psychotic or delirious client should be admitted to a room that can be readily observed but that has minimal noise and light stimulation.

Treat medical conditions or substance withdrawal as necessary.

Appropriate Consultation
Consult a physician before initiating any medications.

Nonpharmacologic Interventions
Start by ensuring your own safety, the safety of other clients and staff, and the safety of the affected client. This is done by establishing firm control of the situation as soon as possible; it may entail the use of physical restraint. In many instances, a show of force, for example, by having police or security officers present, will settle the client sufficiently so that physical means of control need not be used.

Care must be taken to avoid exacerbating the situation by failing to give the excited client enough physical and psychological room (especially if he or she is suspicious or paranoid). Thus, noise should be minimized. Eye contact may be disturbing, as it may be interpreted as threatening or aggressive. You should maintain a considerable physical distance to avoid being struck and also to appear less threatening to the frightened client. Questions asked should not be probing, and sensitive areas, if identifiable from previous background history, should be avoided. Delusion should not be challenged or supported.

If the excited, psychotic client appears on the verge of violence or escape, you should not obstruct the escape route or end up in an enclosed space alone with the client. It is preferable to allow the client to bolt than to risk being assaulted. (See also "Violent or Acutely Agitated Psychiatric Clients," above, this chapter.)

Pharmacologic Interventions
Medication is indispensable in the treatment of acute psychosis and the long-term management of schizophrenia; it is used to control disordered behavior, to provide symptomatic relief and as a specific treatment of the disorder.

If possible, before starting medications, do baseline ECG, complete blood count and liver function testing (LFT).

Consult a physician before initiating medication.

Acute treatment is initiated with major tranquilizers such as haloperidol (high potency) or loxapine (intermediate potency), often in combination with a benzodiazepine, such as lorazepam.

Side effects of the major tranquilizers are orthostatic hypotension, dry mouth, blurred vision, constipation, drowsiness and several extrapyramidal side effects.
Monitoring and Follow-Up
Client should be monitored regularly for mental status (orientation, presence of psychotic symptoms, mood disorders, suicidal ideation), functional status, self-care, nutrition and side effects of medications (akathisia, dizziness, sedation, signs of parkinsonism, tardive dyskinesia and orthostatic hypotension).

Referral
Almost all acutely psychotic patients will need hospitalization, and sometimes this must be accomplished on an involuntary basis. Sometimes hospitalization can be avoided, especially if the client has solid family and community supports and under circumstances where the staff members know the client well and are familiar with his or her particular disorder and the natural course of previous relapses and remissions.

Hospitalization and Medical Evacuation
The decision as to whether to admit the client to a local hospital, treat the client on an outpatient basis or evacuate the client to a psychiatric hospital depends on a number of factors and should, of course, be taken in consultation with the best qualified available physician, preferably a psychiatrist. The following should be considered:

- Is this the first known psychotic episode? How certain is the diagnosis? Is there a need for close observation and monitoring?
- How competent are the local medical and non-medical resources to deal with schizophrenia and with this client in particular? How available is psychiatric consultation, if it is required?
- How dangerous, frightened or unpredictable is the client now or has he or she been in the past? How compliant with directions and medication?
- Is the client in need of shelter? To what extent is the family disrupted by the client? Would it be dangerous or disruptive to return the client to the family?

Whether the client enters hospital voluntarily or involuntarily, it is very important that the family be kept informed of his or her progress and that they maintain as close contact with the client as possible.

Involuntary Admission
Legal requirements must be met before a person can be hospitalized against his or her will. You must refer to the Mental Health Act, NWT (1988).

- In most cases there must be evidence of risk of physical harm before an unwilling person can be admitted. The recommendation of one or more physicians is required.
- In most areas, involuntary admissions are reviewed by a review or appeal board.
- In communities where there are few doctors, relatives or other concerned individuals may be able to apply for a warrant to have the person taken into custody and assessed at the nearest hospital. Evidence for such an application is usually heard by a justice of the peace or a magistrate.
- Involuntary admission may be avoided if the client's family is able to demonstrate solidarity and strength in trying to convince the client to enter voluntarily. The family must, of course, be well informed and genuinely convinced beforehand of the need for hospitalization.
- The client or guardian should be advised of the procedures involved in involuntary admission, as well as the client's legal rights and appeal provisions.

Long-Term Maintenance and Rehabilitation of the Stabilized Schizophrenic Patient
Pharmacologic Interventions
For a considerable number of clients, the long-term use of major tranquilizers is necessary to afford the chance of a stable partial or full remission. However, because some schizophrenic clients may remain well for years, or even indefinitely, without medication, and because vulnerability to relapse cannot be predicted after one episode, medication should be tapered and, if possible, discontinued in fully remitted patients after a first psychotic break.

The maintenance dose should be the lowest dose that prevents relapse. Discovering this dosage is usually a matter of long-term, careful follow-up and monitoring - a collaborative effort involving the client, the nurse practitioner and the physician.
Although the typical neuroleptic medications are often effective in suppressing the florid signs (so-called "positive symptoms"), the negative symptoms (such as lack of initiative, flatness of affect and poverty of ideas) are more difficult to control and often require the newer atypical neuroleptics (*e.g.* risperidone, clozapine, olanzapine).

Many clients are less than fully compliant. Relapse thought to be due to inadequate doses of medication may, in fact, result from the client not having taken the medications as prescribed. To some extent, compliance problems can be alleviated by using long-acting injectable major tranquilizers such as fluphenazine enanthate and fluphenazine decanoate, the effects of which last about 2 and 3 weeks, respectively.

A serious and often irreversible side effect of long-term tranquilization is tardive dyskinesia, a neurological condition characterized by the gradual appearance of involuntary movement. These movements usually involve facial musculature and appear as lip-smacking, chewing, sucking and tongue-thrusting. At times, the extremities, limbs and trunk may be involved.

Upon appearance of these signs, consideration must be given to reducing dosages of, or even discontinuing, the medication. Unfortunately, this is often not possible without the client relapsing into psychosis. Anti-parkinsonian agents are of no value in this condition and no single effective remedy has been found to date.

The side effects of medication for schizophrenia include acute dystonic reaction, parkinsonian side effects and akathisia.

**Acute Dystonic Reaction**
Moderate to severe muscle spasms, usually of the neck (causing tilting of the head), back muscles (causing arching), and tongue or eye. These often dramatic and frightening effects are easily reversed.

Asses and stabilize ABC (airway, breathing and circulation). Consult a physician about use of: *benztropine (B class drug), 2 mg IM*

**Parkinsonian Side Effects**
Muscle rigidity, tremor, facial masking, drooling and loss of associated movements.

Treatment involves reducing the medication dosage and/or administering oral antiparkinsonian agents such as benztropine, which may be prescribed in doses of 1-8 mg/day.

**Akathisia**
Inner restlessness, which can be excruciatingly distressing and which only sometimes is manifested in outward restless movements. This side effect, which can only be alleviated in the same manner as the parkinsonian side effects, is sometimes mistaken for agitation due to the increasing schizophrenic disorder. It can increase risk of suicide.

**Monitoring and Follow-Up**
For about two-thirds of clients experiencing an acute psychotic episode requiring hospitalization, treatment will be a life-long proposition. Return to normal is unusual, and usually the schizophrenic person remains disabled in one way or another and requires long-term rehabilitation and supportive care.

Visits should be regular and frequent to prevent re-hospitalization and to monitor drug compliance, effectiveness and side effects. After an acute episode, there is a 70% chance of relapse within 1 year if the patient is not taking medication, but only a 30% chance if the medication regimen is being followed. The nurse is often in the best position to monitor compliance and drug effectiveness and even to provide the primary therapy under the direction of a consulting psychiatrist.

Frequent, regular contacts are invaluable in preventing re-admission to hospital.

The client should be assisted to engage in active social programs, to combat the tendency to withdraw.

The client should be assisted to make use of educational, employment, training and recreational opportunities. Advice and assistance may also be
required with respect to housing, financial assistance, legal matters and other social services.

In the early stages of recovery, the client may need close supervision, such as that provided in sheltered workshops (vocational), transition homes and day hospitals or day-care programs.

**Personal Counseling**
The schizophrenic client will likely experience a number of stresses and problems directly or indirectly related to the disorder, for which personal counseling is desirable:

- Sexual dysfunction may be a side effect of the medications and may present as decreased libido or cessation of menstruation.
- Courtship: the client may experience severe interpersonal anxiety and need social skills training and counseling in this regard.
- Genetic risk: genetic counseling and planning for parenthood may be appropriate.
- Family adjustment: the client may need help in dealing with problems with other family members, since these problems are often a direct result of the client's symptoms and may be longstanding.
- Self-care: the client may need help and supervision with regard to personal hygiene, grooming, nutrition, financial management and purchases.
- Interpersonal difficulties: the client may require marital or family counseling, divorce counseling, or counseling and social skills training with regard to getting along with friends and acquaintances.

**Family Support**

- Educate the family on the nature of schizophrenia, the cause of the disorder, its treatments, and the family's role in supporting and managing the client at home or in the community.
- Advise family members about how to behave toward the patient, how to deal with the client's thought disorders and paranoid thinking, how to remotivate and encourage the client, and how to respond to bizarre behavior and withdrawal.
- Caution family members against talking about the client in his or her presence and to avoid being critical. The prognosis is poorer in families where there is a high degree of critical emotional expression.
- Help the family to recognize the early warning signs of relapse (especially increased social isolation, moodiness, difficulty thinking or sleeping, increased irritability or the return of symptoms previously in remission).
- Advise the family to encourage the patient to be self-sufficient by doing as much as possible for himself or herself. It is never easy to determine just what the client is capable of doing, and judicious trial and error, with constant alertness to signs of stress, is perhaps the only way.
- Calm the family's fears with regard to the client, and discuss with them any feelings of guilt or shame they might experience. Give them the facts with regard to the causes of the disorder. Encourage patience with respect to the client's anger or depression.
- Help family members to achieve a realistic understanding of the disorder so that they are neither unrealistically optimistic nor despairing. They in turn can help the client with accepting the limitations imposed by the disorder (e.g. on education, marriage, self-sufficiency).
- Have the family assist and encourage the client to attend treatment sessions or other social appointments.
- Emphasize the importance of keeping the client socially active.
- Prepare the family for what will happen if the client has to be hospitalized locally or evacuated for treatment.
- The family itself may require some counseling because of the stresses of the illness, the caretaker role and the embarrassment experienced by family members.
- Where no family is available to provide support, volunteers or professional caregivers (e.g. group or boarding home supervisors) might be encouraged to play a similar role.

In larger communities, schizophrenic patients have formed self-help groups. Although this may not be practical in a small community, such groups may be able to provide resource material and ideas that could be applied in the care and self-care of a small number of clients.
Anxiety Disorders

Definition
Subjective experience of fear, foreboding or panic. Distinguished from "normal" anxiety by its intensity or duration or the extent of disturbance and dysfunction in the absence of an appropriate stimulus. Symptoms may be present as a generalized pattern or in discrete periods ("attacks"), which may or may not be preceded by a triggering stimulus. Condition may present as "stress" (client not coping or functioning as well as usual), a mood disorder, a substance use problem, or one or more somatic complaints.

History
Symptoms appear in three clusters: emotional, physiologic and cognitive.

Emotional
• Sense of doom
• Apprehension
• Fearfulness
• Worry

Physiologic
• General: insomnia, fatigue, weight loss
• CNS: tremor, muscle aches, headaches, dizziness, lightheadedness, paraesthesias
• Autonomic: sweating, dry mouth, increased heart rate, flushing
• Gastrointestinal: stomach upset, diarrhea, anorexia, choking
• Cardiorespiratory: shortness of breath, hyperventilation, chest pain, palpitations

Cognitive
• Poor concentration
• Poor memory
• Recurrent intrusive thoughts

Other Aspects of History
• Age at onset, pattern over time
• Symptoms experienced, onset, triggers (environment, situation, stimulus), duration, severity, associated avoidance behavior, level of distress, dysfunction and limitations
• Life events or stressors that may correlate temporally with onset

• Techniques and strategies to alleviate anxiety (e.g. chemical substances used or abused)
• Associated thoughts or behaviors intrusive?
• Review use of caffeine, any other stimulants, any recreational drug use
• Review current medications, any over-the-counter (OTC) or herbal drugs
• Review for symptoms consistent with underlying medical illnesses
• Review past medical and past psychiatric history

Physical Examination
• Mental status exam: emphasis on survey for depression; explore for any suicidal or homicidal feelings or plans; explore whether client is victim of abuse (if so, take steps to ensure client's safety)
• Cardiorespiratory exam
• Thyroid and other exams as indicated by history

Differential Diagnosis
• Anxiety disorders: generalized anxiety, panic disorder with or without agoraphobia, social phobia, specific phobia, obsessive-compulsive disorder, post-traumatic stress disorder, adjustment disorder with anxiety (< 6 months in duration)
• Other psychiatric disorders: depression, somatization, hypochondrias, personality disorders, victim of abuse (physical, sexual or emotional), psychosis, dementia
• Medical disorder: endocrine (hyperthyroidism, hypoglycemia, Cushing's disease), cardiorespiratory (e.g. congestive heart failure [CHF], cardiac arrhythmia, mitral valve prolapse, chronic obstructive pulmonary disease [COPD], pulmonary embolism, among others)
• Substance use or withdrawal: especially caffeine, alcohol, cannabis, cocaine, amphetamines, but any medication may be responsible

Comorbidity is common, so actively pursue depression, substance abuse, somatization.
Complications
- Inability to perform activities of daily living
- Social phobias
- Substance abuse

Diagnostic Tests
- Complete blood count
- Electrocardiography (ECG)
- Thyroid-stimulating hormone (TSH)

Management
Depending on the type of anxiety disorder, definitive treatment may involve psychotherapy, desensitization therapy and medications. Benzodiazepines, tricyclic antidepressants, SSRIs and occasionally neuroleptics may each have a role.

Appropriate Consultation
Consult physician:
- If there are any safety concerns
- If an underlying medical problem is suspected, since management will need to be tailored for the diagnosis
- If symptoms are so intense as to interfere with normal function, in which case a short course of a benzodiazepine (minor tranquilizer) may be indicated

Nonpharmacologic Interventions
- Have the client reduce the use of stimulants, especially caffeine
- Help the client to reduce self-medicating with non-prescribed drugs, if applicable
- Review techniques to promote relaxation: breathing exercises, meditation, progressive muscle relaxation, aerobic exercise

Pharmacologic Interventions
lorazepam (C class drug), 0.5-1.0 mg PO bid to tid prn for 5 days

Monitoring and Follow-Up
- Follow up weekly
- Support and education about the illness process for the client as well as for the family are critical
- Arrange follow-up with physician at next available visit for all but very severe cases

Referral
Medevac urgently if there is profound disturbance, if there are safety issues or if the client needs more definitive treatment.
Cognitive Impairment

Definitions

- **Dementia**: syndrome of acquired progressive global impairment of cognitive function sufficient to interfere with normal activities (may be due to an underlying reversible or irreversible process)
- **Delirium**: acute deterioration of ability to maintain attention or focus, consequently accompanied by disorientation and fluctuating level of consciousness and often associated with perceptual disturbances; usually due to an underlying organic problem

Delirium and dementia are both syndromes with large differential diagnoses for underlying causes. More than one factor may be involved.

These conditions are commonly seen in but are not limited to the elderly.

History

Elicit the history from the client, but it is just as important to elicit corroborating information from a caregiver, friend or the family.

- Client may present complaining of memory problems, problems with attention or focus, or concentration difficulties
- More often, a caregiver or family member accompanies the client, having noticed the client's difficulties with tasks that previously were not a problem (e.g. self-care, home care, shopping, finances)
- May present with concerns of inappropriate or bizarre behavior, because of delusions and hallucinations
- May present because of accompanying depression or anxiety
- Determine onset of symptoms and temporal course
- Record symptoms noted, objective behaviors observed
- Elicit degree of disturbance and dysfunction (ask about specifics, such as shopping, driving, self-care, handling of money, work performance or hobbies, as applicable; also inquire about ability to learn a new task)

Symptoms Associated with Underlying Medical Disorders

- Constitutional: fevers, sweats, weight loss, fatigue
- Sensory: vision, hearing changes
- Neurologic: new headache, tremor, ataxia, dizziness, seizure, focal deficits, transient ischemic attack (TIA)
- Endocrine: symptoms of thyroid problems, diabetes mellitus, hypercalcemia
- Cardiopulmonary: shortness of breath, cough, chest pain, sleep apnea, palpitations
- Gastrointestinal and genitourinary symptoms: as deemed necessary (it is important to inquire about incontinence)

Risk Factors and Past Medical History

- Trauma
- Falls
- Alcohol or benzodiazepine use

Causes

**Reversible Causes**

- Medications
- Metabolic derangements (e.g. blood glucose, sodium, potassium, calcium, vitamin B12 deficiency; thyroid, renal or liver impairment)
- Hypoxia from cardiopulmonary illness
- Intracranial pathology (e.g. neoplasm, normal-pressure hydrocephalus, infection, subdural hematoma, stroke)
- Sensory deficit states (e.g. hearing or visual impairment)
- Infections (e.g. urinary tract infection, pneumonia)

**Irreversible Causes**

- Alzheimer's disease
- Vascular (multi-infarct) dementia
- Chronic alcohol abuse
- Parkinson's disease
- Huntington's disease
- Head trauma
- Neoplasm
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- Risk factors for cerebrovascular accident
- Occupational exposure
- Sexual exposure
- Previous history of cancer
- Anticoagulation or antithrombotic medication
- Nutrition

**Medication**
- OTC or otherwise acquired drug or remedy

**Psychiatric Assessment**
- Assess for mood, anhedonia, hopelessness, apathy, vegetative symptoms of depression
- Inquire about suicidal tendency
- Assess for psychotic symptoms (e.g. thought disorder, delusions, hallucinations)
- Assess for psychosocial stressors (e.g. losses, abuse or neglect)
- Observe speech, affect, mannerisms, grooming, psychomotor skills

**Mental Status Examination**
- Most widely used tool is Folstein's Mini Mental Status Examination
- Most sensitive items for dementia are impaired time orientation, problems with naming, inability to spell "world" backwards, and problems with copying an overlapping design
- Having the client draw a clock representing a certain time is also helpful
- Assessing judgment, by asking the person to interpret hypothetical situations (e.g. waking to find the house on fire) is also helpful

**Physical Examination**
The physical exam is directed by the differential diagnosis, as generated by the history, but must include the following:
- Vital signs
- Hearing and vision assessments (including fundi)
- Cardiovascular and pulmonary exam (note carotid bruits, evidence of atherosclerotic disease)
- Full neurologic exam, noting especially tremor, cogwheeling rigidity, shuffling gait, deep tendon reflexes, focal deficits in sensory and motor function, aphasia

**Differential Diagnosis**
- Dementia
- Delirium
- Depression
- Age-related memory or cognitive decline
- Substance use or abuse, medications
- Borderline intellectual function, mental retardation
- Other psychiatric disorders: psychotic, amnestic or dissociative

Delirium, dementia and depression can be difficult to distinguish.

Depression in the elderly is often referred to as pseudodementia because the accompanying apathy and associated cognitive difficulties often mimic dementia.

**Diagnostic Tests**
Unless the underlying cause is obvious, blood should be drawn for the following tests:
- Complete blood count
- Electrolytes
- Calcium
- TSH
- Blood glucose

Other investigations will be driven by the history and presentation.

**Management**
Management is ultimately driven by the diagnosis.

**Goals of Treatment**
- Identify and correct reversible causes
- Ensure safety of the client
- Optimize functioning and quality of life

**Appropriate Consultation**
Consult a physician if client is assessed as delirious or in acute distress, if there are unexplained new neurologic symptoms or focal deficits, or if there are risk factors for serious intracranial pathology (e.g. anticoagulant medication, history of trauma, previous cancer).
\textbf{Nonpharmacologic Interventions} 
- Educate and support caregivers and family 
- Encourage measures to ensure safety, and aid the client in optimal functioning and independence 
- Mobilize available community resources such as home care, friendly visitors 

If agitation or behavioral issues are the concern, manage according to guidelines in "Violent or Acutely Agitated Psychiatric Clients," above, this chapter. 

\textbf{Pharmacologic Interventions} 
If at all possible, do not medicate. In particular, avoid sedation, as it may cause falls and worsen symptoms of impairment. 

\textbf{Monitoring and Follow-Up} 
Follow up regularly (e.g. monthly or more often as necessary), preferably on a home visit, to enable you to assess the client functioning in his or her own environment. 

Arrange for all clients with non-urgent symptoms to see the physician at the next available visit. 

\textbf{Referral} 
Medevac may be necessary for clients with potential underlying organic pathology or if the risk-safety assessment requires that client be admitted to hospital (i.e. adequate supervision and a safe environment with family or friends not otherwise possible).
Suicidal Behavior

General Information
• The suicide rate has remained relatively constant for the total Canadian population over the last decade.
• The average suicide rate among First Nations and Inuit people is more than twice the rate for Canadians as a whole, or more.
• Suicides are increasing among young people and teenagers, and suicide is now the second most frequent cause of death among Canadian males between 15 and 30 years of age.
• The age-specific suicide rate for young First Nations and Inuit males is several times the national average for this age group.
• Males are more likely to complete a suicide than females.
• More females than males are treated for suicide attempts.
• For every successful suicide, there are several unsuccessful attempts (estimates are that there may be 50 times as many unsuccessful attempts as successful ones).
• Most people who commit suicide give warning either verbally or through changes in their behavior.
• Many have seen a healthcare provider within the previous month.
• The strongest predictor of suicide is psychiatric illness.
• Firearms and hanging are most often used in completed suicides.
• Suicide is a highly variable and rare event, and accurate prediction is almost impossible.
• Suicide is not significantly influenced by seasonal, meteorological, cosmic or other environmental factors.
• Alcohol use is implicated in most suicides, either at the time of the suicide or in terms of chronic abuse.
• There is no evidence that "crisis lines" in themselves, without back-up and professional attention, significantly reduce suicide rates in their service areas.

Factors Promoting Suicidal Behavior
• Negative life events: Personal stressors such as unemployment, domestic problems, death of a friend or relative, financial distress, chronic or incurable illness, and interpersonal conflict and disappointments.
• Lack of social support: Absence of supportive and caring friends and relatives; a sense of isolation and the feeling that nobody cares or understands.
• Presence of models: Suicides among relatives, friends or acquaintances and publicity about recent suicides; this factor can also influence the means by which suicide is attempted. This affects everybody.
• Expectations: Helplessness, pessimism and feelings of worthlessness; the impression that others would be better off if the person were dead; and a sense of powerlessness and lack of control in the person's life.
• Attention to gestures: Inadvertent reinforcement or encouragement of suicidal behavior by attending exclusively or primarily to the suicidal behavior itself (threats, gestures or attempts).
• Availability of lethal means: Presence of or easy access to guns, drugs or other instruments that are "conventional" means of suicide in the experience of the individual (e.g. through common knowledge, media depiction or personal knowledge of suicides or attempts by other). Suicide is often an impulsive act; easy access to means increases the likelihood of completing the act.
• Any loss (real or imagined): Especially if the loss results in diminished self-esteem or self-confidence.

Characteristics Associated With Suicidal Risk
• Presence of a suicide plan, with reasonable and available means
• Living alone, particularly if socially isolated and if few family resources or other social supports are available
• Marital status: separated, widowed or divorced, common-law or single
• Age: risk increases with age, especially among the elderly, but there has also been a recent increase in risk among young males, and is highest in those 15-25 years of age
• Gender: male
• Race: Caucasian, Aboriginal
• Preoccupation with feelings of hopelessness, helplessness and negative expectations for the future
• Previous attempt or threat
• Death of parent while subject was a child
• Poor physical health (e.g. acute or chronic condition, terminal illness)
• Heavy alcohol or other substance use
• Psychiatric illness, especially depression or schizophrenia
• Recent separation from a loved one (e.g. bereavement)
• Unemployment
• Poor impulse control

Assessment Of Present Risk
• See general characteristics (preceding section)
• Severe feelings of hopelessness, despair, emptiness or worthlessness
• Severe insomnia
• Agitation and restlessness
• Depression or schizophrenia; diminished grasp of reality
• Recent suicide attempt
• Manner of previous attempt; client's expectation of lethality of attempt
• Voices telling subject to harm self
• Desire to make active suicide attempt
• Preoccupation with suicide
• Actual preparation for contemplated attempt

Child And Adolescent Suicide
• Suicide is rare among children < 14 years of age but has increased significantly among older adolescent males and is now the second most common cause of death in this age group.
• Suicide threats, gestures or attempts are most often efforts to communicate despair, frustration and unhappiness and should be responded to as such.
• Boys succeed more often because of their use of more lethal methods.
• Most youngsters who attempt suicide talk about it with at least one person before the attempt.
• Non-specific behavioral clues include anorexia, psychosomatic complaints, rebellious behavior, neglect of personal appearance, and change in behavior or personality.

Factors Promoting Adolescent Suicide
• Loss of love object or significant person
• Identification with deceased parent
• Identification with a living person who is expressing depressed or suicidal ideas
• Parental rejection and hostility or disparagement of the child
• Use of alcohol or drugs
• Chronic social isolation
• Inability to express rage or respond to disappointment and loss; wish to retaliate
• Long-standing history of problems
• Current state of feeling hopeless and helpless

Guidelines For Interviewing Suicidal Clients
• Establish supportive, trusting, calming and non-judgmental relationship. Reassure the client that you will respect his or her confidentiality.
• Interview the client alone, at least initially, and allow him or her to talk freely and for as long as desired.
• Determine level of risk on basis of factors and characteristics described above.
• Assess adequacy of social supports, as well as strengths and weaknesses of the family.
• Assess for depression or other mental illness.
• Ask directly about suicidal thoughts, intent and fantasies.
• If suicidal thoughts are present, inquire about plans and how completely they and their consequences have been thought through; ask also about wills, farewell notes, giveaways.
• Evaluate your own reaction and trust "intuitive" feelings about the client's intent.
• Explore the motives for suicide. Try to gain an understanding of how the situation is perceived by the client (e.g. no other options, escaping life, manipulating a situation, trying to cause change in or trying to hurt another, plea for attention or help, wishing to join a deceased loved one). Try to find a reason to live.
• Do not try to talk the person out of suicide or convince him or her that things are really not so bad. These efforts may only firm the person's resolve.
Interview significant others such as spouse, parents and siblings.

**Guidelines For Management**

**Threatened or Suspected Intent**

- If intent is serious and imminent, admit to a medical facility for observation and treatment if possible.
- Consult mental health personnel, preferably a psychiatrist, or staff on psychiatric unit at Stanton Territorial Hospital, by telephone or make direct referral if resources are locally available.
- If risk is high and client is uncooperative with treatment efforts, consider compulsory detention under the Mental Health Act
- Enlist the aid of spouse, family, elders or friends for supporting, motivating and monitoring the client.
- "Play for time," as suicidal intent tends to wax and wane, and preventive counseling can be effective during the non-suicidal intervals. Try to establish a time-limited "contract" with the would-be suicide during which you are prepared to help the person work on his or her problems. Ask, in effect, "How much time can you give so that you and I can work together on this matter?"
- If the client is intoxicated, do not attempt to counsel but either directly or indirectly provide sympathetic support and continuous monitoring until the client is sober.
- If the client is to return home, ensure that firearms, drugs and other means of suicide are removed. A person seriously intent on suicide will find a way, but obstacles can delay the action and allow time to reconsider.
- In the case of children or adolescents, temporary removal from the home may be advisable and may require admission to a health or social welfare facility.
- Counseling the family in the case of a child or married adult should begin immediately in order to:
  - assist them in understanding what is happening
  - advise them of the treatment options and resources
  - motivate them to assist the client in treatment
  - deal with their guilt, remorse or self-blame
- Offer assistance in making referrals to mental health or social service personnel, as indicated by the circumstances.
- Treatment for children and adolescents will ultimately involve a family intervention plus individual treatment of the child aimed at enhancing self-esteem and sense of importance in the family or social environment.
- Treatment of an adult will consist of individual counseling appropriate to the presumed cause of the problem and usually will also involve family members and various health and social service professionals.
- Long-term treatment in all cases should be done by, or under the direction or supervision of, a competent mental health professional. The role of front-line medical staff depends upon their training and the local presence or absence of specialists in health and social services.
- If the client is being treated on an outpatient basis, the therapist or others must be available to respond at all times.
- Recognize the limits of your own personal responsibility and the impossibility of guaranteeing that an individual will not commit suicide even after intervention and treatment.

**Unsuccessful Attempt**

- Ensure that adequate emergency medical treatment has been given and that the possibility of undetected drug overdose (in addition to the apparent method) has been considered.
- Remove anything that might be used in another, impulsive attempt, especially if the client is intoxicated or impaired by drug overdose.
- Convey the idea that this potentially fatal act may be turned into a positive and constructive experience for the individual and for the family, where relevant.
- Make careful records and tag the chart to ensure that the suicidal potential is recognized on subsequent admissions or contacts. Risk of suicide is very high among those who have attempted suicide previously.
- Continue to monitor and provide support in view of the increased risk of suicide after an attempt.
**Completed Suicide: Interventions for Survivors**
- Family, friends and loved ones left behind by suicide often suffer guilt, anguish, despair, and depression. They are tortured by self-blame, denial, confusion, ambivalence, shame, loss and anger.
- These "survivors" themselves become at high risk for suicide and depression.
- The bereaved need sympathy, consolation, encouragement, distraction and opportunity for abreaction. Every culture has its own techniques for contending with loss and bereavement. Local knowledge is important.
- The process has failed for an individual if the following features are present:
  - typical symptoms of bereavement persist without evidence of relief, recovery or restitution
  - symptoms become exaggerated, such as complete denial of the death
  - deviant behavior violates convention or culturally expected grieving or jeopardizes physical health and safety.
- It is recommended that intervention with those left behind by suicide begin as quickly as possible: within 2 or 3 days after the event.

**Suicide Prevention**
- The suicide problem is best viewed as a total community responsibility, which requires a cooperative community response.
- The community's "gatekeepers" should be trained to recognize suicidal symptoms, assess risk and undertake appropriate management or referral of anyone at risk.
- Healthcare professionals should take the initiative and encourage others to do likewise in encouraging at-risk individuals to talk about their problems; make them aware that resources are available, and actively assist with referrals.
- Recognize the role of changing social conditions, value systems and social organization in the etiology and epidemiology of suicide; encourage community activities that strengthen social and family solidarity and purpose.
- In view of the problem of a high number of suicide attempts, a mental health promotion strategy (see "Mental Health Promotion," in "Mental Illness Prevention and Mental Health Promotion," above, this chapter) is preferred to one specific to suicide "prevention."
Sexual Assault

General
Sexual assault is any unwanted touching or sexual act that is forced on a victim (usually female) without consent. It includes kissing; grabbing of the breast, buttocks or genitals; holding the victim and rubbing against her or squeezing her; tearing or pulling at the victim's clothing; and attempted or completed vaginal, anal or oral intercourse.

Force is the exertion of power by the offender that causes the victim to comply against her will. It includes, but is not limited to, physical violence or threats of physical violence to the victim or a loved one. Sexual assault does not include exhibitionism, voyeurism, verbal or gestural obscenities, or sexual harassment, although these too may be unwanted and psychologically disturbing.

Ninety percent of victims are female. Little is known about the effects of sexual assault on male victims; accordingly, the following discussion focuses on the effects of sexual assaults committed by men against females.

Statistics
• Six percent of adult women report having been raped and 21% report having been subjected to some other form of sexual assault (excluding unwanted kissing) at least once in their lives.
• Women who are physically or emotionally abused constitute an at-risk group for sexual assault.
• Nearly half of the victims are < 17 years of age at the time of the assault (see "Child Sexual Abuse," in the Pediatric Clinical Guidelines).
• Twenty-one percent of all rapes and 17% of other forms of sexual assault occur in the victim's home.
• Two-thirds of all rapists are known to the victim, and in one-third of all rapes the offender is either a present or former intimate partner of the victim.
• In a significant number of rapes (12%), weapons are used or displayed. Almost 10% of rapes are accompanied by severe beatings, and 15% of rape victims sustain injuries that require medical attention.
• Most rape victims use more than one active strategy (e.g. pleading, reasoning, screaming, kicking) in attempting to prevent the assault.
• Sexual assault is a crime, whether the offender is known or unknown to the victim. Spouses can be charged with sexual assault.

Immediate Effects
• Somatic disturbances, including nausea, vomiting, poor appetite, insomnia, nightmares, headaches, fatigue, and specific or general soreness
• Gynecological problems, including vaginal discharge, itching and burning sensations, and menstrual dysfunction
• Disturbance of affect, including anxiety, terror, depression, excitability, loss of temper, guilt, self-blame and mood swings
• Cognitive changes, including difficulty in concentrating, fear of being alone, fear of death, fear of the offender's return and fear of a recurrence
• Interpersonal difficulties at work or school and with friends and family members; mistrust of others (especially men) is common
• Alcohol or drug use or abuse
• Suicidal thoughts and attempts

Longer-Term Effects
• Feelings of being alone
• Suspicion and distrust of others
• Self-imposed restrictions in daily life
• Episodic depression
• Sexual dysfunction

The degree and severity of both the immediate and longer-term effects of sexual assault depend on the nature of the assault, with attempted and completed rape being the most psychologically damaging. One-quarter of rape victims do not consider themselves fully recovered even as long as 4-6 years after the assault.

Course Of Recovery
Three phases in recovery after sexual assault have been identified.
• **Acute phase:** Immediately follows the assault and is characterized by symptoms described above.

• **Recoil phase:** Emotional and physical symptoms wane, and victim may resume her normal day-to-day activities. During this phase, she is likely to deny or minimize the effects of the assault upon her and refuse offers of assistance.

• **Reintegration phase:** May occur weeks, months or even years after the assault. At this time, the victim re-experiences the symptoms characteristic of the acute phase. This is sometimes triggered by an upcoming court appearance or the anniversary of the assault. During this time, the experience of the assault is integrated into the entirety of the victim's life.

**Intervention**

Immediately after the assault, allow the victim to wait in a quiet room away from any noise and confusion. Whenever possible, a female nurse or resource person should remain with the woman throughout her stay at the medical facility.

Maintain an empathetic, non-judgmental and non-intrusive attitude that communicates understanding of the emotional upheaval the victim is experiencing. If the victim is reluctant to talk about her experience, do not probe or otherwise pressure her to do so. On the other hand, if the victim elects to vent, validate her emotions and "normalize" her reactions (i.e. let her know that her experiences are not dissimilar to those of other victims).

Explain the medical procedures that the victim will undergo and the rationale for them (i.e. to determine any injuries, test for sexually transmitted infections and document assault for possible legal proceedings). **Be familiar with the adult sexual assault examination (ASAE) kit.**

When possible, ask the victim if she would prefer a female professional caregiver. In all cases, another woman should be present in the room during the medical examination.

Determine whether the sexual assault could have resulted in a pregnancy; if so, discuss the possibility of administering immediate pregnancy prophylaxis. Discuss the client's need and wish for prophylaxis for sexually transmitted infections (STIs).

Accord the victim the dignity of making her own decisions about who can be told that she has been assaulted and indicate that, whatever her decision, she has your support.

Provide information on police and court procedures and on what may be expected as a consequence of specific legal intervention. The decision to contact the police must be made by the victim.

Keep all information given by the victim confidential unless she specifically requests otherwise.

Offer to talk to the victim's family and friends about their reactions to the rape and the ways in which they can support the victim during the recovery process. If the victim so wishes, explain to the family the importance of allowing the victim to talk about her experience at her own pace.

Inform the victim of any services specifically available for sexual assault victims. In many areas, rape crisis centers located in major urban centers will accept collect long-distance telephone calls.

Help the victim to clarify the problems that need immediate attention (e.g. where and with whom she can stay in order to feel safe) and assist her in taking actions to solve these problems.

Arrange a follow-up appointment at which time bruising not evident during the initial examination can be documented and the victim's adjustment can be monitored. During this appointment, it is important to give the victim information about the recovery phases. In particular, the victim should know that the symptoms she is currently experiencing will subside (the time frame is variable), but she is likely to re-experience these symptoms as part of the recovery process.

If it appears that the victim is unable to function, a psychiatric and psychological referral should be considered.
Family Violence

Maintain a high index of suspicion and include matter-of-fact screening for abuse as a routine part of good healthcare.

Information about child abuse and child sexual abuse is presented in the *Pediatric Clinical Practice Guidelines*.

Spousal Abuse

The healthcare system, and nurses, physicians and public health personnel in particular, are in a strategic position to identify and assist people who are in abusive relationships. Battered women often do not recognize the nature of the problem or identify themselves as "battered," and in cases where they do, they frequently conceal the situation because of shame or fear of retaliation. The healthcare facility often provides the first opportunity to put the problem in perspective for the victim and advise her about her options.

There are four major categories of physical injury or trauma frequently exhibited by but not limited to women seeking medical attention after assault:

- Serious bleeding injuries, especially to the head and face; in the case of sexual assault, there may be vaginal or anal tearing that requires stitching
- Internal injuries, concussion, perforated eardrums, damaged spleen or kidney, abdominal injuries, punctured lungs, severe bruising, eye injuries and strangulation marks on the neck
- Burns from cigarettes, hot appliances, scalding liquids or acid
- Broken or cracked jaw, arm, pelvis, rib, collarbone or leg

Notice also signs of old, untreated injuries. Some women do not attend medical services or are not allowed to do so. Evidence of previous injuries may establish the presence of a pattern. Note your observations and suspicions on the chart so that other medical personnel will be alert for other indications of abuse.

Pregnancy increases susceptibility to assault.

Apart from the obvious physical evidence, there are a number of more subtle physical and psychological symptoms that should be noted:

- Anxiety attacks or depression
- Psychosomatic complaints, including headache, pains in the chest or abdomen, insomnia, fatigue and backache
- Stiff neck or shoulder muscles (due to violent shaking), which mimic the symptoms of whiplash
- Damage to the eardrums
- Marital problems, especially where reference is made to fighting (arguing), jealousy, impulsiveness or drinking on the part of the husband or wife
- Substance abuse problems
- Repeated suicidal gestures or attempts
- Uncontrollable crying

Such vague or non-specific symptoms often lead the healthcare provider to feel that "There is something going on and I do not know what it is." These complaints, coupled with frequent visits to the healthcare facility, poor compliance with treatment recommendations and unresponsiveness to treatment, form what is known as the spousal abuse syndrome.

Guidelines for Assessment and Management

To confirm the abuse, you must ask the woman or man directly if the partner is hitting or threatening to do so. Both men and women tend to minimize abuse, and it is often useful to give examples and to phrase questions in such a way that the client feels that he or she has permission to talk about the abuse.

- Interview and examine the assaulted client by herself or himself or with an advocate present. The client will not feel free to talk if her or his partner is nearby.
- A female client may be more comfortable talking to a woman, whether a nurse, doctor or social services worker. Clients should be asked about their preference.
• Allow the client to talk at her or his own pace. Do not pressure. This may be the only chance the client has to disclose.
• Indicate that you believe what is being said. Be supportive. Discuss options, but do not give advice. Avoid wording that implies blame.
• Avoid expressions of disgust, horror or anger in response to the abuse; also avoid "putting down" the abuser.
• Let the client know that no one deserves or has to tolerate abuse.
• Assess present danger. If there are children in the home, assess whether they are in danger. If you honestly believe that there is a clear danger, address it immediately.
• Offer assistance in arranging for safety. Possible safe refuges are abuse shelters, transition homes or the home of a sympathetic relative or friend.
• Offer to contact the police should the client wish to lay a charge or to have the police lay a charge. Make sure that you know the procedures and the victim's legal rights to make it easier to decide and to act.
• Help set up a safety plan. Assist the person in leaving the home or the relationship if that is desired, but do not pressure the person to do so. Try to reduce anxiety and provide necessary information so that rational, informed decisions regarding life and safety can be made.
• Provide information on the resources and community supports available. If a support group for assaulted women or men exists in the community, ask if the person would like to be contacted by one of its members.
• Document the physical and psychological signs of abuse carefully and thoroughly in the appropriate chart or record. This report should include a description of the injuries requiring medical attention and the treatment provided and a description of any injuries not requiring medical attention (e.g. bruises and minor lacerations).

Elder Abuse
Because of the greater need for and use of medical services by elderly people, healthcare professionals are in an ideal situation to detect potential and actual cases of elder abuse. However, because of the absence of a standard definition and a lack of recognition of the problem, elder abuse is under-reported.

As for other victims of family violence, shame, embarrassment and fear may make disclosure of abuse difficult.

The family is the greatest source of abuse, with the most frequent offenders being a son, a daughter and a spouse, in that order. An elderly person, like a child, is often dependent and can represent a burden to the caregiver, which results in either intentional or unintentional abuse. Elderly people are often unwilling to lay charges because of their dependence, lack of alternatives, fear of abandonment and reprisal, fear of institutionalization or sense of loyalty to the family.

Factors unique to the elderly abused victim:
• Without intervention, the abuse is likely to continue for the remainder of the person's life.
• Institutionalization may be the only alternative to the present living situation.

Those at highest risk for abuse by family members are single or widowed women > 75 years of age who are living with relatives and who have moderate to severe physical or mental impairments, such that assistance is required to meet basic needs.

Types of Abuse of the Elderly

Physical
• Assault
• Rough handling
• Gross neglect
• Withholding of food or personal or medical care

Psychosocial
• Confinement
• Isolation
• Lack of attention
• Intimidation
• Verbal or emotional abuse

Financial
• Withholding finances
• Fraud
• Theft
• Misuse of funds
• Withholding means for daily living

The most frequent type of abuse is financial, followed by psychosocial and physical.

**Symptoms of Physical Abuse and Neglect**

- Bruises, welts, burns and other similar lesions for which adequate explanation is lacking
- Sores, ulcerations and other similar lesions that do not heal
- Undernourishment and dehydration when mental alertness enables expression of needs but immobility prevents independently meeting those needs
- Oversedation or withholding of prescribed drugs
- Failure to keep medical appointments for needed care (because no one will take the person to the appointment)

**Emotional or Psychological Symptoms**

- Denial of any problems in relation to caregivers and/or over protectiveness of caregivers
- Emotional withdrawal and passivity; resignation to current life situation
- Fear and anxiety
- Unusual ease in settling into a medical setting (relief from abusive situation)
- Absence of expectations of being comforted

**Assessment and Management**

- Assess mental competence and refer to territorial mental health legislation to determine possible courses of action.
- If protective legislation for vulnerable or elderly adults exists, report suspected cases of abuse to the agency mandated to investigate and intervene.
- The elderly person, if judged competent, is entitled to make decisions that effect his or her life. The language used when discussing the elderly person's living situation should reflect this (i.e. avoid infantilization).
- Determine whether abuse or neglect reflects inadequate preparation or unrealistic expectations on the part of the caregivers.

- Use outreach programs such as a home nursing program, Meals on Wheels, homemakers, and home help aids to enable the elderly person to remain in his or her residence and community.
- Consult community social services to determine what form of assistance would be available to the elderly person and the care providers.
- Ensure regular medical and nursing care, using frequent home visits to monitor the risk to the elderly person.
- Ensure that there is an accurate and complete medical and social history on the medical record so that this information is available if legal decisions are made concerning the abused person.
- Establish a positive relationship with both the elderly person and the caregiver/abuser.
- Engage social services and other members of the extended family to reduce the stress on the caregiver's family.
- Provide counseling to the abused elderly person and the caregiver to discover and resolve hidden conflict that may be at the root of the problem.
- As a last resort, removal from the home may be necessary. If consent cannot be obtained through counseling, it may be necessary to proceed by way of the legal process, including appointment of a legal guardian.

**Special Considerations in Conducting an Interview about Potential Elder Abuse**

- In the initial stages, the suspected victim should be interviewed separately and the degree of risk to the person's physical and emotional well being should be determined.
- Members of the family, boarding home staff or other caregivers should be interviewed separately.
- Note the client's mental status, behavior, emotional responses and attitudes toward the caregivers.
- Note the attitude of the caregivers toward caregiving, control of the client's activities, extent of outside contacts, and the physical and emotional well being of their charge.
- Ensure that the best-qualified and most appropriate (with respect to mandate) resource person is notified and made responsible for conducting the necessary interviews and investigations.
Resource Utilization In Community Mental Health Care

Perhaps in no other clinical area is the mobilization and coordination of paramedical and non-medical resources more important for effective treatment and prevention than in mental health.

Much of mental health (and, conversely, mental illness) is the product of social experiences in a variety of contexts (family, friendships, school, work, recreation, community). These same "contexts" can be mobilized to provide therapeutic or health-promoting environments and experiences.

Guidelines For Resource Utilization In Mental Health Care

Identify the resources currently or potentially involved with the client or the mental health problem. Consider both formal (social service, medical, educational) and informal (family, spouse, friends, volunteers) resources.

Make or facilitate referral to appropriate services or agencies and enlist the help of informal resources. Some effort may be required to "sell" the service to the client or to persuade the resource to become involved. There may be stigma, fear, misunderstanding, mistrust or indifference on the part of either the client or the resource.

Coordinate or encourage coordination of all the resources involved. Face-to-face meetings of both the formal and informal resource persons, while time consuming, are ultimately more efficient. They also permit the following to take place:
- sharing of information
- assignment of goals
- identification of expectations of both the client and the resource person
- clarification of responsibilities
- establishment of communication networks
- development of a mutually acceptable plan
- avoidance of duplication of effort
- a public commitment to provide a service or take action.

Collaborate with the other resources in providing the service. Conduct joint client interviews where appropriate. Offer treatment or other programs jointly with other resources.

Keep the informal resources, particularly the family and, where possible, the client, centrally involved in the process. Doing so encourages a sense of mastery, independence and responsibility.

Work with others, where possible. The natural caregivers generally have more contact and a more intense and meaningful involvement with the client and therefore have a significant impact. The professionals' role is to provide information and guidance to the caregivers so that their interactions with the client will be salutary and even deliberately systematic and therapeutic in some cases.

This same principle applies to more formal "helpers," such as volunteers, church members and clergy, self-help organizations and even the other community agencies providing service to the client. Some of these agencies have frequent and significant contact with clients and can play an active role in treatment and follow-up.

Provide support for the caregivers, for example by offering back-up to informal helpers, by linking resources working on similar problems, by sharing information about community resources and by providing technical assistance. If possible, offer training through workshops or information sessions in your specialty to help the resources (formal and informal) to serve their mental health charges.

Ensure that communication between the concerned resources is open and adequate.
Discuss with the resource people involved the limits and constraints imposed by the principle of confidentiality (see "Records and Confidentiality," in "Clinical Assessment and Management," above, this chapter).

Participate as a resource in the development of self-help and parent support groups for various classes of mental health problems, providing the necessary support and supervision.

Establish formal liaison between the agencies most immediately involved with mental health problems. This might be by way of standing or ad hoc interagency committees. It is better to have such committees in place relatively permanently than to have to assemble one as each problem arises. This is particularly true for traumatic personal experiences requiring mental health intervention, such as child abuse, sexual abuse and wife battering, but could be extended to less traumatic and more long-standing problems such as parenting difficulties, mental retardation, learning disabilities, juvenile delinquency and substance abuse.

Effective case-finding and resource utilization depend on well-informed professional and lay communities.

Community resource directories, advertisements of special events (e.g. talks, open houses, health fairs) and interagency conferences are good means for keeping the community aware of its resources.

Volunteer corps are extremely helpful with inpatient care and preventive activities. The Canadian Mental Health Association is a particularly valuable resource for a community, and development of a local chapter and use of its resources are encouraged.

**Program Consultants**

In sparsely populated, resource-poor areas, the professional in almost any discipline is often expected (or expects himself or herself) to be an expert in every aspect of his or her profession. Recognizing the unrealistic nature of this expectation does not always allay the feeling that one should know or be able to do something.

At the same time, this feeling of responsibility often persuades one not to bother someone else with the problem, with the result that the individual feels frustrated and dissatisfied, and nothing gets done.

Consultation on mental health programming is available from a number of sources (Health Canada, universities, provincial or territorial departments of health and human resources, the Canadian Mental Health Association and various special interest groups), which should be used as resources in any way possible. Most agencies are more than willing to share their knowledge and expertise.
Introduction

The original *Clinical Practice Guidelines for Nurses in Primary Care (FNIHB, July 2000)* contain information on common health problems and common emergency conditions seen in the adult population. We acknowledge the work of the First Nations and Inuit Health Branch of Health Canada in developing the clinical guidelines and appreciate their permission us to use their guidelines, review and update them again and revise them specifically for the NWT.

The pediatric guidelines consist of 20 sections. Each one includes an assessment (history and physical examination) of the body system in question, along with clinical practice guidelines on common disease entities and emergency situations seen in that system. The most current resources available have been used in the revision and are referenced where possible.

The adult and pediatric guidelines are intended to be used together and are consequently published in one binder for the NWT.

These guidelines are intended for use, in conjunction with the NWT Health Centre Formulary (July 2003) as well as the *Community Health Nursing Program Standards and Protocols (March 2003)* along with the reference sources from each of these manuals and *Clinical Practice Information Notices* as they are issued by the GNWT Department of Health and Social Services.

All drugs referenced in these guidelines are in the *NWT Health Centre Formulary (July 2003)*, with the exception of some drugs which have been used as examples of possible physician prescriptions. There are a few situations where A or C class drugs should be prescribed by a physician only - in these cases the classification will remain A or C but the text will clarify that these drugs in this circumstance should be prescribed by a physician only (e.g. salicylates in treatment of rheumatic fever).

*NWT Health Centre Formulary (July 2003)* classifications have been used.

- **A class drug** - RN initiated, based on nurse assessment of patient, no limitation on duration of treatment
- **B class drug** - Physician initiated, based on consultation with MD, duration/frequency to be specified by MD
- **C class drug** - RN may initiate 1 course. A course is defined as several successive doses of medication over time. The time is the period that the specific drug is expected to produce therapeutic effects. A course may not exceed 2 weeks without consulting a physician. If the condition does not resolve, the expectation is that the nurse will consult a physician. If further medication is needed, a physician order is required.
- **D class drug** - RN one dose - reassess patient, contact MD if further treatment is required

You will find that many drugs have been reclassified to a C classification. This is to emphasize the point that if a patient returns with no resolution of the problem the RN should consult with a physician rather than continue to treat ineffectively.
Acknowledgments

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in helping to review and revise these guidelines

Preface

These Clinical Practice Guidelines are intended primarily for use by registered nurses working in health centers located in the Northwest Territories.

All nurses are encouraged to use other current resources, text or internet, to supplement the information in these guidelines. All nurses are reminded that this manual is a "guideline", however, nurses are encouraged to base their practice on this guideline whenever possible.

It is also important to note that the guidelines contain useful information but are not intended to be exhaustive. Consequently, the manual is to be used for reference and educational purposes only and should not be used under any circumstances as a substitute for clinical judgment, independent research or the seeking of appropriate advice from a qualified healthcare professional.

Nurses must consult with a physician whenever a situation warrants. Appropriate medical advice is to be obtained by telephone in cases where the condition of the client is at all serious or in cases where the condition of the client is beyond the scope of practice and expertise of the nurse to manage autonomously.

Although every effort has been made to ensure that the information contained in the guidelines is accurate and reflective of existing healthcare standards, it should be understood that the field of medical science is in constant evolution. Consequently, the reader is encouraged to consult other publications or manuals. In particular, all drug dosages, indications, contraindications and possible side effects should be verified and confirmed by use of the current edition of the Compendium of Pharmaceuticals and Specialties (CPS) or the manufacturer's drug insert.

These guidelines will be available on the GNWT intranet website. In the printed version you will notice adequate white space between subjects. This is partly for ease of future revisions, but also to encourage you to make your own notes (e.g. mnemonics for remembering things, recent reference sources, cross references to other DHSS GNWT documents), as needed, if you have your own copy of the guidelines.

Every effort will be made to keep these Clinical Practice Guidelines current. Appendix 1 provides the opportunity for the Guidelines Users to submit suggested changes and so assist with the Guidelines update process.
Chapter 1 – Guidelines for Pediatric Health Assessment

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Introduction

The clinical assessment of infants and children differs in many ways from that for adults. Because children are growing and developing both physically and mentally, values for parameters such as dietary requirements and prevalence of disease, expected normal laboratory values, and responses to drug therapy will be different from those observed in adults.

Health Maintenance Requirements

Well children should have regular health maintenance visits, often done at well-baby clinics. Such visits customarily occur immediately after birth, at 2 weeks of age, at the times when immunizations are indicated (2, 4, 6, 12 and 18 months) and subsequently at 1- or 2-year intervals. At each visit, the child should undergo an appropriate history, physical examination and developmental assessment, and anticipatory guidance should be provided about the following topics:

- Appropriate nutrition
- Safety measures
- Expected developmental and behavioral events

In addition, an assessment should be made of the quality of physical care, nurturing and stimulation that the child is receiving.

The most important components that should be assessed at each time period are given in Table 1-1.

<table>
<thead>
<tr>
<th>Table 1-1: Components of well-child assessments at various ages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health parameter</strong></td>
</tr>
<tr>
<td>Height, weight</td>
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<tr>
<td>Head circumference</td>
</tr>
<tr>
<td>Growth chart plotting</td>
</tr>
<tr>
<td>Blood pressure</td>
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<tr>
<td>Eye assessment</td>
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<tr>
<td>Strabismus assessment</td>
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<tr>
<td>Visual acuity testing</td>
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<tr>
<td>Dental assessment</td>
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<tr>
<td>Speech assessment</td>
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<td>Developmental assessment</td>
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<tr>
<td>Sexual development</td>
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<td>School adjustment</td>
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<td>Chemical abuse</td>
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<tr>
<td>Immunizations</td>
</tr>
<tr>
<td>Hemoglobin</td>
</tr>
<tr>
<td>Safety counseling</td>
</tr>
<tr>
<td>Nutrition counseling</td>
</tr>
<tr>
<td>Parenting counseling</td>
</tr>
</tbody>
</table>
Pediatric History

Tips And Techniques

Children
Children who can communicate verbally should be included as historians, with additional details provided as necessary by parents or caregivers. Questions, explanations and discussions occurring with children present should take into account their level of understanding. Young children may be assisted in providing details of the history by such techniques as having them play roles or draw pictures. The interviewer should gain an understanding of the child's terminology for various body parts.

Adolescents
Adolescents should be granted privacy and confidentiality.
• Interview the adolescent alone
• Discussions with parents or caregiver should occur separately, with the adolescent's permission. See also chapter 19, "Adolescent Health."

Components Of The Pediatric History

The pediatric history includes many of the same components as the adult history, but some specific elements are highlighted. The chief complaint, history of present illness, history of past illnesses, allergy and drug history, family history and review of systems are the same as for an adult. In addition, the pediatric history should include the following information:
• Pregnancy and perinatal history
• Immunization history
• Detailed dietary history for the first year of life, including history of vitamin supplements and fluoride use
• Developmental history
• Social history, including questions about any recent separations, deaths, family crises, friends, peer relationships, day-to-day care arrangements, progress in school

Pediatric Physical Examination

Clinicians should be aware of the different sizes of body parts in children relative to adults: head relatively larger, limbs relatively smaller and, in small children, ratio of surface area to weight relatively larger.

Technique

Much information can be obtained by observing the child's spontaneous activities while the history is being conducted, without touching the child. For this purpose it is useful to have an age-appropriate toy available.

Without touching the child, observe:
• Gait
• Breathing frequency and pattern
• Responses to sound
• Grasp patterns
• Color
• Responses to parental comforting measures

For a young child, parts of the physical examination can be conducted with the child either being held by the parent or caregiver or supported on that person's lap.

Generally, the least stressful parts of the exam should come first, with more intrusive or distressing parts later (e.g. examination of the pharynx with the child restrained).
The order of the examination must be varied to suit the situation.

Care should be taken to select appropriate-sized equipment when examining a child (e.g. blood pressure cuff should be two-thirds of the length of the upper arm).

**Developmental Milestones**

Assessment of developmental progress should be part of each complete health assessment. Developmental milestones are achieved at different ages in different children; the approximate ages at which developmental milestones occur are presented in Table 1-2. More detailed assessments are indicated when it appears that the child is not progressing normally.

As part of each complete health assessment, attempts should also be made to assess responses to sound and ability to see.

### Table 1-2: Approximate ages for milestones in the first two years of life

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Approximate age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social smile</td>
<td>1 month</td>
</tr>
<tr>
<td>Sit</td>
<td>7 months</td>
</tr>
<tr>
<td>Vocal babble</td>
<td>9 months</td>
</tr>
<tr>
<td>Pull to stand</td>
<td>9-10 months</td>
</tr>
<tr>
<td>Pincer grasp</td>
<td>12 months</td>
</tr>
<tr>
<td>Walks alone</td>
<td>13 months</td>
</tr>
<tr>
<td>Ten words</td>
<td>18 months</td>
</tr>
<tr>
<td>Hand preference</td>
<td>18 months</td>
</tr>
<tr>
<td>Many words (two together)</td>
<td>24 months</td>
</tr>
</tbody>
</table>

**Physical Examination Of The Newborn**

**General**

Observe the entire infant at the beginning of the examination, before the assessment of specific organ systems. It is important that the infant be completely undressed and in a warm environment with adequate illumination.

Assess the following:

- Consciousness, alertness, general behavior
- Symmetry of body proportions and body movements (e.g. arms and legs, facial grimace)
- State of nutrition and hydration
- Colour
- Any sign of clinical distress (e.g. respiratory)

**Vital Signs**

Average values of vital signs for newborns:

- Temperature 36.5°C to 37.5°C
- Heart rate 120-160 beats/minute

- Respiratory rate 30-60/minute, up to 80/minute if infant is crying or stimulated
- Systolic blood pressure 50-70 mm Hg

**Growth Measurements**

Measure and record length, weight and head circumference. If the infant appears premature or is unusually large or small, assess gestational age (see Table 1-4, below, this chapter).

- Average length at birth 50-52 cm
- Average weight at birth 3500-4400 g
- Average head circumference at birth 33-35 cm

*For additional information about growth measurements, see "Well-Child Care," in chapter 3, “Prevention.”*
Skin

Colour
- Pallor associated with low hemoglobin
- Cyanosis associated with hypoxemia
- Plethora associated with polycythemia
- Jaundice associated with elevated bilirubin

Lesions
- Milia: Pinpoint white papules of keratogenous material, usually on nose, cheeks and forehead, which last several weeks
- Miliaria: Obstructed eccrine (sweat) ducts appearing as pinpoint vesicles on forehead, scalp and skin folds; usually clear within 1 week
- Transient neonatal pustular melanosis: Small vesicopustules, generally present at birth, containing WBCs and no organisms; intact vesicle ruptures to reveal a pigmented macule surrounded by a thin skin ring
- Erythema toxicum: Most common newborn rash, consisting of variable, irregular macular patches and lasting a few days
- Café au lait spots: Suspect neurofibromatosis if there are many (more than five or six) large spots

Head And Neck

Head
Check for:
- Overriding sutures
- Anterior and posterior fontanels (size, consistency)
- Abnormal shape of head (e.g. caput succedaneum, molding, encephaloceles)
- Measure head circumference.

Eyes: Inspection
- Check cornea for cloudiness (sign of congenital cataracts)
- Check conjunctiva for erythema, exudate, orbital edema, subconjunctival hemorrhage, jaundice of sclera
- Check for pupillary size, shape, equality and reactivity to light (PERRL: pupils equal, round, reactive to light), accommodation normal
- Red reflex: hold ophthalmoscope 15-20 cm (6-8 inches) from the eye and use the +10 diopter lens; if normal, the newborn's eye transmits a clear red colour back; black dots may represent cataracts; a whitish colour may suggest retinoblastoma
- Look for fleshy appendages, lipomas or skin tags
- Perform otoscopic examination if sepsis is suspected; check canals for discharge and tympanic membranes for colour, brightness, bony landmarks and light reflex

Nose: Inspection
- Look for flaring of the alae nasi, which is a sign of increased respiratory effort
- Look for hypertelorism or hypotelorism
- Check for choanal atresia, as manifested by respiratory distress; neonates are obligate nose breathers, so first check to determine if air is coming from nostrils; if not and choanal atresia is suspected, a soft nasogastric tube can be passed through each nostril to check patency

Palate: Inspection And Palpation
- Check for defects such as cleft lip and palate

Mouth: Inspection
- Observe size and shape of mouth
- Microstomia: seen in trisomy 18 and 21
- Macrostomia: seen in mucopolysaccharidosis
- "Fish mouth": seen in fetal alcohol syndrome
- Epstein pearls: small white cysts containing keratin, frequently found on either side of the median line of the palate
Tongue: Inspection
• Macroglossia: indicates hypothyroidism or mucopolysaccharidosis

Teeth: Inspection
• Natal teeth (usually lower incisors) may be present
• Risk of aspiration if these are attached loosely

Chin: Inspection
• Micrognathia may occur with Pierre Robin syndrome, Treacher Collins syndrome and Hallerman Streiff syndrome

Neck
Inspection
• Symmetry of shape
• Alignment: torticollis is usually secondary to sternocleidomastoid hematoma
• Neck mass (cystic hygroma is the most common type)

Palpation
• Palpate all muscles for lumps and the clavicles for possible fracture
• Lymph nodes cannot usually be palpated at birth; their presence usually indicates congenital infection

Respiratory System
Inspection
• Cyanosis, central or peripheral (transient bluish colour may be seen in extremities if infant is cooling off during the examination)
• Respiratory rate and pattern (e.g. periodic breathing, periods of true apnea)
• Observe chest movement for symmetry and retractions
• Use of accessory muscles, tracheal tug, indrawing of intercostal or subcostal muscles

Palpation
• Any abnormal masses (palpate gently)

Auscultation
• Note rate and rhythm
• Note presence of S1 and S2 heart sounds
• Note presence of murmurs (consider murmurs pathologic, as in congenital heart defects, until proven otherwise)

Cardiovascular System
• Respiratory rate
• Heart rate
• Blood pressure in upper and lower extremities

See normal values in "Vital Signs," above, this chapter.

Inspection
• Colour: pallor, cyanosis, plethora

Palpation
• Locate point of maximal impulse (PMI) by positioning one finger on the chest, in the fourth intercostal space medial to the midclavicular line

• Abnormal location of PMI can be a clue to pneumothorax, diaphragmatic hernia, situs inversus viscerum or other thoracic problem
• Capillary refill (<2 seconds is normal)
• Peripheral pulses: note character of pulses (bounding or thready; equality); any decrease in femoral pulses or radial-femoral delay may be a sign of coarctation of the aorta
Abdomen

**Inspection**
- Shape of abdomen: flat abdomen may signify decreased tone, presence of abdominal contents in chest or abnormalities of the abdominal musculature
- Contour: note any abdominal distension
- Masses
- Visible peristalsis
- Diastasis recti
- Obvious malformations (e.g. bowel contents outside of abdominal cavity [omphalocele]; this abnormality has a membranous covering [unless it has been ruptured during delivery], whereas gastroschisis does not)
- Umbilical cord: count the vessels (there should be one vein and two arteries); note colour, any discharge

**Auscultation**
- Bowel sounds

**Palpation**
- Check for any abnormal masses
- Liver and spleen: it may be normal for the liver to be located about 2 cm below the right costal margin; spleen is not usually palpable; if it can be felt, be alert for congenital infection or extramedullary hematopoiesis
- Kidneys: should be about 4.5-5.0 cm vertical length in the full-term newborn
- Techniques for kidney palpation: place one hand with four fingers under the baby's back, then palpate by rolling the thumb over the kidneys; or place the right hand under the left lumbar region and palpate the abdomen with the left hand to palpate the left kidney (do the reverse for the right kidney)
- Hernias: umbilical or inguinal

Percussion usually omitted unless problems such as abdominal distension are noted.

Inspect the anal area for patency and for presence of fistulas or skin tags.

Genitalia

The genitalia should be carefully assessed, with particular attention to any malformation, abnormalities or sexual ambiguity.

**Male Genitalia**

**Inspection**
- Glans: color, edema, discharge, bleeding
- Urethral opening: should be located centrally on the glans (in hypospadias, the opening is found on the undersurface of the penis)
- Foreskin (prepuce): usually difficult to retract completely
- Scrotum: in full-term infant, scrotum should have brownish pigmentation and should be fully rugated

**Female Genitalia**

**Inspection**
- Check labia, clitoris, urethral opening and external vaginal vault
- Whitish discharge often present; this is normal, as is a small amount of bleeding, which usually occurs a few days after birth and is secondary to maternal hormone withdrawal
- Hymenal tags, if they occur, are normal
Musculoskeletal System

Inspection And Palpation

Spine
- Check for scoliosis, kyphosis, lordosis, spinal defects, meningomyelocele

Upper Extremities
- Assess the shoulder girdle for injury and the clavicles for fracture (especially if the delivery was traumatic and in large infants with a history of shoulder dystocia)
- Assess mobility of the shoulder and extension of the elbow
- Inspect palmar creases for assessment of gestational age (see Table 1-4, below, this chapter)
- Count the fingers

Lower Extremities
- Assess the feet and ankles for deformity and mobility
- Count the toes
- Examine foot creases for assessment of gestational age (see Table 1-4, below, this chapter)
- Examine the hips last, using Ortolani-Barlow maneuver

Technique for Ortolani-Barlow hip examination:
- Place middle fingers over greater trochanters (outer upper legs)
- Position thumbs on medial sides of knees
- Abduct the thigh to 90° by applying lateral pressure with thumb
- Move knee medially and then replace knee in starting position
- If there is a "clunk," the hip may be dislocatable
- If there is a "click," the hip may be subluxable

Central Nervous System

- Assess state of alertness
- Check for lethargy or irritability
- Posture: For term infant, normal position is one with hips abducted and partially flexed and with knees flexed; arms are adducted and flexed at the elbow; the fists are often clenched, with fingers covering the thumb
- Assess tone; for example, support the infant with one hand under the chest; the neck extensors should be able to hold the head in line for 3 seconds; there should not be more than 10% head lag when the infant is moved from a supine to a sitting position

Reflexes
Reflexes are involuntary movements or actions that help to identify normal brain and nerve activity. Some reflexes occur only in specific periods of development. The following are some of the reflexes seen in newborns.

Rooting Reflex
- Present at birth
- Disappears by about 4 months after birth

Sucking Reflex
- Begins when the corner of the baby's mouth is stroked or touched. The baby turns the head and opens the mouth to follow and "root" in the direction of the stroking. This helps the baby to find the breast or bottle to begin feeding.
- Begins about the 32nd week of pregnancy
- Is not fully developed until about 36 weeks
- Disappears by about 4 months after birth
- Premature babies may have weak or immature sucking ability

Moro Reflex
- Present at birth
- Disappears by about 4-5 months after birth
- Often called a startle reflex because it usually occurs when the baby is startled by a loud sound or movement
- In response to the sound, the baby throws back the head, extends the arms and legs, cries, and then pulls the arms and legs back in
**Tonic Neck Reflex**
- Appears about 2 months after birth
- Disappears by about 6-7 months after birth
- When the baby's head is turned to one side, the arm on that side stretches out and the opposite arm bends up at the elbow
- Often called the fencing position

**Stepping, Placing or Dancing Reflex**
- Present at birth
- Disappears by 2 months after birth
- When dorsum of foot is placed under a table edge, the infant will step, lifting and placing the foot on to the table surface

**Palmar Grasp Reflex**
- Present at birth
- Disappears by about 2-3 months
- Stroking the palm of a baby's hand causes the baby to close the fingers in a grasp
- Reflex is stronger in premature babies

**Other Reflexes**
Reflexes must be symmetric.
- Biceps jerk tests C5 and C6
- Knee jerk tests L2-L4
- Ankle jerk tests S1 and S2
- Landau or truncal incurvation reflex tests T2 through S1
- Anal wink tests S4 and S5

**Apgar Score**
Apgar scoring (Table 1-3) is done at 1 and 5 minutes after birth. If necessary, it is repeated at 10 minutes after birth.

At 5 Minutes
- 7: no asphyxia
- <7: high risk for subsequent dysfunction of central nervous system
- 5-7: mild asphyxia
- 3-4: moderate asphyxia
- 0-2: severe asphyxia

**Interpretation**
At 1 Minute
- <7: depression of nervous system
- <4: severe depression of nervous system

**Table 1-3: Determination of Apgar score**

<table>
<thead>
<tr>
<th>Feature evaluated</th>
<th>0 points</th>
<th>1 point</th>
<th>2 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate</td>
<td>0</td>
<td>&lt; 100 beats/min</td>
<td>&gt; 100 beats/minute</td>
</tr>
<tr>
<td>Respiratory effort</td>
<td>Apnea</td>
<td>Irregular, shallow or gasping breaths</td>
<td>Vigorous, crying</td>
</tr>
<tr>
<td>Color</td>
<td>Pale or blue all over</td>
<td>Pale or blue extremities</td>
<td>Pink</td>
</tr>
<tr>
<td>Muscle tone</td>
<td>Absent</td>
<td>Weak, passive tone</td>
<td>Active movement</td>
</tr>
<tr>
<td>Reflex irritability</td>
<td>Absent</td>
<td>Grimace</td>
<td>Active avoidance</td>
</tr>
</tbody>
</table>

* Sum the scores for each feature. Maximum score = 10, minimum score = 0
Assessment Of Gestational Age

Gestational age can be assessed on the basis of the newborn’s external characteristics.

Table 1-4: Assessment of gestational age

<table>
<thead>
<tr>
<th>External characteristic</th>
<th>28 weeks</th>
<th>32 weeks</th>
<th>36 weeks</th>
<th>40 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ear cartilage</td>
<td>Ear cartilage</td>
<td>Ear cartilage</td>
<td>Ear cartilage</td>
<td>Ear cartilage</td>
</tr>
<tr>
<td></td>
<td>Pinna soft, remains folded</td>
<td>Pinna harder, but</td>
<td>Pinna harder, springs</td>
<td>Pinna firm, stands</td>
</tr>
<tr>
<td></td>
<td></td>
<td>remains folded</td>
<td>back into place when</td>
<td>erect from head</td>
</tr>
<tr>
<td>Breast tissue</td>
<td>None</td>
<td>None</td>
<td>Nodule 1-2mm in diameter</td>
<td>Nodule 6-7mm in diameter</td>
</tr>
<tr>
<td>Male genitalia</td>
<td>Testes undescended, scrotal</td>
<td>Testes in inguinal canal,</td>
<td>Testes high in scrotum,</td>
<td>Testes descended, scrotum</td>
</tr>
<tr>
<td></td>
<td>surface smooth</td>
<td>a few scrotal rugae</td>
<td>more scrotal rugae</td>
<td>pendulous, covered in rugae</td>
</tr>
<tr>
<td>Female genitalia</td>
<td>Prominent clitoris with</td>
<td>Prominent clitoris;</td>
<td>Clitoris less prominent,</td>
<td>Clitoris covered by</td>
</tr>
<tr>
<td></td>
<td>small, widely separated</td>
<td>larger, well-separated</td>
<td>labia majora cover labia</td>
<td>labia majora</td>
</tr>
<tr>
<td></td>
<td>labia</td>
<td>labia</td>
<td>minora</td>
<td></td>
</tr>
<tr>
<td>Plantar surface of</td>
<td>Smooth, no creases</td>
<td>1 or 2 anterior creases</td>
<td>2 or 3 anterior creases</td>
<td>Creases cover the sole</td>
</tr>
<tr>
<td>foot</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Screening Tests

Phenylketonuria (PKU)
- For newborns tested for PKU in the first 24 hours of life, capillary blood screening test for PKU should be repeated at age 2-7 days

Congenital Hypothyroidism
- Screening for congenital hypothyroidism (by TSH level in dried capillary blood sample) should be performed in the first 7 days of life. If the TSH level is abnormal the laboratory will automatically check T4 level on the same sample.
- If the child was born in hospital, verify whether this type of screening was done there

Other Abnormalities Found On Neonatal Screen
- The neonatal screen uses a technique of thin layer chromatography to search for abnormal amino acid levels (of which phenylalanine is one)
- The neonatal screen also checks for biotinidase levels
Chapter 2 – Pediatric Procedures

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Restraint

General
If holding the child firmly is not sufficient to keep him or her immobile for a procedure, a wrapping technique can be used. This technique will be needed for many children between 1 and 6 years of age.

Procedure
Use a sheet or blanket to wrap the child as shown in Fig. 2-1. If a limb is required for the procedure (e.g., for IV access), leave it outside the wrapping.

Venipuncture

General
For venipuncture, always make your first attempt in the largest, most prominent vein you can find. It is sometimes easier to feel a vein than to see it.

Sites

Preferred (Upper Extremity)
• Forearm veins (e.g., cephalic, median basilic or median antecubital); these are the best choices in all age groups, but can be difficult to find in chubby babies
• Veins on the dorsum (back) of the hand
• Tributaries of the cephalic and basilic veins, dorsal venous arch

Other (Less Well Known)
• Saphenous vein, just anterior to medial malleolus (lower extremity)
• Small veins on ventral surface of wrist or larger one on inner aspect of wrist proximal to thumb
Procedure

• Immobilize child by either holding or wrapping (see "Restraint," above, this chapter).
• Practice universal precautions against contamination with child's body substance (e.g. gloves, possibly goggles, safe disposal of needle).
• Apply tourniquet proximal to site; rubbing or warming the skin will help to distend the vein.
• Use a 25- or 23-gauge butterfly needle with syringe attached, bevel up.
• Stabilize vein by applying traction.

• Insert needle just far enough to get "flashback" of blood.
• Apply gentle suction to prevent the vein from collapsing.
• If flow is very slow, try "pumping," by squeezing the limb above the site of the puncture.

Intravenous Access

Vascular Sites

Best Sites, In Order

• Dorsum of hand
• Feet
• Saphenous vein
• Wrist
• Scalp: a good site in infants, as veins are close to the surface and are more easily seen than in the extremities; useful for administration of fluid or medication when the child's condition is stable, but rarely useful during full resuscitation efforts
• Antecubital vein

Upper Extremity

• Forearm veins (e.g. cephalic, median basilic or median antecubital); these veins can be difficult to find in chubby babies
• Veins on the dorsum (back) of the hand
• Tributaries of the cephalic and basilic veins, dorsal venous arch

Lower Extremity

• Saphenous vein, just anterior to medial malleolus
• Median marginal vein
• Dorsal venous arch

Types Of Needles

Over-The-Needle Catheters

• Cathlons or IV catheters are the most stable
• 24- or 22-gauge needle is usually used in infants
• Required for volume resuscitation efforts

Advantages

• More comfortable than butterfly needle
• Frequency of infiltration into interstitial space is lower

Butterfly

• Especially useful for scalp veins
• 25- to 23-gauge needles are most commonly used in infants

Advantages

• May be used to obtain blood samples
• Design (i.e. the wings) facilitates insertion because there is a handle to be gripped
• Wings allow the needle to be taped more securely in place

Disadvantages

Butterfly needles tend to be inserted interstitially more frequently and should not be used for primary venous access in volume resuscitation efforts.
Procedure
• Practice universal precautions against contamination with child's body substances (e.g. gloves, possibly goggles, safe disposal of needle).
• Assemble necessary equipment.
• Immobilize the child well, but avoid restraints if at all possible.
• Always make first attempt in the largest, most prominent vein you can find - take your time to ensure you have identified the best vein.
• If a scalp vein is chosen, you may have to shave the skin around it.
• Apply tourniquet, if appropriate.
• Cleanse the skin.
• Stabilize the vein.
• If using a catheter needle, insert it through the skin at an angle of 30° to 45°. Once the needle is through the skin, adjust the angle of the cannula so that it is parallel to the skin, and advance it slowly into the vein far enough to get "flashback" of blood, then go in another millimeter or so to ensure that the plastic catheter is also in the vein before trying to thread it.
• Apply tourniquet, if appropriate.
• Cleanse the skin.
• Stabilize the vein.
• If using a catheter needle, insert it through the skin at an angle of 30° to 45°. Once the needle is through the skin, adjust the angle of the cannula so that it is parallel to the skin, and advance it slowly into the vein far enough to get "flashback" of blood, then go in another millimeter or so to ensure that the plastic catheter is also in the vein before trying to thread it.
• Remove the tourniquet and attach IV infusion set. Make sure there are no air bubbles in the tubing before connecting it.
• Run in some IV fluid. If the IV line is patent, tape the needle and catheter securely in place.

Complications
Local
• Systemic
• Cellulitis
• Phlebitis
• Thrombosis
• Hematoma formation

Systemic
• Sepsis
• Air embolism
• Catheter fragment embolism
• Pulmonary thromboembolism

Intraosseous Access
General
Purpose
• Used to administer IV fluids and medications when attempts at IV access have failed
• For use in emergency situations only

Indications
Attempt intraosseous access in the following situations in children of all ages, when venous access cannot be rapidly achieved within three attempts or 60-90 seconds:
• Multisystem trauma with associated shock or severe hypovolemia (or both)
• Severe dehydration associated with vascular collapse or loss of consciousness (or both)
• Unresponsive child in need of immediate drug and fluid resuscitation: burns, status asthmaticus, sepsis, near-drowning, cardiac arrest, anaphylaxis

Contraindications
• Pelvic fracture
• Fracture in the extremity proximal to or in the bone chosen for the intraosseous access
Sites

Preferred
- Anterolateral (flat) surface of the proximal tibia, 1-3 cm (one finger's breadth) below and just medial to the tibial tuberosity

Other Possibilities
- Distal tibia, 1-3 cm above the medial malleolus on the surface of the tibia near the ankle (believed by some to be the best site in older children because of the greater thickness of the proximal tibia relative to the distal tibia)
- Distal femur
- Medial malleolus
- Anterior superior iliac spine

Procedure
- Practice universal precautions against contamination with child's body substances (e.g. gloves, possibly goggles, safe disposal of needle).
- Assemble necessary equipment.
- Immobilize the child well, but avoid restraints if at all possible.
- Place the child in the supine position and externally rotate the leg to display the medial aspect of the extremity.
- Identify the landmarks for needle insertion.
- Cleanse the puncture site.
- If the child is conscious, use local anesthesia (see section on local anesthesia in "Suturing," below, this chapter).
- Use an intraosseous needle, size 14-18g.
- Angle the needle away from the joint. Insert the needle 1-3 cm below the tibial tuberosity, through the skin and subcutaneous tissue, perpendicular to the long axis of the bone.
- When the needle reaches the bone, exert firm downward pressure, rotating the needle in a clockwise-anticlockwise manner. Be careful not to bend the needle.
- When the needle reaches the marrow space, the resistance will drop (indicated by a "pop").
- Attach a 10-mL syringe and aspirate some blood and marrow to determine if the needle is correctly positioned (other indicators of correct positioning: the needle will stand upright by itself, IV fluid flows freely, no signs of subcutaneous infiltration are apparent).
- If aspiration is unsuccessful but you believe that the needle is in the bone marrow, flush needle with 10 mL normal saline.
- Secure needle with tape.
- Use as you would a regular IV line. For example, fluids can be infused quickly for resuscitation of a child who is in shock.

Complications
- Extravasation
- Tibial fracture
- Osteomyelitis
- Epiphyseal injury
- Lower extremity compartment syndrome
- Obstruction of needle with marrow, bone fragments or tissue
Insertion Of Nasogastric Tube

General

Tube Size
Estimate length of tube needed by extending the tubing from the tip of the child's nose to the ear lobe and then to the xiphoid process.

• Neonates: size 5-8 French
• Young children: size 12-16 French

Procedure

• Assemble required equipment.
• Explain procedure to child (if he or she is able to understand) and parents or caregiver.
• Lubricate tip of tube and slide it into the nostril along the base of the nose, advancing the tube slowly. Some pressure may be needed to enter the nasopharynx. Try to have the child assist by swallowing.
• Once the tube has been advanced the desired distance, check the position either by aspirating gastric contents or by listening with a stethoscope over the stomach as a small amount of air is instilled into the tube.
• Tape the tube in place.
• Attach to drainage bag.
Withdraw the tube if choking or coughing occurs during placement.

Suturing

Use Of Local Anesthesia

General

• Lidocaine (1%, without epinephrine) is the local anesthetic that should be used
• To avoid systemic toxic effects, instill no more than 4 mg/kg (0.4 mL/kg of a 1% solution without epinephrine)
• Use a 28- or 27-gauge needle (the size found on insulin syringes) and inject slowly

For detailed information on wound management and suturing, see "Skin Wounds," in chapter 9, "The Skin," in the adult clinical guidelines.
Chapter 3 – Prevention

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Definitions Of Prevention

Prevention consists of activities directed toward decreasing the probability of specific illnesses or dysfunctions in individuals, families and communities. It is the concept of reducing unwanted health outcomes by reducing or eliminating risk factors that might lead to those outcomes.

Prevention has three components: primary, secondary and tertiary prevention.

Primary Prevention

Activities aimed at intervention before pathological changes have begun and during the natural history of susceptibility. Immunization is an example of primary prevention.

Secondary Prevention

Activities aimed at early detection of disease and prompt treatment, to cure disease during its earliest stages or to slow its progression, prevent complications and limit disability when cure is not possible. A screening program is an example of secondary prevention.

Tertiary Prevention

Limiting the effects of disease and disability for people in the earlier stages of illness and providing rehabilitation for people who already have residual damage.

Immunization

For a detailed discussion of all issues related to vaccines and immunization, refer to the Canadian Immunization Guide, 6th edition (Health Canada 2002). Follow the NWT immunization schedule.

Injuries

Definition

An injury is the result of any type of trauma, whether intentional or unintentional. Injuries are preventable.

In terms of potential years of life lost, injuries are significant contributors to total mortality. They are among the leading causes of death and disability in children of all age groups and the leading cause in children >1 year of age.

Commonest Types Of Injuries

Infants And Toddlers

- Falls
- Near-drowning
- Burns, scalds
- Poisonings

Older Children (8-15 Years)

- Injuries related to bicycling and other sports

Youth (15-20 Years)

- Firearms-related injuries
Injury Prevention Strategies

General

• Preventing injuries requires effort from the total community
• Preventing injuries requires a detailed history of exposure to potentially injurious activities within the family and at school
• Identifying children and families at risk is a critical step in preventing injuries
• The environment can be modified by construction (e.g. fences around water, safer roads) and by regulations (e.g. requiring seat belts and bicycle helmets)
• A large part of preventing injuries is educating parents and caregivers about potential dangers to children and methods of avoiding injuries; this is an important role for the healthcare worker, particularly nurses (during well-baby clinics and illness visits)

Anticipatory Guidance And Counseling

The parents or caregiver should be educated about the following strategies to minimize the risk of injury.

Birth To 6 Months

• Position child on back for sleeping, to prevent sudden infant death syndrome (SIDS)
• Never leave child unattended in bathtub
• Use approved infant car seat (properly restrained) to protect child in vehicle
• Ensure that mattress fits snugly in crib and that it provides good body support (i.e. not made of feathers, not too soft); space between bars should be approved by CSA International (formerly the Canadian Standards Association)
• Because children like to put things in their mouths, keep small, hard objects that could be swallowed out of reach, and avoid toys with small parts that could come off while in the child's mouth
• Plagiocephaly ("flat head") prevention - ensure young infants have supervised tummy time several times a day while awake; place infants' heads in different positions for sleep

6-12 Months

• Never leave child unattended in bathtub
• Use approved infant car seat in vehicles
• Cover electrical outlets
• Keep electrical cords and plugs out of reach or covered to prevent burns from chewing exposed cords or putting plugs in mouth
• Keep cleaning solutions, solvents and medications out of reach of a crawling infant (i.e. in upper cupboards)
• Avoid use of walkers, which represent a significant cause of injury
• Protect steps and stairways with gates
• Avoid peanuts, peanut butter, seeds and round candies
• Advise older children not to share small food items or objects (e.g. gum, peanuts, pennies) with an infant
• When child is near water, ensure that he or she is wearing a life jacket and is under continual supervision

1-2 Years

• Never leave child unattended in bathtub
• Set temperature on hot water tank at 54°C to prevent scalding
• Supervise child while he or she is close to vehicular traffic
• Use approved infant car seat in vehicles
• Turn pot handles away from edge of stove
• Keep poisonous substances locked up or out of reach
• Advise older children not to share small food items or objects (e.g. gum, peanuts, pennies) with an infant
• When child is near water, ensure that he or she is wearing a life jacket and is under continual supervision
2-5 Years
- Never leave child unattended in bathtub
- Ensure that child uses a seat belt when in a vehicle
- Ensure that child wears a helmet while bicycling or skateboarding
- Avoid transporting children 2-5 years of age on ATVs and snowmobiles
- Keep matches and lighters out of reach
- Keep poisonous substances locked up or out of reach
- Advise older children not to share small food items or objects (e.g. gum, peanuts, pennies) with a younger child
- When child is near water, ensure that he or she is wearing a life jacket and is under continual supervision

5-10 Years
- Ensure that child wears a helmet for bicycle, ATV, snowmobile and skateboard use
- Ensure that child uses a seat belt when in a vehicle
- Teach child how to prevent playground injuries and how to use playground equipment safely
- When child is near water, ensure that he or she is wearing a life jacket and is under continual supervision
- Ensure that child receives instruction about water safety and swimming skills
- Teach child to avoid contact with strangers

10-15 Years
- Provide guidance about risk-taking behavior (particularly alcohol and substance abuse)
- Provide guidance about sexual activity, including how to say No to unwanted touching
- Provide instruction about gun safety
- Provide instruction about boating safety
- Ensure that young adolescent uses a seat belt when in a vehicle
- Ensure that young adolescent wears a helmet for bicycle, ATV, snowmobile and skateboard use
- Ensure that young adolescent receives instruction about water safety and swimming skills

15-20 Years
- Provide guidance about risk-taking behavior (particularly alcohol and substance abuse)
- Provide guidance about sexual activity, including how to say No to unwanted touching
- Provide instruction about gun safety
- Provide instruction about boating safety
- Ensure that young adult uses a seat belt when in a vehicle
- Ensure that young adult wears a helmet for bicycle, ATV, snowmobile and skateboard use

Home Safety
- Ensure that house is equipped with fire alarms and fire extinguishers
- Establish exit routes, and ensure that all members of the family are aware of them
- Ensure that firearms and ammunition are stored safely
- Ensure that dangerous chemicals are stored safely, particularly if there are small children in the home
Well-Child Care

Well-Child Visit

**Purposes**
- Immunization
- Parental support regarding feeding, safety and nurturing of children
- Screening for developmental or physical problems
- Parental education, counseling and anticipatory guidance

**Components Of Well-Child Visit**
Review the child's health record and the family record, so that you are aware of previous health concerns and can plan what should be done during the current visit.

Review the child's immunization record. Ensure that consent for immunization is on file.

Discuss with the parents or caregiver the child's health and progress:
- Current general health
- Achievement of developmental milestones
- Feeding habits
- Sleeping habits
- Behavior
- Relationships with family members

Perform a physical examination. Observe the following aspects:
- Nutritional status
- Character of cry (in infants <6 months of age)
- Color
- Vision
- Hearing
- Activity level
- Any other aspect, as dictated by concerns raised in the history

In addition, examine:
- Hair, scalp, fontanels
- Eyes, ears, nose, mouth (including dentition), throat
- Lungs, heart
- Abdomen, genitalia

- Limbs, specifically muscle tone, motion, symmetry and hips (for congenital dislocation; in newborn period and at every visit up to 12 months of age)
- Skin
- Growth measurements
- Observe for achievement of major developmental milestones

Remain alert for ocular misalignment, vision disorders, tooth decay, and child abuse or neglect.

**Growth Measurement**
Measurement of a child's weight, height and head circumference is most important in the health assessment process, because growth is a major characteristic of childhood.

Atypical growth patterns can be indicators of pathologic processes.

Correct measuring techniques and accuracy are essential if the measurements are to be useful in evaluating growth. In addition, the measurements must be appropriately recorded on a growth chart and compared to norms for the child's age and to his or her previous growth pattern. If the child's measurements consistently follow the relevant growth curve, the growth pattern is considered normal.

A graph gives an easily understood pictorial display of the child's growth and should alert the observer early to deviations from normal.

Failure to thrive should be suspected if the child's growth curve drops by two or more major percentiles. In this situation, the child is considered at high risk. *See "Failure to Thrive," in chapter 17, "Hematology, Endocrinology, Metabolism and Immunology."*

**Abnormal Growth Problems**
Any child with growth or developmental problems should be referred to a physician.
Weight
- Above-normal weight combined with normal height: consider over-nutrition
- Above-normal weight combined with below-normal height: consider a genetic cause (e.g. Down's syndrome) or endocrine problems (e.g. hypothyroidism, Cushing's disease)
- Below-normal weight combined with normal height and head circumference: consider under-nutrition, failure to thrive, iron deficiency, psychosocial deprivation, hypothyroidism
- Below-normal weight combined with below-normal height and head circumference: consider organic cause (e.g. renal failure, iron deficiency, lead intoxication, immune deficiencies, inborn errors of metabolism, HIV infection)

Disproportionate Macrocephaly
- If the head size is large relative to the child's height and weight, close attention must be given to the physical examination and assessment of developmental status. Look for associated physical findings such as a bulging fontanel or split sutures, neurologic abnormalities or delays in reaching developmental milestones
- Above-normal head size combined with normal weight and height: consider primary hydrocephalus, hydrocephalus secondary to associated disease of the central nervous system, primary familial megalencephaly or megalencephaly secondary to associated disease of the central nervous system or to a metabolic storage disease (e.g. Krabbe's disease, neurofibromatosis)

Height
- Above-normal height combined with normal weight and head size: in 90% of cases, this combination of growth parameters represents a familial tendency; the rate of growth is normal, although the absolute percentile value is greater than normal; may also be caused by excess production of growth hormone, hyperthyroidism or Marfan's syndrome
- Above-normal height, weight and head size: consider a pathologic process (e.g. acromegaly) or a chromosomal disorder (e.g. Klinefelter's syndrome)
- Below-normal height: consider a pathologic process (e.g. deficiency of growth hormone, hypothyroidism, chronic anemia), a chromosomal disorder (e.g. Turner's syndrome) or failure of a major organ system (e.g. GI, renal, pulmonary or cardiovascular)

Disproportionate Microcephaly
- If the head size is small relative to the child's height and weight, close attention must be given to the physical examination and assessment of developmental status. Look for associated physical findings such as a bulging fontanel or split sutures, neurologic abnormalities or delays in reaching developmental milestones
- Above-normal head size combined with normal weight and height: consider primary hydrocephalus, hydrocephalus secondary to associated disease of the central nervous system, primary familial megalencephaly or megalencephaly secondary to associated disease of the central nervous system or to a metabolic storage disease (e.g. Krabbe's disease, neurofibromatosis)

Evaluation
A three step approach should be taken in evaluating a child with an abnormal growth curve.
1. Check the growth data for accuracy.
2. If a growth problem is substantiated, assess the child closely for associated symptoms, abnormal findings on physical examination or delays in development. Obtain parents' measurements.
3. Any abnormality in a child's rate of growth requires further assessment. Consult a physician for advice. Children with suspected growth abnormalities who are otherwise normal should be followed closely to determine their growth rate.

Appropriate Screening
The idea of screening for early detection of disease is appealing, but it is valuable only if the following conditions pertain:
- The disease can be diagnosed reliably by a simple, acceptable test
- Effective treatment is available
- The benefits outweigh the costs

The following situations are those in which screening is thought to be useful in child care.

Phenylketonuria (PKU)
- All newborns should be screened for PKU by means of a capillary blood sample before discharge from the hospital
• For any newborn who undergoes this type of screening at less than 24 hours of age, the screening test must be repeated between 2 and 7 days of age

**Congenital Hypothyroidism**

• All newborns should be screened for TSH level by means of a dried capillary blood sample in the first week of life
• If child was born in hospital, verify that this type of screening was done before discharge

**Others**

The routine neonatal heel-prick test is able to screen for some other more rare conditions (e.g. Maple sugar urine disease, transient neonatal or familial tyrosinemia, biotinidase deficiency)

**Hemoglobin Screening**

The prevalence of anemia is high among Aboriginal children 6-24 months of age. In addition to ethnic background, other risk factors for anemia are prematurity and low birth weight, breast-feeding beyond 6 months of age without addition of iron rich solids, lack of access to or inability to consume iron-fortified products, diet of cow's milk only in the first year of life and low socioeconomic status.

The Canadian Task Force on Preventive Health Care (formerly Canadian Task Force on the Periodic Health Examination 1994) recommends that screening for hemoglobin level be performed at 6-12 months of age, optimally at 9 months. Hemoglobin should be monitored more frequently in children in whom anemia has been identified and treatment has begun.

**Table 3-1: Normal hemoglobin levels in children**

<table>
<thead>
<tr>
<th>Age</th>
<th>Hemoglobin level (g/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 month</td>
<td>115 – 180</td>
</tr>
<tr>
<td>2 months</td>
<td>90 – 135</td>
</tr>
<tr>
<td>3-12 months</td>
<td>100 – 140</td>
</tr>
<tr>
<td>1-5 years</td>
<td>110 – 140</td>
</tr>
<tr>
<td>6-14 years</td>
<td>120 – 160</td>
</tr>
</tbody>
</table>

See "Iron Deficiency Anemia in Infancy," in chapter 17, "Hematology, Endocrinology, Metabolism and Immunology."

**Developmental Screening**

In monitoring the health of children, developmental assessment is an important function that should not be neglected. Such assessment is done by making inquiries of the parents or caregiver and by clinical observation of the child's achievement of major age-appropriate milestones.

Assess achievement of developmental milestones for all children at every opportunity, formal Nipissing screening should take place at 6, 12, 18 months, 3 years and 4-6 years.

The earlier developmental delays are detected, the sooner an intervention can be undertaken. Hopefully, early intervention will minimize the long-term impact on the child. It is critical that steps be taken to alleviate developmental problems before the child reaches school age.

The Canadian Task Force on Preventive Health Care recommends that developmental screening be excluded from the periodic health examination of asymptomatic children.

However, formal developmental testing (e.g. Nipissing, as well as other testing tools that are available) may be helpful if a concern about developmental delay is either expressed by the parent or caregiver or suspected by the healthcare professional.

*(For information on developmental screen refer to: A Guide for Using the Nipissing District Developmental Screen in the NWT, May 2002).*

Any child with suspected delay(s) should be referred promptly to a physician for assessment.

**Hearing Screening**

Hearing impairment is one of the most important causes of speech delay, educational difficulties and behavioral difficulties. Early intervention can help to prevent significant speech and educational delays. Therefore, the most important time to screen is during infancy. Unfortunately, this is also the most difficult time to test a child's hearing.
The parents or caregiver should be asked about the child's hearing ability as part of every well-child visit. In addition, the clinician should observe the child's response(s) to sounds.

Formal hearing screening by such methods as tympanometry or pure-tone audiometry is reserved for high-risk (e.g. repeated ear infections or strong family history) or symptomatic children.

The Canadian Task Force on Preventive Health Care does not recommend routine formal testing of asymptomatic children for hearing impairment in the pre-school years. Furthermore, such testing is of little benefit in asymptomatic older children and adolescents.

Temporary conductive hearing loss secondary to otitis media or serous otitis media with effusion is common in Aboriginal communities and may persist for long periods of time (months). Consultation with a physician is important for management of chronic otitis media with hearing loss.

See Appendix 3-1, this chapter, for details of hearing screening.

Vision Screening
The Canadian Task Force on Preventive Health Care recommends that all well-child visits during the first 2 years of life include an eye examination to check for abnormalities of vision. This examination should include inspection of the eyes for abnormalities and the corneal light reflex test. Infants should also be examined for strabismus (by means of the cover-uncover test) in the first year of life (see also "Strabismus [Squinting]," in chapter 8, "The Eyes").

The Task Force also recommends that initial screening of visual acuity be undertaken in the pre-school period (3-5 years of age). If visual acuity on Snellen charts is 20/30 or less, optometric assessment is advised.

See Appendix 3-2, this chapter, for details of vision screening. For more detail on pediatric eye care, see chapter 8, "The Eyes."

When Screening Does Not Work
Urine
Routine urinalysis is not recommended for asymptomatic children.

Scoliosis
The natural history of scoliosis is not well understood, and treatments have not been well evaluated. The screening test itself is not very sensitive or specific. Any abnormalities in posture, spinal symmetry or curvature identified by the child or the child's parents or caregiver should be referred to a physician for assessment.

Observe the spine in adolescents who present for other reasons.

Pre-School Entry Assessment
It is important that all children undergo a detailed pre-school assessment in preparation for starting school. The purpose of the assessment is to ensure readiness for school and to identify and correct any health problems that might interfere with the child's performance in school.

The assessment is generally done at 4-5 years of age, before the child enters kindergarten.

It is best to organize one or more special clinics in the spring of each year to carry out pre-school entry assessments for all children of the appropriate age living in the community. This allows time for any medical, surgical or social referrals to be made before school starts in the fall.

Components Of The Pre-School Entry Assessment
It is important that a parent or the main caregiver accompany the child for this visit.

- Review of child's past health history, as well as the family's health history
- Review of present health status
**Brief Physical Examination**
- Eyes, ears, nose, throat, teeth
- Respiratory system
- Check for cardiac murmurs
- Abdomen
- Genitalia
- Musculoskeletal system

**Screening**
- Growth: measure height and weight, and plot on growth chart
- Vision: Goodlite illiterate "E" chart or random dot "E" chart
- Hearing
- Speech: gross screening for articulation
- Developmental screening: formal Nipissing screen if indicated by concerns expressed by the parents or caregiver or by a healthcare professional
- Hemoglobin, urinalysis: should be done selectively for children whose medical history indicates a past or ongoing problem such as anemia or urinary tract infection
- Review of immunization status: obtain appropriate consents and update immunizations according to accepted schedule; refer to the NWT immunization schedule and to the *Canadian Immunization Guide, 6th edition* (Health Canada 2002)

**Health Counseling for Parents or Caregiver as Necessary**
- Offer nutritional counseling
- Recommend provision of intellectual stimulation (e.g. exposure to books and reading)
- Provide anticipatory guidance about developmental milestones
- Provide information about resources available for school-age children (e.g. dental care, audiology, optometry, speech therapy)
- Allow time to discuss the results of the assessment with the parents or caregiver and to let them raise concerns or ask questions
- Initiate referrals to specific healthcare professionals or agencies as required to address any identified health problems (with parental approval and consent)
- Record all information on the child's personal health history and immunization record and in general file as necessary
- Instruct the parents or caregiver to notify the school of any identified health problem that might have implications for the child's school attendance or performance

**Specific Issues For Preventive Care Of Adolescents**

*See chapter 19, "Adolescent Health."*
Appendix 3-1: Hearing Screening

Perform gross hearing screening for all children during child health clinics. Gross screening includes questioning the parents or caregiver about the child's hearing ability, observing the response to a sound stimulus (e.g. clapping hands) in a younger child and pure-tone audiometric screening in the older pre-schooler (3 years of age) if a concern has been raised about hearing.

Infants And Pre-School Children

<table>
<thead>
<tr>
<th>Age</th>
<th>Procedure</th>
<th>Method</th>
<th>Normal Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn to 2 months</td>
<td>Startle response (Moro reflex)</td>
<td>Produce a loud noise near the child’s ear (e.g. clap hands or slap table surface)</td>
<td>Child is startled, jumps at the noise, blinks, widens eyes, cries</td>
</tr>
<tr>
<td>3-5 months</td>
<td>Ability to track sound stimulus</td>
<td>Produce a noise (e.g. ring bell, call child’s name, sing)</td>
<td>Child’s eyes shift toward sound; child responds to mother’s voice or coos when he or she is engaged</td>
</tr>
<tr>
<td>6-8 months</td>
<td>Sound recognition</td>
<td>Produce noise out of child’s line of vision (e.g. ring bell, call child’s name, sing)</td>
<td>Child turns head in response to sound; responds to name; babbles in response to verbalization</td>
</tr>
<tr>
<td>9-12 months</td>
<td>Sound localization</td>
<td>Call child’s name or say words from outside child’s field of vision</td>
<td>Child localizes to source by turning head or body toward sound; may try to imitate words</td>
</tr>
<tr>
<td>12-24 months</td>
<td>Speech development (normal for age)</td>
<td>Engage child in conversation or question parent or caregiver about speech</td>
<td></td>
</tr>
</tbody>
</table>

Toddlers And Pre-Schoolers (3-5 Years Of Age)

Pure-Tone Audiometry Using Play Response

Procedure
1. Demonstrate method to child: put on ear phones, pretend to hear a sound, say "I hear it" and, at the same time, place a block in a box or a plastic ring on a ring holder.
2. Place ear phones correctly on child.
3. Give a block or ring to the child.
4. Produce a tone at 50 dB and 1000 Hz, and guide child's hand to place block in box or ring on ring holder.
5. After practice, when child seems to understand the procedure and responds correctly, proceed with the screening.
6. Set audiometer at 25 dB and 1000 Hz and present tone in left earphone.
7. If child responds correctly, proceed to test 2000, 4000 and 6000 Hz at 25 dB.
8. Switch to right ear and present 1000, 2000, 4000 and 6000 Hz at 25 dB.
9. Record results on audiography sheet (child should be able to hear all frequencies at 25 dB).
10. Retest, later in the day, frequencies for which response was "doubtful."
11. Children who do not hear all frequencies should be referred for further assessment by a physician.
Appendix 3-2: Vision Screening

General Principles And CPS Guidelines
Screen all children for vision abnormalities. Screening should include inspection of the eye structures for abnormalities, the corneal light reflex test, the cover-uncover test in the younger infant or child, and visual acuity testing in older children 3 years).

The Canadian Paediatric Society has made the following recommendations for vision screening (Community Paediatric Committee, CPS 1998).

Newborn To 3 Months Of Age
- A complete examination of the skin and external eye structures, as well as the conjunctiva, cornea, iris and pupils, is an integral part of the physical examination of all newborns, infants and children.
- The retina should be inspected (by means of the red reflex) for opacities of the lens (cataracts) and signs of posterior eye disease (retinoblastoma).
- Failure of visualization or abnormalities of the red reflex are indications for referral to an ophthalmologist.
- Corneal light reflex should be tested to detect ocular misalignment.
- "6-12 Months Of Age"
  - Conduct examination as for newborn to 3 months of age.
  - Observe ocular alignment to check for strabismus. The corneal light reflex should be central and the cover-uncover test normal.
  - Observe fixation and following.

3-5 Years Of Age
- Conduct examination as for newborn to 3 months of age.
- Conduct visual acuity testing.
- Any child with visual acuity less than 20/30 should be referred for optometric assessment.

6-18 Years Of Age
- Visual acuity should be assessed (e.g. by Snellen chart) every 2 years until 10 years of age, then every 3 years until 18 years of age.
- Any child with visual acuity less than 20/30 should be referred for optometric assessment.

Suggested Screening Techniques For Infants And Pre-School Children

Birth To 4 Months Of Age (Near-Visual Acuity)
Observe child and ensure that the following occur:
- Regards face (of examiner or mother) in line of vision
- Follows object or light to midline
- Follows object or light past midline
- Follows object or light through 180°
- Grasps rattle when offered
- Reaches toward an object placed in line of vision

3-4 Months Of Age And Over
As for children 1-4 months of age, but add tests for strabismus.

Tests For Strabismus (Squint)

Procedure for Corneal Light Reflex Test
1. Sit at child's eye level.
2. Hold a light source (penlight) 13 inches (32 cm) away from the child, in front of your own nose.
3. Ask child to focus on the light, if child is old enough to understand and follow the instruction.
4. Observe position of the light reflex of each cornea and of the eyes.

Responses
- Normal: both eyes are focused in same position, and the light reflects off the same area of the cornea, usually slightly to the nasal side of the pupil center.
• *Abnormal:* eyes are not aligned in position, and the light reflexes are asymmetric, i.e. coming off different areas of the cornea; this may indicate squinting.

If response is abnormal for the corneal light reflex test, perform the cover-uncover test to further assess for strabismus.

**Procedure for Cover-Uncover Test**
Perform this test only if the child is able to cooperate.

1. Cover one eye with an opaque object (a large plastic spoon-shaped cover designed for this purpose may be available; otherwise, improvise).
2. Instruct or try to get the child to fix his or her gaze on a light source (held in front of him or her) with the uncovered eye.
3. Quickly remove the cover from the covered eye, and observe the position of that eye.
4. Repeat steps 1, 2 and 3 for the other eye.

*For further explanation, see "Strabismus (Squinting)," in chapter 8, "The Eyes."

**Responses**

- *Normal:* both eyes are focused in the same position.
- *Abnormal:* covered eye will deviate and may swing back into alignment when the cover is removed; in more obvious cases, the eye will remain deviated after the cover is removed or always appears deviated.

**Referral**

Children with abnormal responses on the corneal light reflex test and the cover-uncover test should be seen as soon as possible by a physician. Referral to an ophthalmologist may be necessary.

**Visual Acuity Testing**

Visual acuity of 20/30 or less requires referral for further optometric assessment.

**3-5 Years Of Age**

If the child is able to comprehend instructions, use the Goodlite illiterate "E" chart or the random dot "E" chart. This test is preferably administered in the child's own language.

**6-18 Years Of Age**

If the child knows the alphabet, use a Snellen chart. Otherwise, use the symbol or "E" charts.
Chapter 4 – Fluid Management

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Fluid Requirements In Children.................................................................................................................................................. 1
Dehydration In Children ............................................................................................................................................................ 1
Fluid Management

Fluid Requirements In Children

General Information
Maintenance fluid is the amount of fluid the body needs to replace usual daily losses from the respiratory tract, the skin, and the urinary and GI tracts.

A well child usually drinks more than maintenance requirements. If a child takes in significantly less than maintenance requirements, he or she will gradually become dehydrated.

The requirement for maintenance fluids varies with the weight of the child (Table 4-1). Infants need more fluid per kilogram of body weight than do older children. Various medical conditions will also affect these requirements (Table 4-2).

Table 4-1: Daily maintenance fluid requirements (24 hour period)

<table>
<thead>
<tr>
<th>Calculation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mL/kg for the first 10 kg body weight</td>
<td></td>
</tr>
<tr>
<td>+ 50 mL/kg for the next 10 kg body weight</td>
<td></td>
</tr>
<tr>
<td>+ 20 mL for each kilogram of body weight over 20 kg</td>
<td></td>
</tr>
</tbody>
</table>

Examples
For 10 kg child: 10 kg x 100 mL/kg = 1000 mL
For 15 kg child: (10 kg x 100 mL/kg) + (5 kg x 50 mL/kg) = 1250 mL
For 25 kg child: (10 kg x 100 mL/kg) + (10 kg x 50 mL/kg) + (5 kg x 20 mL/kg) = 1600 mL

Table 4-2: Conditions modifying daily fluid requirements

<table>
<thead>
<tr>
<th>Requirement increased</th>
<th>Requirement decreased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever,* sweating, vomiting or diarrhea</td>
<td>Meningitis</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Congestive heart failure</td>
</tr>
<tr>
<td>Burns</td>
<td>Renal failure</td>
</tr>
</tbody>
</table>

* Daily maintenance fluids should be increased by 12% for every degree Celsius body temperature above 37.5°C (rectal)

Dehydration In Children

Definition
Abnormal decrease in volume of circulating plasma.

Causes
- Gastroenteritis (most common cause in childhood)
- Inadequate fluid intake
- Diabetes mellitus
- Burns
- Pyloric stenosis
- GI obstruction

Newborns and young children have a much higher water content than adolescents and adults and are therefore more prone to loss of water, sodium and potassium during illness.

History
- Fever
- Vomiting
- Diarrhea
- Urine output
- Lethargy
- Irritability

All body systems must be reviewed to ascertain underlying cause.
Physical Findings

Table 4-3: Clinical features of dehydration

<table>
<thead>
<tr>
<th>Feature</th>
<th>Mild dehydration (&lt; 5%)</th>
<th>Moderate dehydration (5-10%)</th>
<th>Severe dehydration (&gt; 10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate</td>
<td>Normal</td>
<td>Slightly increased</td>
<td>Rapid, weak</td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>Normal</td>
<td>Normal to orthostatic, &gt; 10 mmHg change</td>
<td>Hypotension</td>
</tr>
<tr>
<td>Urine output</td>
<td>Decreased</td>
<td>Moderately decreased</td>
<td>Markedly decreased, anuria</td>
</tr>
<tr>
<td>Mucous membranes</td>
<td>Slightly dry</td>
<td>Very dry</td>
<td>Parched</td>
</tr>
<tr>
<td>Anterior fontanel</td>
<td>Normal</td>
<td>Normal to sunken</td>
<td>Sunken</td>
</tr>
<tr>
<td>Tears</td>
<td>Present</td>
<td>Decreased, eyes sunken</td>
<td>Absent, eyes sunken</td>
</tr>
<tr>
<td>Skin*</td>
<td>Normal turgor</td>
<td>Decreased turgor</td>
<td>Tenting</td>
</tr>
<tr>
<td>Skin perfusion</td>
<td>Normal capillary refill (&lt;2 seconds)</td>
<td>Capillary refill slowed (2-4 seconds); skin cool to touch</td>
<td>Capillary refill markedly delayed (&gt;4 seconds); skin cool, mottled, gray</td>
</tr>
</tbody>
</table>

* Skin condition is less useful in diagnosis of dehydration in children >2 years

Diagnostic Tests
- Urinalysis to check for ketones
- Blood glucometry to rule out diabetes (if no diarrhea)

Management
Goals of Treatment
- Correct dehydration using oral rehydration therapy (ORT) with or without IV fluids
- Treat shock or impending shock
- Prevent complications (e.g. seizures or edema)

Appropriate Consultation
Consult a physician as soon as possible for any infant or young child with signs of dehydration. If the child has presented with severe signs (e.g. shock), this consultation may have to wait until the child's condition has been stabilized.

Nonpharmacologic Interventions
- Using the criteria presented in Table 4-3, decide if child is mildly, moderately or severely dehydrated.
- Weigh child (without clothes).
- Once you have determined the degree of dehydration, calculate the fluid deficit according to Table 4-4 (using the percent dehydration values shown in the column headings for Table 4-3).

Table 4-4: Calculating fluid deficit

**Calculation**
Fluid deficit (L) = weight (kg) x % dehydration

**Example**
For an 8 kg child with 10% dehydration:
8 kg x 10% = 0.8 L deficit

When you have calculated the deficit, add maintenance requirements (see Tables 4-1 and 4-2) and rehydrate according to Table 4-5.
### Table 4-5: Fluid resuscitation

<table>
<thead>
<tr>
<th>Mild dehydration (&lt;5%)</th>
<th>Moderate dehydration (5-10%)</th>
<th>Severe dehydration (&gt;10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Start ORT: 10 mL/kg/hr for 6-8 hours</td>
<td>• Attempt ORT as in mild dehydration: 15-20 mL/kg/hr for 6-8 hours</td>
<td>• Medical emergency</td>
</tr>
<tr>
<td>• Reassess at 4 hour intervals</td>
<td>• Reassess at 4 hour intervals</td>
<td>• NS or Ringer’s lactate 20 mL/kg IV over 20 minutes</td>
</tr>
<tr>
<td>• From 8-24 hours give ORT ad libitum</td>
<td>• From 8-24 hours give ORT ad libitum</td>
<td>• Monitor blood pressure</td>
</tr>
<tr>
<td>• Replace deficit over 6-8 hours, add maintenance requirement to deficit</td>
<td>• Give fluid frequently, in small amounts</td>
<td>• Repeat bolus (to a maximum of 3 boluses in first hour) if signs of shock persist (e.g. tachycardia, decreased systolic blood pressure, poor perfusion, skin gray and mottled)</td>
</tr>
<tr>
<td>• Give extra ORT after each diarrheal stool (e.g. 5-10 mL/kg)</td>
<td>• Replace deficit over 6-8 hours, add maintenance requirement to deficit</td>
<td>• Once response occurs, calculate remaining deficit; replace 50% of the deficit over 8 hours, remainder over next 16 hours (be sure to add maintenance requirements to total IV therapy)</td>
</tr>
<tr>
<td>• Monitor urine output (should be at least 1 mL/kg/hr)</td>
<td>• Give extra ORT after each diarrheal stool (e.g. 5-10 mL/kg)</td>
<td>• Monitor urine output (should be at least 1 mL/kg/hr)</td>
</tr>
<tr>
<td>• Continue breast-feeding; if child is bottle fed, early refeeding of child’s normal formula (within 6-12 hours) is recommended</td>
<td>• Monitor urine output (should be at least 1 mL/kg/hr)</td>
<td>• If unable to start an IV line in 3 attempts (or within 60-90 seconds), establish intraosseous access</td>
</tr>
<tr>
<td>• Full diet should be reinstated within 24-48 hours, if possible</td>
<td>• Continue breast-feeding; if child is bottle fed, early refeeding of child’s normal formula (within 6-12 hours) is recommended</td>
<td>• For intraosseous infusion, see Chapter 2; this technique can save the child’s life and is not technically difficult; when line is in place use as you would a regular IV line.</td>
</tr>
<tr>
<td>• Delay refeeding only if there is severe protracted vomiting</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Monitoring and Follow-Up**

Reassess level of consciousness (according to pediatric Glasgow coma scale, Table 15-1, in chapter 15, "Central Nervous System"), vital signs, skin perfusion, skin turgor and urine output frequently.

**Referral**

Medevac any child with moderate to severe dehydration as soon as possible.

**General Comments about Fluid Management**

IV therapy should usually be used only for severe dehydration or intractable vomiting; oral therapy is always safer. However, the oral replacement solution (ORS) may be administered by nasogastric tube if necessary.

Use an ORS such as Pedialyte® or Gastrolyte® to replace the calculated deficit. If the child is breast-feeding and is able to nurse, then breast-feeding should be continued for maintenance.
requirements; supplement with Pedialyte® or Gastrolyte® to make up the deficit.

Increase the amount of maintenance fluids if there are ongoing fluid losses (e.g. if diarrhea continues).

If a marked increase in diarrhea occurs when a bottle-fed child returns to his or her usual cow’s milk formula, consult a physician about changing to a soy-based formula (e.g. Prosobee® or Isomil®). Switch back to regular cow’s milk formula within 7-10 days.

Do not go back to Pedialyte® unless there is a marked increase in stools while on soy formula.

Some increase in stools does not matter, as long as the child takes in enough to keep up with losses. In other words, treat on the basis of the child's condition, not on the basis of the stools.

If the child is vomiting, he or she will usually tolerate fluids by mouth if given in small amounts (one sip at a time). If child will not suck, try giving sips frequently by spoon.

Allow mother and other family members to administer fluid. Increase daily maintenance fluids by 12% for every degree Celsius body temperature above 37.5°C (rectal).

<table>
<thead>
<tr>
<th>Quick reference</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Weigh child</td>
<td>15 kg baby</td>
</tr>
<tr>
<td>2. Determine degree of dehydration (Table 4-3)</td>
<td>Moderately (10%) dehydrated</td>
</tr>
<tr>
<td>3. Calculate fluid deficit (Table 4-4)</td>
<td>15 kg x 10% = 1500 mL</td>
</tr>
<tr>
<td>4. Add maintenance requirements (Table 4-1 and 4-2)</td>
<td>(10 kg x 100 mL) + (5 kg x 50 mL) = 1250 mL</td>
</tr>
<tr>
<td>5. Total fluid requirements in 24 hours</td>
<td>Total = 2750 mL</td>
</tr>
<tr>
<td>6. Rehydrate according to Table 4-5</td>
<td>15 kg x 15-20 mL = 225-300 mL/hr x 6-8 hours</td>
</tr>
</tbody>
</table>
Chapter 5 – Child Abuse

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Child Abuse .................................................................................................................................................... 1
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http://www.canlii.org/nt/sta/pdf/type35a.pdf
Definitions

Child Abuse
Any injury intentionally inflicted upon a child by an older person. May involve physical, sexual or emotional abuse or neglect.

Physical Abuse
An act or omission by a parent, caregiver or other person that results in injury to a child. Such acts include inflicting blows that cause bruising, striking a child with a fist or instrument, and kicking, throwing or shaking a child. An omission is the failure to prevent an injurious act.

Sexual Abuse
Any exploitation of a child for the sexual gratification of an adult or older person. Sexual abuse is a criminal offense under the Criminal Code of Canada; hence, involvement of the local police force and local child-protection authorities is essential in all investigations of sexual abuse.

Emotional Abuse
Acts or omissions by a parent, caregiver or other person that are damaging to a child's physical, intellectual or emotional development. Such acts or omissions may include unwillingness or inability to provide care, control, affection or stimulation, or exposure of the child to family violence.

Neglect
Child neglect includes situations in which children have suffered harm, or their safety or development has been endangered as a result of the caregiver's failure to provide for or protect them. Unlike abuse, which is usually incident-specific, neglect often involves chronic situations that are not as easily identified as specific incidents.


Situations In Which Child Abuse Occurs

The occurrence of child abuse usually depends on the interplay of three components: a high-risk parent, a high-risk child and a crisis.

High-risk parents tend to have low self-esteem, few supports and difficulty establishing trust. Not all abused children become abusing parents, but many abusing parents were abused as children.

A high-risk child is one who may have special physical needs or who is perceived as undesirable for a variety of reasons (e.g. unwanted, of dubious paternity, irritable).

The crisis is an event, major or minor, within the family that precipitates the abusive event.
History And Physical Examination

If during a routine exam you begin to suspect abuse, refer to Management section following. It is important to document any physical signs, which lead you to report your suspicion of abuse, without jeopardizing any subsequent investigation.

Indicators Of Possible Physical Abuse

General
- Family history of abuse
- Delay in seeking medical attention after an injury
- Inconsistencies in the history
- History incompatible with the presenting problem

Specific
- Unexplained bruises and welts, especially if on multiple body surfaces or if in a recognizable pattern (e.g. belt marks, fingerprints)
- Injuries at various stages of healing (Table 5-1) and in areas of the body not normally injured during play (e.g. axilla, neck, ear)
- Unexplained burns
- Unexplained fractures
- Any fractures in the first year of life

Table 5-1: Estimating ages of healing bruises

<table>
<thead>
<tr>
<th>Color of bruise</th>
<th>Days since injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>0-1</td>
</tr>
<tr>
<td>Bluish purple</td>
<td>1-4</td>
</tr>
<tr>
<td>Greenish yellow</td>
<td>5-7</td>
</tr>
<tr>
<td>Yellowish brown</td>
<td>≥8</td>
</tr>
</tbody>
</table>


Document:
- Detailed description of the injury
- Measurements and drawings where appropriate
- Colour, size and age of lesions
- Child's behaviour
- Details of any spontaneous explanations provided

Do not question the child, the parent or the caregiver. Report your suspicions to the Social Worker.

Differential Diagnosis Of Physical Abuse

- Accidental injury (e.g. unrestrained child in motor vehicle collision, bicycle accident)
- Dermatologic condition (e.g. impetigo, contact dermatitis)
- Mongolian spots

Indicators Of Sexual Abuse

Specific
- Bruises or lacerations of genitalia
- Vaginal or penile discharge
- STIs
- Vaginal bleeding
- Pregnancy (if child ≤14 years of age and an adult male was involved)

Less Specific
- Difficulty walking
- Pain or itching in genital area
- Behavioral symptoms: sexualized behavior in play, delinquent behavior, self-destructive behavior, runaway behavior
- Depression in a child or adolescent
Indicators Of Emotional Abuse

- Failure to thrive (in some infants)
- Behavioral disturbances

Indicators Of Neglect

- Failure to thrive
- Unattended physical or medical needs
- Poor hygiene
- Abandonment
- Failure to supervise

Management

The steps in managing a case of suspected abuse are outlined below

1. Suspect abuse

2. Report your suspicions verbally and in writing to a social worker. Your involvement with the case should then stop here, except at the specific request of the social worker or RCMP. Note that if you are involved in examining the child specifically in relation to a suspicion of abuse, you may be called upon as a witness in any subsequent court proceedings.

Handling A Disclosure Of Abuse

1. Listen to disclosures in a caring and calm manner. Let the child tell her story in her own way - don't ask leading questions about the disclosure. Make sure the child knows that you believe her and that what happened to her was not her fault. Let her know that telling someone was the right thing to do and that now you are going to contact the social worker to try to get some help for her. The child may receive some comfort from knowing that she is not alone and that other children have gone through this. Do not judge the events, circumstances or individuals involved, and don't express to the child what you might be feeling, e.g. "You must hate him for what he did to you".

When the child has finished what she has to say and has disclosed enough so that you suspect abuse, tell the child that you are not allowed to hear any more because it is important that she share her disclosure with a social worker. It is very important to end the disclosure without "closing down" the child. The child must continue to think that what she has to say is important, and she must feel safe enough so that she can relate the complete disclosure to the social worker.

2. Don't make promises to the child that you have no way of keeping. For example, telling a child that "everything is alright" or "now you will get the help you need" are promises that cannot be guaranteed.

3. Once a disclosure has been made or enough information given so that you suspect abuse, do not continue with questioning. It is the role of the social worker and/or RCMP to question the child about the details of abuse. They will then be able to document this information first-hand and present it in court if needed. If you question the child for details, it could cause serious problems with the investigation.

4. Immediately after a disclosure you should document and date any comments or statements made by the child during the disclosure. Try to use the child's exact words. Keep notes about the child's behaviour and emotional state, as well as the circumstances at the time of the disclosure, e.g. "Child stayed in chair with face hidden and cried for 15 minutes".

5. Call and make a report of child abuse to a social worker.

6. Follow up this verbal report with a written report to the social worker you spoke to.

7. Make two copies of the written report and all of your notes, as well as any written/drawn material...
that may form part of the child's disclosure. Give the originals to the social worker you first speak to. Mail a copy of the written report and all supporting documents to the Director of Child and Family Services in Yellowknife. Keep a copy of all documentation on the child's chart.

8. Maintain confidentiality. You may, however, need to let other health care professionals know about the incident in order that they can care for the child appropriately, following correct protocols, and also be on the alert for possible other cases, either in the same family, or in the community.

9. If you have continued contact with the child, recognize and respect the child's feelings in the days following the disclosure. These may include:
   • Feelings of guilt for having told
   • Fear and anxiety about what may happen next
   • Anger or withdrawal
   • Uncertainty
   • Feelings of being blamed
   • Feelings of low self-esteem
   • Feelings of shame

10. Be aware of your own feelings about the disclosure.

11. Practice using non-leading or open questions and comments.


Legal Aspects

The Criminal Code of Canada is penal in nature, intended to punish the perpetrator. Conviction under the Criminal Code requires proof beyond a reasonable doubt, but investigations and appropriate placement may be initiated whenever suspicion of abuse arises. Child-protection legislation has been enacted in all Canadian provinces and territories. The purpose of this legislation has been to determine what is in the best interests of the child. Investigations under these acts are considered civil in nature, with the degree of proof based on a balance of probability.

In Canada, any person who has information about potential abuse or who is concerned that a child needs protection is legally obliged to report the situation to a child-protection agency or the police. Failure to do so is considered an offense punishable by summary conviction. Those who report in good faith are protected from legal action.

Nurses should be familiar with:
(1) the NWT legislation
(2) the appropriate child-protection and law enforcement representatives in the community.
Chapter 6 – Dysfunctional Problems Of Childhood

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  Learning Disabilities ....................................................................................................................................... 1
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  Attention Deficit Hyperactivity Disorder (ADHD) ........................................................................................ 6
Introduction

The topics discussed in this chapter include a variety of physiologic, psychologic and social problems that may interfere with important functions of daily living. Assessment of these problems requires, above all, establishing a good rapport with the family and the child. Usually, the initial interview is lengthy; this is the session during which trust is established. The history and physical examination vary with the presenting complaint.

Common Dysfunctional Problems

Learning Disabilities

Definition
Inability to process language and its symbols or lack of arithmetic-related skills at a level equal to peer group.

Affected children usually suffer from learning disability in a specific area and are normal in all other areas of development.

Causes
Specific learning disabilities are generally thought to be biologic in origin, although the exact mechanisms and biology have not yet been determined.

Major psychiatric disturbances, social deprivation, or loss of vision or hearing can also produce poor learning skills and must be differentiated from specific disabilities.

History
• Current and past behavior and school performance (look for specific patterns and for hyperactivity, which is often associated with a learning disability)
• Perinatal history (perinatal asphyxia or intrauterine injury may play a role in some cases), prematurity
• Family history (such disorders often run in families)
• Early development: recognition of risk factors such as delayed language development
• Social, environmental, family and social factors, which may aggravate the problem (e.g. constant derision may lead to low self-esteem)
• History of meningitis, head trauma

Examination
Most aspects of the examination required to define a specific learning disability are performed by a psychologist and education specialists.

Perform a physical examination to rule out the following conditions:
• Hearing and vision problems
• Medical problems
• Fetal alcohol syndrome (FAS)
• Abuse
• Iron deficiency anemia
• Neurologic abnormality

Differential Diagnosis
• Poor school performance (common)
• Poor motivation (family disorganization)
• Global developmental delay (mental retardation)
• Depression
• Sensory disorders (e.g. hearing loss secondary to otitis media)
• Cerebral palsy

Management

Nonpharmacologic Interventions
• Advocate for the child in the education system
• Support the child's self-esteem
• Support child and parents or caregiver with behavioral strategies in conjunction with psychologic counseling and education
• Recommended (by Canadian Paediatric Society) video "1-2-3 Magic: Training your children to do what you want" (120 min.), 1990. Ask your family resource library, or order a copy ($39.95 US + $6.00 s/h) 1-800-442-4453.
• Arrange for treatment by specialists
Monitoring and Follow-Up

- Follow up two or three times a year with the child and the parents or caregiver to assess progress and provide support
- Liaise annually with the school (with parental consent)

Referral

- Most management of this problem should be done through the education system.
- Refer the child to a physician for evaluation as soon as possible (elective).
- A baseline assessment by a pediatrician is indicated.

Fetal Alcohol Spectrum Disorders

Introduction

Alcohol is a known teratogen that can cause birth defects by affecting the growth and proper formation of the fetus's body and brain (Olson et al 1992). Exposure to alcohol before birth can lead to long-term developmental disabilities in the form of motor, speech or behavioral problems. The range of disability varies, even for those with a diagnosis of fetal alcohol syndrome (FAS).

There is no definitive information as to the quantity of alcohol that may be safely consumed during pregnancy. Full-blown FAS is more likely to occur if intake of alcohol during pregnancy is heavy or continuous (Olsen 1992), but detrimental effects have also been observed after intermittent or binge drinking. Children born to mothers who consumed on average one or two drinks per day and who may occasionally have consumed up to five or more drinks at a time are at higher risk for learning disabilities and other cognitive and behavioral problems.

Abnormalities related to prenatal exposure to alcohol occur along a continuum. Many terms have been and are still used to describe the severity of these alcohol-related abnormalities.

- Fetal alcohol syndrome (FAS): Medical diagnosis referring to a set of alcohol-related disabilities associated with maternal use of alcohol during pregnancy. Recognized in Canada as one of the leading causes of preventable birth defects and developmental delay in children.
- Atypical FAS: Birth defects or developmental abnormalities for which alcohol is being considered one of the possible causes. Used to describe children with prenatal exposure to alcohol, but only some of the characteristics of FAS, including reduced or delayed growth, single birth defects, or developmental learning and behavioral disorders that may not be noticed until months or years after the child's birth.
  - Alcohol-related birth defects (ARBD)
  - Alcohol-related neurodevelopmental defects (ARND)

Collectively, these alcohol related developmental disabilities are now often referred to as Fetal Alcohol Spectrum Disorders (FASD).

The Canadian Paediatric Society (March 2002) advises healthcare professionals, including family physicians, pediatricians and others to whom children are referred, to increase their awareness of maternal alcohol use during pregnancy, so as to identify the possible causes of birth defects and other developmental disorders and to identify and prevent risks for subsequent pregnancies.

High-Risk Populations

Women who drink and have the following characteristics:

- Low socioeconomic status
- Poverty
- Lack of education
- Smoker
- Use of other illicit drugs
- Poor health

Higher prevalence rates have been found in Manitoba and British Columbia Aboriginal populations. Families with one or more children affected by FAS are at much higher risk of recurrence.

Recent research suggests women who have a college education or are still students, who are unmarried, who smoke and who come from...
households with an annual income of more than $50,000 are also at risk of having a baby with FASD.

**Diagnostic Criteria**

See Table 6-1 below

---

**Table 6-1 Age-related diagnostic criteria for fetal alcohol spectrum disorders (DSM-IV, 1994, American Psychiatric Association)**

<table>
<thead>
<tr>
<th>Age</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants</td>
<td>History of prenatal alcohol exposure</td>
</tr>
<tr>
<td></td>
<td>Facial abnormalities</td>
</tr>
<tr>
<td></td>
<td>Growth retardation – height, weight, head circumference</td>
</tr>
<tr>
<td></td>
<td>Hypotonia, increased irritability</td>
</tr>
<tr>
<td></td>
<td>Jitteriness, tremulousness, weak suck</td>
</tr>
<tr>
<td></td>
<td>Difficulty ‘habituating’, getting used to stimulation</td>
</tr>
<tr>
<td>Preschool</td>
<td>History of alcohol exposure, growth retardation, facial abnormalities</td>
</tr>
<tr>
<td></td>
<td>Friendly, talkative and alert</td>
</tr>
<tr>
<td></td>
<td>Temper tantrums and difficulty making transitions</td>
</tr>
<tr>
<td></td>
<td>Hyperactive; may be oversensitive to touch or over-stimulation</td>
</tr>
<tr>
<td></td>
<td>Apparent skill levels may appear to be higher than their tested levels of ability</td>
</tr>
<tr>
<td></td>
<td>Attention deficits, developmental delays – speech, fine motor difficulties</td>
</tr>
<tr>
<td>Middle childhood</td>
<td>History of alcohol exposure, growth retardation, facial abnormalities</td>
</tr>
<tr>
<td></td>
<td>Hyperactivity, attention deficit, impulsiveness</td>
</tr>
<tr>
<td></td>
<td>Poor abstract thinking</td>
</tr>
<tr>
<td></td>
<td>Inability to foresee consequences of actions</td>
</tr>
<tr>
<td></td>
<td>Lack of organization and sequencing</td>
</tr>
<tr>
<td></td>
<td>Inability to make choices</td>
</tr>
<tr>
<td></td>
<td>Lack of organizational skills</td>
</tr>
<tr>
<td></td>
<td>Inappropriate behaviour – overly affectionate – does not discriminate between family and strangers, lack of inhibitions</td>
</tr>
<tr>
<td></td>
<td>Communication problems – lack of social skills to make and keep friends, unresponsive to social clues, uses behaviour as communication</td>
</tr>
<tr>
<td></td>
<td>Difficulty making transitions</td>
</tr>
<tr>
<td></td>
<td>Academic problems – reading and mathematics</td>
</tr>
<tr>
<td></td>
<td>Behaviour problems – “stretched toddler”</td>
</tr>
<tr>
<td>Adolescent and adult</td>
<td>History of alcohol exposure, growth retardation, facial abnormalities</td>
</tr>
<tr>
<td></td>
<td>Intelligence quotient – average to mildly retarded with wide range; continued school difficulties</td>
</tr>
<tr>
<td></td>
<td>Difficulty with adaptive and living skills</td>
</tr>
<tr>
<td></td>
<td>Attention deficits, poor judgment, impulsivity leads to problems with employment, stable living and the law</td>
</tr>
<tr>
<td></td>
<td>Serious life adjustment problems – depression, alcoholism, crime, pregnancy and suicide</td>
</tr>
</tbody>
</table>

---

**Prevention Strategies**

Pregnancy presents the healthcare professional with an excellent opportunity to encourage behavioral change, as women are generally receptive to suggestions about controlling their alcohol consumption during pregnancy. According to the Canadian Paediatric Society (March 2002), prevention efforts should target women before and during their childbearing years, as well as those who influence such women, including their partners, their families and the community.

All efforts should be family-centered and culturally sensitive; should address the pregnant woman, her partner and her family in the context of their community; and should be comprehensive, drawing on all services appropriate to the often-
complex social, economic and emotional needs of these women

The CPS also recommends that healthcare professionals working with members and leaders of communities must be consistent in advising women and their partners that the prudent choice is not to drink alcohol during pregnancy

**Primary Prevention**

Become involved in educating women, their partners and the community in general about the adverse effects of alcohol on a fetus.

Goals of primary prevention:
• Early recognition of women who drink alcohol during pregnancy
• Appropriate counseling to reduce or eliminate alcohol use before conception and during pregnancy
• Early recognition and intervention for any child born with alcohol-related effects

Ask all female clients of childbearing age some basic questions about alcohol consumption:
• Do you use alcohol?
• Has alcohol ever caused a problem for you or your family?
• Do you regularly use any other drugs or substances (e.g. illicit drugs, prescription or OTC drugs)?

Discuss contraceptive methods with women and their partners and enhance access to contraception.

Encourage awareness of and access to community resources for alcohol abuse.

Be aware of, use and offer educational handouts on the effects of alcohol in pregnancy.

**Secondary Prevention**

According to the Canadian Paediatric Society (March 2002), healthcare professionals play an essential role in identifying women who drink at levels that pose a risk to the fetuses and to themselves. Screening should be implemented to identify women at high risk for heavy alcohol consumption before and during pregnancy. Similarly, healthcare professionals have a responsibility to inform women at risk and to initiate appropriate referrals and supportive interventions.

To identify any woman who is using alcohol during pregnancy, screen all pregnant women with basic questions about their alcohol use (see "Primary Prevention" above).

If the woman answers Yes to any of those questions, pose some additional screening questions to assess her level of risk:
• In a typical week, on how many days do you drink?
• On those days, how many drinks do you usually have?

In addition, administer a standard screening test, such as the T-ACE questionnaire
• T for tolerance: How many drinks does it take to make you feel high? (score 2 for more than 2 drinks, score 0 for 2 drinks or less)
• A for annoyance: Have people annoyed you by criticizing you about your drinking? (score 1 for a Yes response)
• C for cut down: Have you felt you should cut down on your drinking? (score 1 for a Yes response)
• E for eye opener: Have you ever had a drink first thing in the morning to get rid of a hangover or to steady your nerves? (score 1 for a Yes response)
• Any score ≥2 indicates high risk

For women identified as being at high risk of having a child with FASD, take the following steps:
• Ask such women why they drink
• Counsel pregnant women who are using alcohol about the effects of alcohol on the fetus and their own health
• Counsel pregnant woman on the benefits of stopping or reducing the use of alcohol at any time during the pregnancy
• Provide client with educational materials to facilitate behavioral change
• Follow up closely, and provide support and encouragement
The Canadian Pediatric Society (March 2002) recommends that healthcare professionals inform women who have occasionally consumed small amounts of alcohol during pregnancy that the risk to the fetus in most situations is likely minimal.

They should also explain that the risk is related to the amount of alcohol consumed, body type, nutritional health and other lifestyle characteristics of the expectant mother. If exposure has already occurred, healthcare professionals should inform the mother that stopping consumption of alcohol at any time will benefit both fetus and mother.

**Tertiary Prevention**
- Strategies should include early diagnosis of the condition and programs designed specifically for children with FASD and their parents or caregivers
- Refer women who are at high risk to appropriate treatment resources for alcohol abuse

- Identify and treat women and their partners who already have one FASD child and who plan to have more children

**Management**

**Appropriate Consultation**
Consult a physician as soon as possible about any child suspected of suffering the effects of alcohol in utero.

**Referral**
The care of a child with FASD requires a coordinated, multidisciplinary, team approach to maximize the child's potential for good quality of life.

There is a small window of opportunity, up to age 10 or 12, to achieve the greatest benefit for a child affected by alcohol in utero. This is the period when the greatest development of fixed neural pathways occurs, and thus when it is easiest to develop alternative coping pathways to work around damaged areas of the brain.
Attention Deficit Hyperactivity Disorder (ADHD)

Definition
A cluster of behavioral symptoms:
• Poor attention span
• Impulsiveness
• Hyperactivity

Not all children with the disorder will exhibit all three behaviors. For example, some very quiet children have a poor attention span.

Causes
Genetic Syndromes
• Fragile X syndrome
• Phenylketonuria (PKU)
• Gilles de la Tourette syndrome

Intrauterine or Prenatal Damage
• Fetal alcohol exposure
• Intrauterine anoxia

Postnatal Factors
• Prematurity
• Meningitis
• Significant head injuries

May be familiar without a specific cause. In most affected children, there is no obvious contributing cause.

History
• Prenatal: pregnancy, exposure to drugs or alcohol

• Perinatal: delivery, asphyxia, illnesses
• Family history: ADHD, related behavioral disorders
• Past medical history: illnesses such as meningitis, injuries, hospital admissions
• History of school progress and behavior (talk with teacher)
• Symptoms (see Table 6-2) usually present before child enters school

The diagnosis is usually established by the presence of at least 8 of 14 possible characteristics over a period of at least 6 months (Table 6-2).

Physical Examination
• Complete general examination: look for dysmorphic features of genetic conditions, FASD
• Examine ears and check hearing
• Examine eyes and check vision
• "Soft neurologic signs" often present (e.g. increased reflexes, poor coordination, poor balance)
• Educational evaluation done through the school system

Differential Diagnosis
• Acting-out behavior disorders
• Reaction to a highly stressful environment
• Deafness
• Pervasive developmental disorder (e.g. autism)
Table 6-2: Diagnostic criteria for Attention-Deficit/Hyperactivity Disorder (DSM-IV, 1994, American Psychiatric Association)

<table>
<thead>
<tr>
<th>A. Either (1) or (2):</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) six (or more) of the following symptoms of <strong>inattention</strong> have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:</td>
</tr>
<tr>
<td><strong>Inattention</strong></td>
</tr>
<tr>
<td>(a) often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities</td>
</tr>
<tr>
<td>(b) often has difficulty sustaining attention in tasks or play activities</td>
</tr>
<tr>
<td>(c) often does not seem to listen when spoken to directly</td>
</tr>
<tr>
<td>(d) often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions)</td>
</tr>
<tr>
<td>(e) often has difficulty organizing tasks and activities</td>
</tr>
<tr>
<td>(f) often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or home-work)</td>
</tr>
<tr>
<td>(g) often loses things necessary for tasks or activities (e.g. toys, school assignments, pencils, books or tools</td>
</tr>
<tr>
<td>(h) is often easily distracted by extraneous stimuli</td>
</tr>
<tr>
<td>(i) is often forgetful in daily activities</td>
</tr>
<tr>
<td>(2) six (or more) of the following symptoms of <strong>hyperactivity-impulsivity</strong> have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:</td>
</tr>
<tr>
<td><strong>Hyperactivity</strong></td>
</tr>
<tr>
<td>A. often fidgets with hands or feet or squirms in seat</td>
</tr>
<tr>
<td>B. often leaves seat in classroom or in other situations in which remaining seated is expected</td>
</tr>
<tr>
<td>C. often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness)</td>
</tr>
<tr>
<td>D. often has difficulty playing or engaging in leisure activities quietly</td>
</tr>
<tr>
<td>E. is often “on the go” or often acts as if “driven by a motor”</td>
</tr>
<tr>
<td>F. often talks excessively</td>
</tr>
<tr>
<td><strong>Impulsivity</strong></td>
</tr>
<tr>
<td>G. often blurts out answers before questions have been completed</td>
</tr>
<tr>
<td>H. often has difficulty awaiting turn</td>
</tr>
<tr>
<td>I. often interrupts or intrudes on others (e.g. butts into conversation or games)</td>
</tr>
</tbody>
</table>

| C. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years. |
| D. Some impairment from the symptoms is present in two or more settings (e.g. at school or work and at home). |
| E. There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning. |
| F. The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder (e.g. Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder) |

**Management**

**Goals of Treatment**
- Improve academic achievement
- Improve attention span
- Control hyperactivity (behavior)
- Decrease impulsivity

Appropriate management includes the involvement of a multidisciplinary team, of which educational specialists are the mainstay. Many specific methods can be used to overcome the child's weaknesses and take advantage of his or her strengths.
The medical role involves advocacy and sometimes the administration of medication. The school and the parents or caregiver should monitor for desired effects and side effects (e.g. impaired growth or tic).

**Nonpharmacologic Interventions**
- Support for the family
- Advocacy within the educational system and within the community
- Monitor medication use, dosage, side effects

**Client Education**
- Explain nature, course and treatment modalities of the disorder
- Stress importance of regular follow-up
- Counsel parents or caregiver about medication: appropriate use, dosage and side effects

**Behavioral Strategies**
Counsel parents or caregiver about behavioral strategies:
- Decrease environmental stimuli
- Focus on the child's positive traits to increase self-esteem
- Give simple directions
- Make eye contact with the child
- Use "time out" as a disciplinary tactic

**Pharmacologic Interventions**
Drug of choice: *methylphenidate (B class drug)*, starting dose 0.5 mg/kg in two doses, morning and noon and readjust according to response

This drug is not recommended for children <6 years of age.

This drug can improve concentration and, in higher doses, reduce hyperactivity. Its use is still controversial, and it should be prescribed only by a physician after full evaluation.

Drug-free periods during school holidays will result in catch-up growth.
Chapter 7 – Nutrition

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  General............................................................................................................................................................ 1
  Types Of Nutrients.......................................................................................................................................... 1

Infant Feeding Principles.................................................................................................................................. 1
  General............................................................................................................................................................ 1
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Feeding Choices................................................................................................................................................. 2
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Nutritional Principles

General
For normal growth, a child's nutritional intake must include protein, fat, carbohydrate, water, vitamins, minerals and trace elements in adequate amounts. For many nutrients, deficiency states can occur if intake is inadequate. Similarly, a variety of diseases are associated with excess intake of specified nutrients.

Types Of Nutrients
- **Energy** (expressed as kilocalories [kcal]): needed for metabolic functions and growth; available from protein, carbohydrate and fat
- **Protein**: contributes to energy intake and supplies amino acids for tissue growth and replacement
- **Carbohydrates**: provide caloric energy and thus help limit the need for protein and fat
- **Fats**: contribute substantially to energy needs because of high caloric density (9 kcal/g); some essential fatty acids are important for growth of the infant's nervous system
- **Water**: necessary to sustain life and growth
- **Vitamins**: essential cofactors in metabolic processes
- **Minerals**: necessary in small quantities for growth and metabolism; deficiency states are clinically recognized for only a few minerals

Infant Feeding Principles

General
Healthy infants obtain nutrition in a pattern that encourages social interaction with parents and caregivers. Thus, infant feeding provides both nutrition for growth and an opportunity for social interaction, both of which are crucial to the infant's well being. Infants should always be held while being fed in an effort to prevent nursing bottle caries of the teeth.

Adequacy Of Intake
Adequacy of intake is best determined by observing weight gain. Expected gain is as follows:
- 30 g/day in the first 3 months
- 15-20 g/day in the second 3 months

Six well-soaked diapers and yellowish stool daily are also indicators of adequate nutritional intake.

Average daily energy requirement is 115 kcal/kg during the first year of life, although there is some variation from one child to another. The average caloric content of formulas and breast milk is 20 kcal/oz or 67 kcal/100 mL (1 oz = 30 mL)
Feeding Choices

Breast-Feeding

In the first 6 months of life, an infant's requirements for water, energy and major nutrients can best be met by human milk.

For this reason, as well as for the emotional benefits to the child and the immunologic benefits in terms of protective effects against infection (especially in populations where refrigeration is lacking or water supplies are suspect), breast milk is the best choice for feeding infants.

Advantages

• Fewer respiratory, GI and otitis media infections
• Ideal food: easily digestible, nutrients well absorbed, less constipation
• Increased contact between mother and baby and, perhaps, added self-esteem for mother
• Economical, portable, affords ease of meeting infant's feeding needs quickly
• May decrease occurrence of allergies in childhood
• Mothers often like it more than bottle-feeding
• More rapid and complete reversion of mother's pelvis and uterus to non-puerperal state

Contraindications

• HIV infection or active TB
• Substances of abuse will pass into human milk; see Table 7-1, below, this chapter, for information about drugs that are passed into milk

Physiology

• Stimulation of areola causes secretion of oxytocin
• Oxytocin is responsible for letdown reflex, whereby milk is ejected from cells into milk ducts
• Sucking stimulates secretion of prolactin, which in turn triggers milk production
• Milk is therefore created in response to nursing, i.e. nursing increases the supply of milk

Technique

• Mother should be in a comfortable position, usually sitting or reclining with baby's head in crook of her arm (side-lying position is often useful following delivery by cesarean section)
• Bring baby to mother (to minimize stress on mother's back)
• Baby's belly and mother's belly should face each other or touch (belly-to-belly position)
• Initiate the rooting reflex by tickling baby's lips with nipple or finger; as baby's mouth opens wide, mother guides her nipple to back of the baby's mouth while pulling the baby closer; this maneuver will ensure that the baby's gums are sucking on the areola, not the nipple
• It is important that the baby be allowed to nurse within the first hour after birth

Positioning And Latching On

Source: Baby & Parent Health Program, Community Health Services, Halton Regional Health Department

Fig. 7-1: Cradle Position for Breast-Feeding

• Breast-feed in a sitting position, with good back support, as soon as possible.
• Place a pillow on your lap to bring baby to breast height.
• Position baby with his or her head resting on your forearm, facing you (belly to belly), with your hand supporting the diaper area.
• Baby's face should be across from the breast, the mouth across from the nipple and the head tilted slightly back.
• Place four fingers under breast and thumb on top, well back from nipple and areola.
• Lightly tickle baby's lower lip with nipple. Have patience.
• When mouth opens wide (as big as a yawn) quickly point nipple at opening and pull baby onto breast.
• If baby is positioned correctly, the nose should be resting on top of breast and not buried in breast tissue. Do not press on breast to make "breathing space."
• If there is pain, take baby away from breast and repeat.
• Check "latch." Mouth should be big with lips turned back. Chin should be well underneath breast, and nose should be resting on top.
• Listen for baby swallowing. If baby is feeding well, you will see short bursts of sucking and swallowing with pauses between. The jaw movement goes past the ears, sometimes making the ears wriggle.
• Let baby feed at first breast until he or she pushes nipple out of mouth; offer a burp and continue on other breast. The baby may not suck for as long on the second breast. Start on that side during the next feeding session.
• If baby starts wriggling during the feeding, he or she may need to burp. Take the baby off the breast, offer a burp and then latch on again.
• Each baby is different and each will take a different period of time to feed. If a feeding is taking an hour or more, the baby is probably not latched on properly. Contact someone to watch you nurse and check the latch.

If you have difficulty feeding your baby in the cradle position, try the football hold.

This hold can work well in the following situations:
• Cesarean birth
• Small baby
• Mother experiencing more difficulty with one side than the other
• Mother with flat nipples
Mother's Diet While Nursing
- Adequate caloric and protein intake
- Plenty of fluids
- Prenatal vitamins

Signs Of Adequate Nursing
- Breasts become hard before and soft after feeding (noted in the first few weeks after the birth)
- Six or more wet diapers in 24 hours
- Baby satisfied and weight gain appropriate (average 1 oz or 30 g per day in the first few months)
- Growth spurts should be anticipated around 10 days, 6 weeks, 3 months and 4-6 months
- During growth spurts, baby will nurse more often over a period of several days, which will increase milk production to allow for further adequate growth

Client Education

Antepartum
Promote advantages of breast-feeding early and regularly during the course of the pregnancy.

Postpartum
Counsel women on the following aspects of breast-feeding:
- Technique
- Natural history
- Colostrum present in breast at birth but may not be seen
- If baby is feeding well, he or she will be adequately nourished
- Milk will not come in before third day postpartum
- Frequent nursing (at least 9 times/24 hours) will lead to milk coming in sooner and in greater quantities
- Mother should allow baby to determine duration of each nursing session
- Baby will lose weight over the first few days and may not regain birth weight until 7 days
- Most supplemental vitamins are unnecessary, however as babies in northern communities have very limited exposure to sun vitamin D should be given; see "Vitamin and Mineral Supplements," below, this chapter
- Breast milk alone is adequate for first 6 months
- Solids may be introduced at 4-6 months (WHO now recommends 6 months for introduction of solids)

Mothers who are planning to return to work should start switching the baby to chosen alternative feeding about a week ahead of time, for the hours of the day when the mother will be away.

Breast Care
- Porous breast shields collect any milk that drips; shields should be changed when wet to prevent skin maceration
- Correct positioning, with nipple and areola well into the infant's mouth, helps prevent nipple soreness and cracked nipples
- For cracked nipples, express some milk, and allow the milk to air dry on the nipples; ensure the infant is latching on correctly
- When one nipple is sore, feedings should be started on the side that is not sore; it may be helpful to change the feeding position (e.g. from sitting to lying) when nipples are sore

Possible Complications

Plugged Milk Ducts
Mother is well except for sore lumps in one or both breasts, without fever.

Apply moist hot packs to lump(s) before and during nursing. The mother should nurse more frequently on the affected side. Ensure good technique.

Mastitis
Woman has a sore lump in one or both breasts, accompanied by fever or redness of the skin overlying the lump. She may be quite ill. Other possible sources of fever should be ruled out (in particular, endometritis and pyelonephritis).

Apply moist hot packs to the lump(s) before and during nursing. The mother should nurse more frequently on the affected side.

Administer antibiotics (e.g. cloxacillin, C class drug) for Staphylococcus aureus (the most common organism) for at least 7 days. The mother should get more rest and use acetaminophen as necessary. The fever should resolve within 48
hours; otherwise, consider changing the antibiotic. The lump should also resolve. A persistent lump may be an abscess, which must be drained surgically.

**Engorgement**
Engorgement usually develops just after milk first comes in (day 3 or 4). It is characterized by warm, hard, sore breasts.

To resolve, offer baby more frequent nursing. The mother may have to hand-express a little milk to soften the areola enough to let baby latch on. The baby should be allowed to nurse long enough to empty the breasts. The problem usually resolves within a day or two.

**Flat or Inverted Nipples**
When stimulated, inverted nipples will retract inward, whereas flat nipples remain flat. Check for either of these conditions during the initial prenatal physical.

Nipple shells (doughnut-shaped inserts, Woolwich shells) can be worn inside the bra throughout pregnancy to gently force the nipple through the center opening of the shell. The baby can nurse successfully even if the shell does not correct the problem before birth. A lactation consultant (available in Yellowknife) or a member of the La Leche League may be a good resource in this situation.

**Problems Of Lactation**
Source: Baby & Parent Health Program, Community Health Services, Halton Regional Health Department

**Insufficient Lactation**
This problem is almost always due to improper feeding techniques, which can be remedied. Occasionally, it is due to problems other than technique.

*Signs*
- Insufficient weight gain in an infant who is receiving food only by breast-feeding
- Infant may latch on poorly
- Infant may suck inconsistently
- Letdown reflex may be inconsistent
- Some infants appear hungry (indicated by crying soon after feedings), whereas others are content, but gain poorly

*Risk Factors*
- Mother has previous experience with this problem
- Physical abnormality of the breast
- No breast enlargement during pregnancy
- History of breast surgery

*Management*
Goal is always to preserve breast-feeding, if possible.
- Frequent feeding sessions
- Breast pumping (with an electric pump, if available) after each feeding
- Increase maternal fluid intake
- Ensure mother gets adequate rest
- Monitor the infant's well being

If signs of failure to thrive or dehydration appear, consult a lactation specialist and a physician. It may be necessary to give formula supplements after breast-feeding sessions, or a switch to formula feeding may be indicated.

**Breast Milk Toxicology**
Most maternal medications are secreted in some quantity into breast milk (Table 7-1). The risks of discontinuing the mother's medication must be weighed against the risks to the baby. Sometimes the medication can be replaced, and sometimes the effect on the baby is not sufficient for concern.

Any medication marked with an asterisk in Table 7-1 is an absolute contraindication to breast-feeding.
Table 7-1: Drugs and breast-feeding

<table>
<thead>
<tr>
<th>Drug</th>
<th>Excreted in milk</th>
<th>Possible effect on infant and recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>Yes</td>
<td>Infants more susceptible to effects</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>Yes</td>
<td>Diarrhea, candidiasis</td>
</tr>
<tr>
<td>ASA</td>
<td>Yes</td>
<td>Complications rare</td>
</tr>
<tr>
<td>Caffeine</td>
<td>Yes</td>
<td>Jitteriness possible</td>
</tr>
<tr>
<td>Carbamazepine</td>
<td>Yes</td>
<td>Decreased weight gain</td>
</tr>
<tr>
<td>Cephalaxin</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>Chlorpromazine</td>
<td>Yes (minimal)</td>
<td>Safe for infant</td>
</tr>
<tr>
<td>Codeine</td>
<td>Yes (trace)</td>
<td>Neonatal depression; no effect later in usual doses</td>
</tr>
<tr>
<td>Contraceptives</td>
<td>Yes</td>
<td>Uncertain long-term effects</td>
</tr>
<tr>
<td>Diazepam</td>
<td>Yes</td>
<td>Drowsiness; may increase jaundice; avoid in infants &lt; 1 month of age</td>
</tr>
<tr>
<td>Digoxin</td>
<td>Yes (minimal)</td>
<td>Usually none</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>Yes</td>
<td>Jaundice; avoid in infants &lt; 1 month of age</td>
</tr>
<tr>
<td>Isoniazid (INH)*</td>
<td>Yes</td>
<td>May be toxic to infant. <strong>Do not breastfeed</strong></td>
</tr>
<tr>
<td>Methyldopa</td>
<td>Yes</td>
<td>Galactorrhea</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>Yes (high)</td>
<td>Contraindicated in infants &lt; 6 months of age</td>
</tr>
<tr>
<td>Nitrofurantoin</td>
<td>Yes (trace)</td>
<td>Avoid</td>
</tr>
<tr>
<td>Nystatin</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>Penicillin</td>
<td>Yes</td>
<td>Usual antibacterial effects</td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>Yes</td>
<td>Lethargy</td>
</tr>
<tr>
<td>Phenytoin</td>
<td>Yes</td>
<td>Usually none</td>
</tr>
<tr>
<td>Prednisone</td>
<td>Yes</td>
<td>Usually no effects</td>
</tr>
<tr>
<td>Propranolol</td>
<td>Yes</td>
<td>Hypoglycemia; usually no effects</td>
</tr>
<tr>
<td>Propylthiouracil*</td>
<td>Yes</td>
<td>Risk of goiter in infant. <strong>Do not breastfeed</strong></td>
</tr>
<tr>
<td>Senna</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>Yes</td>
<td>Tooth discoloration. Use alternative medication</td>
</tr>
<tr>
<td>Theophylline</td>
<td>Yes</td>
<td>Irritability</td>
</tr>
<tr>
<td>Thiazide diuretics</td>
<td>Yes</td>
<td>Low risk of dehydration, electrolyte imbalance</td>
</tr>
</tbody>
</table>

**Formula Feeding**

**General Information**

Commercially prepared formulas resemble breast milk in protein, fat and carbohydrate composition. The immunological components are missing. Some other components (e.g. certain essential amino acids) may be lacking depending on the formulation. Commercial infant formula that is fortified with iron is now the standard recommendation for all infants who are fed formula from birth. Infants weaned from the breast before 9 months of age should receive an iron-fortified formula. **Evaporated milk formulas provide adequate energy and nutrient content and are less expensive, provided they are mixed**.
correctly. They lack an adequate supply of iron and may interfere with absorption of iron from other sources. The composition of whole cow's milk is inappropriate for infants and promotes blood loss from the gut. It should not be used in the first 9 or 10 months of life. Partly skimmed and skimmed milk should never be used in the first year of life, because the lack of fat can be difficult for the kidneys to handle. See Table 7-2 for volume and frequency of formula feeding.

Table 7-2: Approximate volume and frequency of feedings

<table>
<thead>
<tr>
<th>Age</th>
<th>No of bottles per 24 hours</th>
<th>Intake (mL/bottle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st week</td>
<td>6 – 10</td>
<td>30 – 80</td>
</tr>
<tr>
<td>1 – 4 weeks</td>
<td>7 or 8</td>
<td>60 – 120</td>
</tr>
<tr>
<td>1 – 4 months</td>
<td>4 or 5</td>
<td>210 – 240</td>
</tr>
<tr>
<td>5 – 9 months</td>
<td>3 or 4</td>
<td>210 – 240</td>
</tr>
</tbody>
</table>

When refrigeration is lacking, it is suggested that bottles be boiled before formula is prepared.

Recipes For Formula

Commercial Infant Formulas
- Ready to feed: give as is, without dilution
- Concentrate: mix 1:1 with water
- Powdered: follow instructions; over- or under-dilution of powdered formula can be dangerous

Evaporated Milk
3 oz milk + 5 oz water + 1 tbsp sugar = one 8-oz bottle (30 mL = 1 oz)

After 6 months, use 4 oz milk + 4 oz water (no added sugar)

Vitamin And Mineral Supplements

Children in some First Nations and Inuit communities may require fluoride supplementation, except if the community has high levels of natural fluoride in the water supply. The regional dental officer can provide information on the situation in your community.

Recommended dose of fluoride is as follows (Canadian Paediatric Society 1996):
- 6 months to 2 years: 0.25 mg/day
- 3-4 years: 0.50 mg/day
- >5 years: 1 mg/day

Multiple vitamins are generally not recommended, but Tri-Vi-Sol® with fluoride is an adequate preparation for children 0-2 years of age.

It is preferable to give vitamin D (e.g. D-Vi-Sol®) separately from fluoride (e.g. Pedi-Dent® or Karidium®).

Where mothers are forced by circumstances to use evaporated milk formula, appropriate mixing is essential (see below), and daily ferrous sulfate supplements (2 mg elemental iron per kilogram body weight) are recommended. For the at-risk infant (e.g. low birth weight and premature infants, extremes of poverty or a history of iron deficiency in siblings), provision from birth of daily supplemental iron through formula or Fer-In-Sol® is especially important.

In general, in the NWT we use surface water (from rivers and lakes) without natural fluoride as the water supply is largely produced by natural precipitation. Only a few large communities add fluoride as part of water treatment due to potential hazard of overfluoridation in small communities. Yellowknife, Inuvik, and Tuktoyaktuk have fluoride added to their water. Nahanni Butte, Wha Ti, Wrigley, and Fort Liard are on wells and would have some natural fluoride. (source EHO 25/7/2003)

Table 7-3 indicates requirement for vitamin D in relation to type of feeding. For infants living in northern communities, the recommended dose of vitamin D is 800 IU/day.
Table 7-3: Vitamin D requirements

<table>
<thead>
<tr>
<th>Type of feeding</th>
<th>Vitamin D requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>Yes</td>
</tr>
<tr>
<td>Commercial formula</td>
<td>No</td>
</tr>
<tr>
<td>Evaporated milk</td>
<td>No</td>
</tr>
<tr>
<td>Minimal cow’s milk with breast milk, juice supplements</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Solid Foods**

Iron-fortified infant cereal should be added to the diet as a first supplement at age 4-6 months (one grain type at a time). Prepared baby foods, if used, should be added initially in small quantities, one at a time, after cereals have been started. Vegetables or meats should be started before fruits.
Nutritional Deficiency Disorders

Nutritional deficiencies can present clinically as symptoms and signs in multiple body systems. Common body parts and systems affected include the skin, hair, nails, eyes, mouth, neck, and cardiovascular, musculoskeletal and neurologic systems. See Table 7-4 for information on the clinical manifestations of common nutritional deficiencies.

Table 7-4: Physical signs of nutritional deficiency disorders

<table>
<thead>
<tr>
<th>System</th>
<th>Sign</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>General appearance</td>
<td>Reduced weight for height</td>
<td>Calories</td>
</tr>
<tr>
<td>Skin and hair</td>
<td>Pallor</td>
<td>Anemias (iron, vit B&lt;sub&gt;12&lt;/sub&gt;, vit E, folate and copper)</td>
</tr>
<tr>
<td></td>
<td>Edema</td>
<td>Protein, thiamine</td>
</tr>
<tr>
<td></td>
<td>Nasolabial seborrhea</td>
<td>Calories, protein</td>
</tr>
<tr>
<td></td>
<td>Dermatitis</td>
<td>Riboflavin, essential fatty acids, biotin</td>
</tr>
<tr>
<td></td>
<td>Photosensitivity dermatitis</td>
<td>Niacin</td>
</tr>
<tr>
<td></td>
<td>Acrodermatitis</td>
<td>Zinc</td>
</tr>
<tr>
<td></td>
<td>Follicular hyperkeratosis (sandpaper-like)</td>
<td>Vitamin A</td>
</tr>
<tr>
<td></td>
<td>Depigmented skin</td>
<td>Calories, protein</td>
</tr>
<tr>
<td></td>
<td>Purpura</td>
<td>Vitamins C + K</td>
</tr>
<tr>
<td></td>
<td>Scrotal or vulval dermatitis</td>
<td>Riboflavin</td>
</tr>
<tr>
<td></td>
<td>Alopecia</td>
<td>Zinc, biotin, protein</td>
</tr>
<tr>
<td></td>
<td>Depigmented, dull hair</td>
<td>Protein, calories, copper</td>
</tr>
<tr>
<td>Subcutaneous tissue</td>
<td>Decreased</td>
<td>Calories</td>
</tr>
<tr>
<td>Eyes (vision)</td>
<td>Poor adaptation to dark</td>
<td>Vitamins A, E, zinc</td>
</tr>
<tr>
<td></td>
<td>Poor colour discrimination</td>
<td>Vitamin A</td>
</tr>
<tr>
<td></td>
<td>Bitot’s spots, xerophthalmia, keratomalacia</td>
<td>Vitamin A</td>
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<tr>
<td></td>
<td>Conjunctival pallor</td>
<td>Nutritional anemias</td>
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<td></td>
<td>Fundal capillary microaneurysms</td>
<td>Vitamin C</td>
</tr>
<tr>
<td>Face, mouth, neck</td>
<td>Angular stomatitis</td>
<td>Riboflavin, iron</td>
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<tr>
<td></td>
<td>Cheilosis</td>
<td>Vitamin B&lt;sub&gt;6&lt;/sub&gt;, niacin, riboflavin</td>
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<tr>
<td></td>
<td>Bleeding gums</td>
<td>Vitamins C + K</td>
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<tr>
<td></td>
<td>Atrophic papillae</td>
<td>Riboflavin, iron, niacin</td>
</tr>
<tr>
<td></td>
<td>Smooth tongue</td>
<td>Iron</td>
</tr>
<tr>
<td></td>
<td>Red tongue (glossitis)</td>
<td>Vitamins B&lt;sub&gt;6&lt;/sub&gt;, B&lt;sub&gt;12&lt;/sub&gt;, niacin, riboflavin, folate</td>
</tr>
<tr>
<td></td>
<td>Parotid swelling</td>
<td>Protein</td>
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<tr>
<td></td>
<td>Caries</td>
<td>Fluoride</td>
</tr>
<tr>
<td></td>
<td>Anosmia</td>
<td>Vitamins A, B&lt;sub&gt;12&lt;/sub&gt;, zinc</td>
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<td></td>
<td>Hypogeusia</td>
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<td></td>
<td>Goiter</td>
<td>Iodine</td>
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<td>Cardiovascular system</td>
<td>Heart failure</td>
<td>Thiamine, selenium, nutritional anemias</td>
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<td>Genital</td>
<td>Hypogonadism</td>
<td>Zinc</td>
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<td>Skeletal</td>
<td>Costochondral beading</td>
<td>Vitamins D, C</td>
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<td>Subperiosteal hemorrhage</td>
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<td>Cranial bossing</td>
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<td>Vitamin D</td>
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<td>Wide fontanel</td>
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<td>Vitamin D</td>
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<td>Epiphyseal enlargement</td>
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<td>Cranioptable</td>
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<td>Tender bones</td>
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<td>Vitamin C</td>
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<tr>
<td>Tender calves</td>
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<td>Thiamine, selenium</td>
</tr>
<tr>
<td>Spoon-shaped nails (koilonychias)</td>
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<td>Iron</td>
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<tr>
<td>Transverse nail lines</td>
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<td>Protein</td>
</tr>
<tr>
<td>Central nervous system</td>
<td>Sensory or motor neuropathy</td>
<td>Thiamin, vitamins E, B&lt;sub&gt;6&lt;/sub&gt;, B&lt;sub&gt;12&lt;/sub&gt;</td>
</tr>
<tr>
<td>Ataxia, areflexia</td>
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<td>Vitamin E</td>
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<td>Ophthalmoplegia</td>
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<tr>
<td>Tetany</td>
<td></td>
<td>Vitamin D, Ca++ , Mg+</td>
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<tr>
<td>Retardation</td>
<td></td>
<td>Iodine, niacin</td>
</tr>
<tr>
<td>Dementia, delirium</td>
<td></td>
<td>Vitamin E, niacin, thiamine</td>
</tr>
</tbody>
</table>

Source: Nelson's Essentials of Pediatrics (Behrman et al 1999)
Common Nutritional Problems

Obesity

**Definition**
An excess in weight of 20% or more relative to the calculated ideal weight for age, sex and height, determined from standard pediatric growth charts. Many Aboriginal children have a high weight-to-height ratio on standard growth charts. Rapid increases in weight-to-height ratios are of concern, as is obesity in older children.

**Causes**
- Most commonly exogenous, due to excessive caloric intake for basal needs and low energy output.
- Genetic influences: Obese children <3 years old without obese parents are at low risk for obesity in adulthood, but among older children, obesity is an increasingly important predictor of adult obesity, regardless of whether the parents are obese. Parental obesity more than doubles the risk of adult obesity among both obese and non-obese children <10 years old.

Risk factors influencing the development of obesity in children:
- Parental overweight
- Overweight at birth
- Physical inactivity
- Irregular snacking
- Poor food choices
- Lack of availability of variety of nutritious foods

**History**
- Child's birth weight
- Early feeding history
- Age at onset of obesity
- Dietary history (during the week and on weekends)
- Caloric intake beyond calculated norms for age
- Food preferences, snacks, where are meals eaten and with whom, moods associated with food
- Child and family feeding patterns
- Use of food as reward or part of social function

**Physical Findings**
- Overall appearance
- Blood pressure
- Weight and height (with exogenous obesity, linear growth is usually accelerated; with endocrine or metabolic disorders, linear growth is usually retarded)
- Hypoventilation (may suggest Pickwickian syndrome)
- Fat distribution
- Increased subcutaneous tissue
- Increased triceps skin-fold thickness
- Skin: striae, irritations (intertrigo)
- Stage of sexual maturation
- Presence of orthopedic problems (e.g. scoliosis, genu valgum, slipped femoral epiphyses)
- Other causes of obesity associated with signs relevant to underlying cause (e.g. hirsutism, acne, striae, hypertension, mental deficiency)

To rule out a congenital syndrome, check for hypogonadism, short stature, dysmorphic features, small extremities and mental retardation.

**Differential Diagnosis**
- Diabetes mellitus
- Hypothyroidism
- Cushing's disease
- CNS diseases (e.g. meningitis, brain tumors, cerebrovascular accident or head trauma may be associated with onset of obesity due to hyperphagia and decreased activity)
• Genetic or congenital disorders (e.g. Down's syndrome)

Complications
• Accelerated bone growth and skeletal maturation
• Accelerated maturation, with early menarche and decreased final height, often seen in girls
• Hyperinsulinemia
• Decreased levels of growth hormone
• Decreased levels of prolactin in girls
• Decreased levels of testosterone in boys
• Increased rates of amenorrhea and dysfunctional uterine bleeding in girls
• Hyperlipidemia
• Hypertension
• Choledocholithiasis
• Slipped capital femoral epiphyses
• Legge-Calvé-Perthes disease and genu valgum
• Increased respiratory illness in toddlers <2 years old
• Pickwickian syndrome (increased daytime sleepiness and hypoventilation)
• Obstructive sleep apnea
• Psychosocial sequelae (e.g. low self-esteem, abnormal body image, difficulty developing peer relationships, social withdrawal and isolation)
• Adult obesity

With more children becoming overweight, the prevalence of insulin-resistance causing type 2 diabetes in children is rising. The earlier diabetes begins, the earlier in life the complications tend to occur. The development of diabetes in children is a serious public health threat. See "Diabetes Mellitus in Aboriginal Children," in chapter 17, "Hematology, Endocrinology, Metabolism and Immunology."

Diagnostic Tests
• Random blood glucose by glucometry
• TSH and T4 levels (if child is of short stature)
• Urinalysis (for glucose)
• Lipid profile (in adolescents)
• Pelvic ultrasonography to rule out polycystic ovaries in adolescent girls with amenorrhea or dysfunctional uterine bleeding (this test must be ordered by a physician)

Management
Goals of Treatment
Change behavior so that more energy is used by the child for growth, activity and metabolic processes than is consumed. The whole family must be included in the management of this problem.

Appropriate Consultation
• Consult a physician if you suspect an underlying physiologic, metabolic or psychologic disorder as the cause of obesity
• In infants and toddlers, treatment should be cautious; consult a physician before any investigation or treatment is begun

Nonpharmacologic Interventions
Prevention
• Early preventive measures, with emphasis on families in which one or both parents are overweight
• Promotion of prolonged breast-feeding may help decrease the prevalence of obesity in childhood
• Because obese children have a high risk of becoming obese adults, such preventive measures may eventually result in a reduction in the prevalence of cardiovascular diseases and other related diseases
• For obesity due to other causes, underlying disorders must be treated

Older Children with Exogenous Obesity
• Program of decreased caloric intake and increased exercise over a long period
• Reducing television, videotape and video game use may be a promising, population-based approach to prevent childhood obesity

Monitoring and Follow-Up
Follow up monthly to monitor height and weight until optimal weight has been achieved.
Nutritional Rickets

Definition
A disorder characterized by failure of growing bone matrix to become mineralized. Under-mineralized bones are less rigid than normal, and bone deformities result.

Causes
- Vitamin D deficiency
- Calcium deficiency
- Phosphorus deficiency
- Component of multi-vitamin deficiency (northern infant syndrome)

Children at Risk
- Infants of mother whose prenatal diet contained little vitamin D
- Small, premature infants
- Breast-fed infants who do not receive vitamin D supplementation
- Children whose diet is lacking in vitamin D or who have insufficient exposure to sunlight
- Children with chronic renal insufficiency
- Children with biliary atresia or chronic liver disease
- Children with inflammatory bowel disease

History
- Diet containing little vitamin D (breast milk, tea, juices as primary fluid sources)
- Low exposure to sun because of pigmented skin or winter season
- Low vitamin D intake by mother during pregnancy
- Bone pain
- Delayed standing or walking
- Anorexia
- Seizures (due to low calcium)
- Pathologic fractures
- Family history of rickets

Physical Findings
- Growth slowed (short stature)
- Bossing deformity of the head
- Craniotabes
- Premature fusion of sutures
- Bowing of legs
- Thickening of costochondral junction (rachitic rosary)
- Prominence of wrists and knees
- Muscle weakness
- Awkward gait
- Dental caries
- Hepatic or renal enlargement (only if rickets is related to liver or renal disease)
- Seizures (due to low calcium) may be presenting complaint

Differential Diagnosis
- Chronic renal insufficiency
- Biliary atresia
- Chronic liver disease
- Inflammatory bowel disease

Complications
- Permanent leg bowing, occasionally requiring corrective surgery
- Contractures of the pelvis may cause difficulty with labour and delivery

Diagnostic Tests
Discuss any diagnostic tests with a physician.
- Knee and wrist x-ray, if available (one view only, as rickets is a symmetric condition)
- X-ray will show irregular cortices and bony margins, widened metaphyses, widened growth plates and osteopenia

Management
Nonpharmacologic Interventions
Preventive: encourage vitamin supplementation and milk intake (if mother not lactose intolerant) during pregnancy.

In communities where rickets is common, encourage nutrition education and vitamin D supplementation for all children <2 years old.
**Pharmacologic Interventions**

**Prevention: Recommendations of the Canadian Paediatric Society**

Source: Indian and Inuit Health Committee, Canadian Paediatric Society (1988; reaffirmed April 2000)

Infants who are entirely breast-fed should be given 400 IU/day of vitamin D. This amount may be increased to 800 IU/day during the winter for children living in the far North. The administration of 800 IU/day should be limited to children <2 years old, who are at greatest risk for rickets.

Infants who are bottle-fed with formulas made from fortified whole or canned milk have sufficient amounts of vitamin D during the summer but should receive a supplement of 400 IU/day of vitamin D during the winter.

Pregnant women and nursing mothers in the North should take 400 IU/day of vitamin D either as fortified milk or in addition to their vitamin and mineral supplementation, which provides 400 IU/day of vitamin D.

Children >2 years old who do not drink adequate amounts of milk enriched with vitamin D should be given 400 IU/day of vitamin D during the winter. The long days during the summer should provide enough sunlight to produce adequate amounts of endogenous vitamin D.

**Treatment**

Discuss with a physician the initial vitamin D dose for treating rickets. A common regimen is:

- vitamin D (*A class drug*), 400 units/mL;
- 5000 to 10,000 units/day for 5 weeks, followed by 400 units/day (curative dose)

**Monitoring and Follow-Up**

- Blood and urinary calcium levels should be monitored if vitamin D therapy is used
- Discuss frequency of monitoring with a physician

**Referral**

Refer all cases of suspected rickets to a physician for evaluation as soon as possible.

**Iron Deficiency Anemia In Infancy**

See "Iron Deficiency Anemia in Infancy," in chapter 17, "Hematology, Endocrinology, Metabolism and Immunology."
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For more information on the history and physical examination of the eyes in older children and adolescents, see Chapter 1, "The Eyes," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003

For many ocular diseases and conditions, clinical presentation and management are the same in adults and children. For more information, see Chapter 1, "The Eyes," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003
Assessment Of The Eyes

History Of Present Illness And Review Of System

**General**
The following characteristics of each symptom should be elicited and explored:
- Onset (sudden or gradual)
- Chronology
- Current situation (improving or deteriorating)
- Location
- Radiation
- Quality
- Timing (frequency, duration)
- Severity
- Precipitating and aggravating factors
- Relieving factors
- Associated symptoms
- Effects on daily activities
- Previous diagnosis of similar episodes
- Previous treatments
- Efficacy of previous treatments

**Cardinal Symptoms**
In addition to the general characteristics outlined above, additional characteristics of specific symptoms should be elicited as follows.

**Vision**
- Recent changes
- Blurring
- Corrective measures (glasses, contact lenses)

**Other Associated Symptoms**
- Pain
- Irritation
- Foreign-body sensation
- Photophobia
- Diplopia

- Lacrimation
- Itching
- Discharge
- Ear pain
- Nasal discharge
- Sore throat
- Cough
- Nausea or vomiting

**Medical History (Specific To Eyes)**
- Eye diseases or injuries
- Eye surgery
- Use of corrective eyeglasses or contact lenses
- Concurrent URTI
- Immunocompromise from other illness or medications
- Environmental exposure to eye irritants
- Systemic inflammatory disease (e.g. juvenile rheumatoid arthritis)
- Diabetes mellitus
- Chronic renal disease
- Bleeding disorders
- Allergies (especially seasonal)
- Current medications

**Personal And Social History (Specific To Eyes)**
- Concerns reported by parent, caregiver or teacher about child's vision (e.g. squinting, headaches caused by reading)
- Use of protective eyewear for sports and other activities
- Housing and sanitation conditions
- School or daycare exposure to eye infection
Physical Examination

Eye
Examine the bony orbit, lids, lacrimal apparatus, conjunctiva, sclera, cornea, iris, pupil, lens and fundi. Note the following:

- Visual acuity (which is decreased in keratitis, uveitis and acute glaucoma)
- Swelling
- Discharge or crusting
- Discoloration (erythema, bruising or hemorrhage)
- Position and alignment of eyes (e.g. strabismus): use corneal light reflex test, cover-uncover test
- Reaction of pupil to light
- Extraocular movements (which are associated with pain in uveitis)
- Visual field (test in older children if there is concern about glaucoma)

- Corneal clarity, abrasions and lacerations
- Lens opacities (cataracts)
- Red reflex (which is abnormal if there is retinal detachment, glaucoma or cataract)
- Hemorrhage or exudate
- Optic disk and retinal vasculature

Palpate the bony orbit, eyebrows, lacrimal apparatus and pre-auricular lymph nodes for tenderness, swelling or masses.

Apply fluorescein stain to test for corneal integrity (if there is a possibility that trauma has occurred).

An ENT examination, including the lymph nodes of the head and neck, should also be performed if there are symptoms of a systemic condition, such as viral URTI.
Common Problems Of The Eye

Red Eye

Definition
Inflammation in and around the structures of the eye.

Causes
There are numerous causes of red eye in children (Table 8-1).

Table 8-1: Features of various causes of red eye in children

<table>
<thead>
<tr>
<th></th>
<th>Conjunctivitis</th>
<th>Corneal injury or infection</th>
<th>Uveitis (Iritis)</th>
<th>Glaucoma</th>
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<tr>
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<td>Bacterial</td>
<td>Viral</td>
<td>Allergic</td>
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<td>Vision</td>
<td>Normal</td>
<td>Normal</td>
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<td>Pain</td>
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<tr>
<td>Photophobia</td>
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<tr>
<td>Foreign body sensation</td>
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<td>Pre-auricular adenopathy</td>
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<tr>
<td>Conjunctival hyperemia</td>
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<td>Diffuse</td>
<td>Diffuse</td>
<td>Ciliary</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>flush</td>
</tr>
<tr>
<td>Cornea</td>
<td>Clear</td>
<td>Sometimes faint punctate</td>
<td>Clear</td>
<td>Clear</td>
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<td></td>
<td></td>
<td>staining or infiltrates</td>
<td></td>
<td>or</td>
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<td>lightly</td>
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<td>Intraocular pressure</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Reduced</td>
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<td>Increased</td>
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</tbody>
</table>

+, present (to various degrees); -, absent; +/-, may be present

*Hyperthyroidism may cause conjunctival injection.

History
• An accurate history is very important
• History may point to a systemic illness such as juvenile rheumatoid arthritis or the possibility of trauma
• Ask about preceding viral URTI (which would indicate infectious conjunctivitis)
• Ask the child (if of an appropriate age) about visual acuity, pain on movement of the eye and contact with chemical agents or makeup (the last of which might indicate allergic conjunctivitis)
• For newborns, inquire about exposure to silver nitrate or the possibility of maternally acquired infections such as gonorrhea

Physical Findings
• Assess both eyes for symmetry
• Carefully document any evidence of external trauma
• Assess visual acuity and pupillary reaction, essential for measuring improvement or deterioration
• Examine the anterior segment of the globe with a small penlight, and use a fluorescent stain to assess for corneal abrasion or ulcers

• Assess ocular mobility by checking range of movement

Features Of Dangerous Red Eye
The first step is to differentiate major or serious causes of red eye from minor causes. The following danger signs call for urgent consultation and/or referral to a physician.
• Severe ocular pain, especially if unilateral
• Photophobia
• Persistent blurring of vision
• Exophthalmos (proptosis)
• Reduction of ocular movements
• Ciliary flush
• Irregular corneal reflection of light
• Corneal epithelial defect or opacity
• Pupil unreactive to direct light
• Worsening of signs after 3 days of pharmacologic treatment for conjunctivitis
• Immunocompromise (e.g. neonate, immunosuppression)

Differential Diagnosis
See Fig. 8-1.

• Ophthalmia neonatorum
• Conjunctivitis (bacterial, viral or allergic)
• Traumatic injury (e.g. corneal abrasion)
• Foreign body
• Glaucoma
• Uveitis (iritis)
• Periorbital or orbital cellulitis

Management
Some of the diseases (e.g. ophthalmia neonatorum) associated with red eye are covered in detail elsewhere in this chapter.

See table of contents of the chapter for topic headings.

Referral
When in doubt about the diagnosis or if there is significant associated ocular trauma or decreased visual acuity, urgent consultation with and referral to a physician is indicated.

For more details about the causes, assessment and management of conditions associated with red eye, see "Red Eye," in chapter 1, "The Eyes," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adults) 2003.
Fig 8-1: Differential Diagnosis of Red Eye

1. **Trauma?**
   - **yes**
     - Corneal fluorescein stain for ulcer
       - **positive**
         - Corneal abrasion
         - Foreign body
       - **negative**
         - Decreased vision or severe pain
   - **no**
     - Decreased vision or severe pain
       - **yes**
         - Conjunctivitis (allergic or infectious)
       - **no**
         - Assess for increased intraocular pressure and consult physician
           - **yes**
             - Glaucoma
             - Iritis
           - **no**
             - Iritis
**Conjunctivitis**

**Definition**
Inflammation of the conjunctival membrane of the eye. This is one of the most common causes of red eye in children.

**Causes**
Viral or bacterial conjunctivitis is common in children.

The allergic form is more common in adolescents. See "Conjunctivitis" (allergic type), in Chapter 1, "The Eyes," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003

**Bacterial Pathogens**
- Chlamydia
- *Hemophilus influenzae* (non-typable)
- *Neisseria gonorrhoeae*
- *Staphylococcus aureus*
- *Streptococcus pneumoniae*
- In an adolescent, gonococcal or chlamydial infection should be considered if the history is supportive of this diagnosis and the adolescent is sexually active

**Viral Pathogens**
- Adenovirus
- Enterovirus
- Epstein-Barr virus and herpes zoster virus (less common)
- Measles and rubella viruses

**History**
- Eye red and itchy
- Discharge or sticky eye common upon waking in the morning
- Sensation like that of sand in the eye
- Commonly, a viral URTI has preceded the eye infection
- Complicating bacterial infections, such as otitis media, may be evident
- Perform a general assessment if the child appears systemically ill (e.g. fever)

Children with mild viral or superficial bacterial conjunctivitis do not usually have significant systemic symptoms.

**Physical Findings**
- Assess both eyes for symmetry
- Carefully document all evidence of external trauma
- Assess visual acuity and pupillary reaction, essential for measuring improvement or deterioration - both should be normal
- Examine the anterior segment of the globe with a small penlight, and use a fluorescent stain to assess for corneal abrasion or ulcers if history or physical findings suggest corneal abrasion
- Assess ocular mobility by checking range of movement
- Check for reddened conjunctiva (unilateral or bilateral)
- Check for discharge (purulent, watery, milky), which is usually present
- Check for white granules (phlyctenules) on the edge of the cornea surrounded by erythema

**Differential Diagnosis**
- Infectious conjunctivitis
- Trauma
- Foreign body
- Allergic conjunctivitis
- Keratitis
- Glaucoma
- Uveitis (iritis)
- Periorbital or orbital cellulitis
- Measles-associated conjunctivitis

**Complications**
- Spread of infection to other eye structures
- Spread of infection to others

**Diagnostic Tests**
- Measure visual acuity if >3 years old
- Swab any drainage for culture and sensitivity
**Management**

**Goals of Treatment**
- Relieve symptoms
- Rule out more serious infections (e.g. uveitis)
- Prevent complications
- Prevent spread of infection to others

**Appropriate Consultation**
Consult a physician if any of the following occur:
- Significant associated eye pain
- Any deficit in visual acuity or colour vision
- Suspicion of keratoconjunctivitis or other more serious cause of red eye
- Evidence of periorbital cellulitis
- No improvement after 48-72 hours of treatment

**Nonpharmacologic Interventions**
- Supportive care and good hygiene for both forms of infectious conjunctivitis
- Cleansing of eyelids qid by application of compresses of saline or plain water
- Public health measures that support good hygiene (e.g. frequent hand-washing, use of separate clean face cloth and towels), because the condition is highly contagious

**Client Education**
- Counsel parents or caregiver about appropriate use of medications (dose, frequency, instillation)
- Advise parents or caregiver to avoid contamination of the tube or bottle of medication with the infecting organisms
- Suggest ways to prevent spread of infection to other household members
- Instruct parents or caregiver (and child, if of a suitable age) about proper hygiene, especially of hands and eyes
- For bacterial form: child may need school or daycare restrictions for 24-48 hours after treatment is initiated
- For viral form: contagious for 48-72 hours, but condition may last for 2 weeks
- Adenovirus is contagious for 2 weeks
- For allergic form: recommend that child avoid going outside when pollen count is high and that protective glasses be worn to prevent pollen from entering the eyes
- Do not use a patch for conjunctivitis

**Pharmacologic Interventions**
Never use steroid or steroid-and-antibiotic combination eye drops, because the infection may progress or a corneal ulcer may rapidly form and cause perforation.

**Bacterial Conjunctivitis**
Topical antibiotic eye drop: *polymyxin B gramicidin eye drops (C class drug)*, 2 or 3 drops qid for 5-7 days
or 
*erythromycin 5mg/1g (B class drug) qid x 7-10 days*

An antibiotic eye ointment may be used at bedtime in addition to the antibiotic eye drops pm: *erythromycin 5mg/1g (B class drug), hs*

These treatments should not be used for gonorrheal or herpetic eye infections, for which consultation is required.

**Viral Conjunctivitis**
Antibiotics are not helpful and are not indicated.

Normal saline washes often provide excellent symptomatic relief.

**Monitoring and Follow-Up**
Follow up appropriately in 2 or 3 days, or sooner if symptoms worsen.

**Referral**
Referral is indicated under the following circumstances:
- The diagnosis is in doubt and significant ocular infections (e.g. uveitis) cannot be ruled out
- There is associated trauma
- Visual acuity is decreased
- There is significant associated ocular pain
- The child's condition deteriorates or the symptoms persist despite treatment
- The condition recurs frequently
Allergic Conjunctivitis

See " Conjunctivitis" (allergic type), in chapter 1, "The Eyes," in the NWT Clinical Practice Guidelines for Primary Care Nurses (Adult) 2003
Ophthalmia Neonatorum

Definition
Severe conjunctivitis in newborns (<28 days of age).

This condition must be differentiated from the more common mild conjunctivitis, which has the same causes; see "Conjunctivitis," above, this chapter.

Causes
- Generally acquired from the maternal genital tract
- Bacterial organisms include Chlamydia and Neisseria gonorrhoeae
- Chlamydial infection is a very common STI in North America and is thus the more common cause of neonatal conjunctivitis
- Less commonly, Hemophilus strains, Staphylococcus aureus, Streptococcus pneumoniae and other gram-negative organisms may be involved

History
- Depends on causative organism

Gonorrhea
- Generally presents early (day 3-5 of life)
- Should be considered in any infant who presents with conjunctivitis at less than 2 weeks of age

Chlamydial Infection
- Children present with a history of eye redness and discharge after incubation period of 1-2 weeks
- Should be considered in any child who presents with conjunctivitis in the first 3 months of life and who does not respond to usual topical antibiotics for mild conjunctivitis

Physical Findings
The child may appear severely ill, but the physical findings are generally limited to the eye examination:
- Edema or erythema of the conjunctiva
- Purulent secretion
- Eyelids may be stuck together secondary to the purulent secretions

Differential Diagnosis
- Infectious conjunctivitis
- Trauma
- Nasolacrimal duct obstruction (dacyrostenosis)

Complications
- Gonorheal conjunctivitis (also known as GC conjunctivitis) may be fulminant, leading rapidly to extensive orbital infection and possibly blindness
- Systemic infections, including blood, joint and CNS infections, may occur secondary to N. gonorrhoeae infection

Diagnostic Tests
- Swab drainage for culture and sensitivity, N. gonorrhoeae and Chlamydia

It is important to rule out chlamydial infection by means of a Chlamydia antigen swab.

Management

Goals of Treatment
- Treat infection
- Prevent complications

Appropriate Consultation
Consult a physician immediately, before commencing treatment, especially if you suspect gonorrheal or chlamydial infection. See also "Conjunctivitis," above, this chapter.

Nonpharmacologic Interventions
- Prevention of perinatally acquired infections through prenatal clinics and screening and through STI control
- Appropriate follow-up of infected mother and her partner

Pharmacologic Interventions
Prevention
Routine prophylaxis with erythromycin ointment 5mg/1g (B class drug) for all newborns at birth.
Treatment of Chlamydia Infection

erythromycin ethylsuccinate suspension *(A class drug), 40 mg/kg daily, divided qid, PO for 14 days

Topical erythromycin ointment alone is not effective in eliminating nasopharyngeal colonization.

Referral

Refer all suspected cases of gonorrheal ophthalmia to a physician immediately. The child must usually be admitted to hospital for IV administration of antibiotics.

Refer all cases of Chlamydia infection to a physician if there is no improvement after 2 or 3 days of oral treatment.
Nasolacrimal Duct Obstruction (Dacryostenosis)

**Definition**
A congenital disorder of the lacrimal system characterized by blockage of the nasolacrimal duct and resulting in excessive tearing and mucopurulent discharge from the affected eye.

The condition occurs in approximately 2% to 6% of newborns. Onset is usually within the first few weeks of life.

**Cause**
Persistence of a membrane at the lower end of the nasolacrimal duct results in incomplete canalization of the duct and its consequent obstruction.

**History And Physical Findings**
- Usually unilateral but may be bilateral
- Conjunctival erythema and irritation minimal
- Tearing within the affected eye
- Pooling or puddling of tears
- Epiphora (frank overflow of tears)
- Accumulation of mucoid or mucopurulent discharge in the affected eye, which results in crusting (usually evident upon awakening)
- Erythema or maceration of the skin under the eye
- Expression of clear fluid or mucopurulent discharge when the area of the nasolacrimal sac is massaged, which may be intermittent or continuous over several months
- URTI may exacerbate the condition

**Differential Diagnosis**
- Early signs of congenital glaucoma
- Photophobia
- Cloudy cornea
- Excessive lacrimation

**Complications**
- *Dacryocystitis*: inflammation of the nasolacrimal sac, accompanied by edema, erythema and tenderness of the skin over the area of the affected duct (acute or chronic)
- *Pericystitis*: inflammation of the tissues surrounding the affected duct
- *Mucocele*: a bluish, subcutaneous mass below the medial canthal tendon
- *Periorbital cellulitis*: inflammation around the ipsilateral eye (this is an eye emergency)

**Diagnostic Tests**
- Eye swab for culture and sensitivity (if purulent discharge present)

**Management**
In 90% of cases, the condition resolves, with conservative management, once the child reaches 1 year of age.

**Goals of Treatment**
- Observe, to monitor for and prevent complications

**Nonpharmacologic Interventions**
- Provide reassurance to parents or caregiver
- Offer support and encouragement, as condition may take many months to resolve
- Recommend nasolacrimal massage two or three times daily, followed by cleansing of the eyelid with warm water
- Suggest gentle massage of lacrimal sac toward the nose, to clear the passage
- Teach parents or caregiver the signs and symptoms of complications, and instruct them to report any that occur

**Pharmacologic Interventions**
Topical antibiotics for mucopurulent drainage: *erythromycin 5mg/1g eye ointment (B class drug), hs*

**Referral**
Refer to a physician if the condition has not responded to conservative management by the time the child reaches 6 months of age or any time there are complications (e.g. dacryocystitis, pericystitis or periorbital cellulitis, an eye emergency).

A surgery consult may be necessary for lacrimal probing, which may be repeated once or twice. Definitive surgery is indicated if lacrimal probing (performed up to three times) fails to resolve the problem.
Strabismus (Squinting)

Definition
Any abnormality in the alignment of the eyes.

The classification of strabismus is complex. On an etiologic basis, it may be paralytic or non-paralytic, but it can also be classified as congenital or acquired, intermittent or constant, or convergent or divergent.

Pathogenesis
When the eyes are positioned so that an image falls on the fovea (the area of best visual acuity) of one eye, but not the other, the second eye will deviate so that the image falls on its fovea as well. This deviation may be up, down, in or out and results in strabismus.

- Esotropia: both eyes converge medially (crossed eyes)
- Esotropia: one eye deviates medially
- Exotropia: one eye deviates laterally
- Hypertrophia: one eye deviates upward
- Hypotrophia: one eye deviates downward

Early recognition and treatment are important for the development of both normal binocular vision and good cosmetic results. Persistent, untreated strabismus may lead to decreased visual acuity of the deviating eye. For best results, strabismus must be treated before the child reaches 5 years of age.

Main Types

Heterophoria
Intermittent (latent) tendency to misalignment.
- Eyes deviate only under certain conditions (e.g. stress, fatigue, illness)
- Common
- May be associated with transient double vision, headaches, eye strain

Heterotropia
Constant misalignment of eyes.
- Occurs because normal fusional mechanisms are unable to control eye deviation
- Child is unable to use both eyes to fixate on an object and learns to suppress the image in the deviating (non-fixating) eye
- Alternating: child uses either eye for fixating and the other eye deviates; vision develops normally in both eyes because there is no preference for fixation
- Consistent: one eye is used consistently for fixating, and the other eye consistently deviates; child is prone to defective development of vision in the deviating eye (because of constant suppression of the visual image)

Causes

Paralytic
- Weakness or paralysis of one or more ocular muscles
- Deviation is asymmetric
- Congenital: secondary to developmental defect in muscle or nerves or to congenital infection
- Acquired: due to extraocular nerve palsies; indicates a serious underlying problem (e.g. fracture of facial bone, CNS tumor, neurodegenerative disease, myasthenia gravis, CNS infection)

Non-paralytic
- Most common type of strabismus
- Extraocular muscles and the nerves that control them are normal
- Occasionally, this form may be secondary to underlying ocular or visual defects such as cataracts or refraction errors
- Overall, seen in 3% of children

Pseudostrabismus
Young infants have a broad nasal bridge; therefore, less of the inner eye is seen, which may give the impression of squinting.

Intermittent eye convergence (crossed eyes) in infants 3-4 months of age is usually normal but should be monitored. If it persists, the child should be evaluated by a physician.

History
- Family history (about 50% of cases are hereditary)
- Constant or variable squint in one or both eyes
- Squinting worse with fatigue or stress
• Child tilts head or closes one eye (compensatory mechanisms for weak eye)

**Physical Findings**
First assess the following:
• Extraocular eye movements (by having child visually follow an object): watch for asymmetry of movement
• Visual acuity (with Snellen or similar chart)

Then assess alignment with the following two main techniques.

*Corneal Light Reflex Test (Hirschberg Test)*
Direct a small, focal light toward the child's face, and observe the reflections in each cornea. If the eyes are aligned, the reflection should be on symmetric points of the corneas.

*Cover-Uncover Test*
Child is asked to fix gaze on an object.

Examiner alternately covers each eye, after allowing time for the eyes to drift.
• Normal alignment: no movement of either eye
• Phoria: when deviating eye is covered, it tends to move; therefore, when the deviating eye is uncovered, the examiner can observe the eye as it resumes its former position (Fig. 8-2), i.e. movement is seen on uncovering the deviating eye
• Tropia: when fixating eye is covered, the deviating (uncovered) eye moves, i.e. movement is seen on covering the deviating eye

**Complications**
• Amblyopia

**Diagnostic Tests**
None.

**Management**
**Goals of Treatment**
• Prevent complications

**Monitoring and Follow-Up**
A young infant with intermittent, non-paralytic strabismus may be kept under observation until he or she reaches 6 months of age, when referral may become necessary.

**Referral**
• Refer all children with suspected strabismus to a physician for evaluation
• All children with fixed (paralytic) strabismus need more urgent referral, particularly if the paralytic strabismus is acquired

Early referral and treatment give the best chance for good vision in both eyes and good ocular alignment.

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**Hordeolum Or Stye**

**Chalazion**

See "Hordeolum or Stye," and "Chalazion" in chapter 1, "The Eyes," in the NWT Clinical Practice Guidelines for Primary Care Nurses (Adult) 2003
Emergency Problems Of The Eye

Orbital Cellulitis

Definition
Bacterial infection of the deep tissues of the posterior orbital space.

Orbital cellulitis and periorbital cellulitis (see next section) may coexist in the same person.

Causes
Usually a serious complication of acute sinusitis or other facial infection or trauma.
- Streptococcus pneumoniae
- Hemophilus influenzae (non-typable)
- Branhamella catarrhalis
- Staphylococcus (less common)

History
- Preceding history of acute sinusitis (although such a history is not often present in young children, <6 years old)
- Often no obvious antecedent event in children
- Low- to high-grade fever
- Mild or marked swelling and pain on movement of the eye
- Mild to marked visual impairment

Physical Findings
- Inflammation and swelling of the surrounding orbital tissues and eyelids
- Exophthalmos (proptosis) may be present in severe cases
- Mild to moderate ophthalmoplegia (inability to move eye)
- Mild to significant decrease in visual acuity
- Child may appear mildly ill to moribund, depending on severity of infection

Assess for any neurologic complications and level of consciousness (see pediatric Glasgow coma scale, Table 15-1, in chapter 15, "Central Nervous System").

Differential Diagnosis
- Periorbital cellulitis
- Insect bite
- Allergic reaction
- Conjunctivitis
- Dacryocystitis
- Eczematoid dermatitis
- Rhabdomyosarcoma

Complications
- Intracranial cavernous sinus thrombosis (associated with signs of CNS irritation, puffiness of the face, deterioration in level of consciousness)
- Orbital or subperiosteal abscess
- Infection of other orbital structures
- Meningitis
- Intracranial abscess
- Blindness

Diagnostic Tests
- Swab any discharge for culture and sensitivity before starting antibiotics

Management
Goals of Treatment
- Treat infection
- Prevent complications

Appropriate Consultation
Consult a physician immediately.

Adjuvant Therapy
- Start IV therapy with normal saline to keep vein open

Client Education
- Explain to the parents or caregiver the nature, course, expected treatment and outcomes of disease

Pharmacologic Interventions
- IV antibiotics should be started urgently, before transport
- Discuss choice of antibiotics with a physician.
  Antibiotic of choice: cefuroxime (B class drug)

Referral
Medevac to hospital.
**Periorbital Cellulitis (Preseptal)**

**Definition**
Infection of the tissues anterior to the orbital septum.

Periorbital cellulitis and orbital cellulitis (see previous section) may coexist in the same person.

**Causes**
Bacteria gain access to the tissues around the orbit through trauma, skin pustules, insect bites, URTIs, infections of the teeth and occasionally sinusitis.

- *Hemophilus influenzae* (type B) - very important in children <5 years old
- *Staphylococcus aureus*
- *Streptococcus pyogenes*

**History**
- May be a preceding history of trauma or insect bites to the eye area, but frequently there is no antecedent history
- Child may have other systemic features, such as fever and irritability
- Parents or caregiver may have noticed that the eyes are swollen to the point of shutting
- Examination of the child may be very difficult, because of edema, pain and anxiety

**Physical Findings**
- Child febrile, ill-looking
- No pain on movement of the eye
- Visual acuity usually normal (if it can be assessed)
- Orbital edema and erythema
- Discharge from the eyelid and surrounding tissues

Unless other complications have occurred, the child should show no evidence of neurologic problems.

**Differential Diagnosis**
- Orbital cellulitis

**Complications**
- CNS infection
- Meningitis

**Diagnostic Tests**
- Swab any discharge for culture and sensitivity before starting antibiotics

**Management**

**Appropriate Consultation**
Consult a physician for all cases of suspected periorbital cellulitis.

**Client Education**
- Explain to parents or caregiver the nature, course, expected treatment and outcomes of the disease
- If child is being treated on an outpatient basis, counsel parents or caregiver about appropriate use of medications (dose, route, side effects)

**Pharmacologic Interventions**
Discuss with a physician. If the infection is extensive, IV antibiotics may have to be started before transfer to hospital. If the infection is mild or moderate, the physician may decide to treat the child as an outpatient, using oral antibiotics (e.g. amoxicillin/clavulanate)

**Referral**
Medevac for admission to hospital and treatment with IV antibiotics may be needed for more severe infections.
Corneal Abrasion
Conjunctival, Corneal Or Intraocular Foreign Bodies
Acute Angle-Closure Glaucoma
Chemical Burns
Blunt Or Lacerating Ocular Trauma
Uveitis (Iritis)

For the above emergency problems of the eye see Chapter 1, "The Eyes," in the NWT Clinical Practice Guidelines for Primary Care Nurses (Adult) 2003
Chapter 9 – Ears, Nose And Throat (ENT)

Assessment Of The Ears, Nose And Throat

History Of Present Illness And Review Of System
Examination Of The Ears, Nose And Throat

Common Problems Of The Ears, Nose And Throat

Otitis Externa
Acute Otitis Media
Chronic Otitis Media (Purulent Draining Ear)
Serous Otitis Media (Otitis Media With Effusion)
Foreign Body In The Nose
Stomatitis
Pharyngitis
Pharyngitis
Viral Pharyngitis
Sinusitis

Emergency Problems Of The Ear, Nose And Throat

Retropharyngeal And Peritonsillar Abscess
Epistaxis

Common Dental Problems In Infants

Eruption Cyst
Epstein's Pearls
Neonatal Teeth
Normal Tooth Development

Common Oral And Dental Problems In Older Children

Ankyloglossia (Tongue-Tie)
Migratory Glossitis (Geographic Tongue)
Thumb Sucking
Congenital Absence Of Teeth (Anodontia)
Partial Absence Of Teeth (Oligodontia)
Other Common Abnormalities Of The Teeth
Common Malocclusions
Dental Caries
Milk Caries

For more information on the history and physical examination of the ears, nose and throat in older children and adolescents, see Chapter 2, "Ears, Nose and Throat (ENT)," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003

For otitis externa, chronic otitis media (purulent draining ear) and sinusitis, clinical presentation and management are the same in adults and children. For information on these conditions, see chapter 2, "Ears, Nose and Throat (ENT)," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003
Assessment Of The Ears, Nose And Throat

History Of Present Illness And Review Of System

General
The following characteristics of each symptom should be elicited and explored:
- Onset (sudden or gradual)
- Chronology
- Current situation (improving or deteriorating)
- Location
- Radiation
- Quality
- Timing (frequency, duration)
- Severity
- Precipitating and aggravating factors
- Relieving factors
- Associated symptoms
- Effects on daily activities
- Previous diagnosis of similar episodes
- Previous treatments
- Efficacy of previous treatments

Cardinal Symptoms
In addition to the general characteristics outlined above, additional characteristics of specific symptoms should be elicited, as follows.

Ears
- Recent changes in hearing
- Itching
- Earache
- Discharge
- Tinnitus
- Vertigo
- Ear trauma

Nose
- Nasal discharge or postnasal drip
- Epistaxis
- Obstruction of airflow
- Sinus pain
- Itching
- Nasal trauma

Mouth and Throat
- Dental status
- Oral lesions
- Bleeding gums
- Sore throat
- Dysphagia (difficulty swallowing)
- Hoarseness or recent voice change

Neck
- Pain
- Swelling
- Enlargement of glands

Other Associated Symptoms
- Fever
- Malaise
- Nausea and vomiting

Medical History (Specific To ENT)
- Seasonal allergies
- Frequent ear or throat infections
- Sinusitis
- Trauma to head or ENT area
- ENT surgery
- Audiometric screening results indicating hearing loss
- Prescription or OTC medications used regularly

Family History (Specific To ENT)
- Others at home with similar symptoms
- Seasonal allergies
- Asthma
- Hearing loss

Personal And Social History (Specific To ENT)
- Feeding methods (breast or bottle), bottle propping
- Frequent exposure to water (swimmer's ear)
- Use of foreign object to clean ear
- Insertion of foreign body in ear
- Crowded living conditions
- Poor personal hygiene
- Exposure to cigarette smoke, wood smoke or other respiratory toxins
Examination Of The Ears, Nose And Throat

**General Appearance**
- Apparent state of health (e.g. appearance of acute illness)
- Hydration status
- Degree of comfort or distress
- Colour (flushed or pale)
- Character of cry (infants < 6 months old)
- Activity level (spontaneous activity or lethargy)
- Mental status (whether alert and active)
- Degree of cooperation, consolability
- Emotional reaction to parent (or caregiver) and examiner
- Hygiene
- Posture
- Difficulty with gait or balance

**Safety Tip**
For examination, it may be necessary to restrain a struggling child. For example, lay the child in a supine position and have the parent or caregiver hold the child's arms extended, in a position close to the sides of the head. This will limit side-to-side movements while you are examining ENT structures. Brace the otoscope, and guard against sudden head movements.

**Ears**

**Inspection**
- External ear: position (in relation to eyes) - low-set or small, deformed auricles may indicate associated congenital defects, especially renal agenesis
- Pinna: lesions, abnormal appearance or position
- Canal: discharge, swelling, redness, wax, foreign bodies
- Eardrum: colour, light reflex, landmarks, bulging or retraction, perforation, scarring, air bubbles, fluid level

Estimate hearing by producing a loud noise (e.g. by clapping hands) for an infant or young child (which should elicit a blink response) or by performing a watch or whisper test for an older child. Perform tympanography (if equipment available).

Clinical tip: For the best view of the eardrum in an infant or a child < 6 years old, pull the outer ear upward, outward and backward.

**Palpation**
- Tenderness over tragus or mastoid process
- Tenderness on manipulation of the pinna
- Pre- or post-auricular nodes

**Nose**

**Inspection**
- External: inflammation, deformity, discharge, bleeding
- Internal: colour of mucosa, edema, deviated septum, polyps, bleeding points
- Transilluminate sinuses to check for dulling of light reflex

**Palpation and Percussion**
- Check for sinus and nasal tenderness (only in older children who can cooperate and provide a response)

**Mouth And Throat**

**Inspection**
- Lips: colour, lesions, symmetry
- Oral cavity: breath odor, colour, lesions of buccal mucosa
- Teeth and gums: redness, swelling, caries
- Tongue: colour, texture, lesions, tenderness of floor of mouth
- Throat: colour, tonsillar enlargement, exudate

**Neck**

**Inspection**
- Symmetry
- Swelling
- Masses
- Redness
- Enlargement of thyroid

**Palpation**
- Tenderness, enlargement, mobility, contour and consistency of nodes and masses
- Thyroid: size, consistency, contour, position, tenderness
Common Problems Of The Ears, Nose And Throat

Otitis Externa

See "Otitis Externa," in chapter 2, "Ears, Nose and Throat (ENT)," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003

Acute Otitis Media

Definition

Acute suppurative infection of the middle ear, often preceded by a viral upper respiratory tract infection (URTI). Spontaneous recovery in 80%.

Occurs more frequently in the following groups and situations:
- Children with cleft palate
- Children with Down's syndrome
- Daycare environment
- Children of Aboriginal origin
- Possibly bottle-fed children, if the child is propped up for feeding or goes to sleep with a bottle of milk at night
- Children who use pacifiers when sleeping at night
- Children 6 months to 3 years old
- During winter months
- More common in boys than girls
- Children exposed to cigarette smoke

Causes

Viral Organisms
- In 25% to 30% of cases
- Respiratory syncytial virus (RSV)
- Influenza A virus
- Coxsackievirus
- Adenovirus
- Parainfluenza virus

Less Common Organisms
- Mycoplasma
- Chlamydia

Common Bacterial Organisms
- *Streptococcus pneumoniae* (40%)
- *Hemophilus influenzae*, untypable (25%)
- *Moraxella catarrhalis* (10%)
- *Streptococcus pyogenes*
- *Pseudomonas aeruginosa*
- *Staphylococcus aureus*

Other Miscellaneous Causes
- Immunoreactivity
- Allergic rhinitis

History

- Otalgia (pain is absent in 20% of children)
- Fever
- Irritability (in infants)
- Hearing loss
- Vomiting or diarrhea may be present
- Non-specific sensation of tugging at ears
- Restless sleep

Physical Findings

- Fever
- May appear acutely ill

Inspection of the tympanic membrane is the key to diagnosis:
- Light reflex and bony landmarks usually disappear in acute otitis media
- Tympanic membrane appears dull, red and bulging in acute otitis media
- Reduction in or lack of movement of the tympanic membrane on pneumatic otoscopy

Wax and other debris should be removed from the ear canal to allow a clear view of the tympanic membrane.

Redness of the tympanic membrane in the absence of other signs may be due to crying agitation, a common cold, aggressive examination or manipulation of the external ear canal, or serous
otitis media with effusion (see "Serous Otitis Media [Otitis Media with Effusion]," below, this chapter).

**Guidelines for Pneumatic Otoscopy**

Anyone can learn pneumatic otoscopy, but practice is needed. This method consists of applying air pressure to the tympanic membrane and watching the resultant movement.

- Tools: a battery-operated bright light with a well-charged battery and a hermetically sealed otoscope with pneumatic attachment
- Client must remain still during the examination (it may be necessary to restrain a child)
- Apply positive pressure (by squeezing a full bulb) and negative pressure (by releasing the bulb), and observe any movement of the eardrum
- Lack of movement implies the presence of fluid in the middle ear or chronic stiffness of the tympanic membrane

**Differential Diagnosis**

- Acute otitis externa
- Pharyngitis or tonsillitis
- Non-infectious middle ear effusion
- Trauma to or foreign body in ear canal
- Referred pain from dental abscess
- Mastoiditis (rare)

**Complications**

- Perforated tympanic membrane
- Serous otitis media
- Mastoiditis (rare)

**Diagnostic Tests**

- Swab any drainage for culture and sensitivity

**Management**

**Goals of Treatment**

- Control pain and fever
- Relieve infection
- Prevent complications
- Avoid unnecessary use of antibiotics

**Appropriate Consultation**

Usually not necessary if condition is uncomplicated.

**Client Education**

- Recommend increased rest in the acute febrile phase
- Counsel parents or caregiver about appropriate use of medications (dosage, compliance, follow-up)
- Explain disease course and expected outcome
- Recommend avoidance of flying until symptoms have resolved
- Discourage prop feeding with bottle

**Pharmacologic Interventions**

Antipyretic and analgesic for fever and pain: *acetaminophen (A class drug), 10-15 mg/kg PO q4-6h prn*

If there is any doubt about the diagnosis, and there is a possibility that the child does not have acute otitis media, do not give antibiotics. In 70% of cases, acute otitis media resolves on its own with supportive care only.

Antibiotic therapy, first-line drug: *amoxicillin (C class drug), 40 mg/kg per day, divided tid, PO for 10 days*

Consider second-line antibiotic therapy under the following conditions:

- Penicillin allergy, give: *cefuroxime axetil (B class drug) 40 mg/kg/day, divided bid, PO for 10 days*

  - Acute otitis media unresponsive to a 3- or 4-day trial of amoxicillin and accompanied by persistent fever, irritability or pain
  - Early recurrence of otitis media (< 2 months after initial bout), which is often due to bacteria that produce β-lactamase and are thus resistant to amoxicillin, pneumococci with reduced susceptibility to penicillins or cephalosporin, or organisms resistant to cotrimoxazole
  - Immunocompromise (e.g. leukemia)
  - Infection in newborns <2 months old
  - Preference for alternative dosing schedule (e.g. working parents): *cotrimoxazole suspension (C class drug), 6-10 mg/kg daily, divided bid, PO for 10 days*
Drug choice should be based on efficacy, cost and acceptability to the child.

Antihistamines and decongestants have no proven efficacy in the treatment of acute otitis media and should be avoided.

**Monitoring and Follow-Up**
Instruct parents or caregiver to bring the child back to the clinic in 3 days if symptoms do not diminish or if symptoms progress despite therapy.

Otherwise, follow up in 14 days:
- If ear is normal, do not give any treatment
- If ear is still dull but asymptomatic (no pain or hearing loss), follow up again in 6 weeks
- If condition is unresolved, with persistent symptoms, consider treatment with a second-line antibiotic

Look for development of serous otitis media.

Assess hearing 1 month after treatment is complete.

In 70% to 80% of patients, effusion persists after 2 weeks, and 10% still have effusion at 3 months and may exhibit conductive loss of hearing (see "Serous Otitis Media [Otitis Media with Effusion]," below, this chapter).

**Referral**
Not necessary if condition is uncomplicated.

**Recurrent Acute Otitis Media**
Recurrence of this condition is very common in children.

- If infection recurs less than 2 months after the previous infection, use one of the second-line antibiotics
- If infection recurs more than 2 months after the previous infection, treat as acute otitis media with amoxicillin

**Antibiotic Prophylaxis Guidelines**
Consider prophylaxis in children who have had multiple episodes of acute otitis media (three episodes in 6 months). Prophylaxis is intended for prevention primarily during the winter months. Consult with a physician before starting prophylaxis. Given increasing antibiotic resistance, antibiotic prophylaxis is no longer recommended.

*amoxicillin (C class drug), 20 mg/kg daily PO hs or (in older children) cotrimoxazole (C class drug), 4-20 mg/kg daily PO hs*

**Monitoring and Follow-Up**
- Assess compliance with medication for treatment of acute episode and for prophylaxis
- Observe closely for acute recurrent attacks
- Assess hearing monthly

**Referral**
Refer to a physician any child with multiple episodes of acute otitis media (more than five episodes in a single year) that are unresponsive to medical management. An ENT consultation is advisable.

Myringotomy with insertion of T-tubes (plus adenoidectomy) may be indicated. See "Bugs and Drugs" (2001), page 94, for list of when to refer for myringotomy tubes.

**Chronic Otitis Media (Purulent Draining Ear)**
Otitis media is considered chronic or persistent in the following situations:
- Six episodes by 6 years of age
- Five episodes within 1 year
- Three episodes within 6 months

The diagnosis and management of chronic otitis media in children is the same as in adults. See "Chronic Otitis Media (Purulent Draining Ear)," in chapter 2, "Ears, Nose and Throat (ENT)," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003
Serous Otitis Media (Otitis Media With Effusion)

Definition
Presence of non-infective fluid in the middle ear for longer than 3 months (following a bout of acute otitis media) without evidence of acute infection.

Cause
- Unclear
- Bacteria are isolated from a significant proportion of middle-ear aspirates

History
- Previous asymptomatic otitis media
- Feeling of fullness in the ear
- Tinnitus (uncommon)
- Hearing reduced (as indicated by hearing examination)

Physical Findings
- Tympanic membrane dull, translucent or bulging; landmarks diminished or absent
- Reduction of mobility of tympanic membrane, indicated by pneumatic otoscopy (for description of technique, see "Acute Otitis Media," above, this chapter)

Differential Diagnosis
- Acute otitis media
- Dysfunction of eustachian tube

Complications
- Secondary infection
- Chronic serous otitis media
- Hearing loss

Complicating factors, such as nasal allergy, submucous clefts and nasopharyngeal tumors, must be excluded.

Diagnostic Tests
- Tympanography (if available) may support the diagnosis of effusion

Management

Goals of Treatment
- Prevent hearing loss

Nonpharmacologic Interventions
- Observation for 2-3 months is appropriate
- Ensure appropriate seating at school (e.g. close to front of classroom)
- Encourage compliance and regular follow-up
- Encourage parents or caregiver to speak clearly and directly to child
- Measure hearing by audiology if effusion persists at 2-3 months

Pharmacologic Interventions
None. Antihistamines, decongestants and steroids have no proven efficacy.

Monitoring and Follow-Up
- Check ears and hearing every 2 weeks
- In a young child, follow for language development while effusion persists

Appropriate Consultation
Consult a physician about antibiotic therapy if effusion persists for more than 3 months.

Referral
Refer to a physician if the effusion persists.

An ENT consultation regarding surgical management may be indicated.

General indications for myringotomy and T-tubes:
- Persistent effusion for more than 6 months, with associated hearing loss
- Recurrent, acute ear infections in addition to chronic effusion and anatomic alteration of the tympanic membrane (e.g. retraction pocket, granulomas)
- Poor language development
Foreign Body In The Nose

Children frequently put foreign bodies in their nostrils. Occasionally, the foreign body (anything from a small pea to a small bead or toy part) obstructs the airway or becomes embedded, causing significant infection.

History
• Generally unilateral
• History of purulent rhinorrhea and difficulty with breathing through the affected nostril
• Typically, the parent or caregiver relates that a very foul smell is emanating from the child
• Fever and other systemic features uncommon

Physical Findings
• Obvious mucopurulent discharge, generally unilateral
• Nasal blockage may be so severe that adequate visualization of the foreign body is impossible
• Suction may be necessary to visualize the foreign body

It is important to explore the opposite nostril and ears for other foreign bodies.

Differential Diagnosis
• Sinusitis

Complications
• Sinus infection
• Epistaxis

Diagnostic Tests
None.

Management
Goals of Treatment
• Relieve obstruction
• Prevent recurrence

Nonpharmacologic Interventions
Foreign bodies can usually be removed by means of a blunt plastic hook. The hook can be maneuvered along the wall of the nostril beyond the foreign body, then turned inward to rest behind the foreign body, and finally pulled out.

Round, smooth, hard objects may be more difficult to remove. If such an item has become embedded behind granulation tissue, consultation with an ENT specialist and removal under general anesthesia may be necessary.

It is not recommended to attempt removal of a foreign body beyond the dictates of common sense. The child will become increasingly frightened and the procedure increasingly difficult.

Educate the parents or caregiver about the problems associated with foreign bodies, particularly the risk of aspiration and the need to remove foreign bodies under general anesthetic.
Stomatitis

**Definition**
Ulcers and inflammation of the tissues of the mouth, including the lips, buccal mucosa, gingiva and posterior pharyngeal wall.

**Causes**
For most cases in young children:
- Herpes simplex virus
- Coxsackievirus

**History**
- Fever
- Pain
- Drooling
- Difficulty swallowing
- Decreased nutritional intake
- Associated respiratory or GI symptoms
- Associated skin rash

**Physical Findings**
- Temperature increased in infectious types (temperature is often very high with herpes infection)
- Painful lesions

Examine outside of lips first. Next, gently retract the lips with a tongue depressor to examine the anterior buccal mucosa and gingiva. Then gently attempt to separate teeth and depress the tongue. Look for the following features:
- Erythema (herpangina)
- Vesicles (early stages of all infectious types)
- Ulcers: check distribution (confluent ulcers may appear as large, irregular white areas)
- Submandibular lymph nodes (most prominent in herpes)

See Table 9-1 for the features of common forms of stomatitis.

### Table 9-1: Features of common forms of stomatitis in children

<table>
<thead>
<tr>
<th>Disease</th>
<th>Cause</th>
<th>Type of lesions</th>
<th>Site</th>
<th>Diameter</th>
<th>Other features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herpangina or hand-foot-and-mouth disease</td>
<td>Coxsackievirus, echovirus, enterovirus 71</td>
<td>Vesicles and ulcers with erythema</td>
<td>Anterior pillars, posterior palate, pharynx and buccal mucosa</td>
<td>1 – 3 mm</td>
<td>Dysphagia, vesicles on palms of hands and soles of feet and in mouth</td>
</tr>
<tr>
<td>Herpes stomatitis</td>
<td>Herpes simplex virus</td>
<td>Vesicles and shallow ulcers, which may be confluent</td>
<td>Gingiva, buccal mucosa, tongue, lips</td>
<td>&gt; 5 mm</td>
<td>Drooling, coalescence of lesions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Duration about 10 days</td>
</tr>
<tr>
<td>Aphthous stomatitis</td>
<td>Unknown</td>
<td>Ulcers with exudate</td>
<td>Buccal mucosa, lateral tongue</td>
<td>&gt; 5 mm</td>
<td>Pain, no fever</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Usually only one or two lesions</td>
</tr>
</tbody>
</table>

**Differential Diagnosis**
- Vincent's infection (Vincent's angina)
- Lichen planus
- Mononucleosis
- Immunologic: gingival hyperplasia
- Systemic lupus erythematosus
- Congenital: epidermolysis bullosa
- Erythema multiforme

**Complications**
- Pain

- Dehydration
- Secondary infection (e.g. gangrenous stomatitis)
- Ludwig's angina

**Diagnostic Tests**
None.

**Management**
There are as yet no specific treatments for any of these conditions. An educated guess must be made as to the cause.
Herpes stomatitis usually lasts 10 days and the child can feel miserable for this period.

Herpangina lasts for only a few days and has few complications. Aphthous stomatitis requires no treatment.

Do not treat this condition with antibiotics, as they are not indicated and are not helpful.

**Goals of Treatment**

- Relieve symptoms
- Prevent complications

**Nonpharmacologic Interventions**

- Maintenance of hydration is important
- Increase oral intake of fluids (i.e. maintenance requirements + fluid deficits caused by fever)

**Client Education**

- Counsel parents or caregiver about the expected duration of this illness and the signs and symptoms of dehydration
- Recommend dietary adjustments: bland, non-acidic fluids (such as milk and water); older children may eat Popsicles, ice cream and similar food items; avoid citrus foods, such as orange juice
- Recommend local mouthwashes (1:1 hydrogen peroxide and water), especially after eating
- To prevent spread of infection, recommend avoidance of direct contact with infected individuals (e.g. kissing, sharing glasses and utensils, hand contact)
- Provide support to parents or caregiver to help them cope with a "cranky" child

**Pharmacologic Interventions**

Antipyretic and analgesic for fever and pain: *acetaminophen (A class drug), 10-15 mg/kg PO or PR q4h prn*

**Monitoring and Follow-Up**

Reassess the young child (<2 years of age) in 24-48 hours to ensure maintenance of hydration.

**Appropriate Consultation and Referral**

The disease is self-limiting, so consultation and referral are usually unnecessary, unless there are complications.
Pharyngotonsillitis

Definition
A painful condition of the oropharynx associated with infection of the mucous membranes of the pharynx and palatine tonsils. Peak prevalence is in children <5 years old.

The condition may be caused by a bacteria or virus, and it may be difficult to differentiate between these two forms clinically. Viral infections are the most common cause of pharyngotonsillitis in younger children; bacterial pharyngotonsillitis is very rare in children <3 years old, but its prevalence increases with age.

The next two sections describe bacterial and viral pharyngotonsillitis in detail.

Bacterial Pharyngotonsillitis

Causes
- Group A β-hemolytic streptococci (accounting for 15% to 40% of cases of acute pharyngotonsillitis); unusual in children <3 years old
- *Mycoplasma pneumoniae* (accounting for 10% of cases of pharyngotonsillitis in adolescents)
- Pneumococci, anaerobic organisms of the mouth
- *Staphylococcus aureus, Hemophilus influenzae* (both of which are rare)
- Predisposing factors: previous episodes of pharyngitis or tonsillitis, overcrowding, poor nutrition

Pharyngotonsillitis may be secondary to diphtheria or infectious mononucleosis.

History
- Acute onset
- Very sore throat
- Fever
- Headache
- Abdominal pain and vomiting
- General malaise

Physical Findings
- Significant fever
- Tachycardia
- Pharyngeal and tonsillar erythema
- Petechiae of soft palate
- Tonsillar exudate (particularly with streptococcal infection, diphtheria or mononucleosis)
- Anterior cervical lymphadenopathy

- Erythematous "sandpaper" rash of scarlet fever (may be present with streptococcal infection)
- Erythematous rash (particularly if child is receiving amoxicillin) and lymphadenopathy with splenic enlargement in children with mononucleosis
- Usually not associated with coryza
- Cough minimal or absent (this is a helpful diagnostic clue)

Differential Diagnosis
- Viral pharyngotonsillitis
- Epiglottitis
- Gonococcal pharyngitis in sexually active adolescents

Complications
- Peritonsillar or retropharyngeal abscess
- Acute rheumatic fever (after group A β-hemolytic streptococcal infection)
- Obstruction of the upper airway (with diphtheria); see "Diphtheria," in chapter 18, "Communicable Diseases"

Diagnostic Tests
- Swab throat for culture and sensitivity in clinically symptomatic children
- Rapid strep test

Management

Goals of Treatment
- Relieve symptoms
- Prevent complications
- Prevent spread of group A streptococcal infection to others
• Decide whether to treat as viral or bacterial pharyngotonsillitis - consider differential diagnosis of mononucleosis (see "Mononucleosis," in chapter 11, "Communicable Diseases," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003 or diphtheria (see "Diphtheria," in chapter 18, "Communicable Diseases," these pediatric clinical guidelines)

**Appropriate Consultation**
Consult a physician if the child has significant dysphagia or dyspnea signaling obstruction of the upper airway, or if you are concerned about an underlying pathologic state, such as peritonsillar abscess or rheumatic fever.

**Nonpharmacologic Interventions**
• Increased rest during febrile phase
• Increase oral fluids during febrile phase
• Avoidance of irritants (e.g. smoke)
• Warm saline gargles qid (for older children)
• Appropriate surveillance of community with respect to complications of rheumatic fever

**Pharmacologic Interventions**
Indications for the introduction of antibiotics:
• Child appears acutely ill
• Child has a history of rheumatic fever
• Child has an illness that is clinically compatible with scarlet fever
• Evidence of early peritonsillar abscess (consult a physician)

In the absence of the above situations, and if the child is relatively asymptomatic, it is appropriate to await culture results before administering antibiotics, if cultures can be obtained quickly. This approach will not increase the risk of acute rheumatic fever but avoids unnecessary use of antibiotics. If the culture results are positive, the child can be recalled for initiation of antibiotic treatment.

Antibiotics:
- penicillin V (**C class drug**), 40 mg/kg per day, divided tid or qid, PO for 10 days
- erythromycin (**C class drug**), 40 mg/kg per day, divided qid, PO for 10 days
- (for infants) erythromycin ethylsuccinate suspension (**C class drug**), 30-40 mg/kg per day, divided qid, PO

Many children are carriers of group A ß-hemolytic Streptococcus. However, assuming compliance with the antibiotic regimen, only routine follow-up is required; culture is not indicated.

Antipyretic and analgesic for fever and pain: acetaminophen (**A class drug**), 10-15 mg/kg q4-6h prn

**Monitoring and Follow-Up**
Follow-up is recommended in 48-72 hours. Ascertain culture results at that time.

Repeat culture on the completion of antibiotic therapy is unnecessary, and cultures need not be obtained from asymptomatic family contacts.

**Referral**
Children who have had five or more documented group A ß-hemolytic streptococcal infections should be referred to a physician regarding an ENT consultation. They may benefit from tonsillectomy.
Viral Pharyngotonsillitis

Causes
- Adenovirus or enterovirus (the latter is more common in children <3 years old)
- Influenza virus
- Parainfluenza virus
- Coxsackievirus
- Echovirus
- Epstein-Barr virus (mononucleosis)
- Herpes simplex virus

Differential Diagnosis
- Bacterial pharyngotonsillitis
- Epiglottitis

Complications
- Secondary bacterial infection

Diagnostic Tests
None.

Management

Goals of Treatment
- Supportive care to relieve symptoms

Nonpharmacologic Interventions
- Rest and reassurance
- Increase oral fluids during febrile phase
- Avoidance of irritants (e.g. smoke)
- Warm saline gargles qid (for older children)

Pharmacologic Interventions
Antipyretic and analgesic for fever and pain: acetaminophen (A class drug), 10-15 mg/kg PO q4-6h prn

Occasionally, children are unable to drink secondary to the pain of pharyngotonsillitis caused by some viral infections, particularly coxsackievirus and herpesvirus. In such situations, admission to hospital may be required for IV administration of fluids (to prevent dehydration).

Sinusitis

Sinusitis is uncommon in young children (<10-12 years old). See "Acute Sinusitis" and "Chronic Sinusitis," in chapter 2, "Ears, Nose and Throat (ENT)," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003
Emergency Problems Of The Ear, Nose And Throat

Retropharyngeal And Peritonsillar Abscess

Definition

**Retropharyngeal Abscess**
A collection of pus in the retropharyngeal space.

**Peritonsillar Abscess**
A collection of pus between the tonsil capsule and either the anterior or posterior tonsillar pillar.

Causes

May be viewed as a complication of bacterial pharyngotonsillitis.

**Retropharyngeal Abscess**
• Penetrating trauma to the oropharynx

**Peritonsillar Abscess**
• Infection spreads from superior pole of the infected tonsil

History

**Retropharyngeal Abscess**
• More common in young children than adolescents
• Fever, drooling and refusal to swallow
• May present with stridor
• Rule out trauma to the oropharynx

**Peritonsillar Abscess**
• Much more common in adolescents than in younger children
• Previous history of sore throat often present
• Fever prominent
• Pain, drooling and dysphagia
• Trismus (difficulty opening mouth) may be present
• Breathing may be difficult

Physical Findings

Before examining the pharynx, consider the diagnosis of epiglottitis. If epiglottitis is suspected, do not examine the throat.

**Retropharyngeal Abscess**
• Child appears acutely ill

• Stiffness of the neck and possibly refusal to flex the neck
• Obvious redness and swelling on inspection of the posterior pharynx
• Exudate may be seen on the tonsils
• Cervical lymphadenopathy generally present

**Peritonsillar Abscess**
• Child appears acutely ill
• Inspection reveals unilateral swelling of the anterior or posterior tonsillar pillar
• Tonsils displaced, with uvula shifted to the opposite side from the infection
• May be difficult to examine children because of trismus

Differential Diagnosis

• Epiglottitis (if there is stridor, drooling and fever); see "Epiglottitis," in chapter 10, "Respiratory System"
• Diphtheria
• Mononucleosis

Complications

• Obstruction of the airway
• Parapharyngeal abscess
• Aspiration (if abscess ruptures)

Diagnostic Tests

None.

Management

Goals of Treatment

• Relieve symptoms
• Prevent complications

Appropriate Consultation

Consult with a physician immediately. Referral to hospital and an ENT specialist is in order. IV antibiotic treatment may be instituted while awaiting transfer, especially if the transfer is expected to take a period of many hours.
Mild cases in an older child may be treated on an outpatient basis, but only on the advice of a physician.

**Adjuvant Therapy**
- Start IV therapy with normal saline, at a rate adequate to maintain hydration (rate depends on size and hydration status of the child)

**Nonpharmacologic Interventions**
- Bed rest
- If child is drooling, give nothing by mouth
- Give sips of cold liquids only if the child is able to swallow saliva

**Pharmacologic Interventions**
Antibiotics:
*penicillin G sodium (B class drug)*, 100,000 to 300,000 units/kg daily, divided q6h, IV

For children with allergy to penicillin:
*clindamycin (B class drug)*, 20-40 mg/kg/day in 3 or 4 divided doses IV

**Monitoring and Follow-Up**
Monitor child closely to ensure that an adequate airway is maintained.

**Referral**
Medevac to hospital. Consultation with an ENT specialist is usually necessary, and the condition may require surgical intervention.

**General Guidelines For Tonsillectomy**
- Documented cases of recurrent tonsillitis (child symptomatic or positive culture for group A β-hemolytic Streptococcus)--five episodes per year for 2 years is generally considered an indication for the procedure
- Throat infection complicated by peritonsillar or retropharyngeal abscess requiring drainage
- Suspected malignant lesion of tonsil
- Cor pulmonale
- Obstructive sleep apnea
- Severe upper airway obstruction
Epistaxis

Definition
Bleeding from the nostril. Very common in childhood.

Causes
• Mechanical dysfunction of the nose secondary to mucosal drying (e.g. from wood heat or dry air), trauma or inflammation
• Bleeding from the anterior nasal septum (Little's area or Kiesselbach's plexus) is most common
• Posterior bleeding (usually from the sphenopalatine artery) is much less common in childhood
• Uncommon causes (tumor, foreign body, leukemia, rheumatic fever, high blood pressure and bleeding disorders) must always be considered, but are rare in childhood

History
• Bleeding may range from mild trickling of blood to significant bleeding because of trauma or neoplasm
• Usually, bleeding is almost entirely from the anterior nostril
• In posterior epistaxis, bleeding tends to be more brisk and severe, and blood flows into the nasopharynx and mouth even when the child is in a sitting position
• Ask about possibility of trauma, nose-picking, or blood noticed on pillow or bedding
• Rule out possibility of underlying bleeding disorder, ingestion of ASA or other factors that might increase risk of bleeding
• Ask about level of humidity in the house

Physical Examination
Examine child sitting up and leaning forward so that the blood will flow forward. Good illumination is essential; you will need an appropriate flashlight, as well as suction to remove the blood and secretions; topical vasoconstrictors may be helpful for visualization.
• Assess ABCs and vital signs, and stabilize as required
• Blood pressure normal, unless bleeding is severe enough to cause loss of volume
• Heart rate may be elevated because of fear or if bleeding is severe enough to cause loss of volume
• Obvious deformity or displacement may be present
• Bleeding from anterior portion of septum may be present
• Inspect throat for posterior bleeding
• Sinuses may feel tender
• Septum may be deviated
• Try to ensure that there is no foreign body, polyp or tumor

Differential Diagnosis
• Mild infection of nasal mucosa
• Dryness and irritation of nasal mucosa
• Nasal fracture
• Foreign body
• Malignant lesion
• Tuberculosis
• Blood dyscrasias

Diagnostic Tests
None.

Management

Goals of Treatment
• Stop loss of blood
• Prevent further episodes

Nonpharmacologic Interventions
Most bleeding will be stopped by application of pressure to both sides of the nose, with firm pressure against the nasal septum for 5-15 minutes.

Client Education
• Recommend increasing room humidity (a pot of water should be kept on the stove at all times, especially in winter)
• Counsel parents or caregiver about appropriate use of medication, including dosage and side effects, as well as avoidance of overuse
• Recommend avoidance of known irritants and local trauma (e.g. nose-picking, forceful nose-blowing)
• Instruct parents or caregiver (and the child, if of an appropriate age) about first-aid control of recurrent epistaxis (child should sit up and lean forward, applying firm, direct pressure to nasal septum)
• Recommend use of ice packs to control acute bleeding
• Recommend liberal use of lubricants such as petroleum jelly in the nares to promote hydration of the nasal mucosa
• Advise parents or caregiver to keep the child's fingernails trimmed to avoid trauma from nose picking

Pharmacologic Interventions
If direct pressure alone is insufficient to stop the bleeding, consult a physician regarding use of vasoconstricting nose drops. If prescribed by physician:
• Soak a cotton ball with the solution
• Place the medicated cotton ball in the anterior portion of the nose
• Press firmly against the bleeding nasal septum for 10 minutes

For older children (>2 years of age), use procedures presented in "Anterior Epistaxis" and "Posterior Epistaxis," in chapter 2, "Ears, Nose and Throat (ENT)," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003

Appropriate Consultation
Consult with a physician if:
• The above measures fail to control bleeding
• More severe bleeding occurs

• The bleeding is suspected to be coming from the posterior nasal area
• The epistaxis is recurrent and there is concern about a serious underlying problem

If bleeding persists, it may be necessary to apply either anterior or posterior packing of the nose, a procedure which should be done only if the healthcare provider has previous experience and only after a physician has been consulted.

Monitoring and Follow-Up
• Monitor ABCs if significant bleeding has occurred or is still occurring
• Follow up as necessary if current bleeding resolves with first-line treatment

Referral
In rare cases, a child may require evacuation for consultation with an ENT specialist, with a view to arterial ligation, but only if all three steps above (pressure, application of medicated cotton ball, and packing) have failed to control the bleeding.

A telephone consultation with a physician is mandatory before transporting any child with epistaxis.

If there has been trauma, it is important to rule out septal hematoma. Hematoma of the nasal septum must be managed surgically, and medevac is necessary.

If the problem is recurrent, electively refer child to a physician to rule out other pathology.
Common Dental Problems In Infants

**Eruption Cyst**

**Definition**
Small white, gray or bluish translucent eruptions on crest of maxilla or mandible.

**Cause**
Remnants of dental lamina, which are usually shed after birth.

**Management**
Reassure parents or caregiver that this condition will resolve on its own and needs no treatment.

**Epstein's Pearls**

**Definition**
Small, white, keratinized lesions along the midline of the palate.

**Cause**
Remnants of epithelial tissue trapped as the fetus grows, which usually fall off after birth.

**Management**
Reassure parents or caregiver that this condition will resolve on its own and needs no treatment.

**Neonatal Teeth**

**Definition**
Eruption of teeth in neonatal period. In 80% of cases, such teeth are lower primary incisors. They tend to be hypermobile because of inadequate root formation.

**Management**
Reassure parents or caregiver that this condition will resolve without sequelae.

**Referral**
Refer to a dentist. Removal is recommended to prevent aspiration of the teeth.
Normal Tooth Development

By about 5 or 6 years of age, a child's jaws have grown enough to make space for the permanent teeth. At 6 to 7 years of age, the first permanent teeth (the first molars) start coming in at the back of the mouth, behind, not under, the last baby teeth. Table 9-2 presents the ages when the permanent teeth are likely to appear (refer to Fig. 9-1 for position of various teeth on the jaw).

Table 9-2: Age at eruption of permanent teeth

<table>
<thead>
<tr>
<th>Tooth*</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper teeth (maxillary)</td>
<td></td>
</tr>
<tr>
<td>Central incisor (1)</td>
<td>7 – 8 years</td>
</tr>
<tr>
<td>Lateral incisor (2)</td>
<td>8 – 9 years</td>
</tr>
<tr>
<td>Cuspid (3)</td>
<td>11 – 12 years</td>
</tr>
<tr>
<td>First bicuspid (4)</td>
<td>10 – 11 years</td>
</tr>
<tr>
<td>Second bicuspid (5)</td>
<td>10 – 12 years</td>
</tr>
<tr>
<td>First molar (6)</td>
<td>6 – 7 years</td>
</tr>
<tr>
<td>Second molar (7)</td>
<td>12 – 13 years</td>
</tr>
<tr>
<td>Third molar (8)</td>
<td>17 – 21 years</td>
</tr>
<tr>
<td>Lower teeth (mandibular)</td>
<td></td>
</tr>
<tr>
<td>Third molar (8)</td>
<td>17 – 21 years</td>
</tr>
<tr>
<td>Second molar (7)</td>
<td>11 – 13 years</td>
</tr>
<tr>
<td>First molar (6)</td>
<td>6 – 7 years</td>
</tr>
<tr>
<td>Second bicuspid (5)</td>
<td>11 – 12 years</td>
</tr>
<tr>
<td>First bicuspid (4)</td>
<td>10 – 12 years</td>
</tr>
<tr>
<td>Cuspid (3)</td>
<td>9 – 10 years</td>
</tr>
<tr>
<td>Lateral incisor (2)</td>
<td>7 – 8 years</td>
</tr>
<tr>
<td>Central incisor (1)</td>
<td>6 – 7 years</td>
</tr>
</tbody>
</table>

* Numbers correspond to designations in Fig 9-1
Common Oral And Dental Problems In Older Children

Ankyloglossia (Tongue-Tie)

**Definition**
A condition in which a short lingual frenum attaches the tongue to the floor of the mouth, interfering with protrusion of the tongue.

**Management**
No treatment is warranted if the tongue can be protruded beyond the lips. In 95% of cases, reassurance is all that is required.

**Referral**
Very occasionally, a thick fibrous band of tissue interferes with the tongue's protrusion beyond the lips. In such cases, consultation with an ENT specialist is suggested with a view to possible surgical release.

Migratory Glossitis (Geographic Tongue)

**Definition**
Tongue demonstrates several smooth, red areas outlined by elevated gray margins of epithelial tissue.

**Cause**
Unknown.

**Management**
Reassure child and parents or caregiver.

Thumb Sucking

This generally benign activity may result in protrusion of the maxillary incisors and anterior open bite. However, most children suffer no effects to their dentition.

**Referral**
In rare cases, the child with a severe thumb-sucking problem may need referral to a dentist and close follow-up for anterior open bite.

**Management**
Reassure the parents or caregiver. Children entering school generally stop sucking the thumb as a result of peer pressure.

Congenital Absence Of Teeth (Anodontia)

Very rare. Teeth usually begin to erupt by 6 months, but may be delayed until up to 12 months.
Partial Absence Of Teeth (Oligodontia)
This condition is more common with the permanent dentition, particularly the third molars, the mandibular second bicuspids, the maxillary lateral incisors and the maxillary second bicuspids.

Referral
Appropriate dental referral should be made.

Other Common Abnormalities Of The Teeth
- Delayed eruption
- Rotation of incisors
- Bulging of alveolar ridge
- Large space between maxillary central incisors

Referral
Children should be assessed by a dentist by age 7 years if any of these common abnormalities have presented.

Common Malocclusions
Definition
Anterior open bite (protrusion of maxillary anterior teeth) or crossbite (maxillary teeth positioned behind the mandibular teeth).

Referral
Children with significant malocclusions should be referred to a dentist.

Dental Caries
With the introduction of fluoride into the drinking water of some urban and rural communities and most toothpaste, and with increased attention to dental health, there has been a decrease in the prevalence of pediatric dental caries in most southern populations.

Environmental factors (such as hygiene and diet), particularly as influenced by the parents or caregiver, are the most significant predictors of childhood dental problems.

Management
Prevention
Encourage appropriate dental hygiene: toothbrushing from the time of tooth eruption, flossing from the time the child reaches school age, low sugar consumption.

Where water is not fluoridated, children up to 14 years of age may need fluoride supplements. See the fluoride recommendations of the Canadian Paediatric Society in the section "Vitamin and Mineral Supplements," chapter 7, "Nutrition."

Check with the regional office for the local policy regarding fluoride supplementation.
Milk Caries

Definition
Caries of the deciduous teeth, most commonly the maxillary incisors and mandibular premolars and molars. May be severe enough to cause dental abscess.

Very common in Aboriginal groups in Canada, often resulting in extraction of the affected teeth and problems with permanent teeth.

Causes
• Secondary to prolonged nursing (either bottle or breast) at bedtime
• Liquid pools around the child's teeth, causing significant caries, particularly in the maxillary incisors

Management
Prevention of this problem is a major public health concern, and public health measures to discourage bottle caries are of primary importance:
• Discourage bottle propping
• Discourage use of sweet fluids in bottle
• Encourage drinking from a cup by 1 year
• Encourage good oral hygiene: cleaning of teeth with gauze as soon as they erupt and cleaning of toddlers' teeth with a soft toothbrush; to ensure effective brushing, an adult must supervise the child until 6 years of age
• Encourage parents or caregiver to take children for their first dental assessment by 3 years of age
• Fluoride supplements may be appropriate for infants and children ≤14 years of age

Referral
Appropriate management includes referral to a dental practitioner for dental fillings. The repair procedure may require a general anesthetic, particularly for milk bottle caries. Repair involves fillings that last for 8-10 years.

Occlusion sealants (organic polymers) that bond to the enamel are intended for teeth with deep developmental grooves and help in preventing caries. However, this method is not cost-effective for primary molars.
Chapter 10 – Respiratory System

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For more information on the history and physical examination of the respiratory system in older children and adolescents, see chapter 3, "Respiratory System," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003
General Information

Respiratory illnesses in children are the most common cause of nursing station visits and hospital admissions among Aboriginal children. Such illnesses are more common in children who live in crowded housing and those who are exposed to cigarette or wood smoke. Because of the contagious nature of many of the viral illnesses, outbreaks are common. Careful assessment is necessary to prevent morbidity.

Assessment Of The Respiratory System

History Of Present Illness And Review Of System

General
The history varies according to the child's age.
- Onset of illness (sudden or gradual)
- Symptoms (acute or chronic)
- Fever
- Runny nose
- Sore throat
- Chest pain (older children may complain of this symptom)
- Shortness of breath
- Cough, night cough, exercise-induced cough (see Table 10-1)
- Stridor
- Wheeze
- Cyanosis
- Fatigue
- Pallor
- Intake/output
- Previous similar episodes
- Medications
- Allergies
- Family history of respiratory ailments (e.g. asthma)

Examination Of The Respiratory System

Use the IPPA approach:
- I for inspection
- P for palpation
- P for percussion
- A for auscultation

Some of these techniques (specifically palpation and percussion) are difficult to perform on infants and toddlers, and may not yield useful information.

Vital Signs
- Respiratory rate: normally 30-40 breaths/minute in infants, 20 breaths/minute at 6 years of age, 16 breaths/minute in adolescents
- Very rapid respiratory rate suggests disease of the lower airway, not the upper airway
- Respiratory rhythm and depth
- Heart rate
- Temperature
- Pulse oximetry
- Hypotonic
- Unconsolable
- Fatigue
- Pallor
- Cyanosis of nails and mucous membranes (late sign)
- Nasal flaring (especially in infants)
- Drooling: sign of upper airway disease (e.g. epiglottitis)
- Grunting (especially in infants)
- Prolonged expiration (may indicate asthma or bronchiolitis)
- Symmetry of chest movements (asymmetry may indicate pneumonia)
- Accessory muscles of breathing: use of sternocleidomastoid muscles suggests upper airway obstruction, such as croup or epiglottitis; use of intercostal and abdominal muscles in children <6 years old suggests lower airway disease, such as pneumonia or bronchiolitis

Inspection

Signs of Distress
- Child appears acutely ill (may indicate septicemia)
Table 10-1: Types of cough and most likely illness

<table>
<thead>
<tr>
<th>Nature of cough</th>
<th>Likely type of illness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paroxysmal</td>
<td>Pertussis</td>
</tr>
<tr>
<td>Loose, productive</td>
<td>URTI, bronchitis</td>
</tr>
<tr>
<td>Sharp, barking</td>
<td>Croup, foreign body</td>
</tr>
<tr>
<td>Tight, productive</td>
<td>Pneumonia, bronchiolitis</td>
</tr>
<tr>
<td>Chronic</td>
<td>Asthma, bronchiectasis, tuberculosis</td>
</tr>
</tbody>
</table>

**Signs of Chronic Disease**
- Clubbing (may indicate bronchiectasis, cystic fibrosis)
- Eczema (may indicate asthma)
- Hyperinflation ("barrel chest", may indicate asthma)

**Palpation**
Not useful in children <3 years old, although it may be useful in older, cooperative children. Allows further assessment of respiratory excursion.

**Percussion**
Useful only in older children (>2 years old).
- Resonance is normal
- Dullness to percussion over areas of fluid or solid tissue is present in lobar pneumonia, pleural effusion and collapsed lung
- Increased resonance over areas of hyperinflation (sounding like percussion of a puffed-out cheek) is present in bronchiolitis, asthma, foreign body with obstruction to lung behind and pneumothorax

**Auscultation**
- Quality of breath sounds (tracheobronchial, bronchovesicular, vesicular)
- Volume of air entry
- Ratio of inspiration to expiration
- Adventitious sounds: crackles, wheezes, pleural rub, stridor, bronchial breathing

In infants and small children, the sounds may be transmitted easily and may therefore be difficult to localize. Breath sounds often seem louder in children because of the thinness of the chest wall.

**Decrease in Breath Sounds**
- Pneumonia
- Collapsed lung
- Pleural effusion
- Pneumothorax

**Prolonged Expiratory Phase**
- Asthma
- Bronchiolitis

**Localized Crackles**
- Pneumonia
- Bronchiectasis

**Diffuse Crackles**
- Severe pneumonia
- Bronchiolitis (also congestive heart failure)

Crackles that disappear after coughing usually have no significance. You may not hear crackles if the child is breathing shallowly. Try to have the child take deep breaths.

Some children with pneumonia may not have crackles or any signs other than tachypnea.

**Wheeze**
- May be inspiratory or expiratory
- Suggest asthma or bronchiolitis
- Foreign body

**Pleural Rub**
- Sounds like two pieces of leather being rubbed together
- Suggests pneumonia

**X-Rays In Children**
X-rays should be performed on site (when possible), according to regional policy only, in children who have signs consistent with acute involvement of the lower respiratory tract, including tachypnea, persistent crackles or high fever, if such imaging will help to clarify a diagnosis and/or affect management. Otherwise, manage the illness on clinical grounds.

X-rays are not useful in the diagnosis or treatment of asthma or bronchiolitis or for children who do not appear acutely ill ("happy wheezers").

Bronchiolitis is often complicated by atelectasis, important to know for prognostic value.
Common Problems Of The Respiratory System

Upper Respiratory Tract Infection (URTI)

Definition
Viral infection and inflammation of the upper airway structures. Also known as the common cold.

Causes
• Viral condition
• Many different viruses may cause symptoms of URTI

History
• Onset over 1-2 days
• Usually runs a 3-7-day course
• Fever
• Runny nose
• Cough
• Little distress (infants, who are obligate nose breathers, may experience more distress because of blockage)
• Exposure to others with URTI
• Decrease in appetite

Physical Findings

General
• If temperature is elevated, look for pharyngitis or otitis media
• Examine ears, nose, mouth and neck lymph nodes
• Fever unusual with simple URTI
• Usually no respiratory distress
• May have macular rash (viral exanthem)
• Tympanic membranes may be slightly red
• Nares may be red and swollen with clear to purulent discharge
• Pharynx, tonsils may be slightly red

Lungs
• Breath sounds usually normal, with good bilateral air entry
• Crackles that clear with coughing may be present

Differential Diagnosis
• Bacterial URTI

Complications
• Bacterial URTI (e.g. sinusitis)
• Acute otitis media

Diagnostic Tests
None.

Management

Goals of Treatment
• Primarily to relieve symptoms

Nonpharmacologic Interventions
• Rest
• Adequate fluids
• Normal saline nose drops for infants with nasal congestion that interferes with feeding

Pharmacologic Interventions
Antipyretic for fever: acetaminophen (A class drug), 10-15 mg/kg PO or PR q4-6h prn

Decongestants and cough suppressants are symptomatic medications and have little proven value. They should be used judiciously and only in older children.

Do not use decongestants or antihistamines in children <1 year old.

Monitoring and Follow-Up
Follow-up is necessary only if symptoms worsen or do not resolve as expected.

Advise the parents or caregiver to watch for the following symptoms:
• Development of bronchiolitis (especially in infants)
• Development of otitis media
• Precipitation of wheezing in asthmatic children
• Development of secondary pneumonia

Referral
Not usually required.

Upper Airway Disorders
Disorders of the upper airway are common clinical problems. Differentiation of the various disorders is often difficult. See Tables 10-2 and 10-3 for some helpful information on the clinical manifestations of these disorders. Several of these disorders are discussed in detail in this chapter.
Table 10-2: Features of upper airway disorders

<table>
<thead>
<tr>
<th>Entity</th>
<th>Usual age range</th>
<th>Mode of onset of respiratory distress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe tonsillitis</td>
<td>Late preschool or school age</td>
<td>Gradual</td>
</tr>
<tr>
<td>Peritonsillar abscess</td>
<td>Usually &gt;8 years</td>
<td>Sudden increase in temperature, appears acutely ill, unilateral throat pain, “hot potato” speech</td>
</tr>
<tr>
<td>Retropharyngeal abscess</td>
<td>Infancy to adolescence</td>
<td>Fever and appearance of acute illness after URTI, pharyngitis or penetrating injury</td>
</tr>
<tr>
<td>Croup</td>
<td>6 months to 6 years</td>
<td>Gradual onset of stridor and barking cough after mild URTI</td>
</tr>
<tr>
<td>Epiglottitis</td>
<td>1 – 7 years</td>
<td>Acute onset of hyperpyrexia, dysphagia and drooling</td>
</tr>
<tr>
<td>Foreign-body aspiration</td>
<td>Late infancy to 4 years</td>
<td>Choking episode resulting in immediate or delayed respiratory distress</td>
</tr>
<tr>
<td>Bacterial tracheitis</td>
<td>Infancy to 4 years</td>
<td>Moderately rapid onset of fever, appearance of acute illness, respiratory distress</td>
</tr>
</tbody>
</table>

Table 10-3: Clinical features of acute upper airway disorders

<table>
<thead>
<tr>
<th>Clinical feature</th>
<th>Supraglottic disorders (Epiglottitis)</th>
<th>Subglottic disorders (Croup)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stridor</td>
<td>Quiet</td>
<td>Loud</td>
</tr>
<tr>
<td>Voice alteration</td>
<td>Aphonic, muffled</td>
<td>Hoarse</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Postural preference</td>
<td>+</td>
<td>±</td>
</tr>
<tr>
<td>Barky cough</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Fever</td>
<td>+++</td>
<td>±</td>
</tr>
<tr>
<td>Appearance of acute illness</td>
<td>++</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: +, present in mild form; ++, present in moderate form; ++++, present in severe form; ±, may be present or absent; -, absent
Croup (Laryngotracheobronchitis)

**Definition**
Acute upper airway illness causing subglottic obstruction. Occurs predominantly in late fall and late spring.

Most common cause of stridor in children.

Occurs most often in children 6 months to 6 years of age (peak age <3 years). Occurs more often in boys than girls (ratio 3:2).

May also occur in younger infants. Because of their smaller airways, the risk of respiratory distress is much greater in this age group.

Course is variable, with symptoms usually improving by 3 to 5 days.

**Causes**
Contagious: may be contracted by direct contact or inhalation of airborne secretions.

**Viruses**
- Parainfluenza virus (most common causative organism)
- Respiratory syncytial virus (RSV)
- Adenovirus

**Bacteria**
- Mycoplasma pneumoniae

**History**
- Preceded by URTI (fever, runny nose)
- Sore throat
- Brassy, barky, seal-like cough

Most children are not markedly ill. Some may show symptoms of upper airway compromise:
- Decreased drinking
- Drooling
- Dysphagia
- Loud stridor
- Hoarse voice or cry, aphony

Symptoms most pronounced at night.

Rule out any trauma to neck, choking episode or ingestion of a foreign body.

**Physical Findings**
Signs may be minimal to marked. First priority is assessment of respiratory function, not diagnosis. If the child shows signs of respiratory distress, avoid invasive techniques such as taking temperature or performing throat or ear examination.

- Irritability, anxiety (may indicate hypoxia)
- Lethargy (may be due to hypercarbia)
- Temperature increased (fever is usually low-grade)
- Assess hydration status
- Tachypnea
- Pulse oximetry may be altered if the child is in respiratory distress
- Respiratory effort may be labored

**Signs of Respiratory Distress**
- Inspiratory stridor (at rest)
- Cyanosis
- Indrawing (suprasternal greater than intercostal), nasal flaring
- Breath sounds usually normal, but transmitted upper airway stridor can be heard
- Associated wheezing and hyperinflation

Tripod or sniffing position suggests laryngeal or higher-level obstruction (e.g. epiglottitis).

**Differential Diagnosis**
- Epiglottitis
- Bacterial tracheitis
- Retropharyngeal abscess
- Diphtheria
- Aspiration of a caustic substance
- Foreign-body aspiration
- Thermal injury
- Smoke inhalation
- Laryngeal fracture
- Congenital problems (e.g. tracheomalacia, hemangioma of larynx)
- Neurologic disease causing hypotonia
- Allergic angioedema

**Complications**
- Respiratory distress
- Respiratory failure
- Hypoxia
- Dehydration
- Pulmonary edema
Diagnostic Tests
• Pulse oximetry (if available and child is in respiratory distress)

Management
Goals of Treatment
• Relieve symptoms
• Prevent complications

Mild Croup
There is no specific treatment for this form, in which the child feeds well, is not acutely distressed and seems happy, but has a barking cough.

Client Education
• Explain the nature, course and expected outcomes of the illness
• Warn parents or caregiver that croup may worsen at night
• Advise parents or caregiver to watch for signs of respiratory distress
• Recommend that child be given adequate fluids to prevent dehydration
• Recommend increasing humidity through use of a cool-mist humidifier, exposure to a steamy bathroom or going outside in the cool air

Pharmacologic Interventions
Antipyretic and analgesic for fever and sore throat: acetaminophen (A class drug), 10-15 mg/kg PO or PR q4-6h prn

Moderate To Severe Croup

Appropriate Consultation
Consult a physician if the child shows signs of respiratory distress.

Adjuvant Therapy
Give oxygen if there is any evidence of respiratory distress:
• 6-10 L/min or more by mask
• Keep oxygen saturation at ≥97%

Nonpharmacologic Interventions
• Increase fluid intake to prevent dehydration
• Nurse the child in upright position

Pharmacologic Interventions
racemic epinephrine, aerosolized (D class drug), 0.5 mL in 3 mL normal saline
and
(The following drugs must be ordered by a physician)
corticosteroids, e.g. dexamethasone (B class drug), 0.15 mg- 0.6 mg/kg PO or IM, one dose before transfer (use as first line) or other option budesonide (B class drug) 2 g by nebulizer (one dose)

Monitoring and Follow-Up
Monitor ABCs and pulse oximetry (if available), hydration, intake and output.

If child appears acutely ill and has a high fever, consider diagnosis of bacterial tracheitis (Staphylococcus or Hemophilus influenzae) and consult a physician about antibiotic therapy.

Referral
Medevac.

Pharmacologic Interventions
Antipyretic and analgesic for fever and sore throat: acetaminophen (A class drug), 10-15 mg/kg PO or PR q4-6h prn

Monitoring and Follow-Up
Follow up in 24-48 hours (sooner if symptoms worsen).

Referral
Refer electively to a physician any child with recurrent croup (even if it is mild), for evaluation of coexisting problems (e.g. subglottic stenosis, hemangioma of larynx).
Bronchiolitis

Definition
Acute viral syndrome of the bronchioles characterized by wheezing and respiratory distress. This is an illness of young children (<2 years old) and occurs most often in the winter and spring. The illness runs its course over 4 or 5 days, but can last longer in young infants.

Acute Course
• In 80% of cases, clinical improvement will be evident within 3 or 4 days of initial presentation (recovery is usually dramatic)
• Radiologic changes normalize over the following 9 weeks

Prolonged Course
• In 20% of cases, the course is protracted, and the condition lasts from weeks to months
• Persistent wheezing and hyperinflation
• Abnormal gas exchange and lung function
• Some children experience lobar collapse

Causes
• Respiratory syncytial virus (RSV) (most common causative organism)
• Parainfluenza virus
• Adenovirus
• Influenza

History
Prodrome
• Mild URTI for several (1-4) days
• Rhinitis (serous nasal discharge)
• Sneezing
• Cough
• Low-grade fever (38.5°C to 39°C)
• Anorexia with poor feeding
• Irritability

Physical Findings
Various degrees of respiratory distress, from none to severe.

Mild Cases
• Gradual onset, resolves within 1-3 days
• Low-grade fever
• Paroxysmal wheezing, tight cough

Signs of Worsening
• Tachypnea (60-80 breaths/minute)
• Tachycardia (>200 beats/minute)
• Hypoxia with or without cyanosis, pallor
• Nasal flaring, indrawing, chest retractions
• Lethargy and apnea
• Audible wheezing
• Breath sounds decreased
• Prolonged expiratory phase
• Widespread, fine end-inspiratory and early expiratory crackles

Severely ill children may not have wheezes because they are unable to move air. Therefore, beware of the silent chest. Such children look sick. Check hydration status.

Differential Diagnosis
• Pneumonia
• Asthma
• Foreign-body aspiration
• Inhalation of noxious material (e.g. chemicals, fumes, toxins)
• Gastroesophageal reflux disease (GERD)
• Aspiration

Complications
Acute
• Dehydration
• Febrile seizures
• Respiratory distress with prolonged apneic spells
• Respiratory failure
• Death (mortality rate <1%, but among children with underlying disease it is >1%)

Chronic
• RSV bronchiolitis
• Asthma
• Adenovirus bronchiolitis
• Bronchiolitis obliterans (chronic bronchiolitis)

Diagnostic Tests
• Pulse oximetry (if available)

Management
Goals of Treatment
• Relieve symptoms
• Observe closely for and prevent complications
• See Fig 10-1 for treatment guidelines
Mild Bronchiolitis
Characterized by increased respiratory rate (but still <40 breaths/minute); child is happy although wheezy, feeds and sleeps well.

**Appropriate Consultation**
Contact physician for any child with mild symptoms who is at increased risk:
- Is unable to tolerate food
- Has an underlying illness (e.g. lung disease, congenital heart disease, neuromuscular weakness or immune deficiency)
- Was born prematurely
- Is less than 3 months of age
- Cannot be watched carefully at home for signs of respiratory distress

**Client Education**
If the parents are able caregivers and they live near the healthcare facility, send the child home with the following instructions:
- Child should sleep in propped-up position
- Use cool-mist humidifier
- Ensure adequate fluid intake (maintenance requirements + deficits resulting from fever or tachypnea)
- Monitor closely for signs of respiratory distress

**Monitoring and Follow-Up**
Reassess daily until symptoms have diminished (usually 3-5 days).

Moderate To Severe Bronchiolitis
Characterized by respiratory distress with or without apneic spells, cyanosis or high-risk patient.

**Appropriate Consultation**
Contact a physician immediately for any child with moderate to severe symptoms.

**Adjuvant Therapy**
- Give oxygen at 6-10 L/min
- Keep oxygen saturation at >97%
- Start IV therapy with normal saline
- Administer enough fluid to maintain hydration

**Pharmacologic Interventions**

**Bronchodilator**
A trial of bronchodilators should be given if there is significant wheezing. Infants with a history of prior wheezing or a family history of asthma are more likely to respond to bronchodilators:

Salbutamol (*C class drug*), by nebulizer and face mask; doses of 0.03 mL/kg of 5mg/mL in 2 mL normal saline (maximum dose 1 mL)

or by MDI, 1 or 2 puffs

**Antibiotics**
Antibiotics are not indicated unless there is evidence of secondary bacterial infection, such as clinical deterioration with or without sepsis.

**Antiviral Agent**
Ribavirin is a synthetic antiviral agent directed against viral DNA. This guanine analog prevents viral replication and is intended to shorten the clinical course of the disease. It can reduce the severity of bronchiolitis if administered early in the course of the disease. It is administered in hospital by continuous inhalation as a small-particle mist for 12-20 hours per 24 hours for a period of 3-5 days. It is indicated for use in high-risk patients but rarely used these days.

**RSV Immunoglobulins**
RSV immunoglobulins (*palivizumab* – Synagis®) given monthly during RSV season to prevent illness in children at risk, see Clinical Practice Information Notice (April 24th, 2003) RSV Prophylaxis Protocol for Eligible Premature Infants

**Monitoring and Follow-Up**
Monitor child closely in the healthcare facility until he or she can be transported to hospital (unless there is significant improvement with bronchodilators):
- ABCs
- Oxygen saturation: monitor for hypoxia
- Apnea monitoring
- Hydration status: intake and output

**Referral**
Medevac child if he or she has any of the following:
- Signs of respiratory distress
- Episodes of cyanosis with apnea
- Decreased oxygen saturation
- Inability to tolerate feeding
- Underlying illness (e.g. lung disease, congenital heart disease, neuromuscular weakness or immune deficiency)
- Was born prematurely
- Less than 3 months of age
- Cannot be watched carefully at home for signs of respiratory distress
For transport, consider:

- Supplemental oxygen (if the child is cyanotic, has a markedly increased respiratory rate or appears fatigued)
- IV therapy (if the child is severely distressed or poorly hydrated)
- Administration of bronchodilator (if the child needs continuing medication en route)
Fig 10-1: Bronchiolitis treatment guidelines
Suggested approach to management of children with bronchiolitis. Decisions to treat must be individualized.

**INITIAL ASSESSMENT**
- Level of consciousness
- Respiratory rate
- Oral intake, hydration
- Heart rate
- Indrawing, breath sounds
- Temperature
- Head bobbing
- Oxygen saturation

**MILD DISEASE**
- RR < 40
- Indrawing: none
- Auscultation: vesicular
- Skin colour: normal
- General condition: not affected

Reassurance if SaO2 > 92%
Maintain good hydration
Close follow-up

**MODERATE DISEASE**
- RR 40-60
- Indrawing: moderate subcostal
- Auscultation: wheeze + rales/rhonchi
- Skin colour: pallor
- General condition: moderately affected

Oxygen
Salbutamol 0.03ml/kg of 5mg/mL in 2mL NS with O2 at 5L/min.
Can give x2 q30 min

**SEVERE DISEASE**
- RR > 60
- Indrawing: severe
- Auscultation: faint + severe wheeze + pronounced rales/rhonchi
- Skin colour: cyanotic
- General condition: severely affected

Oxygen
Same as for moderate disease

+ TRANSFER

Improvement?

- SaO2 >92% in RA one hour after salbutamol
- Salbutamol ii puffs bid + prn with aerochamber at home

**YES**
- SaO2 > 92% 1 hour post-Rx
- Treat with oxygen in Health Centre x 2-8 hours
- Home if stable
- Close follow-up
- *can try salbutamol again to see if responding*

**NO**
- Racemic epinephrine 0.05-1.0 mL/kg/dose (max 0.5mL) or epinephrine 0.5-1.0 mL/kg/dose of 1:1,000 (max 5 mL) in 3mL NS with O2 at 5L/min x2 q30 min then q2h prn if improving
- *Pallor may be expected adverse effect*

- SaO2 < 92% 1 hour post-Rx
- Transfer
**Pneumonia**

**Definition**
Inflammation and infection of the lung. Often classified by anatomic location:
- **Lobar pneumonia**: localized to one or more lobes of the lung
- **Bronchopneumonia**: inflammation around medium-sized airways, which causes patchy consolidation of parts of the lobes
- **Interstitial pneumonia**: inflammation of lung tissue between air sacs, usually generalized, often viral

**Causes**
- Viral form most common in children (RSV, parainfluenza virus, influenza A or B, adenoviruses)
- Bacterial organisms in 10% to 30% of cases
- **Mycoplasma, Chlamydia**
- Inhaled toxins
- Fungi (uncommon)
- Tuberculosis: still a factor in chronic pneumonia in Aboriginal children
- Often spread from an intercurrent infection elsewhere (e.g. otitis media)

**Table 10-4: Common causes of pneumonia according to age**

<table>
<thead>
<tr>
<th>Age</th>
<th>Bacterial</th>
<th>Viral</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 4 weeks</td>
<td>Group B Streptococcus, gram-negative rods, listeria monocytogenes, staphylococcus aureus</td>
<td>CMV, herpesvirus</td>
</tr>
<tr>
<td>4 – 16 weeks</td>
<td>Chlamydia, hemophilus influenzae, staphylococcus aureus, streptococcus pneumoniae, listeria monocytogenes</td>
<td>CMV, RSV, parainfluenza, influenza virus, adenovirus</td>
</tr>
<tr>
<td>4 months to 5 years</td>
<td>Hemophilus influenzae, mycoplasma, staphylococcus aureus, streptococcus pneumoniae, chlamydia</td>
<td>RSV, adenovirus, parainfluenza, adenovirus, influenza virus</td>
</tr>
<tr>
<td>&gt; 5 years</td>
<td>Mycoplasma, streptococcus pneumoniae, hemophilus influenzae</td>
<td>Influenza virus</td>
</tr>
</tbody>
</table>

Source: Bugs and Drugs (2001), pp 103-106

**History**

**Viral**
- Gradual onset
- Symptoms of URTI appear first

**Bacterial**
- Acute onset

**General Symptoms**
- Fever (less prominent in viral form, high in bacterial form)
- Chills
- Malaise
- Headache
- Lethargy
- Anorexia or poor feeding in infants

**Respiratory Symptoms**
- URTI symptoms, especially with viral form
- Chest pain (older child may complain of this symptom)
- Shortness of breath
- Cough

In children, there is often no history of sputum production.

If there is any eye discharge, consider *Chlamydia* or adenovirus as the cause.

**Physical Findings**
- Temperature elevated (more likely with bacterial form in older children)
- Tachypnea
- Tachycardia
- Signs of URTI (e.g. runny nose, red throat)
- Indrawing, nasal flaring
- Decreased unilateral chest excursion over area of lobar pneumonia (chest excursion may be normal in bronchopneumonia or interstitial pneumonia)
- Tactile fremitus increased in lobar pneumonia, decreased in pleural effusion
- Dullness to percussion in lobar pneumonia and pleural effusion
- Breath sounds decreased or absent or may be increased over consolidation
- Crackles may be present over affected lobes (other lobes normal) in lobar pneumonia
• Scattered crackles in bronchopneumonia
• Scattered crackles and wheezes in interstitial pneumonia
• Pleural rub (localized in lobar pneumonia)

Differential Diagnosis
• Bronchitis
• Asthma
• Foreign-body aspiration or inhalation of toxin
• Tumor
• Pulmonary trauma
• Cystic fibrosis
• Heart failure
• Intra-abdominal pathology causing splinting or reactive effusion

Complications
• Respiratory failure and cardiovascular collapse
• Pleural effusion
• Empyema
• Lung abscess
• Pneumothorax
• Bacteremia
• Sepsis
• Pericarditis

Diagnostic Tests
Chest x-ray (if available), but only if the diagnosis is in doubt and the outcome of the x-ray will affect management; otherwise, treat on clinical basis.

Management
Management depends on the cause and severity of the disease and the age of the child.

Goals of Treatment
• Relieve infection
• Prevent complications

Appropriate Consultation
Consult a physician if any of the following apply:
• Moderate to severe respiratory distress
• Age less than 6 months
• Underlying cardiac or lung disease
• Immunosuppression
• Failure to respond to oral antibiotics within 24-48 hours
• Inability to tolerate oral antibiotics
• Symptoms involving other systems (e.g. diarrhea)

Adjuvant Therapy
• Give oxygen (humidified), by mask at 6-10 L/min or more, to any child who is in respiratory distress
• Start IV therapy with normal saline during transport to hospital, and run at a rate adequate to maintain hydration

Nonpharmacologic Interventions
• Rest
• Assure adequate hydration
• Nurse in propped-up position if child is short of breath

Pharmacologic Interventions
Choice of and route for antibiotic therapy are based on age and the most likely infective organism.

Neonate
Cover for group B Streptococcus and coliform bacteria before transfer:
ampicillin (C class drug), 200 mg/kg per day, divided q8h, IV
and
gentamicin (B class drug), 7.5 mg/kg/day IV q8h

1-4 Months of Age
Cover for Hemophilus influenzae, Staphylococcus aureus and Streptococcus pneumoniae.

Treat "less sick" child as an outpatient:
amoxicillin (C class drug), 40 mg/kg per day, divided q8h, PO for 10 days

For a sick child awaiting transfer to hospital:
cefuroxime (B class drug), 150 mg/kg per day, divided q8h, IV or IM
+ erythromycin (C class drug) 40mg/kg/day PO q6h

>4 Months to 5 Years Old
Treat "less sick" child as an outpatient:
amoxicillin (C class drug), 40 mg/kg per day, divided q8h, PO for 10 days
or
erthyromycin (C class drug) 40 mg/kg/day PO q6h
or
azithromycin (B class drug) 10 mg/kg x one dose, then 5 mg/kg x four doses

For a sick child awaiting transfer to hospital:
cefuroxime (B class drug), 150 mg/kg per day, divided q8h, IV or IM
+ erythromycin (C class drug) 40mg/kg/day PO q6h
>5 Years Old
Treat "less sick" child as an outpatient:

- **erythromycin ethylsuccinate suspension (C class drug),** 30-50 mg/kg per day, divided q6h, PO for 10 days
  - or
- **azithromycin (B class drug) 10 mg/kg x one dose, then 5 mg/kg x four doses**
  - or
- **clarithromycin (B class drug) 15mg/kg/day PO divided q12h for 10-14 days**
  - or (in an older child)
- **erythromycin (C class drug), 250 mg, 1 tab PO q6h for 10 days**

For a sick child awaiting transfer to hospital:

- **cefuroxime (B class drug), 150 mg/kg per day, divided q8h, IV or IM**
  - +
- **erythromycin (C class drug) 40mg/kg/day PO q6h**

**Monitoring and Follow-Up**
- **Outpatient:** Follow up in 24-48 hours to assess progress and again when course of antibiotics is complete
- **Child awaiting transport to hospital:**

  Monitor ABCs, pulse oximetry (if available and child is in respiratory distress) and hydration

**Referral**
Medevac in the following situations:
- Moderate to severe respiratory distress
- Age less than 3 months
- Underlying cardiac or lung disease
- Immunosuppression
- Failure to respond to oral antibiotics within 24-48 hours
- Inability to tolerate oral antibiotics
- Adequate care at home cannot be guaranteed
**Acute Asthma**

For further reading on asthma and current guidelines please refer to:
www.asthmaguidelines.com
www.pulsus.com/Respir/08_02/guide-ed.htm
where Boulet et al (1999) Canadian Asthma Consensus Guidelines, updates and treatment flowcharts and checklists can be found.

**Definition**
Chronic diagnosis seen in adults, irreversible obstructive disease of the lungs characterized by hyperreactivity of the airways and inflammation, which leads to recurrent episodes of cough and wheezing.

It occurs in 5% to 10% of children, and the prevalence is increasing, for unknown reasons.

Three major events lead to obstruction:
- Mucosal edema with inflammation
- Increased production of mucus
- Smooth-muscle hyperreactivity (bronchospasm)

**Causes**
**Precipitating Factors**
- Severe or recurrent RSV bronchiolitis in genetically predisposed
- Familial tendency
- History of eczema/allergy

**Triggers**
- Allergens (e.g. pollens)
- Exercise
- Cold air
- Cigarette smoke
- Wood smoke
- Respiratory infection
- Emotions (e.g. fear, anger, crying, laughing)

**History And Physical Findings**

**Acute Episodes**
- History of preceding URTI
- Exposure to known allergen (e.g. smoke)
- Wheeze
- Cough
- Dyspnea
- Chest tightness

**Impact of Asthma on Child**
- Number of school days missed
- Limitation of activity because of frequency of attacks
- Number of visits to clinic or emergency department for treatment
- Number of admissions to hospital or ICU
- Number of courses of systemic steroids needed to manage acute episodes

**Environmental History**
- Type of home
- Heating source
- Carpeting
- Pets
- Exposure to secondhand smoke
- Stuffed animals
- Feather pillow, duvet

**Signs of Atopic Disease**
- Eczema
- "Allergic shiners" (dark circles under eyes)
- Transverse nasal crease
- Frequent nose rubbing
- Watery eyes and nose

**Determining Severity Of Acute Asthma Exacerbation**

**Mild Exacerbation**
- Cough, wheeze, some dyspnea
- Inspiratory and expiratory wheezes
- Oxygen saturation >95% on room air
- PEFR 75% of personal best

**Moderate Exacerbation**
- Abbreviated speech
- Dyspnea at rest
- Cough, wheeze, dyspnea
- Intercostal indrawing, tracheal tug
- Inspiratory and expiratory wheezes
- Oxygen saturation 92% - 95% on room air
- PEFR 50% to 75% of personal best
- Partial relief with β₂-agonist and required > 4 hours

**Severe Exacerbation**
- Anxiety, confusion, fatigue, decreased level of consciousness
- Dyspnea, with inability to speak or eat
- Respiratory rate greater than 2 SD above normal rate for age
• Persistent tachycardia
• No relief with usual dose of $\beta_2$-agonist

### Signs of Severe Airway Obstruction

- Cyanosis
- Nostril flaring, tracheal tug, intercostal indrawing
- Use of accessory muscles, especially sternocleidomastoid muscles
- Pulsus paradoxus greater than 20 mm Hg
- Breath sounds faint or absent (because of lack of air entry)
- Marked expiratory wheezes, prolonged expiratory phase
- Oxygen saturation <92% on room air
- PEFR less than 50% of personal best or standard level

Beware the silent chest. A very quiet chest is common in severe asthma, because there is little movement of air.

### Risk Factors For Severe Asthma

History of the following features:

- Poorly controlled asthma
- Frequent asthma attacks (more than two per week)
- Recent severe attack
- Recent visit to emergency room or admission to hospital or ICU for asthma
- Severe present attack
- Duration of current symptoms longer than 24 hours
- More than 10 puffs of salbutamol in past 24 hours
- Recent use of high-dose steroids
- Long delay in seeking medical care

### Differential Diagnosis

- Pneumonia
- Croup
- Bronchiolitis
- Foreign-body aspiration
- Cystic fibrosis
- Pulmonary edema
- GERD with recurrent aspiration

### Complications

- Frequent absences from school
- Frequent admission to hospital
- Restrictions in physical activity
- Psychologic impact of chronic illness
- Localized bronchiectasis
- Death

### Diagnostic Tests

- Pulse oximetry (if available)
- PEFR (can be attempted in an older child, if he or she is not too distressed)
- Chest x-ray (if available) to rule out pneumothorax before medevac by air

### Management Of Acute Asthma Exacerbation

#### Goals of Treatment

- Relieve symptoms
- Prevent complications
- Prevent recurrence

#### Appropriate Consultation

Consult a physician for:

- Any child with previously undiagnosed (suspected) asthma
- Any child with known asthma who is experiencing acute symptoms
- Any child receiving long-term prophylaxis whose symptoms are not well controlled with the current medication regimen

#### Adjuvant Therapy

- Give oxygen (6-10 L/min or more by mask) to keep oxygen saturation at >95%
- Start IV therapy with normal saline in children with moderate to severe respiratory distress

#### Nonpharmacologic Interventions

- Nurse in an upright position
- Give liberal oral fluids to prevent dehydration and to help liquefy secretions

#### Pharmacologic Interventions

In a case of acute asthma, try to consult a physician before giving any medication to the child.

Aerosolized $\beta_2$-agonists:  
**salbutamol (C class drug),** 5 mg/mL by nebulizer, q20min, for a maximum of 3 times (may be given continuously if needed)

Dose is based on child's weight:

- $\leq 10$ kg: 1.25-2.5 mg/dose, in 3 mL normal saline
- 11-20 kg: 2.5 mg/dose, in 3 mL normal saline
- $> 20$ kg: 5.0 mg/dose, in 3 mL normal saline

If a full response is achieved, consult a physician about continuing management at home:
**Criteria for Hospital Admission**
- Child is critically ill (moderate to severe airway obstruction with respiratory distress)
- Poor response to emergency therapy: needs more than three or four salbutamol treatments, post-treatment PEFR is less than 40% of predicted, post-treatment oxygen saturation <95% on room air
- Social considerations: parents or caregiver unreliable, home is far from health facility

**Discharge Home after Treatment of Acute Episode**
- Provide instructions (preferably written) to the parents or caregiver on symptoms and signs of respiratory distress
- Advise parents or caregiver to bring the child back to the clinic if there is no response to β2-agonists or the response lasts less than 2 hours
- Counsel about appropriate use of drugs, including dosages, administration techniques (e.g. use of MDI with spacer), effects and side effects
- Explain strategies to prevent further attacks
- Prophylactic medication regimen as required

**Monitoring and Follow-Up**
Monitor ABCs, pulse oximetry (if available), hydration and level of consciousness while awaiting transport.

**Referral**
Medevac.

**salbutamol** (*C class drug*), by MDI, 1 or 2 puffs q2-4h prn for relief, depending on severity and
**prednisone** (*B class drug*), 1-2 mg/kg per day (to a maximum of 60 mg) PO od for 5 days
If only a partial response is achieved:
Continue β2-agonist q20min as above and add the following:
**ipratropium bromide** (*C class drug*), 250 mcg q1h, by nebulizer with salbutamol (*C class drug*) and consult physician about IV steroids
Chronic Asthma

Definition
• Mild chronic asthma: mild activity limitation, infrequent episodic illness
• Mild persistent asthma: occasional night cough relieved by β2-agonists or exercise-induced bronchospasm regularly relieved by β2-agonists
• Moderate asthma: regular use of β2-agonists at night for cough, activity limitations despite use of β2-agonists, recent emergency treatment for acute symptoms or use of prednisone for control of symptoms
• Exercise-induced asthma

Management
Goals of Treatment
• Prevent symptoms (e.g. cough, shortness of breath, wheeze that interferes with daytime activities, exercise, school attendance or sleep)
• Prevent need for regular use of rescue medications (e.g. salbutamol)
• Prevent visits to emergency department or admission to hospital
• Normalize PEFR and FEV1 on pulmonary function testing

Appropriate Consultation
Consult a physician for:
• Any child with previously undiagnosed asthma
• Any child with known asthma who is experiencing acute symptoms
• Any child receiving long-term prophylaxis whose symptoms are not well controlled with the current medication regimen

Client Education
• Discuss diagnosis and expected course of illness
• Counsel parents or caregiver about appropriate use of medications (dose, frequency, side effects)
• Advise child about proper use of aerosol delivery device, Aerochamber and spacer
• Review inhaler techniques regularly and often to ensure optimal use
• Teach parents or caregiver how to monitor for symptoms and how to use peak flow meter (if deemed beneficial for managing symptoms)
• Provide instruction on worsening signs of asthma
• Provide written instruction on a plan of action that the parents or caregiver should initiate when signs of worsening are first occurring (e.g. increasing need for usual rescue medications)
• Counsel parents (or caregiver) and child about how to minimize local side effects (oral candidiasis) by careful rinsing of the mouth and gargling

Pharmacologic Interventions
Long-Term Prophylactic Management of Chronic Asthma
To be prescribed only by a physician.

Various medication regimens (some of which are non-formulary items) may be prescribed for prophylaxis, including the following.

Bronchodilators (β2-Agonists)
• Short-acting, e.g. salbutamol (C class drug)
• Long-acting, e.g. salmeterol (B class drug)

Anti-inflammatory Agents
• Corticosteroids e.g. budesonide (B class drug) or fluticasone (B class drug)
• Mast cell stabilizers, e.g. sodium cromoglycate (B class drug)
• Theophylline (B class drug): may have a role for children receiving optimal anti-inflammatory therapy but still needing more bronchodilation than they are obtaining from β2-agonists
• Leukotriene receptor antagonists, e.g. montelukast (B class drug): may help with exercise-induced asthma and may have steroid-sparing properties, which allow better control of asthma at lower doses of inhaled steroids

For Mild Chronic Asthma
aerosolized salbutamol (C class drug), 100-200 mcg (1 or 2 puffs) q4-6h

For younger children, a home nebulizer for use with aerosol solution should be considered. If unable to obtain a nebulizer, mild chronic asthma in very young children can be managed with regular inhaler and spacer, such as the Aerochamber.

For Mild Persistent Asthma
β2-agonist prn, e.g. salbutamol (C class drug) and
sodium cromoglycate (B class drug)
or
inhaled steroids, e.g. budesonide (B class drug), 200-800 mcg/day or fluticasone (B class drug), 100-500 mcg/day
For Moderate Chronic Asthma

- β₂-agonists prn, e.g. salbutamol (C class drug)
- inhaled steroids, e.g. budesonide (B class drug), 200-800 mcg/day
  or
- fluticasone (B class drug), 100-500 mcg/day
  and
- prednisone (B class drug), 0.5-1 mg/kg per day for exacerbations, PO (maximum 5-day course)

For Exercise-Induced Asthma

- salbutamol (C class drug), 100-200 mg (1 or 2 puffs) 15 minutes before exercise
  or
- long-acting β₂ agonist

For Night Cough

- inhaled steroids (B class drug), 200-800 mcg/day
  or
- fluticasone (B class drug), 100-500 mcg/day
  or
- salbutamol (C class drug), 100-200 mg (1 or 2 puffs) hs

Monitoring and Follow-Up

See children with chronic asthma at least several times a year to assess if there is adequate control of symptoms. Watch for growth failure in children taking more than 800 µg of inhaled steroids per day.

Referral

Refer as needed to a physician to assess control and to prescribe medications for long-term prophylaxis.
Persistent Cough

Definition
Cough is a forceful explosive expiration and release of air, which serves to remove secretions and foreign material from the respiratory tract. Chronic or persistent cough is a cough lasting longer than 3 weeks. Cough is a symptom of some other specific diagnosis.

Differential Diagnosis

Infection
- URTI with irritation or postnasal drip (or both); may be associated with sinusitis
- Bronchitis caused by or related to virus, *Mycoplasma*, pertussis, tuberculosis or (rarely) other organisms or parasites
- Pneumonia, especially that caused by *Mycoplasma*

Post-infection
- After bronchiolitis or pneumonia
- Allergy: allergic rhinitis with postnasal drip
- Asthma: cough may predominate, rather than wheeze

Suppurative Lung Disease
- Bronchiectasis
- Cystic fibrosis

Environmental Irritants
- Dry air
- Fumes
- Smoke

Aspiration
- Foreign body: onset of cough is usually sudden, but symptoms may be chronic if aspirated material is small
- Gastroesophageal reflux with aspiration
- Neuromuscular disorders: aspiration especially associated with feeding

Anatomic Defects
- Compression of airways by lung or blood vessel anomalies or tumors

History

Nature of Cough
- Production of sputum indicates pneumonia or bronchiectasis
- Presence of whoop indicates pertussis
- Paroxysmal nature (i.e. continuous, short coughs on a single expiration) indicates pertussis, parapertussis, some viruses such as adenovirus
- Dry hacking cough indicates tracheal irritation
- Brassy cough indicates tracheal or bronchial compression
- Increase in cough in supine position indicates sinusitis with postnasal drip, gastroesophageal reflux
- Nocturnal cough indicates asthma
- Exercise-induced cough indicates asthma

Associated Symptoms and Events
- URTI symptoms
- Postnasal drip
- Allergic "shiners"
- Exposure to infectious persons
- Diarrhea, poor weight gain (cystic fibrosis)

Past History
- Developmental delay
- Neuromuscular abnormalities
- Eczema (may precede asthma)
- Viral pneumonia (due to RSV or adenovirus) may be followed by airway damage, chronic cough and wheeze

Physical Examination
Assess for:
- Presence of respiratory distress (respiratory rate, use of accessory muscles)
- Nasal congestion
- Allergic "shiners"
- Dullness over areas of lung consolidation
- Sound of cough
- Breath sounds
- Adventitious sounds
- Skin rash
- Muscle wasting
- Developmental delay

Management
Management depends on the diagnosis.

Goals of Treatment
- Identify underlying diagnosis

Appropriate Consultation
Consult with a physician about the need for investigation and, in some cases, referral to tertiary care center.

Do not use any cough medications without establishing diagnosis.
Emergency Problems Of The Respiratory System

Epiglottitis

Definition
Acute, life-threatening infection, consisting of cellulitis of the epiglottis and resulting in critical narrowing of the airway. Progresses rapidly (less than 12 hours from onset to respiratory distress). Usually occurs in children 3-7 years old. Children inadequately immunized against Hemophilus influenzae type B may be particularly susceptible.

Causes
Usually a bacterial infection:
• Hemophilus influenzae type B (accounted for more than 90% of cases before vaccines were introduced, but is now rare)
• Staphylococcus aureus
• Streptococcus pneumoniae
• Streptococcus pyogenes, group A

History
• Abrupt onset
• Limited or no prodrome
• High fever (>39°C)
• Sore throat with drooling
• Dysphagia
• No cough, runny nose or other symptoms of URTI

Check that primary immunization series (for Hemophilus influenzae type B) is complete.

Physical Findings
Do not attempt to examine oropharynx, since this may provoke sudden obstruction.

Examination should be minimal to minimize distress to the child.

• Child looks acutely ill and anxious
• High fever
• Cyanosis
• Slow, labored breathing
• Suprasternal indrawing
• Drooling
• Child will not talk and sits erect in the classic "sniffing" position, leaning forward with hyperextension of the neck
• Stridor relatively quiet, given the degree of distress
• Breath sounds normal, with transmitted stridor
• Air entry reduced

Differential Diagnosis
• Croup (see Table 10-5)
• Bacterial tracheitis
• Peritonsillar or retropharyngeal abscess
• Uvulitis
• Diphtheria
• URTI in the presence of congenital or acquired airway disease (e.g. subglottic stenosis or laryngeal web)

Complications
• Complete obstruction of airway causing respiratory arrest, hypoxia and death
• Sepsis
• Septic shock

Table 10-5: Comparison of epiglottitis and croup

<table>
<thead>
<tr>
<th>Feature</th>
<th>Epiglottitis</th>
<th>Croup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>2 – 8 years</td>
<td>6 months to 6 years</td>
</tr>
<tr>
<td>Onset</td>
<td>Acute</td>
<td>Gradual; child often has a cold first</td>
</tr>
<tr>
<td>Temperature</td>
<td>High (&gt; 39°C)</td>
<td>Low (&lt; 38°C)</td>
</tr>
<tr>
<td>Swallowing</td>
<td>Difficulty; salivation</td>
<td>No difficulty</td>
</tr>
<tr>
<td>Position</td>
<td>Sitting up, leaning forward</td>
<td>variable</td>
</tr>
</tbody>
</table>

Diagnostic Tests
None.

Management
ABCs are the first priority!

Goals of Treatment
• Relieve infection
• Prevent complications

Appropriate Consultation
Consult a physician as soon as possible, but ensure that the child's ABCs are stabilized first.
**Adjuvant Therapy**

- Give oxygen by mask at 6-10 L/min or more, unless this is distressing to the child
- Oxygen by nasal prongs at 2-4 L/min may be less distressing
- Start IV therapy with normal saline to keep vein open, unless this is likely to distress the child and thereby to increase respiratory distress

**Nonpharmacologic Interventions**

- Nurse the child in the parent's or caregiver's arms
- Give nothing by mouth
- Allow the child to assume any position that makes him or her comfortable

**Pharmacologic Interventions**

Administration of antibiotics effective against H. influenzae should be started before transport, if possible.

A child with epiglottitis has septicemia and should be given initial doses of antibiotic therapy, unless he or she is likely to become distressed by this treatment. Discuss with a physician.

- cefuroxime (**B class drug**), 150 mg/kg per day, divided q8h, IV

Rifampin prophylaxis (20 mg/kg daily in a single dose for 4 days) is recommended for the child and for family, household and possibly daycare contacts. Discuss prophylaxis with a physician.

**Monitoring and Follow-Up**

Monitor ABCs and pulse oximetry (if available) as frequently as possible, but be discreet and try not to agitate the child.

**Referral**

Medevac immediately to a facility where controlled intubation is possible.

A physician or paramedic skilled in intubation should accompany the child during transfer.
Neonatal Resuscitation


Diagnosis

Try to anticipate situations in which a child may need resuscitation. The following situations represent some of the predisposing factors.

History of Maternal Perinatal Complications

- Preterm labor
- Placental abnormalities: placenta previa, abruptio placentae or cord compression
- Amniotic fluid abnormalities: polyhydramnios or oligohydramnios, meconium-stained
- Infectious process: maternal fever
- Infectious agents (maternal source): group B Streptococcus, gram-negative bacteria, viruses (e.g. HSV, toxoplasmosis, CMV, HIV)
- Maternal abnormalities: diabetes mellitus, size of pelvic outlet
- Neonatal abnormalities: genetic, anatomic or cardiac
- Maternal drugs: prescription or illicit

Physical Examination and Evaluation

The physical examination may have to be done while resuscitation is performed.

- Airway: Is it patent? Is foreign material (e.g. meconium) present?
- Breathing effort: Present or absent?
- Circulation: Is pulse present? What is heart rate? What is infant's color?
- Disability: neurologic status, floppy tone, absence of reflex and grimace
- Environment: heat loss
- Apgar score: should be assessed 1 and 5 minutes after birth (Table 10-6)

Table 10-6: Determination of Apgar score

<table>
<thead>
<tr>
<th>Feature evaluated</th>
<th>0 points</th>
<th>1 point</th>
<th>2 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate</td>
<td>0</td>
<td>&lt; 100 beats/min</td>
<td>&gt; 100 beats/minute</td>
</tr>
<tr>
<td>Respiratory effort</td>
<td>Apnea</td>
<td>Irregular, shallow or gasping breaths</td>
<td>Vigorous, crying</td>
</tr>
<tr>
<td>Colour</td>
<td>Pale or blue all over</td>
<td>Pale or blue extremities</td>
<td>Pink</td>
</tr>
<tr>
<td>Muscle tone</td>
<td>Absent</td>
<td>Weak, passive tone</td>
<td>Active movement</td>
</tr>
<tr>
<td>Reflex irritability</td>
<td>Absent</td>
<td>Grimace</td>
<td>Active avoidance</td>
</tr>
</tbody>
</table>

* Sum the scores for each feature. Maximum score = 10, minimum score = 0

Procedure For Resuscitation

1. Clamp and cut the cord.
2. Position the airway.
3. Suction the mouth and nasopharynx.
4. Dry the neonate and keep warm with thermal blanket or dry towel. Cover scalp. Use heating lamp
5. Stimulate by drying the baby and rubbing his or her back.
6. Evaluate respirations.
7. Use blow-by method or simple facemask to deliver 100% oxygen for neonate in mild distress. For an infant with apnea or severe respiratory depression, begin assisted breathing with bag-valve mask (BVM) and 100% oxygen; ventilate at 40-60 breaths/minute.
8. Check heart rate (apical beat).

If heart rate < 60 beats/minute:

9. Continue assisted ventilation (30 breaths/minute).
10. Begin chest compressions at 90/minute.
11. If no improvement after 30 seconds, continue ventilation and compressions.
12. If no improvement after a further 30 seconds, establish vascular access and give epinephrine solution (1:10,000) (D class drug) at 0.01-0.03 mg/kg IV or IO or through ET tube. Subsequent doses must be ordered by a physician.
13. Reassess heart rate and respirations.

If heart > 60 beats/minute:

14. Continue assisted ventilation.
15. Reassess heart rate and respirations each minute.
16. Give 100% oxygen by mask or blow-by method.
17. Reassess heart rate and respirations after 30 seconds.

If heart rate < 100 beats/minute:
18. Begin assisted BVM ventilation with 100% oxygen.
19. Reassess heart rate after 30 seconds.

If heart rate > 100 beats/minute:
20. Check skin color. If peripheral cyanosis is present, give oxygen by mask or blow-by method.
21. Reassess heart rate after 1 minute.

### Table 10-7: Summary of steps in neonatal resuscitation: ABCDEF

<table>
<thead>
<tr>
<th>A for airway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear or suction airway</td>
</tr>
<tr>
<td>Consider giving oxygen prn</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>B for breathing</td>
</tr>
<tr>
<td>Support breathing with oral airway</td>
</tr>
<tr>
<td>and bag-valve-mask prn</td>
</tr>
<tr>
<td>100% oxygen</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>C for circulation</td>
</tr>
<tr>
<td>no support needed if heart rate &gt; 100 beats/minute</td>
</tr>
<tr>
<td>if heart rate ≤ 100 beats/minute,</td>
</tr>
<tr>
<td>ventilate and observe</td>
</tr>
<tr>
<td>If there is a response (heart rate</td>
</tr>
<tr>
<td>increased to &gt; 100 beats/minute),</td>
</tr>
<tr>
<td>no further support is needed</td>
</tr>
<tr>
<td>If response is poor (heart rate &lt; 60 beats/minute) recheck airway; if airway and breathing are adequate, initiate chest compressions</td>
</tr>
<tr>
<td>If “ABC” (above) fail to produce a response, consider “D” as follows</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>D for drugs</td>
</tr>
<tr>
<td>IV fluid (for volume expansion): 0.9% NS</td>
</tr>
<tr>
<td>epinephrine solution (1:10,000) (D class drug), 0.01-0.03 mg/kg/IV, IO or ET (at slow rate of infusion)</td>
</tr>
<tr>
<td>consider naloxone (D class drug) if there is a possibility of maternal narcotics</td>
</tr>
</tbody>
</table>

| E for exposure                     |
| keep infant under radiant warmer or surrounded by warmed blankets |

| F for final steps                  |
| consult pediatric and neonatal departments at nearest tertiary care facility |
| transfer to neonatal ICU if child needs more than simple oxygen and transient (for < 5 minutes) assisted ventilation with bag-valve-mask |

### Post-Resuscitation Care

**Signs of Continuing Perinatal Asphyxia**
- Altered gaze, slack face
- Increasing irritability
- Seizures
- Decreased muscle tone
- Decreased suck, swallow or gag reflex
- Breathing irregularities
- Stupor or coma
- Signs of increased intracranial pressure (e.g. bulging fontanel, frequent emesis, blunted reflexes, "sunset" eyes)

**Stabilization**

**Monitoring and Assessment**
- Observe infant continuously
- Do not leave unattended
- Handle gently

**Vital Signs**
Record vital signs every 15 minutes or more frequently, depending on situation.
- Heart rate: normally 120-160 beats/minute (use pulse oximetry, if available)
- Respiratory rate: normally 40-60 breaths/minute (airway can be kept open by slightly extending the position of the head and suctioning as necessary)
- Axillary temperature: normally 36.5°C to 37°C
- Blood pressure: difficult to assess in newborns without special equipment; signs of adequate perfusion include good capillary refill, good colour, adequate urinary output and normal alertness; determine capillary refill time (to assess skin perfusion) by blanching area with digital pressure (normal refill time is 2-4 seconds)
Thermoregulation
Provide warmth to maintain normal body temperature. Ambient temperature at which an infant uses the least energy to maintain body temperature depends on the infant's weight, gestational age at birth and postnatal age. Prolonged cold stress results in increased oxygen consumption and abnormal glucose utilization, which can lead to hypoglycemia, hypoxemia and acidosis.

Measures to Maintain Warmth
• Dry the baby and keep the environment warm and humid
• Maintain a warm room temperature, keep the infant away from cold windows and use double-walled incubators or radiant heaters (if available)
• Warm linen in contact with the baby and change wet linen

Maintenance of Oxygenation and Ventilation

Signs of Respiratory Distress
• Periodic breathing
• Tachypnea (respiratory rate > 60 breaths/minute)
• Grunting
• Chest wall retractions
• Nasal flaring

Common Causes of Respiratory Distress in Newborns
• Respiratory distress syndrome
• Aspiration syndrome
• Pneumonia
• Pulmonary air leak

In these situations, consult a physician.

Respiratory Failure and Mechanical Ventilation
• Progressively increased oxygen demands and respiratory distress
• If there is evidence of respiratory failure, take steps immediately to provide positive pressure ventilation (PPV)
• Maintain oxygen saturation in the range of 90% to 95% by pulse oximetry (if available)
• Initiate PPV with infant resuscitation bag at 40-60 respirations/minute and pressure of 20-30 cm H2O
• Effectiveness of ventilation judged by infant's clinical response, symmetric chest movement and auscultation of air entry to both lungs
• Major cardiopulmonary failure may be prevented by early intervention with 100% oxygen and PPV

Maintenance of Circulation
Adequate cardiac output is essential to maintain circulation. The best way to maintain circulation is provision of adequate fluids and electrolytes. Babies with unstable conditions are usually given nothing by mouth, and an IV infusion is started.

Conditions Necessitating IV Infusion
• Extreme prematurity
• GI anomalies (e.g. gastroschisis)
• Cardiac anomalies
• Respiratory distress syndrome
• Dehydration
• Shock

Fluid Administration Guidelines for Newborns
• Term infant: 80-100 mL/kg every 24 hours
• Preterm infant: 100-140 mL/kg every 24 hours

Maintenance of Homeostasis
The most common problem is hypoglycemia, which occurs in a variety of situations:
• Prematurity
• Restricted intrauterine growth
• Asphyxia during birth
• Hypothermia
• Diabetic mother

Use a reagent strip or blood glucose monitor to assess blood glucose level every hour.

Maintain glucose levels at greater than 2 mmol/L.

IV administration of a 10% dextrose solution (approximately 3-4 mL/kg each hour) is usually adequate to correct transient hypoglycemia. Persistent hypoglycemia should be treated with a bolus of D5W or D10W (2-3 mL/kg). Discuss with a physician.

Abnormalities such as hypocalcemia, hypomagnesium, hyponatremia and hyperkalemia can complicate homeostasis, especially if resuscitation and stabilization processes are prolonged.

Infection
If sepsis is suspected, obtain swabs from ear canal, umbilicus and tracheal secretions. Obtain blood for culture if possible. IV administration of antibiotics should not be delayed. Discuss with a physician.
Usual antibiotic dosages:

- **Ampicillin (C class drug)**, 200 mg/kg/day IV divided q6h
- **Gentamicin (B class drug)**, 2.5 mg/kg q8h by slow IV push or IM

### Management of Special Conditions

#### Aspiration of Meconium
Suction mouth and nose at perineum, when head just out.

#### Pneumothorax
Depending on respiratory compromise, needle aspiration of pneumothorax (if tension) may be necessary. Keep infant in oxygen-rich environment x 1 hour.

#### Seizures
Administer anticonvulsants to control seizure activity:
- **Lorazepam (D class drug)**, 0.05 mg/kg per dose IV

#### Shock
If shock is suspected, volume expansion is indicated (e.g. 20 mL/kg bolus of normal saline or Ringer's lactate).

#### Exposed Abdominal or Neural Contents
Treat infant with sterile technique. Wrap defect in warm, sterile saline dressing and cover with plastic wrap to prevent drying. Position so that no pressure is applied to the defect.

#### Gastrointestinal Obstruction
Examples include duodenal atresia, ileal atresia and anal atresia. Give nothing by mouth. Insert an orogastric tube to remove gastric contents and prevent abdominal distension. Establish IV infusion with normal saline.
### Appendix 10-1: Oxygen Delivery Techniques

<table>
<thead>
<tr>
<th>Device</th>
<th>Flow (L/min)</th>
<th>Oxygen (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal prongs</td>
<td>2 – 4</td>
<td>24 – 28</td>
</tr>
<tr>
<td>Simple face mask</td>
<td>6 – 10</td>
<td>35 – 60</td>
</tr>
<tr>
<td>Face tent</td>
<td>10 – 15</td>
<td>35 – 40</td>
</tr>
<tr>
<td>Venturi mask</td>
<td>4 – 10</td>
<td>25 – 60</td>
</tr>
<tr>
<td>Partial rebreathing mask</td>
<td>10 – 12</td>
<td>50 – 60</td>
</tr>
<tr>
<td>Oxyhood</td>
<td>10 – 15</td>
<td>80 – 90</td>
</tr>
<tr>
<td>Nonrebreather mask</td>
<td>10 – 12</td>
<td>90 - 95</td>
</tr>
</tbody>
</table>
Chapter 11 – Cardiovascular System

Explanatory Note ......................................................

Assessment Of The Cardiovascular System.................................
  History Of Present Illness And Review Of System........................1
  Examination of the Cardiovascular System..............................2

Common Problems Of The Cardio-Vascular System....................
  Heart Murmurs...............................................................3
  Innocent Heart Murmur ..................................................4

Emergency Problems Of The Cardio-Vascular System................
  Cyanosis In The Newborn (Birth To 6 Weeks)............................5
  Rheumatic Fever (Carditis)..................................................7
  Cardiac Failure.....................................................................9

For more information on the history and physical examination of the cardiovascular system in older children and adolescents, see chapter 4, "Cardiovascular System," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.
Explanatory Note

Cardiovascular disease is uncommon in childhood. The major problems seen include congenital heart disease (usually septal defects but also abnormalities of the great vessels, hypoplastic heart, pulmonary or aortic atresia, and tetralogy of Fallot), cardiac failure, rheumatic fever carditis and myocarditis. Functional or innocent heart murmurs are common. Congestive heart failure at birth is rare and usually suggests severe valvular deformities. Symptoms of ventricular septal defect, including heart failure, usually occur at approximately 6 weeks of age.

Assessment Of The Cardiovascular System

History Of Present Illness And Review Of System

Symptoms of cardiovascular disease vary with the age of the child.

General
Ask about:
• Rapid or noisy breathing
• Cough
• Cyanosis
• Sweating
• Sleeping patterns
• Exercise tolerance: indicated in a young child by ability to feed and in an older child by ability to keep up with peers during play

In Infants
Cyanosis
• An abnormality of oxygen transport related to heart, lungs or blood
• Causes bluish discoloration of mucous membranes, nail beds and skin and is a significant clinical finding

Exercise Intolerance
• Eats slowly
• Tires during feeding
• Cyanosis appears with feeding
• Often described by parents or caregiver as a "good baby": always quiet, sleeps a lot

Difficulty Breathing
• Tachypnea
• Retractions
• Anxious appearance
• Grunting

Excessively Perspiration
• Infant's head described as "always wet"
• Infant perspires freely and easily, especially with excretion and feeding

Slow Growth
• Child usually exhibits slow weight gain, relative to height gain
• Difficulty in feeding may contribute to this problem
• Metabolic demands increased

Respiratory Infections
• More common with congestive heart failure
• More severe with increased pulmonary flow

In Children
• Slow growth
• Respiratory infections
• Chest pain
• Palpitations
• Dizzy spells or blackouts
• Exercise intolerance
• Squatting with cyanotic episodes ("tetralogy spells")

Medical History (Specific To Cardiovascular System)
• Prematurity (associated with a higher prevalence of congenital cardiac malformation)
• History of illnesses related to heart disease (e.g. strep throat)
• "Flu-like" illness
• Joint pains or swelling
• Down's syndrome, FAS (associated with a higher prevalence of congenital heart disease)
Examination of the Cardiovascular System

An examination of the cardiovascular system involves more than just examining the heart. The examination generally covers two systems: the central cardiovascular system (head, neck and precordium [anterior chest]) and the peripheral vascular system (extremities). Examination of the cardiovascular system must also include a full assessment of the lungs and neuromental status (for signs of confusion, irritability or stupor).

Vital Signs
- Heart rate
- Respiratory rate
- Blood pressure (in both an upper and a lower limb, if possible)
- Temperature (may be elevated with myocarditis or acute rheumatic fever)
- Cardiovascular problems may present as failure to thrive (weight and height below percentiles for age) or as a sharp decline in the growth curve across a major percentile line

Inspection
- Respiratory distress
- Cyanosis: central and peripheral
- Hands and feet: cyanosis, clubbing
- Precordium: visible pulsations
- Edema

Palpation
- Apical beat is located at fourth intercostal space, lateral to the mid-clavicular line in infants, and at fifth intercostal space, lateral to the mid-clavicular line in older children
- Brief, localized apical tap is normal
- Apical beat may be laterally displaced, which indicates cardiomegaly
- Thrills or heaves may be palpable through chest wall; check supraclavicular area for thrills (in children with a thin chest wall, normal heart movements can be easily palpated and should not be confused with true thrills and heaves)
- Hepatomegaly
- Pulses: brachial, radial, femoral, popliteal, posterior tibial, dorsalis pedis (also check for synchrony of radial and femoral pulses)
- Check for presence, rate, rhythm, amplitude and equivalence of peripheral pulses, especially femoral pulses (which are bounding in patent ductus arteriosus, absent in coarctation of aorta)
- Edema: pitting (rated 0 to 4) and level (how far up the feet and legs the edema extends); sacral edema
- Skin: temperature, turgor

Auscultation
- S1 and S2 heart sounds
- Physiologic splitting of S2 heart sound
- Added heart sounds (S3 and S4): determine their location and relation to respiration
- Murmurs: determine location (where murmurs are best heard), radiation, their timing in cardiac cycle, intensity grade (see Table 11-1) and quality
- Bruits: may occur in carotid arteries, abdominal aorta, renal arteries, iliac arteries, femoral arteries
- Crackles in lungs: may indicate heart failure (in infants and children, this usually occurs as a late sign)

Table 11-1: Characteristics of heart sounds of various grades

<table>
<thead>
<tr>
<th>Grade</th>
<th>Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Very quiet, barely audible</td>
</tr>
<tr>
<td>II</td>
<td>Quiet but audible</td>
</tr>
<tr>
<td>III</td>
<td>Easily heard</td>
</tr>
<tr>
<td>IV</td>
<td>Thrill can be felt, murmur is easily heard</td>
</tr>
<tr>
<td>V</td>
<td>Thrill can be felt and loud murmur can be heard with stethoscope placed lightly on chest</td>
</tr>
<tr>
<td>VI</td>
<td>Thrill can be felt and very loud murmur can be heard with stethoscope held close to chest wall</td>
</tr>
</tbody>
</table>
Common Problems Of The Cardio-Vascular System

Heart Murmurs

General
Most murmurs are innocent flow murmurs, which are present in up to 50% of children; see "Innocent Heart Murmur," below, this chapter.

A heart murmur may signify congenital anatomic, infectious or inflammatory damage to valves and outlets of the four chambers of the heart.

Physical Findings: Auscultation
Auscultation helps to distinguish significant murmurs from innocent murmurs.

Murmurs must be recognized in relation to other physiologic and pathologic sounds of the cardiac cycle.

• The first heart sound is caused by the closure of the mitral and tricuspid valves, which usually occurs simultaneously. The first sound is best heard at the cardiac apex.
• The second heart sound occurs with the closure of the aortic and pulmonary valves. Because the closure of these two valves is somewhat asynchronous, what is known as the second heart sound actually consists of two sounds. The separation of the two component sounds is often difficult to detect in young children, although it is more pronounced during inspiration. Wide separation of the second heart sound is often a significant pathologic finding. The second heart sound is best heard in the second and third left intercostal spaces.
• A third heart sound may occur after the second heart sound. This may be found in healthy children. It is a sign of heart failure in a symptomatic child. The third heart sound is best heard when listening at the apex of the heart (in the fourth and fifth intercostal spaces); a left side-lying position may accentuate the sound. Use the bell part of the stethoscope.
• Ejection "clicks" may be present in certain conditions; they are always abnormal.

If a murmur is present, several characteristics should be determined.

Timing within Cardiac Cycle
• Systolic ejection murmurs occur after the first sound. They are caused by turbulence in the blood as it leaves the heart.
• Pansystolic murmurs begin with the first heart sound and end with the second. They most often occur in association with ventricular septal defects.
• Diastolic murmurs begin with the second heart sound. They are always abnormal.

Location on the Thorax
There are four general auscultatory areas:
• Aortic: left ventricular outflow murmur (usually ejection)
• Pulmonary: right ventricular outflow murmur, patent ductus arteriosus
• Tricuspid: tricuspid murmurs increase on inspiration; ventricular septal defects are heard best in this area
• Mitral: murmur at the cardiac apex

Radiation
Radiation of the murmur to the back, sides and neck should be carefully auscultated. Radiation of the murmur may give important diagnostic clues (e.g. aortic stenosis radiates to the neck).

Intensity of Murmur
• Intensity expressed as a fraction of 6 (e.g. 1/6, 2/6), where a very loud murmur = 5/6 or 6/6, a loud murmur = 3/6 or 4/6, and a soft murmur = 1/6 or 2/6.
• Intensity (loudness) does not necessarily correlate with the severity of the condition. Soft murmurs may be dangerous, whereas loud murmurs are not necessarily so. A murmur associated with a thrill has an intensity of at least 4/6.
• Intensity may also increase with increased blood flow, as with exercise, fever.

Quality
• Blowing
• Rumbling
• Clanging
Innocent Heart Murmur

Definition
Heart murmur that occurs in the absence of anatomic or physiologic abnormalities of the heart and therefore has no clinical significance.

Such murmurs occur in 50% of children.

The age at onset is most frequently 3-8 years.

Pathophysiology
Most innocent heart murmurs are produced by the forward flow of blood, which creates turbulence in the chambers of the heart or the great vessels. Because the intensity of the murmur parallels the ejection velocity of blood from the ventricles, innocent murmurs usually occur during early to mid-systole, are short in duration, have a crescendo-decrescendo contour (especially an ejection murmur), are less than 3/6 in intensity and are never diastolic.

Clinical Features
Innocent heart murmurs are asymptomatic and are usually found on routine physical examination.

Diagnostic Tests
- ECG
- Echocardiography (only as ordered by a physician)

Management
- No treatment necessary
- Reassure the parents or caregiver

Referral
Refer child electively to a physician for assessment when a murmur is found.
Cyanosis In The Newborn (Birth To 6 Weeks)

Definition
Bluish discoloration of the skin and mucous membranes secondary to hypoxia.

Causes
Congenital Heart Disease
Cardiac cyanosis is due to left-to-right shunting, so that systemic venous blood bypasses the pulmonary circulation and enters the arterial systemic circulation.

Settings of increased risk of congenital heart disease:
• Genetic syndromes (e.g. Down’s syndrome)
• Certain extracardiac anomalies (e.g. omphalocele)
• Maternal diabetes that is poorly controlled in the first trimester
• Exposure to a cardiac teratogen (e.g. lithium, isotretinoin)
• Family history of significant congenital heart disease
• Fetal alcohol syndrome

Non-cardiac Causes
• Pulmonary infection (e.g. group B streptococcal infection)
• Aspiration of meconium
• Pulmonary hypoplasia
• Respiratory distress syndrome (e.g. in premature infants)
• Hypoventilation (e.g. neurologic depression)
• Persistent fetal circulation: seen in post term infants with perinatal distress or those with pulmonary disease
• Diaphragmatic hernia

Clinical Features Of Infants With Cyanotic Heart Disease
The clinical features usually present in the first week of life but may present later:
• Difficulty feeding; infant appears to tire easily
• Lethargy
• Cyanosis when feeding or active (e.g. while crying)
• Perspiration on face or forehead, especially when feeding or active
• Rapid, noisy breathing

Physical Findings
• Lethargy
• Cyanosis, initially of the oral mucosa; in severe cases, the cyanosis becomes generalized
• Tachypnea
• Poor perfusion (e.g. pallor or gray, ashen appearance; extremities cool; capillary refill diminished; peripheral pulses diminished)
• In coarctation of aorta, pulse quality and blood pressure may differ in different extremities
• Heart sounds may be loud
• Precordium may appear hyperdynamic (heaves or thrills may be present)
• Heart murmur may be present
• Hepatomegaly (if infant is in heart failure)

Differential Diagnosis
• Pulmonary causes as listed above
• Sepsis

Complications
• Cardiac failure
• Failure to thrive
• Death

Diagnostic Tests
• Pulse oximetry (if available)

Management
Appropriate Consultation
• Consult a physician immediately and prepare to medevac

Adjuvant Therapy
• Give oxygen 6-10 L/min (more, if necessary) by mask
• Consider IV therapy with normal saline if infant is feeding poorly or is in significant clinical distress. Do not overload with fluid.

**Nonpharmacologic Interventions**
• Nurse in an upright position
• Feed small amounts frequently

**Monitoring and Follow-Up**
• Monitor level of consciousness, vital signs, heart and lung sounds, perfusion, pulse oximetry (if available), and intake and output
• Watch for signs of cardiac failure (see "Cardiac Failure," below, this chapter)

**Referral**
• Medevac as soon as possible
Rheumatic Fever (Carditis)

Definition
A diffuse inflammatory disease of the connective tissues, which involves the heart, joints, skin, CNS and subcutaneous tissue. It tends to recur. The disease arises from immune complications of group A β-hemolytic streptococcal infection.

Rheumatic fever is much more common in Aboriginal children and those living in lower socioeconomic circumstances. It may occur at any age but is most common in school-age children. The risk is higher in families in which there is a history of the disease.

Causes
• Precedent group A streptococcal infection (pharyngitis) and subsequent immune response

History
The disease is nearly always preceded by streptococcal pharyngitis (occurring 2-5 weeks earlier).

The presenting symptoms are variable, but may include the following:
• Fever
• Joint pain, redness and swelling (a constellation of symptoms known as migratory arthritis, typically involving the large joints)
• Emotional lability
• Involuntary, purposeless muscular movements (known as Sydenham's chorea)
• Shortness of breath, edema, cough, fatigue (representing heart failure)
• Rash (erythema marginatum)
• Subcutaneous nodules along tendon sheaths

Physical Findings
The physical findings are variable and depend on the degree of involvement of various parts and systems of the body.
• Low-grade fever
• Tachycardia (increase in resting heart rate)
• Tachypnea

Cardiovascular Signs
• Dyspnea, cyanosis, edema and hepatomegaly if the child is in heart failure
• Thrill or heave may be present
• New heart murmurs, often pansystolic
• Rubs may be audible with inspiration and expiration if disease is associated with pericarditis
• Decrease in intensity of heart sounds

Musculoskeletal Signs
• Joints hot, tender and swollen at several sites

Skin
• Rash (erythema marginatum)
• Nodules may be palpated in subcutaneous tissue, usually on extensor surfaces of limbs

Other Symptoms
• Emotional lability
• Involuntary, purposeless muscular movements (Sydenham's chorea)

The diagnosis is based on a complicated collection of signs known as Jones' criteria (Table 11-2).

Table 11-2: Jones' criteria for diagnosis of rheumatic fever*

<table>
<thead>
<tr>
<th>Major criteria</th>
<th>Minor criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carditis</td>
<td>Fever</td>
</tr>
<tr>
<td>Polyarteritis</td>
<td>Arthralgia</td>
</tr>
<tr>
<td>Chorea</td>
<td>Previous rheumatic fever</td>
</tr>
<tr>
<td>Erythema marginatum</td>
<td>Laboratory findings</td>
</tr>
<tr>
<td>Subcutaneous nodules</td>
<td></td>
</tr>
</tbody>
</table>

* Any combination of two major criteria or one major and two minor criteria is indicative of the diagnosis

Differential Diagnosis
• Congenital heart disease (previously undiagnosed)
• Viral carditis
• Rheumatoid arthritis
• Tics (which may mimic chorea)
Complications
• Carditis
• Congestive heart failure
• Rheumatic heart disease (valvular damage, usually to the mitral valve)

Diagnostic Tests
None.

Management
The diagnosis and treatment of rheumatic fever require evacuation to hospital.

Emergency treatment of congestive heart failure may be necessary; see "Cardiac Failure," below, this chapter.

Goals of Treatment
• Identify the disease early
• Prevent complications

Primary Prevention
• Aggressive treatment of group A streptococcal throat infections with a complete course of antibiotic medications

Acute Phase
Appropriate Consultation
Consult a physician immediately and prepare to medevac.

Nonpharmacologic Interventions
• Bed rest

Pharmacologic Interventions
Medications should not be started until the diagnosis has been clearly established.

Medications are prescribed only by a physician.

salicylates (ASA) (A class drug), 100-120 mg/kg per day

If carditis is present, the following is sometimes used:
prednisone (B class drug), 2-3 mg/kg per day, max. 60 mg/day

Monitoring and Follow-Up
Monitor for signs of cardiac failure. If child is in cardiac failure, see "Cardiac Failure," below, this chapter.

Referral
Medevac.

Post-Acute Phase
Pharmacologic Interventions for Prophylaxis
Because of the risk of recurrence, continual penicillin prophylaxis must be maintained.

The risk of recurrence is greatest in the first 5 years after the initial bout. A physician would initially prescribe prophylaxis, usually one of the following commonly used drug regimens:
penicillin G benzathine (B class drug), 1.2 million units per month IM

Oral penicillin should be used only in exceptional cases, as ensuring compliance is difficult.

For children with allergy to penicillin:
erythromycin (C class drug), 250 mg PO q12h

Prophylaxis for children without carditis should be maintained for at least 5 years and preferably throughout childhood.

If valvular disease results, lifetime prophylaxis is recommended or at least to 21 years of age.
Cardiac Failure

Definition
The inability of the heart to pump blood commensurate with the body's needs. The symptoms and signs correlate with the degree of failure.

Causes
- Congenital abnormality of cardiac structures
- Inflammatory (e.g. rheumatic fever)
- Infectious (e.g. viral cardiomyopathy, subacute bacterial endocarditis)
- Severe anemia (i.e. hemoglobin < 40 g/L)
- Other high-output states (e.g. thyrotoxicosis, arteriovenous malformation)
- Extracardiac disease (e.g. chronic pulmonary disease, pulmonary hypertension)

History
The history varies according to the child's age.
- Difficulty with feeding
- Shortness of breath
- Excessive sweating
- Poor weight gain
- Anxious appearance

Physical Findings
- Tachycardia
- Tachypnea
- Blood pressure usually normal but may be reduced (if so, this is cause for concern, as it may indicate cardiogenic shock)
- Temperature: if higher than normal, consider inflammatory or infectious cause
- Irritate
- Anxious
- Fontanel full
- Nostrils flared
- Cyanosis
- Peripheral swelling (in older children)
- Increased venous distension
- Heave or thrill
- Gallop rhythm (with extra S3 heart sound)
- Increased murmurs
- Crackles in lung fields
- Hepatomegaly

Differential Diagnosis
- Respiratory disease (e.g. bronchiolitis or pneumonia)
- Metabolic abnormality (e.g. hypoglycemia; poisoning, as with salicylates)
- Sepsis

Complications
- Decreased cardiac output (shock)
- Death

Diagnostic Tests
- Pulse oximetry (if available)

Management
Goals of Treatment
- Improve hemodynamic function
- Prevent complications

Appropriate Consultation
Consult with a physician regarding emergency treatment.

Nonpharmacologic Interventions
- Nurse the child in head-elevated position (do not allow neck to become kinked)
- Restrict oral fluids to no more than the quantity required to maintain hydration

Adjuvant Therapy
- Start IV therapy with normal saline to keep vein open
- Give oxygen 6-10 L/min or more by mask

Pharmacologic Interventions
Diuretics to decrease volume:
- furosemide (D class drug), 1 mg/kg IV stat

The following drug, to increase contractility, must be ordered by a physician:
- pediatric digoxin (B class drug), 0.04 mg/kg IV or PO

Total dose usually divided as follows: half dose given stat, quarter dose given 6 hours later and quarter dose given 12 hours after first dose (i.e. 6 hours after second dose)
**Monitoring and Follow-Up**

*Acute Phase*
Monitor ABCs, vital signs, pulse oximetry (if available), heart and lung sounds, intake and output until child is transferred to hospital.

*Over the Long Term*
Children with cardiac illness should be monitored regularly within the community to ensure normal growth and development and to watch for complications. Frequency of follow-up depends on the severity of the condition.

**Referral**
Medevac immediately.
Chapter 12 – Gastrointestinal System

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For more information on the history and physical examination of the gastrointestinal system in older children and adolescents, see chapter 5, "Gastrointestinal System," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.
Assessment Of The Gastrointestinal System

History Of Present Illness And Review Of System

Abdominal Pain
• Site
• Frequency
• Duration
• Character (e.g. crampy or constant, sharp or stabbing)
• Radiation
• Onset (sudden or gradual)
• Progression
• Aggravating and relieving factors
• Associated symptoms

Vomiting Or Regurgitation
• Frequency
• Volume
• Force (e.g. projectile)
• Colour
• Hematemesis
• Relationship to food intake

Bowel Habits
• Frequency, quantity, colour and consistency of stool

• Presence of blood
• Pain before, during or after defecation

Other Characteristics And Symptoms
• Growth history (when possible, obtain actual measurements)
• Appetite
• Food and fluid intake since onset of illness
• Usual nutrition and food habits: type of foods eaten, variety of foods in diet, quantity of food eaten, dietary balance, fiber content of diet
• Dysphagia
• Unusual weight loss or weight gain
• Colour (e.g. presence of jaundice)
• Skin (e.g. pruritis, rash)
• Activity level
• History of previous GI diseases or abdominal surgery
• Medications (e.g. iron)
• Allergies, especially known allergies to food (e.g. lactose intolerance)

Examination Of The Abdomen

General
• Apparent state of health
• Appearance of comfort or distress
• Colour (e.g. flushed, pale, jaundiced)
• Nutritional status (obese or emaciated)
• State of hydration (skin turgor)

Vital Signs
• Temperature may be elevated in infection
• Blood pressure usually normal
• Tachycardia may be present
• Respiratory rate usually normal

Inspection
Observe abdomen from a distance:
• Size, shape and contour; note any distension or asymmetry (in infancy, abdomen is typically protuberant; in early childhood the abdomen is still protuberant, but flattens when the child is lying down)
• Peristaltic waves
• Visible masses
• Guarding and positioning for comfort (child's behavior can also give very good clues as to the severity of any abdominal pain)

Auscultation
Auscultation, to listen for bowel sounds, should be done before palpation.

Increase in bowel sounds alone is not significant, because this can occur with anxiety or mild gastroenteritis. However, it may also be a sign of obstruction.
Absence of bowel sounds indicates ileus, which can be due to a variety of factors, including metabolic problems, infection or peritoneal irritation.

**Percussion**
- General percussion in all four quadrants for normal tympany
- Increased tympanitic sound in a distended abdomen indicates gas, which may be a result of obstruction, perforation, ileus or swallowed air
- Dullness in association with abdominal distension indicates fluid
- Delineate outline of liver; upper border is in the mid-clavicular line, between the fourth and sixth intercostal spaces; upper limit of liver span ranges from 8 cm at 5 years of age to 13 cm at puberty
- Determine spleen size
- If ascites is present, there will be dullness to percussion on the dependent side when the child is in a side-lying position; the border of the percussion note will change to a new position several moments after the child assumes a supine recumbent position

**Palpation**
Ideally, palpation is performed with the child lying supine, with hands by the sides and relaxed. In reality, it must sometimes be done on the run. Be sure your hands are warm. The child's abdomen must be completely exposed. Examine all four quadrants in succession. If there is pain, start with the painless areas, and palpate the painful area last. Palpation should be light at first, with progression to deep palpation by the end of the examination.

**Light Palpation**
- Assess tenderness, guarding, superficial masses
- Watch the child's facial expression

**Deep Palpation**
- Feel for organs (liver, spleen, bladder and kidneys) and masses
- Assess for rebound tenderness (pain that occurs upon suddenly releasing the hand after deep palpation), which indicates peritoneal irritation
- Assess for referred tenderness (pain that is felt in an area distant to the area being palpated), which can be a clue to the location of the underlying disease

**Rectal Examination**
- Anal patency (check this feature only in newborns)
- Skin tags
- Sphincter tone
- Fissures
- Tenderness
- Masses
- Occult blood
Common Problems Of The Gastro-Intestinal System

Gastroenteritis

Definition
Inflammatory process (usually infectious) involving the GI tract and resulting in diarrhea and vomiting. It is very common, especially among infants. The danger of dehydration from diarrhea is much greater in children than adults because of high body water content and large surface area for weight. Significant diarrhea and vomiting must be taken seriously in small children.

Causes
Numerous organisms can cause gastroenteritis, including bacteria, viruses and parasites. These organisms can be categorized according to the mechanism by which they produce diarrhea (secretory, cytotoxic, osmotic or dysenteric mechanism).

Viruses
- Rotavirus: most common cause in children 6-24 months of age
- Norwalk virus: affects older children
- Enteric adenovirus: common in children <2 years old

Bacteria
- Salmonella
- Shigella
- Escherichia coli
- Campylobacter

Parasites
- Giardia

Other Causes
- Food poisoning
- Adverse reaction to antibiotic therapy causing *Clostridium difficile* infection
- Hyperthyroidism
- Hirschsprung's disease (congenital megacolon)
- Overfeeding (in newborns)

History
- Onset and duration of symptoms
- Vomiting: frequency, colour, amount
- Stool pattern: frequency, quantity (record amount in cups), consistency (formed or watery), colour, presence of blood or mucus
- Thirst
- Oral intake from all sources
- Voiding: frequency and duration, number of wet diapers and their degree of saturation
- Alertness and activity level
- Alterations in mental state (e.g. irritability, lethargy)
- Diet history, focusing on water source and intake of poultry, milk and fish
- Family history: other family members or close contacts with similar symptoms
- Exposure to infected contacts at daycare center
- Past medical history, including other recent illness, recent antibiotic use (which may lead to infection with *C. difficile*), GI surgery
- Recent travel to an area where diarrheal illness is endemic

Physical Findings
Weight (with child unclothed) must be recorded for future comparison.

Vital Signs
- Temperature elevated in infectious gastroenteritis
- Tachycardia if febrile or in compensated shock
- Respiration normal, unless in shock
- Blood pressure normal, unless in shock from dehydration
- Colour: pale, mottled skin may indicate dehydration

Hydration Status
- Mucous membranes: check for dryness
- Fontanel sunken in dehydration
- Skin turgor decreased in dehydration; skin may be doughy; when pinched, skin may remain in a
tent shape for several seconds before slowly resuming its normal shape

- Mental state (e.g. irritability, listlessness)
- See Table 4-3, "Clinical Features of Dehydration," in chapter 4, "Fluid Management"

**Abdominal Examination**

- Distension
- Bowel sounds: high-pitched, rushing sounds in secretory or dysenteric gastroenteritis; may be decreased with ileus in dysenteric or malabsorptive conditions
- Mild, diffuse, generalized tenderness is usual

**Differential Diagnosis**

See "Causes," above, this section.

- Viral gastroenteritis: 80% of cases in children <2 years old
- Bacterial gastroenteritis: 20% of cases in children <2 years old

Infections outside the GI tract can also cause diarrhea and vomiting, especially in younger children. Otitis media, pneumonia and urinary tract infections are among the most frequent non-GI infections associated with diarrhea and vomiting.

**Management**

**Goals of Treatment**

- Maintain adequate hydration
- Rehydrate if dehydrated
- Prevent complications

**Appropriate Consultation**

Consult a physician in the following situations:

- Any infant or child who shows signs of dehydration on initial presentation
- Any infant or child who does not improve on home therapy
- Any infant or child whose diarrhea increases with re-introduction of cow's milk formula
- Bloody diarrhea

**Fluid therapy is based on assessment of degree of dehydration**

- Therapy should include the following elements: rehydration, maintenance of fluids and replacement of ongoing losses
- To determine degree of dehydration, calculate fluid deficit, and calculate daily maintenance requirements, see Tables 4-1, 4-2, 4-3, 4-4 in chapter 4, "Fluid Management"

**Mild Diarrhea without Dehydration**

- Breast-feeding and normal dietary intake should continue at home, with fluid intake dictated by thirst
- Maintenance oral replacement solution (e.g. Pedialyte®) should be offered *ad libitum*
- High-osmolality fluids (e.g. undiluted juices or soda pop) and plain water should be avoided

**Mild Dehydration (<5%)**

- Assessment and treatment under close observation is recommended
- Rehydration phase: oral replacement solution (e.g. Pedialyte®), 10 mL/kg per hour, with reassessment q4h
- Rehydration should be achieved over 4 hours
- Breast-feeding should continue
- For bottle-fed children, usual formula should be re-started within 6-12 hours
- Extra oral replacement solution (at 5-10 mL/kg) may be given after each diarrheal stool

**Moderate Dehydration (5% to 10%)**

- Rehydration phase: oral replacement solution (e.g. Pedialyte®), 15-20 mL/kg per hour, under direct observation
- Frequent reassessment, including weight and state of hydration, is required during the rehydration phase (q1-2h)
- Rehydration should be achieved over 4 hours
- If dehydration is corrected, continue fluid therapy for maintenance and to make up for ongoing losses
- Extra oral replacement solution (at 5-10 mL/kg) may be given after each diarrheal stool
- If dehydration persists, repeat rehydration phase
- Breast-feeding should continue
- For bottle-fed children, usual formula should be re-started within 6-12 hours

**Nonpharmacologic Interventions**

See "Dehydration in Children," in chapter 4, "Fluid Management"
Severe Dehydration (>10% or Signs of Shock)
Requires IV therapy, in addition to oral rehydration.
• Start IV therapy with normal saline or Ringer's lactate
• Give a bolus of 20 mL/kg over 20 minutes
• Reassess status and repeat bolus (to a maximum of three boluses in 1 hour) if shock or other signs of severe dehydration persist
• Once a response occurs, calculate the remaining deficit; replace 50% of the deficit over 8 hours and remainder over the next 16 hours; be sure to include maintenance requirements in total IV therapy
• Intraosseous infusion should be used if an IV line cannot be established (see "Intraosseous Access," in chapter 2, "Pediatric Procedures")

Fluid and Feeding Guidelines
• Fluids may be given by nasogastric tube if necessary
• Oral replacement solution should be given slowly but steadily in small aliquots (to minimize vomiting)
• Oral replacement solution alone should not be given for more than 24 hours
• Encourage the mother to administer the fluid by syringe or spoon in small frequent doses
• Breast-feeding should continue during rehydration
• Regular feeding (breast or bottle) should begin within 6-12 hours
• Full diet should be re-instituted within 24-48 hours, if possible

There is evidence that diarrhea lasts longer if starvation occurs.

If the reintroduction of formula exacerbates diarrhea, consider the possibility of lactose intolerance, which may be secondary to loss of the GI brush border (see "Lactose Intolerance," in chapter 17, "Hematology, Endocrinology, Metabolism and Immunology"). If this adverse reaction to formula persists for more than 2 days, consult a physician about switching to a lactose-free formula (e.g. Prosobee® or Isomil®) for 5-7 days.

Pharmacologic Interventions
Antispasmodic and antidiarrheal agents should not be used. It should be explained to the parents or caregiver that it is best to consider the diarrhea as a purging process, to rid the intestinal tract of organisms, and that the most important part of managing diarrhea is the replacement of lost fluids. There is also a very limited role for antiemetic agents.

Specific antimicrobial agents are usually not indicated, even for bacterial infection. An exception is gastroenteritis caused by *Giardia lamblia*, which is usually treated as follows: metronidazole (C class drug), 15-20 mg/kg per day, divided tid x 5 days

Monitoring and Follow-Up
Gastroenteritis without Dehydration
Re-evaluate the child with mild symptoms (treated at home) within 24 hours. Ensure that the parent or caregiver is aware of the signs and symptoms of dehydration, and instruct him or her to return immediately if dehydration occurs or worsens or if the child cannot ingest an adequate quantity of fluid.

Gastroenteritis with Dehydration
Record vital signs, clinical condition, intake and output, and weight frequently when rehydrating a child with dehydration, and keep child under observation at the clinic.

Referral
• Infants or children with mild dehydration who respond after 4 hours of rehydration may be sent home on maintenance therapy; if dehydration persists and there are continuing fluid losses, child should be medevaced
• The decision to continue home management should be made in consultation with a physician and depends primarily on the ability of the parents or caregiver to provide adequate care and on other factors, such as the distance of their home from the treatment facility
• Most children with significant dehydration (≥5%) should be evacuated to hospital
• Many children with 5% to 10% dehydration can be rehydrated substantially in the nursing station while awaiting transport
Inguinal Hernia

Definition
Protrusion of part of the abdominal contents into the inguinal canal.

This type of hernia is common in children, affecting more boys than girls and occurring on the right side more often than the left.

Cause
- Embryologic failure of closure of the processus vaginalis

History
- Mass may be present in the groin at birth or may appear anytime after birth
- Mass that can be pushed back inside the abdomen wall (termed "reducible")

If the hernia becomes incarcerated:
- Pain may occur
- Mass becomes impossible to reduce

If incarceration lasts long enough to cause infarction of the bowel, there may be signs of intestinal obstruction. See "Bowel Obstruction," below, this chapter.

Physical Findings
- Vital signs usually normal, unless bowel infarction has occurred
- Mass visible in the inguinal area, especially when the baby is crying
- If the mass is not visible, feel the inguinal canal by invaginating the upper part of the scrotum or labia with a finger; if the inguinal canal admits a finger it is too large
- Gentle palpation of the lower inguinal area near the pubis may give a feeling like rubbing two layers of silk together
- During transillumination of scrotum (by shining a flashlight behind the scrotum), hernial contents will not be transilluminated because they contain viscera
- Try to reduce the hernia with the child in a supine or head-down position, so that gravity will assist the procedure
- If the hernia proves difficult to reduce, do not force abdominal contents back, because this can internalize or incarcerate the hernia, and the child remains at risk for all the complications of hernias (see "Complications," below, this section)

Differential Diagnosis
- Hydrocele
- Undescended testis (cryptorchism)
- Scrotal trauma
- Seminoma, teratoma
- Lymphadenopathy

Complications
- Incarceration of hernia
- Strangulation of hernia
- Bowel obstruction
- Testicular infarction

Cryptorchism is associated with inguinal hernia.

Diagnostic Tests
None.

Management
Goals of Treatment
- Observation until surgery (within 2 weeks of diagnosis, ideally)
- Prevent complications

Appropriate Consultation
Consult a physician and prepare to medevac if the hernia is not reducible and there are signs of complications. If the hernia is not incarcerated (and is reducible), this is not an emergency situation.

Nonpharmacologic Interventions
Reassure the parents or caregiver.

Client Education
Teach the parents or caregiver the following:
- How to check and reduce the hernia
- Signs and symptoms of complications (e.g. incarceration, strangulation, bowel obstruction)
Emphasize the need to have the child assessed immediately if the hernia becomes difficult to reduce.

**Pharmacologic Interventions**
None.

**Monitoring and Follow-Up**
Assess the size and reducibility of the hernia every 3 months while awaiting surgical consultation and surgery.

**Referral**
Refer all asymptomatic children electively to a physician for assessment. A surgical referral will be necessary. Because of the risk of incarceration, surgery is recommended for all infantile inguinal hernias.

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**Umbilical Hernia**

**Definition**
Protrusion of abdominal contents through the diastasis recti, causing an out-pouching of the umbilicus. Very common in First Nations children.

**Cause**
• Weakness of the diastasis recti muscles of the abdomen

**History And Physical Findings**
• Enlargement and protrusion of the umbilicus

**Complications**
Complications are rare.
• Incarceration or strangulation of hernia
• Bowel obstruction

**Diagnostic Tests**
None.

**Management**
In spite of the size of umbilical hernias, they almost never become incarcerated, and surgery is not required. They usually disappear by the time the child reaches 2 or 3 years of age. All that is necessary is to reassure the parents or caregiver.

Strapping and taping are not of clinical value but may help to ease parental concerns and are usually not harmful.
Constipation

Definition
Infrequent passage of hard, often dry stool.

In 99% of cases, the cause of the constipation is never proven definitively. The condition is common in children, and often (in 60% of cases) occurs during the first year of life.

Constipation is a symptom, not a diagnosis. In all cases, the underlying cause must be sought, as many of the causes are correctable.

Causes

Dietary
• Introduction of cow's milk, too much of it.
• Inadequate fluid intake
• Under-nutrition
• Diet high in carbohydrates or protein (or both)
• Low-fiber diet

Organic
• Diseases causing abnormally dry stool
• Diabetes insipidus or diabetes mellitus
• Fanconi's syndrome
• Idiopathic hypercalcemia

Gastrointestinal Anomalies
• Hirschsprung's disease (congenital megacolon)
• Anorectal stenotic lesion, stricture or fissure
• Masses (intrinsic or extrinsic)
• Anterior anal displacement

CNS Lesions
• Hypotonia (benign congenital hypotonia)
• Hypertonia (cerebral palsy)
• Infectious polyneuritis or poliomyelitis
• Myelodysplasia

Other Causes
• Hypothyroidism
• Prune-belly syndrome
• Coercive toilet training

History
• Frequency of bowel movements: in children older than infancy, a period of more than 3 days without a bowel movement is one of the best indicators of this condition
• Consistency of stool is usually hard
• In severe constipation, stools may be very thick
• Pain on defecation
• Blood on stool
• Straining at stool
• Intermittent, crampy abdominal pain
• Constipation present since birth (in this situation, consider Hirschsprung's disease)
• Dietary history, specifically low fiber content (the best sources of fiber are whole wheat bread and flour, bran, whole grain cereals, vegetables and some fruits)
• Family history of constipation
• Drugs that are constipating (e.g. iron)
• Concurrent bladder incontinence or abnormal anal tone (neurologic)
• Hypothyroidism (dry skin, lethargy, slow growth of hair and nails)

Physical Findings
• Assess height for short stature and weight

Abdominal Examination
• Fecal masses can usually be felt along the descending colon or in the suprapubic area

Rectal Examination
• Rectum may be large, dilated and full of stool
• Normal tone of external sphincter
• Reflex contraction of anus on gentle scratching of the perianal skin with a sharp object (anal wink reflex)
• Anal placement should be midline and midway between posterior fornix and coccyx
• Evidence of precipitating event (e.g. anal fissure)

Differential Diagnosis
See "Causes," above, this section.

In infancy, the possibility of Hirschsprung's disease causes the greatest concern. This diagnosis is most likely in a baby who has been severely constipated from birth and in whom passage of meconium was delayed (i.e. >24 hours after birth).
During rectal examination of a child with this disease, the examining finger can usually be inserted a long way before dilatation of the rectum is encountered; in contrast, in functional constipation, the rectum is dilated right down to the external sphincter.

Occasionally, short-segment Hirschsprung’s disease may present later in life as constipation.

Complications
- Overflow incontinence (encopresis) with fecal soiling (may be incorrectly characterized as diarrhea)
- Impaction with chronic dilatation
- Urinary tract infection with or without vesico-ureteral reflux
- Intestinal obstruction

Constipation also seems to be related to enuresis.

Diagnostic Tests
- Check urine (culture and sensitivity) to exclude UTI, which can complicate chronic constipation

Management
Goals of Treatment
- Relieve symptoms
- Establish regular bowel function
- Rule out any underlying cause
- Prevent or treat complications
- Encourage wise use of laxatives, to prevent dependence on these drugs

Nonpharmacologic Interventions
Interventions depend on age and severity of constipation.
- Newborns: add brown sugar to formula or water (1 tsp in 4-8 oz. or 5 mL in 125-250 mL)
- Infants: as solid foods are introduced, gradually increase fruits and vegetables as proportion of the diet
- Older children: prunes or prune juice may be effective
- Increase dietary fiber if low
- Increase fluids
- Reduce milk intake if more than recommended.

Client Education
- Explain pathophysiology to family (and child, if old enough): draw a diagram of GI system and explain how stool is formed and the mechanism of constipation.
- Encourage high-fiber diet. Most children eat a diet very low in fiber. A commitment on the part of the whole family is usually required to change this aspect of the diet. A good rationale for promoting a high-fiber diet for all family members is that high fiber intake may reduce the risk of cancer in later life and also smoothes out carbohydrate absorption.
- Stress importance of follow up.
- Educate about proper toilet training for toddlers: regular attempts just after meals, proper position (hips flexed, feet flat).

Pharmacologic Interventions
Medication is used only if organic pathology has been ruled out.

Infants (if distressed):
infant glycerin suppository (A class drug), 1.5 g; give one suppository and repeat as necessary

Older children:
magnesium hydroxide (Milk of Magnesia) (A class drug), 6.5-15 mL PO hs (2-6 years) or 15-30 mL PO hs (6-12 years)
or
mineral oil (A class drug), 5-20 mL PO hs (usually 30 mL/10 kg)

Limit the use of these agents to 3 or 4 days at most for acute constipation, unless complications such as encopresis are present.

Monitoring and Follow-Up
If you treat the child for acute functional constipation, reassess in 2 or 3 days to see if the condition has resolved.

Referral
The following factors may alert you to the need for referral:
- History: failure to pass meconium in the first 24 hours of life in an infant now presenting with difficulty passing stool
• Rectal examination: rectum empty, despite stool in colon (as revealed by abdominal exam)
• Abnormal size and location of anus (ectopic or imperforate)
• Abnormal findings on neurologic examination of the lower extremity
• Evidence of sexual abuse

The following factors may indicate the need for emergency medevac:

• Clinical indications of intestinal obstruction (e.g. vomiting, abdominal pain, decrease in bowel sounds)
• Clinical indications of Hirschsprung's disease (e.g. delayed passage of meconium at birth, fever, pain, distension, bloody diarrhea)
• Clinical indications of acute surgical abdomen (e.g. fever, abdominal tenderness, mass)
**Gastroesophageal Reflux Disease (GERD)**

**Definition**
Physiologic or pathologic reflux of an abnormal quantity of gastric contents into the esophagus, which results in GI, respiratory or neurobehavioral manifestations.

The prevalence is unknown. In children, the peak age at onset is 1-4 months of age.

**Physiologic Regurgitant Reflux**
Reflex occurs occasionally in all infants and children, and brief episodes of reflux (small quantities) after meals are normal. It is important to differentiate physiologic from pathologic reflux.

**Pathologic Regurgitant Reflux**
Pathologic reflux differs from physiologic reflux in two ways:
- Abnormally large quantity of material refluxed
- High frequency or long duration of episodes (or both)

**Causes**
Disturbance of the normal functioning of the esophagus and related structures results in a defective anti-reflux barrier.

**Gastric Dysfunction**
- Large volume of gastric contents
- High abdominal pressure (because of obesity or tight clothes)

**Dysfunction of Lower Esophageal Sphincter (LES)**
- Transient relaxation of LES (major cause of reflux)
- Basal relaxation of LES (minor cause of reflux)

**Esophageal Dysfunction**
- Impairment of esophageal clearance of refluxate

**Predisposing Factors**
- Supine position
- Certain foods and medications (see "Management," below, this section)

**History And Physical Findings**

**Infants**

**Gastrointestinal Manifestations**
- Failure to thrive
- Malnutrition
- Esophagitis
- Feeding problems
- Irritability
- Hematemesis
- Anemia

**Respiratory Manifestations**
- Apnea (obstructive)
- Chronic cough
- Wheeze
- Pneumonia (chronic or recurrent)
- Cyanotic spells
- Others (e.g. stridor, hiccups, hoarseness)

Reflux with respiratory manifestations is more likely to be observed in association with certain disorders in both infants and children (e.g. esophageal atresia, cystic fibrosis, bronchopulmonary dysplasia and tracheoesophageal fistula).

**Neurobehavioral Manifestations**
- Arching and stiffening of back
- Hyperextension of the neck or marked flexion of the neck to one side (torticollis)

**Children and Adolescents**

**Gastrointestinal Manifestations (Esophagitis)**
- Chest pain (heartburn)
- Dysphagia (difficulty swallowing)
- Halitosis (due to refluxate in mouth)
- Odynophagia (painful swallowing)
- Water brash (flow of sour saliva into mouth)
- Hematemesis
- Anemia (iron-deficient form)

**Respiratory Manifestations**
- Recurrent or chronic pneumonia
- Recurrent wheeze
- Chronic cough
- Others (e.g. stridor, hoarseness)
Differential Diagnosis
• Infection as a cause of vomiting (e.g. gastroenteritis)
• Neurologic problem (e.g. hydrocephalus, brain tumor)
• Metabolic problem (e.g. phenylketonuria, galactosemia)
• Food intolerance (e.g. milk allergy, celiac disease)
• Anatomic malformations (e.g. pyloric stenosis, esophageal atresia, intussusception)

Complications
• Esophagitis
• Esophageal stricture
• Failure to thrive
• Recurrent aspiration pneumonia
• Reactive airways disease, asthma
• Apnea, near-miss SIDS
• Anemia

Diagnostic Tests
• Hemoglobin level (if there is a concern about anemia)
• Chest x-ray (if available), to rule out aspiration or recurrent pneumonia

Management
Goals of Treatment
• Eliminate detrimental effects of reflux (GI, respiratory and neurobehavioral manifestations)

Client Education
Discuss diagnosis with parents or caregiver and explain difference between physiologic and pathologic reflux.

Positioning
• Place child in upright positions
• Avoid supine or semi-seated position
• Elevation of head of bed onto 6-inch (15-cm) blocks may be useful

Feeding
• Thicken infant foods (add 1 tbsp [15 mL] dry rice cereal for each ounce of formula)
• Fasting for a few hours before child goes to sleep
• Avoid large meals (i.e. smaller but more frequent feedings)
• Diet for weight loss may be considered in an older child, if he or she is overweight or obese
• Avoid foods that decrease LES pressure or increase gastric acidity (e.g. carbonated drinks, fatty foods, citrus fruits, tomatoes)
• Avoid tight-fitting clothes
• Avoid exposure to tobacco smoke

Appropriate Consultation
Consult a physician in the following circumstances:
• You think that diagnostic tests are necessary to confirm the diagnosis, or you think that medications are needed
• Conservative measures fail to control reflux
• There is evidence of complications (e.g. failure to thrive)

Pharmacologic Interventions (for Older Children and Adolescents)
Medications for an infant or young child must be ordered by a physician.

The medications presented here are for older children and adolescents (≥12 years old).

Acid-Reducing Agents
Used more often in older children who have pain associated with esophagitis:
aluminum-magnesium-simethicone suspension (A class drug), 0.5-1.0 mL/kg PO 3-6 times per day

Histamine Antagonists
ranitidine (C class drug), 2 mg/kg PO tid

Prokinetic Agents
Mechanism of action of prokinetic agents is to raise the basal LES pressure, improve esophageal clearance and increase the rate of gastric emptying. Such an agent is usually started on a trial basis for 8 weeks and prescribed by a physician.
dopamine antagonist (e.g. domperidone) (B class drug), as first-line therapy, before feeding
**Monitoring and Follow-Up**

Reassess monthly while the child is symptomatic. Watch carefully for signs of complications (e.g., failure to thrive, recurrent pneumonia, asthma, erosive esophagitis or anemia). Monitor growth and development, hemoglobin level and lung sounds.

**Referral**

Refer any infant with suspected GERD to a physician in the following situations:
- Simple measures fail to relieve the problem
- There are symptoms of complications (e.g. failure to thrive, recurrent pneumonia)

Surgery may be necessary in severe cases. Indications for surgery:
- Failure of medical management
- Severe or intractable detrimental effects (e.g. failure to thrive, recurrent pneumonia, peptic stricture)
- Neurologically impaired children with or without gastrostomy tube

**Prognosis**

- Most infants with mild or moderate reflux become asymptomatic and can discontinue medical therapy by 1 year of age
- Of infants with severe reflux, 60% to 65% become asymptomatic without therapy by 2 years of age
- Children more resistant to complete resolution have good response to medical therapy but experience relapse when medications are discontinued
Emergency Problems Of The Gastrointestinal System

Abdominal Pain (Acute)

Abdominal pain is a common symptom in children. In very young children, it may be difficult to verify that the pain is abdominal, as the child cannot describe the pain. In younger children, abdominal pain may be a non-specific symptom of disease in almost any system. In older children, the symptoms become more specific, but can still be caused by a wide variety of more and less serious conditions.

Abdominal pain is often categorized as acute, chronic or recurrent. The latter is usually defined as pain that recurs at least monthly over a 6-month period. Pain that requires surgical intervention is almost always acute.

Causes

Infants
- Infant colic
- Hernia
- Intussusception (in children 3 months to 2 years old)
- Volvulus
- Duplication of bowel

Pre-school Children
- Pneumonia
- Hydronephrosis, Ureteral-pelvic junction (UPJ) obstruction
- Pyelonephritis
- Appendicitis (especially in children ≥3 years old)
- Urinary tract infection

6-18 Years Old
- Appendicitis
- Mittelschmerz (pain at the midpoint of menstrual cycle, presumably related to ovulation)
- Tonsillitis
- Urinary tract infection
- Functional cause

History

Characteristics of Pain
Use the following mnemonic to characterize the pain:
O for onset
P for progression
Q for quality
R for radiation
S for site
T for timing
A for aggravating factors and associated symptoms

Review of Systems and Medical History
- Respiratory system
- Urinary system
- Diet
- Sexual history (in female adolescents)
- Trauma
- Medications

Physical Findings
- Temperature
- Heart rate
- Blood pressure
- Respiratory rate

General Observations
- Colour
- Sweating
- Distress
- Facial expression

Abdominal Examination
- Abdominal distension (may be caused by organomegaly, infection, obstruction or ascites)
- Peristaltic waves present in obstruction (e.g. pyloric stenosis in small infants)
- Guarding with or without decrease in activity level
- Involuntary guarding
- Bowel sounds: high-pitched, rushing (may indicate obstruction) or absent (may indicate ileus)
• Tympany increased with severe distension or perforation
• Tenderness (generalized or localized)
• Muscle rigidity (voluntary or involuntary)
• Localized rigidity may indicate peritoneal irritation
• Masses, pulsation, hernia
• Rebound tenderness (pain on sudden release of palpation pressure) may indicate peritoneal irritation; cough or jumping also may elicit rebound tenderness
• Obturator sign (pain on internal and external rotation of hip)
• Psoas sign (pain on raising straight leg by means of obturator muscle) may indicate abscess
• Referred pain (pain felt in an area different from that palpated) may indicate site of lesion
• Board-like abdomen may indicate perforation
• Murphy's sign (pain in right upper quadrant when child is breathing in and examiner is applying pressure over the liver)
• Enlargement of liver or spleen
• Tenderness of costovertebral angle

Rectal Examination
• Indicated if you suspect a surgical problem (e.g. appendicitis)
• Feel for hard stool
• Palpate for tenderness in the area of the appendix

Pelvic Examination
• Bimanual pelvic exam (optional), to feel uterus and adnexa in sexually active adolescent females

Differential Diagnosis
See "Causes," above, this section.

The lists of causes given above are by no means comprehensive, but most of the urgent conditions are listed there. Once urgent conditions have been ruled out, the child can often be treated symptomatically until a physician has been able to make an assessment.

Diagnostic Tests (If Available)
• Hemoglobin
• WBC count

• Urinalysis (for blood, protein, nitrites and WBCs)
• Pregnancy test for all reproductive-age females
• Chest x-ray (upright), to rule out pneumonia

Management
Specific management is based on the most likely cause of the abdominal pain.

Initial Decision
Decide whether to admit and observe, discharge, or refer for surgical opinion.

Goals of Treatment
• Identify or rule out urgent causes of pain
• Refer child with an urgent cause to a center where surgery is available
• Treat treatable conditions
• Provide relief and reassurance for conditions that are not serious

Appropriate Consultation
Consult a physician if the diagnosis is unclear, if the presentation looks at all serious (e.g. surgical abdomen) and before administering any analgesia.

Nonpharmacologic Interventions
• Give nothing by mouth until the diagnosis is clear
• Insert nasogastric tube if there is vomiting, bleeding or suspected bowel obstruction
• Insert Foley catheter as necessary

Adjuvant Therapy
• Start IV therapy with normal saline
• Determine expected fluid losses and current level of hydration, and hydrate accordingly

Pharmacologic Interventions
Unless the diagnosis is clear, do not administer any analgesia until you have consulted a physician.

Although classic surgical teaching has been that medication for pain may confuse the diagnosis of abdominal pain in the emergency setting, this is not supported by the literature. In fact, if anything, the diagnosis may be clarified by pain relief, which may result in fewer unnecessary surgical procedures.
**Monitoring and Follow-Up**
Monitor pain, ABCs, vital signs and any associated fluid losses closely. Serial exams over a few hours may clarify the diagnosis.

**Referral**
Medevac for evaluation if the diagnosis is uncertain and the child's condition warrants urgent evaluation.

Keep child under observation if you are unsure of the diagnosis. For any child with acute abdominal pain who has been sent home, the parents or caregiver should be warned that it is difficult to diagnose appendicitis early in the course of this condition and that if the pain increases in severity or becomes constant or fixed in one spot (especially the right lower quadrant), they should bring the child back to the clinic.
Appendicitis

Definition
Inflammation of appendix.

This condition is rare in children <3 years old. It can be very difficult to diagnose, especially in younger children. Therefore, the index of suspicion should be high.

Cause
Obstruction of the opening of the appendix by stool. Infection may occur later.

History
The following outlines the classic pattern of acute appendicitis. However, in younger children, this history is less likely. If the child is older and has a retrocecal or retroperitoneal appendix, the presentation may be confusing, with pain radiating to the back or bladder, or the presence of bowel irritation.

- Vague, diffuse periumbilical or epigastric pain
- Pain shifts within hours to right lower quadrant
- Anorexia
- Nausea
- Vomiting usually occurs a few hours after onset of pain, but may not be present
- Low-grade fever may be present
- Urinary frequency, dysuria and diarrhea may develop if tip of appendix irritates the bladder or bowel
- In adolescent girls, date of most recent normal menstrual period and any recent menstrual irregularity should be noted

Physical Findings
Presentation is variable, depending on whether the child presents early or late in the evolution of the disease process.

- Temperature mildly elevated
- Tachycardia (although heart rate may be normal in early stages)
- Most children are pale and appear to be in pain
- Variable level of distress
- Body position and gait are useful in diagnosis; in many full-blown cases, the child is bent over and experiences pain on movement or avoids any movement or activity

Abdominal Examination
- Bowel sounds variable: hyperactive to normal in early stages, reduced to absent in later stages
- Localized tenderness in right lower quadrant
- Muscle guarding in right lower quadrant
- Rebound tenderness may be present
- Psoas stretch test positive

Another test for peritoneal irritation is to have the child jump off the examining table. If the child can do this without pain, he or she probably does not have appendicitis.

Rectal Examination
- Tenderness in right lower quadrant if tip of appendix is near the rectum

Differential Diagnosis
Appendicitis is known as the "great mimic." The actual signs and symptoms depend on the location of the appendix within the abdomen.

- Gastroenteritis
- Crohn's disease
- Stone in ureter
- Mittelschmerz
- Ruptured follicular cyst
- Ectopic pregnancy
- Pelvic inflammatory disease
- Twisted ovarian cyst
- Pyelonephritis
- Biliary colic
- Cholecystitis

Complications
- Abscess
- Localized peritonitis
- Perforation
- Generalized peritonitis
- Sepsis

Diagnostic Tests
- WBC count (if available)
- Urinalysis
Management

**Goals of Treatment**
- Maintain hydration
- Prevent complications

**Appropriate Consultation**
Consult a physician as soon as possible.

**Nonpharmacologic Interventions**
- Bed rest
- Nothing by mouth
- Insert a nasogastric tube if abdomen is distended

**Adjuvant Therapy**
- Start IV therapy with normal saline
- Adjust IV rate according to age and state of hydration

**Pharmacologic Interventions**
Although classic surgical teaching has been that medication for pain may confuse the diagnosis of abdominal pain in the emergency setting, this is not supported by the literature. In fact, if anything, the diagnosis may be clarified by pain relief, which may result in fewer unnecessary surgical procedures. Nonetheless, do not administer analgesia until you have consulted a physician.

If the diagnosis is clear, the physician may recommend that broad-spectrum antibiotics be started before transport to hospital. For example, for suspected gangrenous or perforated appendix: ampicillin (**C class drug**), 200 mg/kg per day, divided q6h, IV and gentamicin (**B class drug**), 7.5 mg/kg per day, divided q8h, IV and clindamycin phosphate (**B class drug**), 40 mg/kg per day, divided q6-8h, IV

**Monitoring and Follow-Up**
Monitor vital signs and general condition frequently.

**Referral**
Medevac as soon as possible; surgical consultation is required.
### Bowel Obstruction

#### Definition
Blockage of small or large bowel. Most common in newborns. Less common in older children, unless they have a specific risk factor.

#### Causes

**Newborns**
- Atresia: duodenal (often associated with Down's syndrome), jejunal or ileal
- Imperforate anus
- Malrotation
- Duplication of bowel
- Volvulus

**Infants**
- Atresia: duodenal (often associated with Down's syndrome), jejunal or ileal
- Imperforate anus
- Malrotation
- Duplication of bowel
- Volvulus
- Pyloric stenosis
- Post-surgical adhesions
- Intussusception (most common in children 3 months to 2 years of age)

**Older Children**
- Post-surgical adhesions
- Intussusception (unusual but possible)
- Malrotation
- Duplication of bowel
- Tumor

#### History
- Vomiting: often with sudden onset; may be stained with bile if obstruction is below ligament of Treitz; may be projectile if obstruction is high in the GI tract; may be stained with feces if obstruction is very low in the GI tract
- Diarrhea: bloody or colour of red currant jelly (indicates intussusception)
- Abdominal pain: severe and initially crampy
- Bowel movements decreased or absent
- Abdominal distension
- History of GI surgery
- History of similar pain

#### Physical Findings
- General observations of colour, hydration and facial expression
- Temperature normal or mildly elevated
- Tachycardia
- Blood pressure normal, unless child is in shock
- Capillary refill normal, unless child is in shock

#### Abdominal Examination
- Abdominal distension, unless the obstruction is located very high in the GI tract
- Peristaltic waves may be visible
- Bowel sounds may be increased in early stages and disappear later
- Diffuse tenderness
- Shifting dullness can help to distinguish distension caused by ascites from obstruction

#### Differential Diagnosis
See "Causes," above, this section.

#### Complications
- Perforation
- Peritonitis
- Strangulation of bowel segment
- Sepsis
- Hypotension, shock
- Death

#### Diagnostic Tests
- Examination of stool for occult blood
- Urinalysis

#### Management

**Goals of Treatment**
Treatment is directed to cause and is thus usually surgical.
- Relieve distension
- Maintain hydration
- Prevent complications

**Appropriate Consultation**
Consult a physician and prepare to medevac.
Adjuvant Therapy
• Start a large-bore IV (14- or 16-gauge) with normal saline
• Give enough fluid for maintenance or more, according to state of hydration
• If there is evidence of hypovolemia or shock, give a bolus of IV fluid (20 mL/kg) over 20 minutes; repeat as necessary until hypovolemia is corrected (up to three times in 1 hour)

See "Shock," in chapter 20, "General Emergencies and Major Trauma."

Nonpharmacologic Interventions
• Bed rest
• Nothing by mouth
• Insert a nasogastric tube and attach to low suction or to straight drainage
• Insert urinary catheter; measure hourly urinary output

Pharmacologic Interventions
Analgesia may be necessary or prudent if transfer is delayed. Discuss with a physician first.

meperidine (D class drug),
dosage depending on age and weight of child

Monitoring and Follow-Up
Monitor ABCs, vital signs, intake and output, abdominal findings and general condition frequently while awaiting transfer.

Referral
Medevac as soon as possible.
Intussusception

Definition
Telescoping of one section of bowel into another. In children, the most common form of intussusception is prolapse of the terminal ileum into the colon. (Some clinicians suspect that this is less common in Aboriginal children, but there is no proof of such a difference.)

Cause
Unknown. Associated with Henoch-Schönlein purpura and previous gastroenteritis, both cause hyperplasia of Peyer's patch.

History
• Usually starts with crampy abdominal pain, which is manifested as regular, intermittent episodes of colic during which the baby draws his or her feet up to the knee-chest position
• Vomiting
• "Currant jelly" stool: almost pathognomonic when present
• Other signs of obstruction, including abdominal distension, may be present
• Lethargy: may become extreme, very similar to coma

Physical Findings
• Pale looking, lethargic between crampy episodes
• Vital signs usually normal in the early stages

Abdominal Examination
• Careful palpation may reveal an empty feeling in the right lower quadrant and a sausage-shaped mass in the area of the transverse colon

Rectal Examination
• May reveal bloody or currant jelly stool

Differential Diagnosis
• Infection
• Parasitic infestation (e.g. Enterobius)
• Tumor
• Hirschsprung's disease (congenital megacolon)
• Obstruction of the bowel
• Meckel's diverticulum
• Incarcerated hernia
• Malrotation of the gut with incarceration

In children who are extremely lethargic, a clinical history, physical examination and high index of suspicion are needed to rule out conditions such as meningitis, various metabolic conditions, enterocolitis caused by coxsackievirus and trauma.

Complications
• Bowel necrosis
• GI bleeding
• Bowel perforation
• Sepsis
• Shock

Diagnostic Tests
None.

Management
Goals of Treatment
• Identify the condition early (keep a high index of suspicion)
• Maintain hydration
• Prevent complications

Appropriate Consultation
Consult a physician and prepare to medevac.

Adjuvant Therapy
• Start IV therapy with normal saline and run at a rate sufficient to maintain hydration
• If there is evidence of hypovolemia or shock, give a bolus of IV fluid (20 mL/kg) over 20 minutes; repeat as necessary until hypovolemia is corrected (up to three times in 1 hour)

See "Shock," in chapter 20, "General Emergencies and Major Trauma."

Nonpharmacologic Interventions
• Nothing by mouth
• Insert nasogastric tube

Pharmacologic Interventions
None.
**Monitoring and Follow-Up**
Monitor ABCs, vital signs, intake and output, and abdominal findings frequently while awaiting transfer.

**Referral**
- Once this diagnosis is suspected, the child must be transferred to a center where pediatric surgery and radiology can be carried out.
- If the intussusception has been present for less than 18 hours and there is no free air on x-ray of the abdomen, a barium enema with hydrostatic pressure can be attempted to reduce the intussusception. This procedure is successful in up to 70% of cases and avoids the need for a surgical procedure.
- If the attempted reduction of the intussusception is unsuccessful or if there appears to be a lead point (e.g. tumor), surgery is required immediately.
Chapter 13 – Genitourinary System

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For more information on the history and physical examination of the genitourinary system in older children and adolescents, see chapter 6, "Urinary and Male Genital Systems," and chapter 13, "Women's Health and Gynecology," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.

For balanitis and testicular torsion (a medical emergency), clinical presentation and management are the same in adults and children. For information on these conditions, see chapter 6, "Urinary and Male Genital Systems," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.
Assessment Of The Genitourinary System

General
The genitourinary (GU) system may be affected by infection, external problems, congenital abnormalities and diseases of the kidneys. Some of the more common problems are discussed below.

History Of Present Illness And Review Of System
The following symptoms are those most commonly associated with urinary tract infection (UTI) in children:
- Fever
- Unexplained crying
- Holding of genitals
- Enuresis (bed-wetting)
- Constipation (chronic)
- Toilet-training problems
- Dysuria
- Frequency
- Urgency
- Change in colour of urine
- Abdominal pain and back pain
- Scrotal or groin pain, vaginal discharge
- Genital sores, swelling, disation
- Jaundice in young infants

The following symptoms are associated with nephrotic syndrome and glomerulonephritis:
- Swelling (e.g. ankles, around eyes)
- Headaches
- Nosebleeds (an occasional symptom of hypertension, but nosebleeds also occur frequently in normal children)
- Hematuria
- Decreased urinary output

A complete history of the GU system should include questions related to the following topics:
- Sexual activity (for adolescents)
- Problems related to inappropriate touching by others (i.e. sexual abuse)

Children must be asked such questions with sensitivity and without the use of leading questions. The parents or caregiver can be asked about these topics directly.

Physical Examination
Vital Signs
- Temperature
- Heart rate
- Blood pressure

Urinary System (Abdominal Examination)
For full details, see "Examination of the Abdomen," in chapter 12, "Gastrointestinal System."

Inspection
- Check specifically for any abdominal distension (a sign of ascites)
- Masses
- Asymmetry

Percussion
- Liver span (may be increased in glomerulonephritis)
- Ascites (dull to percussion in flanks when child is supine; location of dullness shifts when child changes position)
- Tenderness over costovertebral angle

Palpation
- Size of liver and any tenderness because of congestion
- Kidneys are often palpable in infants, the right kidney being most easily "captured"; perform deep palpation to determine kidney size and tenderness (place one hand under the back and the other hand on the abdomen to try to "capture" the kidney between the hands)
Male Genitalia
Perform examination with the child supine and, if possible, in the standing position.

Penis
Inspection
• Position of urethra (e.g. epispadias, hypospadias)
• Discharge at urethra (sign of urethritis)
• Inflammation of foreskin or head of penis (sign of balanitis)

Palpation
• Foreskin adherent at birth
• In 90% of uncircumcised male children, the foreskin becomes partially or fully retractable by 3 years of age
• Inability to retract foreskin (phimosis)
• Inability of retracted foreskin to return to normal position (paraphimosis)

Scrotum and Testicles
Inspection
• Scrotum may appear enlarged
• Check for edema (a sign of glomerulonephritis), hydrocele (transillumination should be possible), hernia or varicocele

Palpation
• Cremasteric reflex (absent in testicular torsion)
• Testicular size, consistency, shape and descent into scrotum
• Testicular tenderness: consider torsion or epididymitis (pain is actually in the epididymis, not the testicle)
• Swelling in inguinal canal: consider hernia or hydrocele of spermatic cord

Female Genitalia
• Child should be in supine frog-leg position for examination
• Do not perform an internal vaginal examination in a prepubescent child or an adolescent who is not sexually active
• Spread labia by applying gentle traction toward examiner and slightly laterally to visualize introitus

Inspection
• Vulvar irritation
• Erythema (in prepubescent girls, the labia normally appears redder than in adult women, because the tissue is thinner)
• Urethral irritation (sign of UTI)
• Vaginal discharge (may indicate vaginitis or sexual abuse)
• Bleeding (may indicate vaginitis or sexual abuse in a prepubescent girl)
• Enlargement of vaginal orifice (may indicate sexual abuse)

For information about examining the adolescent male, see "Physical Examination of the System," in chapter 6, "Urinary and Male Genital Systems," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.

For information about examining the adolescent female, see "Examination of the Female Reproductive System," in chapter 13, "Women's Health and Gynecology," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.
Common Problems Of The Genitourinary System

Urinary Tract Infection (UTI)

Definition
Bacterial invasion of the GU tract with resulting infection.

- **Cystitis**: infection affecting only the lower GU tract (e.g. the bladder)
- **Pyelonephritis**: ascending infection involving the upper GU tract (e.g. the ureters and kidneys)

UTI is the most common genitourinary disease in children. It occurs more frequently in girls than in boys, except in infancy. In fact, UTI is unusual in boys, and further investigation of the GU tract is appropriate when it occurs.

Causes
Bacterial invasion by one of the following organisms:
- Escherichia coli
- Klebsiella
- Enteric Streptococcus
- Staphylococcus
- Proteus
- Predisposing factors: congenital GU tract abnormalities (e.g. short urethra), although most children with UTI have normal GU tract; perineal fecal contamination because of inadequate hygiene; infrequent voiding; perianal infections; sexual activity

History
The history depends on the child's age.

**Neonates and Infants**
- Primarily non-specific, non-urinary symptoms
- May present with septicemia
- Fever
- Irritability ("colic")
- Poor feeding
- Vomiting, diarrhea
- Jaundice (particularly in neonates)
- Hypothermia
- Failure to thrive
- Decreased activity, lethargy

**Younger Children (<3 Years Old)**
- More abdominal complaints than GU complaints
- Fever
- Abdominal pain
- Vomiting
- Frequency, urgency, dysuria, enuresis, strong-smelling urine
- Urinary retention

**Older Children (>3 Years)**
- Frequency
- Dysuria
- Urgency
- Enuresis
- Flank or back pain (this probably indicates pyelonephritis, not cystitis)
- Fever
- Vomiting

Physical Findings
- Fever (may be absent in simple cystitis)
- Suprapubic tenderness (in cystitis)
- Tenderness of abdomen, flank and costovertebral angle (more likely with pyelonephritis)

Be sure to assess hydration status.

Differential Diagnosis
Distinguish between cystitis and pyelonephritis.

**Infection of the Lower GU Tract**
- Urethral irritation (e.g. bubble bath)
- Urethral trauma
- Diabetes mellitus
- Masses adjacent to bladder

**Infection of the Upper GU Tract**
- Gastroenteritis
- Pelvic inflammatory disease (PID)
- Tubo-ovarian abscess
- Appendicitis
- Ovarian torsion
Complications
- Recurrent UTI
- Sepsis, especially in neonates and infants <6 months of age
- Renal damage leading to adult hypertension, renal failure

Diagnostic Tests
Bag urine specimens are usually contaminated and cannot be relied upon to diagnose UTI. If negative, then UTI is absent. If positive, it must be confirmed with a proper specimen BEFORE antibiotics.

In young children who are to receive antibiotic therapy a catheter urine specimen is recommended if UTI is suspected. (Bugs and Drugs, 2001, p 116)

Urinalysis for routine and microscopy (midstream specimen for children, catheter specimen for infants):
- WBCs
- Bacteriuria
- Some hematuria (blood in urine)
- Positive for nitrates (although UTI can occur with organisms that do not produce nitrate)

Urine for culture and sensitivity:
- Preferable to use first morning specimen
- If multiple organisms present on culture, suspect contamination, not true infection

Management
Lower GU infections (e.g. cystitis) are generally less severe and can be managed safely on an outpatient basis. Pyelonephritis is more severe and may require hospital care for IV antibiotics. The decision about hospitalization depends on the child's age and the severity of the clinical condition.

Goals of Treatment
- Relieve infection
- Prevent recurrence
- Identify underlying factors

Appropriate Consultation
Consult a physician for any of the following:
- Neonatal infections, for which medevac is required; these are often associated with bacterial sepsis, so more aggressive treatment is needed
- Suspected pyelonephritis, for which child may be admitted to hospital (depends on age and severity of illness)

Cystitis

Nonpharmacologic Interventions
- Increased rest if febrile
- Increased oral fluids

Pharmacologic Interventions
Do not treat as UTI unless results of urine dipstick are indicative of such a diagnosis (e.g. positive for nitrates or WBCs).

Antibiotics:
cotrimoxazole (C class drug), 6-10 mg/kg per day, divided bid, PO for 10-14 days
or
amoxicillin-clavulanate (B class drug), 40 mg/kg per day, divided tid, PO for 10-14 days
or
nitrofurantoin (C class drug) 5-7 mg/kg per day, divided qid, PO for 10-14 days

Pyelonephritis (Suspected)

Adjuvant Therapy
- IV therapy with normal saline may be necessary for children with pyelonephritis (before transfer)
- Run at a rate sufficient to maintain hydration

Pharmacologic Interventions
IV antibiotics may be started before transfer, on the advice of a physician:
ampicillin (C class drug), 100-200 mg/kg per day, divided q6h, IV
and
gentamicin (B class drug), 2.5 mg/kg per dose tid IV

Monitoring and Follow-Up
- If treating as an outpatient, follow up in 24-48 hours. Check sensitivity of organisms to antibiotics when urine cultures are available.
If no response to oral antibiotics after 48-72 hours or if symptoms are deteriorating, consult with a physician about changing the antibiotic or the need for IV antibiotic therapy
- Perform follow-up urinalysis and culture 1 week after completion of treatment and then monthly for 3 months (if anatomy of the GU tract is normal)

Referral
- Medevac all neonates
- Older infants and children with suspected pyelonephritis may require medevac, depending on their age and clinical condition
- Refer to a physician (for evaluation) any child with culture-proven UTI who has been treated on an outpatient basis

Radiologic evaluation may be indicated in any girl who has had more than two or three culture-proven lower UTIs, in any boy who has had one culture-proven lower UTI and in any child who has had pyelonephritis; such evaluation includes renal ultrasonography and voiding cystourethrography (VCUG).
Hydrocele (Physiologic)

Definition
In infant boys, a mild scrotal swelling, resulting from a collection of fluid around the testicle (unilateral or bilateral). It may be confused with a groin node. Usually present from birth and usually due to patency of the processus vaginalis.

Occurs only rarely in infant girls, in whom it presents as a firm swelling in the groin.

Cause
Unknown.

History
- Painless swelling in scrotum, of variable size
- Congenital or acquired
- Most cases resolve by age 1 year
- Swelling may fluctuate in size

Physical Findings
- Should be able to palpate an upper border of the swelling
- Testis is usually felt behind the mass, but may be difficult to feel
- Transillumination of the swelling should be possible
- Inguinal hernia may also be present

Hydrocele of the spermatic cord may also be seen:
- Painless cystic swelling along the inguinal canal
- Swelling may transilluminate

Differential Diagnosis
- Enlargement of groin node
- Inguinal hernia
- Trauma
- Cystic lesion
- Hematoma
- Neoplasm

Complications
- Slight increase in risk of inguinal hernia

Diagnostic Tests
None.

Management
Goals of Treatment
- Observe until condition resolves spontaneously or surgical referral becomes necessary

Appropriate Consultation
Consult physician in the following circumstances:
- Diagnosis is unclear
- There are signs of complications (e.g. infection)
- There is an associated inguinal hernia

Nonpharmacologic Interventions
- Explain to parents or caregiver the pathophysiology of the defect
- Reassure the parents or caregiver
- Advise parents or caregiver to return to the clinic if the mass enlarges

Monitoring and Follow-Up
Reassess every 3 months until resolution occurs or referral becomes necessary.

Referral
Referral to a physician may be necessary if there are signs of complications (e.g. if there is an associated inguinal hernia) or resolution does not occur when expected (by 1 year of age).

Surgical treatment is considered in the following circumstances:
- No signs of resolution by age 1 year
- Hernias are associated with the hydrocele
Prepubescent Vaginal Discharge

For vaginal discharge in adolescents, see "Vulvovaginitis," in chapter 13, "Women's Health and Gynecology," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.

Definition
Physiologic discharge:
• Mucoid
• Non-malodorous
• Seen in newborns and premenarchal girls (Tanner stage II and III); (for definition of Tanner stages, see "Puberty," in chapter 19, "Adolescent Medicine")
• Normal vaginal secretions are often increased midcycle in adolescents

Any other discharge is a symptom of underlying problems.

Vaginal discharge is uncommon in girls <9 years old.

Causes And Associated Organisms
• Poor hygiene (Escherichia coli)
• Autoinoculation from associated URTI (Hemophilus influenzae, group B Streptococcus) or skin infections (Staphylococcus)
• Pinworms (E. coli)
• Foreign body (associated with E. coli)
• Specific infection: Candida, Chlamydia, Neisseria gonorrhoeae, Trichomonas (uncommon), bacterial vaginosis

If N. gonorrhoeae or Chlamydia is the cause of the discharge and the child is underage for consensual sex (i.e. <14 years), sexual abuse must be considered.

History
• Various degrees of perineal discomfort or itching
• Dysuria
• Frequency
• Associated illnesses (e.g. URTI, skin problems, pinworms)
• Hygiene

• Possible sexual abuse

Physical Findings
Do not perform a vaginal speculum examination.

• Suboptimal general or perineal hygiene
• Signs of URTI or skin disease

Labial Irritation
• Consider problems with perineal hygiene
• Candida
• Sexual abuse

Marked Erythema
• Consider Candida

Vaginal Discharge
• May be fairly non-specific
• Thick, white, cheesy: Candida
• Frothy, green: Trichomonas

Foreign Body
• May be visualized better if child is in knee-chest position
• May be able to palpate a foreign body while doing a rectal examination

Differential Diagnosis
Non-infectious
• Poor hygiene
• Chemical irritation (e.g. from bubble bath)
• Foreign body
• Trauma

Infectious
• Group A Streptococcus infection
• Non-specific bacterial infection
• Pinworms
• Candida (less common)
• STI (consider sexual abuse)
Complications
The complications depend on the underlying cause.
• Localized perineal irritation
• UTI
• Abdominal pain (with pinworms or UTI)
• Vaginitis
• Bleeding (from trauma)

Diagnostic Tests
If child is cooperative, attempt to swab vaginal orifice (using small swab i.e. similar size to nasopharyngeal type swab); avoid touching the hymenal edge. Swab for Chlamydia, N. gonorrhoeae, culture and sensitivity, and hanging drop, in that order.

Management
Management depends on cause.

Goals of Treatment
• Identify and correct underlying cause

Appropriate Consultation
Consult a physician if child is febrile or has abdominal pain, or if you suspect sexual abuse.

If the child is <14 years old and there was sexual activity involving an adult partner, the legal definition of sexual abuse specifies that legal (e.g. police) and child protection authorities must be notified.

Nonpharmacologic and Pharmacologic Interventions

For Poor Hygiene
• Improve perineal hygiene (e.g. use of clean cotton panties, frequent changing of underwear, regular bathing)
• Avoid bubble baths

• Wipe from front to back, but avoid scrubbing genitalia

For Foreign Body
In an older child who can cooperate, remove the foreign body, if possible; otherwise consult a physician about removal.

Give:
amoxicillin (C class drug), 40 mg/kg per day, divided tid, PO for 7-10 days while awaiting removal of foreign body

For Pinworms
See "Pinworms," in chapter 18, "Communicable Diseases."

For Candidal Infection
nystatin cream (A class drug), PV od for 6 days

For Trichomonal Infection
metronidazole (C class drug), 1-2 g PO stat

For Bacterial Vaginosis
metronidazole (C class drug), 1-2 g PO stat

For Sexually Transmitted Infection
Consult a physician if you suspect an STI in a preadolescent child. Refer to and follow the Canadian STD Guidelines (Health Canada 1998).

If the cause of the discharge is uncertain, send samples for culture (according to child's age), as above, and treat with amoxicillin pending results of culture.

Report as suspected sexual abuse all cases of gonorrhea and Chlamydia infection in girls <14 years old who have been sexually active with an adult (in accordance with the legal definition of sexual abuse). Other cases of vaginitis may be reportable, depending on the circumstance.
Glomerulonephritis

Definition
Disease in which there is immunologic or toxic damage to the glomerular apparatus of the kidneys. It can occur acutely, or it may have a chronic or insidious onset.

Some types of glomerulonephritis are self-limiting, and others may go on to cause permanent kidney damage.

The most common type in northern Canada is post-streptococcal glomerulonephritis, described below. Any suspected glomerulonephritis should be fully investigated.

Causes
- Usually secondary to previous streptococcal infection (e.g. of the throat or skin)
- Follows pharyngitis by 1-3 weeks
- Lag time after skin infections is variable, but most frequently 2-4 weeks

History
- Acute onset
- Usually history of pharyngitis or impetigo about 10 days before the abrupt onset of dark urine
- Acute phase lasts about 1 week

Systemic Symptoms
- Anorexia
- Abdominal pain
- Fever
- Headaches
- Lethargy
- Fatigue, malaise
- Weakness
- Rash, impetigo
- Joint pain
- Weight loss

Physical Findings
The physical findings are variable and may include the following:
- Edema (in about 75% of cases)
- Hypertension (in about 50% of cases)
- Hematuria (two-thirds of children have gross hematuria)

• Proteinuria
• Oliguria
• Renal failure (to variable degree)
• Congestive heart failure
• Encephalopathy (rare)

Edema, hypertension and hematuria are the most common and most worrisome symptoms.

Differential Diagnosis
- Other forms of glomerulonephritis, which have many similar features (distinguished by laboratory tests, renal biopsy and other diagnostic methods)
- Acute hemorrhagic cystitis (no edema, hypertension, renal failure; does involve dysuria, frequency, urgency)
- Acute interstitial nephritis

Complications
- Acute renal failure
- Congestive heart failure
- Hyperkalemia
- Hypertension
- Chronic renal failure

Diagnostic Tests
The diagnosis is made on a clinical basis and is confirmed by the following tests:
- Urinalysis (hematuria, proteinuria)
- Hemoglobin decreased (mild anemia), WBC count increased
- Recent throat swab positive for Streptococcus A infection

Management
Goals of Treatment
- Prevent, if possible, by early treatment of all streptococcal infections (skin and pharyngeal)
- Prevent or treat complications

Appropriate Consultation
Consult a physician immediately if you suspect this disorder.
**Nonpharmacologic Interventions**

While awaiting transfer:
- Bed rest
- Fluid restriction (to 60 mL/kg per day + urine losses)

**Pharmacologic Interventions**

None, unless complications develop. Treat complications only on physician's instruction.

**Monitoring and Follow-Up while Awaiting Transfer**

- Fluid restriction (to 60 ml/kg per day + urine losses)
- Monitor blood pressure and vital signs
- Monitor intake and output
- Watch for major life-threatening problems, such as acute renal insufficiency with electrolyte abnormalities, fluid overload, pulmonary edema, congestive heart failure, acute hypertension

**Monitoring and Follow-Up over the Long Term**

- Will depend on cause and type of condition
- Post-streptococcal glomerulonephritis usually has no long-term sequelae, but other types of glomerulonephritis may have long-term complications, including recurrence and chronic renal failure
- Consulting specialist will provide instructions for surveillance

**Referral**

Medevac.

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**Balanitis**


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**Emergency Problems Of The Male Genital System**

**Testicular Torsion**

Chapter 14 – Musculoskeletal System

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For detailed information on the clinical presentation, assessment and management of other musculoskeletal problems occurring in children, see chapter 7, "Musculoskeletal System," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.
Assessment Of The Musculoskeletal System

History Of Present Illness And Review Of System

History varies with age and type of condition.

**General**
The following characteristics of each symptom should be elicited and explored:
- Onset (sudden or gradual)
- Acuity or chronicity (subacute, acute or chronic)
- Chronology
- Location
- Radiation
- Quality
- Timing (frequency, duration)
- Whether intermittent or constant
- Severity
- Precipitating and aggravating factors
- Relieving factors
- Associated symptoms, weight loss, decreased energy
- Effects on daily activities and play
- Previous diagnosis of similar episodes
- Previous treatments
- Efficacy of previous treatments
- Ask about fever
- Family history

**Bones And Joints**
- Pain
- Swelling
- Redness
- Heat
- Stiffness
- Time of day when symptoms are most bothersome
- Relation of symptoms to movement
- Limitation of movement
- Change of gait (e.g. limp)
- Deformity
- Extra-articular findings (e.g. rash)
- Trauma (obtain accurate description of exact mechanism of injury)

**Muscles**
- Pain
- Weakness
- Wasting
- History of previous injuries and treatment received

**Neurovascular Structures**
- Paresthesia
- Paresis
- Paralysis
- Skin: look for signs of physical abuse (e.g. bruises, welts, cigarette burns)

**Functional Assessment**
- Inability or refusal to use limb or to bear weight (especially in a young child)
- Self-care deficits (e.g. in bathing, dressing, toileting, grooming)
- Mobility and use of mobility aids

**Medical History (Specific To Musculoskeletal System)**
- Recent infection, such as URTI (may be associated with septic arthritis), diarrhea, pharyngitis
- Recent immunization (specifically if vaccine was administered in a limb)
- Previous trauma (to bones, joints, ligaments)
- Arthritis (juvenile rheumatoid arthritis)
- Recent immobilization of an extremity
- Medications (e.g. those used to treat musculoskeletal symptoms)
- Obesity

**Family History (Specific To Musculoskeletal System)**
- Rheumatoid arthritis
- Diabetes mellitus
- Lupus erythematosus
Personal And Social History (Specific To Musculoskeletal System)
- Absenteeism from school (multiple days)
- Sports activities (e.g. contact sports involving repetitive motion)
- Risk behaviors for injuries, especially in adolescents (e.g. snowmobiling, illicit drug use, alcohol abuse [specifically drinking and driving])
- Dietary calcium and vitamin D intake
- Smoking
- Exercise habits

Physical Examination

Although the musculoskeletal and neurologic systems (see chapter 15, "Central Nervous System") are discussed separately in this set of guidelines, they are usually examined together.

Vital Signs
- Temperature may be elevated in inflammatory or infectious disease
- Tachycardia from pain or shock if major trauma is involved
- Blood pressure normal, unless child is in shock from major trauma

Compare corresponding paired joints and bones for the following characteristics.

Vital Signs
- Temperature may be elevated in inflammatory or infectious disease
- Tachycardia from pain or shock if major trauma is involved
- Blood pressure normal, unless child is in shock from major trauma

Inspection
The inspection is perhaps the most important part of the exam, so take your time.
- Apparent state of health (child may look acutely ill)
- Appearance of comfort or distress
- Child may look acutely ill because of an infectious or inflammatory process
- Distress (related to pain) is usually evident if there is an infectious, inflammatory or fracture-related cause
- Significant trauma to an extremity may result in shock-like appearance
- Colour (e.g. flushed, pale)
- Nutritional status (obese or emaciated)

Observe:
- Mobility, gait and posture, presence of limp or unwillingness to bear weight

Determine ability to perform activities of daily living (e.g. sitting, standing, walking, dressing, playing).

Palpation
- Swelling and induration (e.g. tissues feel tense, "boggy")
- Presence of heat implies inflammatory process or infection (if an area feels hot to the touch, compare with uninvolved joints or skin)
- Subcutaneous nodules
- Swelling around joints (may indicate joint effusion or infection)
- Crepitus may be palpable with joint movement or in soft tissue overlying bony fractures
- Range of motion of joints (active and passive)
- Resistance to or pain on movement of joint
- Degree of joint movement achieved
- Stability and integrity of ligaments
- Tendon function

Neurovascular Function
- Pallor
- Limb temperature (especially coolness)
- Paresthesia
- Peripheral pulses
- Paralysis
Common Problems Of The Musculo-Skeletal System

Limb Pain

Often presents as an alteration of activity or gait or an unwillingness to bear weight or use a limb.

The affected joint may not be the one the child complains about; for example, pain may be referred from disease of the hip joint to the knee, and the child presents with knee pain.

History

• Trauma: acute or subacute
• Infection (pain may be related to URTI or skin infection)
• Distress variable, from significant (as in septic arthritis) to mild (as in chronic juvenile rheumatoid arthritis, in which stiffness is predominant)
• Fever (high in cases of septic joints)
• Variable degree of limitation of activity (e.g. child with septic joint or significant trauma is less likely to be able to bear weight)

Physical Findings

Physical findings are variable, depending on the specific underlying cause. Look for:
• Fever or change in vital signs (distress may cause increase in heart and respiratory rates)
• Heat, redness, swelling, obvious deformity
• Decrease in mobility
• Bone tenderness

Perform a general physical examination to look for signs of other illnesses (e.g. rash with Henoch-Schönlein purpura or heart disease with rheumatic fever).

Differential Diagnosis

• Cellulitis (of the overlying areas only; no involvement of bones or joint spaces)
• Septic arthritis (this is an emergency situation)
• Transient viral arthritis
• Juvenile rheumatoid arthritis
• Transient toxic synovitis (commonly seen in the hip); related to previous URTI
• Osteomyelitis
• Trauma (e.g. hemarthrosis)
• Post-immunization arthritis (especially after immunization for rubella)
• Bleeding disorder (e.g. hemophilia)
• Henoch-Schönlein purpura (look for abdominal pain and rash)
• Sprain or strain
• Slipped capital femoral epiphysis
• Legge-Calvé-Perthes disease
• Growing pains
• Rickets
• Malignant lesion
• Rheumatic fever

The diagnosis of limb pain is difficult and should be undertaken with the help of a physician. Septic arthritis and osteomyelitis can be life threatening, as can fractures to large bones and joints.

Diagnostic Tests

Discuss with a physician.

Management

Goals of Treatment

• Ensure proper diagnosis
• Minimize risk of further injury (e.g. by immobilization)

Appropriate Consultation

Consult a physician if there is acute pain with significant compromise in function, if you are unsure of the diagnosis, if there is significant trauma or if there is a possibility of joint or bone infection.

Adjuvant Therapy

If the child appears acutely ill, if infection is suspected (e.g. cellulitis, septic arthritis), or if there is significant trauma:
• Start IV therapy with normal saline and run at a rate sufficient to maintain hydration

For daily maintenance fluid requirements and signs of dehydration, see chapter 4, "Fluid Management."
**Nonpharmacologic Interventions**

- Bed rest
- Immobilize extremity to prevent damage, ease pain

**Pharmacologic Interventions**

Antipyretic and analgesic for fever and pain:
*acetaminophen (A class drug), 10-15 mg/kg PO q4h prn*

Acute inflammation of a joint in association with fever but no obvious cause for the inflammation should be treated as an infection (with the advice of a physician).

While awaiting transfer, the physician may order antibiotics, such as the following:
*cefuroxime (B class drug), 150 mg/kg per day, divided q8h, IV*
*or cefazolin (C class drug), 75-100 mg/kg per day, divided q8h*

**Monitoring and Follow-Up**

Monitoring and follow-up vary, depending on the diagnosis.

**Referral**

Most cases of acute limb pain require medevac.

Cases of mild, non-acute limb pain can be referred electively to a physician for evaluation.
**In-Toeing**

**Definition**
Inward pointing of toes. If mild, may resolve on its own; if extreme, treatment is required.

**Causes**
- *Metatarsus varus*: adduction of forefoot on hindfoot (lateral border of foot is curved instead of straight); presents in infancy
- *Tibial torsion*: in-turning of entire foot (medial twisting of tibia); presents in early childhood
- *Femoral anteversion*: in-turning of leg (medial twisting at hip); presents in early childhood

**History**
- May be associated with stumbling
- Sleeping with feet tucked underneath legs (tibial torsion)
- Sitting in the W-position, with knees together and feet spread laterally (femoral anteversion)

**Physical Findings**

**Fig. 14-1: Metatarsus Varus**

Forefoot is turned medially on the hindfoot. Ankle joint has normal dorsiflexion and plantar flexion. Physiologic metatarsus varus can lead to adduction of forefoot past midline (no treatment needed).

**Fig. 14-2: Tibial Torsion**

Measured by angle between foot and thigh with ankle and knee positioned at 90°. The foot normally rotates externally with age (about 2° at about 1 year of age, about 20° at 15 years of age). In tibial torsion, this angle is smaller.

**Fig. 14-3: Measuring Rotation in Femoral Anteversion**

Decreased external rotation of the hip; if external rotation is less than 20°, in-toeing may result.

**Differential Diagnosis**
More severe congenital deformity with clubfoot (rigid deformity of whole foot, evident at birth)

**Complications**
- Gait difficulties if left unattended

**Management**

**Goals of Treatment**
- Improve foot position
- *Metatarsus Varus*: usually requires no treatment if the condition is mild. Reassure the parents or caregiver and follow up closely. See "Referral," below, this section.
- *Tibial Torsion*: discuss with a physician or advise change in sleeping position
- *Increased Femoral Anteversion*: change sitting position to tailor position. Most children require no other intervention

**Monitoring and Follow-Up**
Monitor gait every 3 or 4 months.

**Referral**
- *Metatarsus Varus*: Refer to a physician if the condition persists for more than 3 months or if there is a non-flexible deformity at birth.
- *Tibial torsion*: Refer to a physician. May require orthopedic consult.
Congenital Dislocation Of Hip (Developmental Hip Dysplasia)

Definition
Failure of femoral head to rest in acetabulum of pelvis (Fig. 14-4). There are three presentations: hip may be dislocated, dislocatable or subluxated.

This condition is commonly seen in some First Nations communities, but is almost never seen in Inuit people.

A check for congenital problems of the hip is part of routine neonatal screening. This condition is best diagnosed before the child begins walking.

See section on the musculoskeletal system in "Physical Examination of the Newborn," in chapter 1, "Guidelines for Pediatric Health Assessment."

Fig. 14-4: Hip Joint

Causes
• Congenital
• Condition exacerbated by use of tikanagans (cradle boards) or other means of swaddling
• Often able to identify other affected family members
• Breech birth

History
• If diagnosed after the child is walking, presents as a limp with or without pain

Physical Findings

Inspection of the Newborn
• Asymmetric fat folds in thigh
• Extra skin folds on involved side

Inspection of the Older Child
• Legs unequal in length
• Limp
• Trendelenburg sign: lurching toward affected side

Palpation
• Examine child in supine position (on back)
• With thighs flexed, should be able to abduct to 90° in each hip; diagnosis should be suspected if abduction is limited to 60° to 70°

Ortolani-Barlow hip examination for screening newborns:
• Place middle fingers over greater trochanters (outer upper legs)
• Position thumbs on medial sides of knees
• Abduct the thigh to 90° by applying lateral pressure with thumb
• Move knee medially and then replace knee in starting position
• If there is a "clunk," the hip may be dislocatable
• If there is a "click," the hip may be subluxable

Differential Diagnosis
• Congenital short femur
• Synovial click
• Congenital adduction contraction
• Fixed dislocation in arthrogryposis

Complications
• Long-term disturbance of the gait if left undiagnosed and untreated
• Osteoarthritis

Management

Goals of Treatment
• Develop improved or normal femoral insertion into acetabulum
• Normalize gait
Nonpharmacologic Interventions
Early detection is important. Hence, the hip exam is an essential part of newborn screening. In addition, infants should be screened several times by nurse and physician during the first year of life, as the problem may not be evident at birth.

Educate community about potential treatments, such as decreased use of tikanagan.

Definitive treatments:
- Splint (e.g. Pavlik harness for children from birth to 8 months of age)
- Casting
- Surgery

Referral
Refer child as soon as possible for assessment by a physician.
Limp

Definition
Gait abnormality.

This complaint should always be taken seriously. A limp may arise from problems in joints, bones, ligaments or soft tissues. In diagnosing a limp, it is difficult to distinguish bone pain from muscle and joint pain. Younger children (toddlers) may refuse to bear weight. Severe illness involving bone, joint or muscle may present as a limp.

Causes

Joint
- Infection:
  - Bacterial (septic arthritis)
  - Viral
- Inflammatory:
  - Juvenile rheumatoid arthritis or rheumatic fever
  - Reactive synovitis
- Trauma

Bone
- Trauma
- Fracture
- Osteomyelitis
- Tumor

Muscle
- Sprains
- Strains
- Inflammatory process

Ligaments (Soft Tissue)
- Trauma
- Infection (cellulitis)
- Post-immunization

Physical Findings
Look for:
- Heat
- Swelling
- Redness
- Pain on movement
- Decrease in ability to bear weight
- Decrease in active and passive range of motion
- Pinpoint pain on palpation (may indicate fracture, osteomyelitis, tumor)

Perform abdominal and general examinations if the cause is not evident on limb examination (e.g. incarcerated hernia may present as a limp).

Differential Diagnosis
See "Causes," above, this section.

Complications
Depends on the cause of the limp.

Diagnostic Tests
None.

Management

Goals of Treatment
- Diagnose accurately
- Treat underlying cause
- Maintain a high index of concern about possible pathology

Appropriate Consultation
Consult with a physician if you are unsure of the diagnosis or the symptoms are significant.

Nonpharmacologic Interventions
Immobilization may be required to rest the limb, reduce pain and prevent further damage.

Pharmacologic Interventions
Analgesic for pain:
\textit{acetaminophen (A class drug), 10-15 mg/kg PO q4h prn}

Monitoring and Follow-Up
Depends on the diagnosis.

Referral
Refer to a physician or to hospital as indicated by severity of symptoms and possible diagnosis.
Growing Pains

Definition
An idiopathic symptom complex that affects 10% to 20% of school-age children. Pain usually occurs in shins or thigh muscles. Joint pain is rare. The pain is intermittent, usually occurring at night, and lasts from 30 minutes to several hours.

Causes
Unknown, although probably related to over-exertion and fatigue. Emotional factors may also play a role.

History
• Usually non-articular
• Calves or thighs usually involved
• Deep aching, usually worse at night
• May waken the child at night
• May be relieved with massage, rubbing

Physical Findings
No physical signs.

Differential Diagnosis
• Acute infection or inflammation
• Trauma

Complications
None.

Management

Goals of Treatment
• Rule out more severe disease or pathology

Nonpharmacologic Interventions
• Reassure child and family

Client Education
• Explain course of the condition and prognosis
• Counsel parents or caregiver about appropriate home management with rest, heat and analgesia
• Advise that heating pad or moist hot packs prn may help

Pharmacologic Interventions
Analgesic for pain (for children >6 years old):
acetaminophen (A class drug), 325 mg, 1-2 tabs PO q6h prn

Monitoring and Follow-Up
Reassess the child if attacks become more frequent or increase in severity, or pain persists during daytime.

Referral
Referral to a physician is not usually needed, unless the diagnosis is unclear or incorrect, or the symptoms are worsening.
Osgood-Schlatter Disease

Definition
Traction apophysitis of the tibial tubercle.

Considered an overuse syndrome in which repetitive microtrauma causes partial avulsion of the patellar tendon at its insertion on the tibia. It occurs during the pubertal growth spurt.

Risk Factors
• Male gender
• Active in sports (e.g. football, soccer)
• Recent growth spurt

Cause
• Activity (e.g. sports and running), which causes microtrauma

History And Physical Findings
• Knee pain around the tibial tuberosity
• Swelling
• Limp
• Tenderness and prominence of the tibial tubercle

Symptoms increase with activity (e.g. running, jumping, going up and down stairs, kneeling) and are relieved by rest.

Differential Diagnosis
• Patellar tendinitis
• Osteomyelitis
• Knee sprain
• Ligamentous strain
• Patellar femoral syndrome
• Osteosarcoma

Complications
• Detachment of cartilage fragments from the tibial tuberosity
• Decrease in capacity for physical activity
• Osteoarthritis

Diagnostic Tests
None.

Management

Nonpharmacologic Interventions
• Reassure child and parents or caregiver as to the benign cause and favorable prognosis
• Rest the limb
• Apply ice packs prn
• Decrease activities that aggravate symptoms
• Knee immobilization (e.g. via splint), but for short-term use only (e.g. a few days)
• Counsel parents or caregiver about appropriate use of medications, including dosage and side effects

Pharmacologic Interventions
Anti-inflammatory and analgesic:
acetaminophen (A class drug), 325 mg, 1-2 tabs PO q6h prn for 7-10 days
or
ibuprofen (A class drug), 200 mg, 1-2 tabs PO q6h prn for 7-10 days

Monitoring and Follow-Up
Follow up in 1-2 weeks. The condition is usually self-limiting and resolves over several months.

Referral
Refer to a physician for evaluation if symptoms do not improve with conservative measures in 6-8 weeks.

The condition becomes chronic in 5% to 15% of cases, with persistent tenderness, swelling and formation of ossicles, which may need surgical removal.
Patellar Femoral Syndrome

Definition
Osteochondritis involving the patella, resulting in knee pain and swelling. It is considered an overuse syndrome not involving avascular necrosis or an inflammatory process, and as such it develops over a period of time.

Usually unilateral, but sometimes bilateral.

Onset during adolescence.

Most of those affected show a mild degree of patellar femoral malalignment, which, with activity, causes instability of the patella and gradual destruction of the patellar cartilage.

Risk Factors
- Female gender
- Physical activity

Causes
Soft Tissue
- Prepatellar bursitis
- Patellar tendinitis
- Meniscal tear

Articular
- Chondromalacia patellae
- Patellar osteoarthritis
- Osteochondritis dissecans of the knee
- Chondral fracture

Functional
- Patellar instability
- Synovium caught between patella and femur

Referred Pain
- Back pain
- Hip pain
- Ankle pain

Mechanism
- Overuse syndrome in athletes
- Sports involving running, jumping, or quick stops and turns (pivots)
- Contact sports (e.g. football)
- Direct impact to patella
- Degeneration of patella
- Chondromalacia patellae
- Patellar osteoarthritis
- Anatomic variation, such as increased angle between femur and tibia (Q-angle; note that females more often have larger Q-angle) or shallow outer patellofemoral groove (patella prone to sublux or dislocate laterally)

History
- Acute or chronic anterior knee pain and pain on underside of patella
- Gradually progressive, general aching or grating pain
- Sensation of the knee "giving out" and instability (reflex response to pain); child is unable to keep knee in flexed position for any length of time
- Grinding, popping or clicking sound on knee flexion

Provocative Factors
- Going up or down stairs or going down hills
- Running
- Prolonged sitting with knee bent

Physical Findings
- No knee effusion
- No decrease in range of motion of affected knee
- Tenderness of undersurface of medial or lateral patella
- Grinding, popping or clicking sound on knee flexion, detected on manipulation of patella
- Positive patellar inhibition test: child refuses to actively extend knee when patella is compressed against the femoral condyles; patella is displaced with knee extension
- Chronic pain may result in disuse atrophy of the quadriceps
- Crepitation when determining range of motion of knee
- Q-angle increased
- Abnormal patellar alignment

Apprehension Sign
- Hold patella as child lies with knee in extension
- Ask child to tense quadriceps muscle
• Positive result: child experiences pain
• Child may refuse to do the test in anticipation of pain

**Differential Diagnosis**
• Knee sprain
• Ligamentous strain
• Osgood-Schlatter disease

**Complications**
• Interference with daily activities

**Diagnostic Tests**
None.

**Management**

**Nonpharmacologic Interventions**
• Rest; child can continue most activity, but for a short period in the acute stage (1-2 weeks), activities that require flexion of the knee should be limited
• Ice packs prn
• Tensor bandage may provide some comfort (should be worn only while child is awake)

**Exercises to Strengthen Quadriceps**
• Isometric progressive resistance exercises
• Leg-sled press (45°)

**Pharmacologic Interventions**
Anti-inflammatory agents (NSAIDs) for short course (1-2 weeks):
- ibuprofen (*A class drug*), 200 mg, 1-2 tabs PO tid
- naproxen (*C class drug*), 125 mg, 1-2 tabs PO bid to tid

**Monitoring and Follow-Up**
Reassess every 1-2 weeks during the acute stage. Ascertain adherence to exercise program, and provide support and encouragement.

Surgical arthroscopy may be needed (in 5% to 10% of cases) to remove bony or cartilaginous fragments or to shave the underside of the patella.

**Referral**
Refer to a physician for assessment if there is no improvement with conservative management after 6-8 weeks.

**Exercises to Stretch Lower Extremity**
• Quadriceps stretches
• Hamstring stretches
• Iliotibial band stretches
• Ankle stretches
• Gastrocnemius muscle stretches
• Soleus muscle stretches
Musculoskeletal Injury

Trauma to the musculoskeletal tissue may cause damage that ranges from minor (e.g. sprain) to major (e.g. fracture or dislocation). See Table 14-1 for comparative information on the common symptoms of musculoskeletal injury.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Fracture</th>
<th>Dislocation</th>
<th>Sprain</th>
<th>Strain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Severe</td>
<td>Moderate to severe</td>
<td>Mild to moderate</td>
<td>Mild to moderate</td>
</tr>
<tr>
<td>Swelling</td>
<td>Moderate to severe</td>
<td>Mild</td>
<td>Mild to severe</td>
<td>Mild to moderate</td>
</tr>
<tr>
<td>Bruising</td>
<td>Mild to severe</td>
<td>Mild to severe</td>
<td>Mild to severe</td>
<td>Mild to severe</td>
</tr>
<tr>
<td>Deformity</td>
<td>Variable</td>
<td>Marked</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Function</td>
<td>Loss of function</td>
<td>Loss of function</td>
<td>Limited</td>
<td>Limited</td>
</tr>
<tr>
<td>Tenderness</td>
<td>Severe</td>
<td>Moderate to severe</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Crepitus</td>
<td>Present</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
</tr>
</tbody>
</table>

Fractures

**Definition**
A break in the continuity of the bone.

The fracture line through the bone may be transverse, oblique or spiral.

Clavicle fracture is one of the most common types of fracture in children.

The most serious bony injury of the upper limb is supracondylar fracture of the elbow.

Fractures involving the epiphysis of a bone are serious, as they may damage the epiphyseal plate so much that growth is arrested.

Fractures of the pelvis, hip, femur and epiphyseal separations about the knee are all major injuries requiring prolonged care in a hospital situation.

**Causes**
Trauma is the most common cause.

Occasionally, pre-existing pathologic conditions may predispose to fractures:

- Osteogenesis imperfecta
- Rickets
- Scurvy
- Bony cyst
- Malignant lesion

In the case of a fracture in an infant or toddler, the possibility of abuse should be considered.

**Types of Fractures**

- *Closed (simple) fracture:* fracture that does not communicate with the external environment
- *Open (compound) fracture:* fracture that communicates with the external environment (through laceration of skin)
- *Comminuted fracture:* fracture involving three or more fragments
- *Avulsion fracture:* fracture in which fragment of bone is pulled from its normal position by muscular contraction or resistance of a ligament
- *Greenstick fracture:* incomplete angulated fracture of a long bone, seen most often in children
- *Undisplaced fracture:* fractured bone stays in alignment
•**Displaced fracture**: fractured bone goes out of alignment

**History**

Usually a history of trauma, except if there is pre-existing bone pathology (including osteopenia, which is seen in children with cerebral palsy, among other conditions).

The fracture site and type can usually be linked to the description of the injury.

• Determine exact mechanism of injury
• Pain
• Swelling
• Loss of function
• Possible numbness distal to fracture site

In cases of abuse, classic features of the history may not be present or may not fit the reported injury.

**Physical Findings**

• Respiratory rate, heart rate and blood pressure increased (because of pain)
• If there is significant associated blood loss, blood pressure may drop
• In older children, fracture of tibia, femur or pelvis may be associated with traumatic shock
• Child is distressed because of pain
• Skin lacerations with protruding bones may be present if fracture is compound
• Bruising and swelling
• Range of motion decreased
• Visible deformity if displaced
• Affected part may be pale if blood flow to the area is compromised
• Limb cool, pulses absent and sensation decreased if blood supply has been compromised
• Check temperature of area and presence of pulses distal to site of injury
• Test sensory function (to sharp and dull stimuli) distal to site of injury
• Affected area extremely tender
• If bones are displaced, crepitations may be felt

**Differential Diagnosis**

• Severe sprain
• Severe contusion
• Dislocation

**Complications**

**Immediate (within First Few Hours)**

• Hypovolemia from blood loss
• Shock
• Damage to arteries, neurovascular bundle and surrounding soft tissues

**Early (within First Few Weeks)**

• Wound infection
• Fat embolism
• Respiratory distress syndrome
• Chest infection
• Disseminated intravascular coagulopathy
• Osteomyelitis (if fracture is compound)
• Malunion and compartment syndrome may result from casting

**Late (Months or Years Later)**

• Deformity
• Osteoarthritis of adjacent or distant joints
• Aseptic necrosis
• Traumatic chondromalacia
• Reflex sympathetic dystrophy

**Diagnostic Tests**

• X-ray, if available and only if result will affect clinical decision to transfer child to hospital
• If no fracture is seen on x-ray, but there is bony tenderness, it is prudent to treat as a fracture
• Type I fractures (growth plate fractures) often appear normal on x-ray

**Management**

Most bones join in 4-6 weeks; lower-limb bones may take longer, and some greenstick fractures in children may take less time.

**Goals of Treatment**

• Stabilize fracture
• Relieve pain
• Prevent or manage complications
**Appropriate Consultation**
Consult physician for all suspected or confirmed fractures.

**Adjuvant Therapy**
If there is a history of or clinical findings indicating significant trauma, and for all major fractures (e.g. femur, pelvis, hip):
- Start IV therapy with normal saline and run at a rate sufficient to maintain hydration, unless hypotension is present

If hypotensive, treat for shock:
- Give oxygen at 10-12 L/min using a non-rebreather mask to obtain highest oxygen concentrations
- Keep oxygen saturation >97%
- Start 2 large-bore IVs with normal saline (or Ringer's lactate) or establish intraosseous access if IV access cannot be established within 60-90 seconds; see "Intraosseous Access," in chapter 2, "Pediatric Procedures"
- Deliver bolus of 20 mL/kg over 20 minutes
- Repeat bolus as necessary until there is a response

See also "Shock," in chapter 20, "General Emergencies and Major Trauma."

**Nonpharmacologic Interventions**
- If spinal injury is suspected, keep child recumbent and use backboard with neck brace for transport
- Immobilize fracture site with a splint extending across joint, above and below site of injury
- Use a back slab cast or sling (for upper extremities) as appropriate
- Apply traction for displaced femoral fracture (use Sager Traction splint, if available)
- For compound fracture, wrap skin wound with sterile dressing and protect by splinting
- Do not cast a fracture.

**Pharmacologic Interventions**
Analgesia may be necessary for significant fractures. Consult with a physician if at all possible before using narcotic analgesics.

- **meperidine (D class drug), IM**
  The dose depends on the age and size of the child. Check the Compendium of Pharmaceuticals and Specialties for guidance.
  Antibiotics are necessary if the fracture is compound. Consultation with a physician is required. IV or IM antibiotics are to be given only on the advice of a physician.
  - **cefuroxime (B class drug),** 50-100 mg/kg per day, divided q8h, IV
  - **ceftriaxone (B class drug),** 50-75 mg/kg per day, in one dose, IM or IV  (maximum dose 2 g)
  Tetanus toxoid should be given if required. Refer to Canadian Immunization Guide, 6th edition (Health Canada 2002) for recommendations.

**Monitoring and Follow-Up**
Monitor ABCs, vital signs, pain control and neurovascular status of area distal to the fracture site while awaiting transfer to hospital.

After emergency treatment, take the opportunity to follow up with the child and parents or caregiver to offer guidance about accident prevention.

**Referral**
Medevac.
Dislocation Of A Major Joint

Definition
Displacement of a bone from normal anatomic insertion or attachment.

Cause
• Trauma is the most common cause

Specific Childhood Issues
Dislocations and fractures in infants and toddlers should be examined with consideration of the possibility of an abusive situation.

Pulled elbow is common in toddlers. It is caused by a sudden pull or jerk (trauma), during which the radial head is pulled out of the attached ligament (subluxation).

Dislocation of the knees and elbows are true emergencies because of the potential for neurovascular problems.

History
• Associated trauma consistent with site and type of injury
• If history is not consistent with injury, consider the possibility of abuse
• Pain, often aggravated by movement
• Loss of function

Physical Findings
• Tachycardia and tachypnea (related to pain)
• Swelling (mild)
• Bruising (mild to severe)
• Marked deformity of affected joint
• Tenderness (moderate to severe)

Differential Diagnosis
• Fracture
• Soft-tissue injury

Complications
• Vascular or nerve damage

Management
Goals of Treatment
• Control pain
• Realignment

Appropriate Consultation
Consult a physician. If a larger joint is dislocated, medevac will probably be needed.

Nonpharmacologic Interventions
• Give nothing by mouth, in case surgery is required
• Immobilize the site with a back slab cast or sling (for upper extremities), as appropriate

Pharmacologic Interventions
Analgesia may be necessary for significant injury. Consult with a physician if at all possible before using narcotic analgesics.

meperidine (D class drug), IM
The dose depends on the age and size of the child. Check the Compendium of Pharmaceuticals and Specialties for guidance.

Monitoring and Follow-Up
Monitor for control of pain and to determine the neurovascular status of the involved limb.

Referral
Medevac for orthopedic consult and definitive treatment.

Dislocation Of A Smaller Joint
The physician may advise that small joints (e.g. fingers) be realigned by gentle traction.

Once relocated, immobilize the joint to allow for healing. The duration of immobilization will depend on the joint involved and should be determined by a physician. Fingers should never be immobilized for more than 3 or 4 days.
Chapter 15 – Central Nervous System

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Appendix 15-1: Example Of A Form To Record Headaches And Seizures......................................................... 15

For more information on the history and physical examination of the central nervous system in older children and adolescents, see chapter 8, "Central Nervous System," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.
Assessment Of The Central Nervous System

History Of Present Illness And Review Of System

It is important to obtain a complete history and details of all presenting symptoms, including information about onset (sudden or gradual), duration and progression.

- Change in level of consciousness (e.g. lethargy, stupor)
- Irritability
- Changes in cry (in infants <6 months old)
- Changes in feeding patterns
- Presence of headache and its characteristics: site, duration, alleviating factors, association with vomiting or visual disturbance
- Visual disturbance (e.g. double vision [diplopia] indicates involvement of cranial nerves)
- Changes in hearing, smell or taste in older child
- Vertigo (indicates inner ear disturbance)
- Muscle weakness or wasting
- Involuntary motor movements (e.g. tics, chorea)

- Abnormal muscle tone (hypertonia [increased tone] or hypotonia [decreased tone])
- Abnormal changes in sensation (e.g. tingling, numbness)
- Detailed description of any seizures, fainting or other spells: skin colour, respiration, precipitants, duration, associated limb and eye movements, level of consciousness, behavior before and after the seizure, breath-holding
- Chronology of attainment of normal developmental milestones
- Previous history of neurologic disorder
- Family history of neurologic disorder (many disorders are familial)
- Details of mother's pregnancy, labor, delivery and neonatal period (especially for children <2 years old)

Physical Examination

A general physical examination, as well as a detailed neurologic examination, is important.

Assess the following:

- Level of consciousness (can be quantified by means of the pediatric Glasgow coma score - Table 15-1)
- Mental status
- Speech
- Eye examination: full-range extraocular movements, PERRLA (pupils equal, round and reactive to light; accommodation normal), funduscopic for clarity and vascularity of optic disk
- Head shape and size, fontanel and suture size
- Facial dysmorphism (may indicate a genetic syndrome)
- Cutaneous birthmarks (may indicate a neurocutaneous disorder)
- Cranial bruit (may indicate an intracranial vascular malformation)

- Sinus of lower back and hair tuft
- Tone, strength and reflexes of limbs
- Observation of child with respect to achievement of major age-appropriate developmental milestones (e.g. crawling, walking, playing with toys)
- Observation of gait while child is walking
- Meningeal signs (e.g. neck stiffness, Kernig's sign [pain with passive knee extension and hip flexion], Brudzinski's sign [spontaneous hip flexion with passive neck flexion])
- Respiratory examination: look for underlying pneumonia
- Cardiac examination: listen for murmur (which could indicate embolic stroke or cerebral abscess)
- Abdominal examination: check for enlargement of liver or spleen (which could indicate a liquid storage disorder)
Table 15-1: Scoring for the pediatric Glasgow Coma Score*

<table>
<thead>
<tr>
<th>Feature</th>
<th>Score</th>
<th>Age group and response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eyes opening</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>&gt; 1 year</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Spontaneously</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>To verbal command</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>To pain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No response</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eyes opening</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>&gt; 1 year</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Obeys</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Localizes pain</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Flexion withdrawal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flexion abnormal</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Extension</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extension</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>No response</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Best motor response</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 5 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Birth to 23 months</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Oriented and converses</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Disoriented and converses</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Inappropriate words</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Incomprehensible sounds</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>No response</td>
</tr>
</tbody>
</table>

* Score is obtained by determining the score for each of the three criteria and summing them.

Note: NA = not applicable
Common Problems Of The Central Nervous System

Hypotonia ("Floppy Infant")

Definition
Lower-than-normal muscular resistance to passive movement of a joint. Muscle strength is a key component of this resistance.

Causes
- Static encephalopathy related to perinatal or prenatal insult (e.g. hypoxia, ischemia at birth, intracranial hemorrhage)
- Direct CNS injury (e.g. spinal cord transection)
- Muscular atrophy of the spine
- Myasthenia gravis
- Congenital myopathy
- Myotonic dystrophy
- Muscular dystrophy
- Systemic illness (e.g. congenital heart disease, hypothyroidism, celiac disease, inborn errors of metabolism)
- Infantile botulism
- Benign congenital hypotonia
- Chromosomal abnormality (e.g. Down's syndrome)

History
- Onset (acute or gradual)
- Duration
- Past history of any acute illness (e.g. meningitis)
- Family history of myopathy
- Social history: infant-parent interaction, siblings' history (many babies are "floppy" because of lack of stimulation)

Associated Symptoms
- Respiratory and feeding difficulties
- Fasciculations
- Ptosis
- History of any delays in reaching milestones
- Inappropriate weight gain for age

Prenatal Symptoms
- Physiologic insults during pregnancy or birth
- Maternal health problems (e.g. hypertension, diabetes mellitus)
- Maternal use of neurotoxic drugs

Physical Findings
- Vital signs
- General physical examination to rule out any underlying cause
- Complete CNS exam (see Examination," above, this chapter)
- Assessment of developmental milestones for age
- Assessment of primitive reflexes of the newborn (see "Physical Examination of the Newborn," in chapter 1.)
- Muscle tone decreased (hypotonia)

Differential Diagnosis
See "Causes," above, this section.

Complications
- Long-term disability

Diagnostic Tests
None.

Management
Management depends on the cause of the hypotonia.

Goals of Treatment
- Identify underlying cause early
- Minimize long-term disability

Appropriate Consultation
Consult a physician immediately to discuss the case.

Referral
A hypotonic child should be evacuated for evaluation and investigation. The urgency of evacuation depends on the child's clinical condition and possible causes of the hypotonia.
Emergency Problems Of The Central Nervous System

Seizure Disorders

Definition
Neurologic manifestations of involuntary and excessive neuronal discharge.

The symptoms depend on the part of brain that is involved and may include any of the following:
• Altered level of consciousness
• Tonic-clonic movements of some or all body parts
• Eye movements
• Visual, auditory or olfactory disturbance

Most seizures in children involve loss of consciousness and tonic-clonic movements, but auditory, visual or olfactory disturbance, behavioral change or absences in attention may also occur.

Seizures must be differentiated from other "spells" (e.g. fainting, arrhythmia, vertigo, tic).

Types

Generalized Seizure
• Affects both hemispheres
• Characterized by change in level of consciousness
• Bilateral motor involvement
• Examples: absence seizure or grand mal seizure with tonic-clonic movements of all four limbs

Simple Partial Seizure
• Affects only part of brain (focal, motor or sensory)
• Formerly called focal seizures
• May progress to generalized seizures

The history is important, because the anticonvulsants used for partial seizures differ from those used for generalized seizures.

Complex Partial Seizure
• Partial seizure with affective or behavioral changes

Febrile Seizure
• Associated with temperature >38°C
• Occurs in children <6 years old (prevalence is 2% to 4% among children <5 years old)
• No signs or history of underlying seizure disorder
• Often familial
• Uncomplicated and benign if seizure is of short duration (<5 minutes)
• Involves tonic-clonic movements
• Bilateral

Other complex seizures (not covered by categories listed above) may require more complete tertiary assessment.

History
• Previous episodes (i.e. known seizures)

Nature of Current Seizures
• Onset (sudden or gradual)
• Date and time of onset
• Whether consciousness has been regained since onset of seizure activity
• Duration of seizure
• Sequence of seizures
• Type of seizure (generalized or partial)
• Association with fever
• Association with head injury
• Ingestion of poisonous substance or other poisoning (e.g. lead encephalopathy)
• Associated with breath-holding spell

Other Factors
• Compliance with anticonvulsant therapy in child known to have epilepsy
• Other chronic disease
• Medication use
• Allergies to medications
• Symptoms of intercurrent illness (e.g. fever, malaise, cough)
Physical Findings

Acute Seizure

- Temperature normal unless underlying infection is present
- Heart rate elevated and may be irregular
- Respiration irregular (absent during seizure, present between seizures)
- Blood pressure elevated or low
- Oxygen saturation may be decreased
- Loss of consciousness
- Skin pale or cyanotic
- Evidence of loss of bowel and bladder control
- Repeated episodes of tonic-clonic movements
- Foaming at mouth may be present
- Blood around or in mouth if child has bitten tongue
- Abnormalities suggesting underlying cause (e.g. stiff neck and bulging fontanel would suggest meningitis)
- Focal neurologic findings (e.g. hemiparesis or abnormal deep tendon reflexes would be of specific concern)

Always consider meningitis in a child with an apparent simple febrile convolution. Meningitis can usually be diagnosed on clinical grounds alone, but if in doubt, contact a physician.

For any child who is having a generalized grand mal seizure on arrival and for whom the exact time of onset of the convolution is unknown, manage as you would for status epilepticus (a condition lasting longer than 30 minutes and characterized by continuous seizure activity or intermittent convulsive activity with failure to regain consciousness between convulsions). See "Management," below, this section.

Differential Diagnosis

- Epilepsy
- Drugs (non-compliance with prescription, withdrawal syndrome, overdose, multiple drug abuse)
- Hypoxia
- Brain tumor
- Infection (e.g. meningitis)
- Metabolic disturbances (e.g. hypoglycemia, uremia, liver failure, electrolyte disturbance)
- Head injury

Complications

- Hypoxia during seizures
- Status epilepticus
- Arrhythmia
- Injury during seizure (e.g. from a fall)
- Brain damage
- Death

Diagnostic Tests

Acute Seizure

- Random glucose stick test
- Pulse oximetry (if available)

Management


Acute Seizure (Status Epilepticus)

Goals of Treatment

- Protect airway
- Stabilize cardiorespiratory function
- Stop seizures and prevent recurrence

ABCs are the first priority:
- Ensure airway is clear and patent
- Suction secretions as necessary
- Insert oropharyngeal airway
- Assist ventilation as needed by means of Ambu-bag with oxygen

Appropriate Consultation

Consult a physician as soon as possible after emergency care.

Adjuvant Therapy

- Give oxygen 6-10 L/min by mask or more to keep oxygen saturations >97%
- Start IV therapy with normal saline, adjusting rate according to state of hydration
**Nonpharmacologic Interventions**
- Nurse child in side-lying position
- Keep child warm
- Give nothing by mouth until child has fully recovered

**Pharmacologic Interventions**

- *lorazepam (D class drug)*, 0.05-0.10 mg/kg IV (maximum 4 mg per dose), repeat q10min for 2 more doses (administer slowly over 5 minutes, maximum rate 2 mg/min)
- or
- *diazepam (D class drug)*, 0.3 mg/kg IV (maximum 5 mg per dose for child =5 years old, 10 mg per dose for child >5 years old), repeat q5min for 2 more doses (administer slowly over 5 minutes, maximum rate 2 mg/min)

If unable to achieve IV access, diazepam can be given effectively by the rectal route, as follows. Use IV solution without dilution and administer by inserting the smallest possible syringe or a small catheter affixed to the end of a syringe (if the dose is less than 5 mg, a tuberculin syringe is ideal):

- *diazepam (D class drug)*, 0.5 mg/kg per dose PR (maximum dose 10 mg), repeat q5-10min for total of 2 doses (maximum rate 2 mg/min)

The medication should be placed a distance of 4 cm into the rectum, adjacent to the rectal mucosa. The buttocks should be elevated and squeezed together for 5 minutes to avoid evacuation of the rectal contents after administration of the drug. Two doses may be given, 5-10 minutes apart.

The patient with status epilepticus (convulsion lasting longer than 30 minutes) should receive a loading dose of a long-acting anticonvulsant after the first dose of benzodiazepine. Contact physician for long-acting anticonvulsant order.

**Risks of Drug Therapy**
- Hypotension
- Respiratory depression

**Monitoring and Follow-Up**
- Identify focal neurologic deficits
- Observe for return to normal level of consciousness
- Monitor vital signs, ABCs, pulse oximetry (if available)
- Monitor closely for continued seizure activity

**Referral**
- Medevac for diagnostic work-up is indicated if this is a previously long-lasting undiagnosed seizure or you suspect meningitis or another underlying metabolic cause
- First afebrile seizures should be referred for investigation
- Benign febrile seizures can usually be handled in the community. Investigation is required only if the seizures are of long duration ≥15 minutes or they are complicated (e.g. focal, residual paralysis)

It is important that seizures be controlled before transport. If at all possible, obtain the assistance of an experienced critical care pediatric professional in stabilizing and transferring the child to hospital.

**Chronic Seizure Disorder**
Management depends on underlying cause and severity of symptoms.

**Goals of Treatment**
- Control seizures
- Prevent recurrence
- Allow child to return to a normal lifestyle
- Achieve good adherence to treatment regimen over a long period
- Discontinue medications eventually, with continued control of seizures

**Nonpharmacologic Interventions**
Provide reassurance.

**Client Education**
- Explain prognosis
- Emphasize importance of adhering to medication regimen
- Emphasize importance of good lifestyle habits (e.g. regular meals, adequate sleep) to prevent recurrences
- Counsel about first aid during seizures
- Advise supervision during swimming
- Advise that the child be treated as a normal child would be
• Advise about possible teratogenic effects of medications (e.g. phenytoin) for sexually active females

**Pharmacologic Interventions**
Anticonvulsants are tailored to the specific type of seizure. Monotherapy is ideal, but 10% to 15% of patients need two or more medications. Poor compliance is the major cause of seizure recurrence.

**Commonly Used Anticonvulsants (B Class Drugs)**
• carbamazepine
• phenobarbital
• phenytoin
• valproic acid

**Monitoring and Follow-Up**
• Follow up every 6 months if seizures are well controlled, more frequently if child is having breakthrough seizures
• Assess adherence to medication regimen
• Monitor serum drug levels every 6 months if stable, more frequently if necessary

**Referral**
• Refer electively for review by a physician at least annually if seizures are well controlled
• Refer urgently if child is having breakthrough seizures
• Consider neurologic follow-up if symptoms are not controlled on current medications
Head Trauma


Head trauma is common among children and results in a significant number of visits to emergency clinics.

Children are more predisposed than adults to head injury because their head to body ratio is greater, their brains are less myelinated and thus more prone to injury, and their cranial bones are thinner. Although the incidence of mass lesions is lower among children than among adults, children are more likely to suffer from a unique form of brain injury called malignant brain edema. In addition, children may lose relatively large amounts of blood from scalp lacerations and subgaleal hematomas and may present in hemorrhagic shock.

History

Head trauma may be due to child abuse or serious neglect by a parent or caregiver. In all cases, a thorough history should be obtained of past injuries and of the circumstances surrounding the present injury. It may be impractical to review old records for all children with head injuries, but in suspicious cases these records must be reviewed and appropriate follow-up arranged.

Ascertain the following:

• Mechanism of injury
• Time of injury
• Loss of consciousness (a brief seizure at the time of injury) may not be clinically significant
• Loss of memory
• Amnesia
• Irritability
• Visual disturbance
• Disorientation
• Abnormal gait
• Lethargy, pallor or agitation may indicate severe injury
• Vomiting
• Symptoms of increased intracranial pressure (vomiting, headache, irritability)

Many children will vomit two or three times after even a minor head injury. However, protracted vomiting and retching, associated with other symptoms or signs, indicates a more severe head injury.

The child's complete medical history must be obtained. Evidence of conditions such as a predisposition to seizures or bleeding problems is important and will affect the clinical management.

Physical Findings

Severity of intracranial injury can be assessed from a variety of characteristics (see Table 15-2 below).

Vital Signs

• Temperature usually normal
• Tachypnea: rapid heart rate may signify blood loss, in which case evidence of other injuries should be sought
• Bradycardia with hypertension (Cushing response): usually a late response in children with increased intracranial pressure and therefore not very reliable
• Hypertension: late sign of increased intracranial pressure
• Hypotension signifies shock: look for other injuries, since shock is not a usual sign of brain injury
Table 15-2: Classification of severity of intracranial injury

<table>
<thead>
<tr>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td>Progressive lethargy</td>
<td>Focal neurologic signs present</td>
</tr>
<tr>
<td>Mild headache</td>
<td>Progressive headache</td>
<td></td>
</tr>
<tr>
<td>No evidence of skull fracture, facial</td>
<td>Signs of basal skull fracture; possible</td>
<td>Penetrating skull injury, palpable</td>
</tr>
<tr>
<td>injury or other trauma</td>
<td>penetrating injury or depressed skull fracture; serious facial injury, multiple trauma</td>
<td>depressed skull fracture or compound skull fracture; serious facial injury or multiple trauma</td>
</tr>
<tr>
<td>Three or fewer episodes of vomiting</td>
<td>Vomiting protracted (more than three episodes) or associated with other symptoms</td>
<td>Glasgow coma score ≤ 10; a decrease of 2 or more points in serial Glasgow coma scores, not clearly caused by seizures, drugs, decreased cerebral perfusion or metabolic factors</td>
</tr>
<tr>
<td>Glasgow coma score 15</td>
<td>Glasgow coma score 11-14</td>
<td></td>
</tr>
<tr>
<td>Loss of consciousness for &lt; 5 minutes</td>
<td>Loss of consciousness for ≥ 5 minutes</td>
<td>Unconscious</td>
</tr>
<tr>
<td></td>
<td>Post-traumatic amnesia or seizure</td>
<td></td>
</tr>
</tbody>
</table>


**Signs of Skull Fracture**
- Hematotympanum
- Periorbital or post-auricular ecchymosis
- Cerebrospinal fluid otorrhea or rhinorrhea
- Depressed fracture or penetrating injury

Palpate scalp hematomas and contusions for underlying depressions, which signify depressed skull fracture. Before suturing, explore all full-thickness skull lacerations to ensure that the underlying bone is intact.

**Neurologic Examination**
- Pediatric Glasgow coma scale
- Papilledema (increased intracranial pressure)
- Pupillary light reflexes (PERRLA)
- Cranial nerve examination
- Movement of extremities
- Abnormal posture (decorticate or decerebrate)
- Muscle flaccidity, spasticity
- Plantar responses

Injuries to other areas such as the thorax or abdomen should be sought and treated promptly, since they may contribute to morbidity and death.

Clues to increased intracranial pressure:
- Decrease in Glasgow coma score of 2 points or more
- Abnormality or changes in pupillary size and reaction to light
- Respiratory abnormalities
- Development of paresis in absence of shock
- Hypoxia
- Seizures
- Elevation of blood pressure
- Decrease in heart rate
- Decrease in respiratory rate

Maintain a high index of suspicion for child abuse.

**Management**

**Mild Injury**
Children with mild intracranial injury may be discharged home. An instruction sheet should be
given to the parents or caregiver concerning observation and precautions (Table 15-3)

Table 15-3: Instructions to parents or caregivers for observation at home of children with head trauma

<table>
<thead>
<tr>
<th>Condition</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate To Severe Injury</td>
<td>ABCs must be assessed before any detailed history-taking or neurologic examination.</td>
</tr>
<tr>
<td>Instability of the cardiorespiratory system</td>
<td>may be due to severe intracranial injury, intracranial hypertension or injury to other areas, such as the thorax or the abdomen. Prompt ventilatory support and treatment of shock are mandatory, since these factors, if left uncorrected, will result in secondary intracranial trauma.</td>
</tr>
<tr>
<td></td>
<td>See &quot;Shock,&quot; in chapter 20, &quot;General Emergencies and Major Trauma.&quot;</td>
</tr>
<tr>
<td>Stabilizing Head and Cervical Spine</td>
<td>Manual in-line stabilization must be maintained until injury to the cervical spine has been excluded or the neck is properly immobilized on a flat, hard surface with weights on either side of the neck.</td>
</tr>
<tr>
<td>Suture scalp lacerations, as major blood loss can occur from such lesions.</td>
<td></td>
</tr>
</tbody>
</table>

**Appropriate Consultation**
For any loss of consciousness, investigation and treatment should be discussed with a physician.

**Adjuvant Therapy**
- Start IV therapy with normal saline to keep vein open (unless the child is in shock from other injuries)
- Give oxygen at 6-10 L/min or more, as necessary

**Nonpharmacologic Interventions**
- Elevate head of bed by 30° to 45°
- Place head and neck in midline position
- Minimize stimuli (e.g. suctioning and movement)
- Restrict fluids to 60% of normal intake (except in cases of shock)
- To control increased intracranial pressure: above measures plus establish controlled hyperventilation

**Pharmacologic Interventions**
Medications should be given only if prescribed by a physician.
Diuretics if intracranial pressure is increased (and there is documented deterioration) despite measures outlined above:
*mannitol (B class drug), 0.5-1 g/kg IV*

**Monitoring and Follow-Up**
Monitor ABCs, vital signs, pulse oximetry (if available), level of consciousness (with serial pediatric Glasgow coma scores), intake and output.

**Referral**
Medevac.
Headache

**Definition**

**Acute**
Pain in the head involving blood vessels, meninges, and bony and soft-tissue components of the head.

**Chronic or Recurrent**
Pain in the head occurring on a chronic basis with three broad categories of causes: vascular cause (migraines), muscle contraction (tension headaches) and organic cause. Occurs in 20% of school-age children. Onset may occur at any age.

**Causes**
Vascular causes (leading to migraine) and muscle contraction (leading to tension headaches) are the most common causes of headache in children.

**Vascular Lesions**
- Arteriovenous malformation
- Berry aneurysm
- Cerebral infarction
- Intracranial hemorrhage

**Migraine**
Vascular headaches (migraine) are common in children, who often have incomplete manifestations of this condition. This type of headache should be considered in any recurrent problem with headache.
- Classic
- Common
- Cluster

**Complicated Migraine**
- Basilar artery
- Hemiplegic
- Ophthalmoplegic

**Variants of Migraine**
- Acute confusional state
- Benign paroxysmal vertigo
- Cyclic vomiting

**Muscle Contraction**
- Tension

**Infection**
- Brain abscess
- Dental infection
- Encephalitis
- Meningitis
- Sinusitis (chronic)

**Trauma**
- Neck injury
- Post-concussion syndrome
- Subdural hematoma

**Toxic Effects**
- Carbon monoxide
- Heavy metal poisoning (e.g. lead)
- Non-medicinal agents
- Excess intake of vitamins

**Psychogenic**
- Conversion
- Depression
- Factitious

**Other Causes**
- Food allergy or sensitivity
- Refractive error
- Ocular muscle imbalance
- Temporomandibular joint (TMJ) dysfunction

**Traction**
- Brain tumors
- Hydrocephalus
- Hypertension

**History**
Gather history from many sources, including the affected child and his or her parents (or caregiver) and teachers. It is best to get a description of both the initial and the most recent headaches. Children >4 years old may be able to give a good description of their symptoms.

**Onset**
- When headache began
- Conditions associated with initial headache (e.g. trauma, drug ingestion)
- Aura: visual, auditory
Location
- Unilateral or bilateral

Radiation
- Where headache starts
- Where headache hurts the most
- Whether headache spreads to other areas
- Occipital radiation: neck problems, occipital neuralgia, basilar migraine
- Facial radiation: sinus, dental or TMJ

Quality
- Sharp, dull or tight
- Throbbing or pounding (characteristic of vascular headaches)
- Whether character of pain changes over time

Severity
- Severity of the headache on a scale of 1 to 10, with 10 representing the worst pain ever felt
- Whether pain is increasing or decreasing in intensity over time
- Whether headache interferes with child's day-to-day activities

Timing
- Constant or intermittent
- Frequency per day, week and month
- Whether frequency is increasing over time
- Association with particular time of day, week, month or season
- Duration and whether duration is increasing over time

Associated Symptoms (Functional Inquiry)
- Nausea and vomiting with or without abdominal pain (typical of migraine)
- Photophobia, facial pain, fever
- Transient neurologic signs
- Acute confusion, hemiplegia, ophthalmoplegia, syncope, vertigo, paresthesias, phonophobia
- Depression
- Anorexia, declining school performance, insomnia, weight loss
- Other medical problems
- Past medical history
- Family history of headaches

In the absence of other symptoms, recurrent headaches of more than 3 months' duration are rarely due to an organic cause.

Headaches of relative recent onset (<3 weeks) that are increasing in frequency and severity are worrisome.

Physical Findings
Physical findings are usually minimal with headaches.
- Blood pressure usually normal
- Temperature may be elevated with infectious process (e.g. meningitis)
- Height and weight

HEENT (Head, Eyes, Ears, Nose and Throat)
- Pained facies
- Nuchal rigidity
- Funduscopic examination (disks, blood vessels); results usually normal
- Spasm or tenderness of neck muscle, tenderness of TMJ
- Deficits of cranial nerves
- Purulent rhinorrhea
- Halitosis, dental abscesses
- Cephalic bruits: use bell of stethoscope over the frontotemporal areas and orbits

Neurologic Examination
- Level of consciousness
- Mental status: general demeanor, confusion, depression, stress
- Cutaneous lesions (café au lait spots)
- Focal abnormalities (e.g. tics, limb paresis)
- Sensory deficits
- Abnormal deep tendon reflexes
- Mental confusion

Clinical Characteristics of Specific Types of Headaches
Traction
- Headaches increase rapidly in frequency and severity
- Headache worst upon awakening in the morning, diminishes during the day
- Headache wakens child from sleep
- Aggravated by coughing or valsala maneuver
May be relieved by vomiting
Associated symptoms: focal neurologic findings; altered gait; changes in behavior, personality, cognition or learning

In 88% of children with a brain tumor, abnormal neurologic signs will be evident within the first 4 months after onset of headache.

**Classic Migraine**
- Headache pulsatile (throbbing), periodic, separated by symptom-free intervals and associated with at least three of the following symptoms: abdominal pain and nausea or vomiting, aura (motor, sensory, visual), family history of migraine
- Unilateral
- Headache relieved by sleep

**Tension Headache**
- Band-like tightness or pressure in the bifrontal, occipital or posterior cervical regions lasting for days or weeks but not disrupting regular activities; not associated with a prodrome; seen at any age
- Associated symptoms: tight neck muscles, sore scalp; nausea, vomiting and aura are uncommon

**Refractive Error**
- Persistent frontal headache, which is worse while reading or doing schoolwork

**TMJ Dysfunction**
- Temporal headache
- Associated symptoms: local jaw discomfort, malocclusion (crossbite), decreased range of motion of mouth, click with jaw movement, bruxism (grinding of teeth)

**Chronic Sinusitis**
- Frontal headache
- Tenderness to percussion over the frontal, maxillary or nasal sinuses
- Associated symptoms: prolonged rhinorrhea and congestion, chronic cough and postnasal drip, anorexia, low-grade fever, malaise

It is unusual for children <10 years old to have recurrent headaches secondary to chronic sinusitis.

**Differential Diagnosis**
See "Causes," above, this section.

**Complications**
- Recurrent or chronic headaches can be debilitating and may cause absences from school and social withdrawal
- Intracranial lesions, masses or infections are life-threatening

**Diagnostic Tests**
Most headaches can be diagnosed from the history and physical examination.

For recurrent or chronic headache, diagnostic information may include daily headache record, see Appendix 15-1.

**Management**

**Goals of Treatment**
Goals of treatment depend on the cause of the headache.

**Acute**
- Rule out serious organic pathology
- Relieve pain

**Recurrent or Chronic**
- Relieve pain
- Prevent recurrence
- Avoid disruption of normal life tasks, such as attending school

**Appropriate Consultation**
Consult a physician immediately in the following circumstances:
- Concern about an underlying organic cause for headaches
- Uncertainty about the diagnosis
- Headaches are chronic and unresponsive to simple analgesia

**Nonpharmacologic Interventions**
Supportive reassurance and education are appropriate for non-organic headaches only:
- Advise parents or caregiver that headaches in children are common and real
- Reassure family that headache is unlikely to indicate brain tumor
• Explain underlying pathophysiology of vascular and muscle contraction headaches (which are benign and have a favorable prognosis)
• Counsel about avoiding factors that trigger headaches
• Identify stressors and advise on how to deal with them
• Counsel about use of medications (dose, frequency, side effects)

Relaxation and Imagery Therapy
• Abdominal breathing exercises
• Visual imagery exercises

Pharmacologic Interventions
For tension headaches and mild migraines, analgesics are useful:
acetaminophen (A class drug), 10-15 mg/kg per dose (usually analgesic of choice)

Children >6 years old may be given 325 mg, and children >12 years old may be given 325-650 mg PO q4h prn.

or
Nonsteroidal anti-inflammatory drugs (NSAIDs):
ibuprofen (A class drug), 5-10 mg/kg per dose PO q8h prn, to daily maximum of 40 mg/kg

NSAIDs are associated with a risk of GI side effects.

Do not use ASA, as it is associated with Reye's syndrome.

For migraines:
• Avoid precipitants (triggers)
• Simple analgesic (acetaminophen, ibuprofen) may be given at first sign of aura or headache
• Avoid narcotics

On the advice of a physician, migraine prophylaxis may be ordered, but this is rarely necessary in young children.

For information on treatment and prophylaxis of migraines, see "Migraine Headache," in chapter 8, "Central Nervous System," in NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.

Monitoring and Follow-Up
During follow-up visits:
• Review headache diary if unable to identify cause on first visit, as well as to monitor management
• Reinforce balanced health habits of sleep, exercise and diet

Referral
Medevac any child with acute symptoms in whom organic pathology is evident or cannot be ruled out without investigation. If symptoms are mild, refer the child electively to a physician.
Appendix 15-1: Example Of A Form To Record Headaches And Seizures

<table>
<thead>
<tr>
<th>NAME</th>
<th>B D</th>
<th>CHART NO.</th>
<th>CHILDREN'S CENTER MONTHLY RECORD OF HEADACHES/SEIZURES</th>
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<td>31</td>
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<tr>
<td>Totals</td>
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</tbody>
</table>

Note: D=day; N=night
<table>
<thead>
<tr>
<th>DATE &amp; TIME</th>
<th>DESCRIPTION: duration, precipitating factors, record of everything eaten in the 24 hours before headache</th>
</tr>
</thead>
<tbody>
<tr>
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</table>
# Chapter 16 – The Skin

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- Types Of Lesions .................................................................................................................... 2

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For more information on the history and physical examination of the skin in older children and adolescents, see chapter 9, "The Skin," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.

For ringworm (tinea), including tinea corporis and tinea pedis, and for warts (verrucae), clinical presentation and management are the same in adults and children. For information on these conditions, see chapter 9, "The Skin," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.
Assessment Of The Integumentary System

History Of Present Illness And Review Of System

General
The following characteristics of each symptom should be elicited and explored:
• Onset (sudden or gradual)
• Skin site involved
• Chronology
• Date(s) and site(s) of recurrence(s)
• Current situation (improving or deteriorating)
• Nature of symptom: intermittent or continuous
• Influence of environmental factors
• Potential causative factors
• Measures taken to relieve symptoms

Cardinal Symptoms
In addition to the general characteristics outlined above, additional characteristics of specific symptoms should be elicited, as follows.

Skin
• Changes in texture, colour, pigmentation
• Unusual dryness or moisture
• Itching
• Rash
• Bruises, petechiae
• Lesions
• Changes in moles or birthmarks

Hair
• Changes in amount, texture, distribution

Nails
• Changes in texture, structure

Medical History (Specific To Integumentary System)
• Allergic manifestation (e.g. asthma, hay fever, urticaria, eczema)
• Recent or current viral or bacterial illness
• Allergies to drugs, foods or other chemical substances
• Sensitivity to sunlight
• Medications: current and past prescription and OTC drugs
• Immunosuppression (e.g. HIV/AIDS)
• Seborrheic dermatitis
• Dermatitis
• Psoriasis
• Diabetes mellitus

Family History (Specific To Integumentary System)
• Allergies (e.g. seasonal hay fever, allergies to foods)
• Asthma
• Seborrheic dermatitis
• Psoriasis
• Others at home with similar symptoms (e.g. rash)

Personal And Social History (Specific To Integumentary System)
• Obesity
• Inadequate personal hygiene
• Hot or humid environment, poor environmental sanitation
• Exposure to new chemicals (e.g. soaps), foods, pets or plants
• Emotional disturbance
• History of sensitive skin
• Others at home, work or school with similar symptoms
• Recent travel
Physical Examination

General Appearance
- Apparent state of health
- Appearance of comfort or distress
- Colour (e.g. flushed, pale)
- Nutritional status (obese or emaciated)
- State of hydration
- Vital signs (temperature may be elevated)

Inspection And Palpation Of The Skin
- Colour
- Temperature, texture, turgor
- Dryness or moisture
- Scaling
- Pigmentation
- Vascularity (erythema, abnormal veins)
- Bruising, petechiae
- Edema (dependent, facial)
- Induration (firm to touch)
- Individual lesions (colour, type, texture, general pattern of distribution, character of edge, whether raised or flat)
- Hair (amount, texture, distribution)
- Nails (shape, texture, discoloration, grooving)
- Mucous membranes (e.g. moisture, lesions)
- Skin folds (e.g. rashes, lesions)
- Joint involvement

Other Aspects
- Examine lymph nodes
- Examine area distal to enlarged lymph nodes

Types Of Lesions
Lesions of the skin and mucous membranes are characterized by their size, elevation, contents and colour (Figs. 16-1 to 16-3).

Fig. 16-1: Skin Lesions Up to 1 cm in Greatest Dimension

A: Macule, a flat, circumscribed area of discoloration of the skin or mucous membrane up to 1 cm in its greatest dimension.

B: Papule, a solid, elevated lesion of the skin or mucous membrane up to 1 cm in its greatest dimension.

C: Vesicle, a fluid-filled, superficial, elevated lesion of the skin or mucous membrane, up to 1 cm in its greatest dimension.

Fig. 16-2: Skin Lesions Greater than 1 cm in at Least One Dimension

A: Patch, a flat, circumscribed area of discoloration of the skin or mucous membrane, with at least one dimension greater than 1 cm.

B: Plaque, a solid, elevated lesion of the skin or mucous membrane, with at least one dimension greater than 1 cm.
C: Nodule, a solid, elevated lesion of the skin or mucous membrane, with the added dimension of depth into the underlying tissue, with at least one dimension greater than 1 cm.

D: Tumor, a solid, elevated lesion of the skin or mucous membrane, with the added dimension of depth into the underlying tissue (to a greater extent than for a nodule), with at least one dimension greater than 1 cm.

E: Bulla, a fluid-filled, superficial, elevated lesion of the skin or mucous membrane, with at least one dimension greater than 1 cm.

**Fig. 16-3: Skin Lesions of Variable Size**

Wheal - an irregularly shaped, elevated, solid, changing, transient lesion of the skin or mucous membrane, due to cutaneous edema.

Other lesions of variable size include pustules (vesicle or bulla containing pus rather than clear fluid) and telangiectasias (fine, often irregular red lines produced by dilatation of a capillary).
Common Problems Of The Skin

Scabies

**Definition**
Infestation of the skin with a mite parasite.

Skin eruptions consist variably of wheals, papules, vesicles, burrows and superimposed eczematous dermatitis. The lesions are intensely pruritic, especially at night, which leads to marked excoriation.

In infants, the face, scalp, palms and soles are most commonly involved.

In adolescents, the lesions, which often appear as threadlike burrows, occur in the interdigital spaces, the groin and genitalia, the umbilicus, and the axillae and on the wrists, elbows, ankles and buttocks.

**Cause**
- Itch mite, *Sarcoptes scabiei*, which burrows under the skin
- Usually transmitted by direct contact and (rarely) fomites (e.g. clothes, linen)

**Risk Factors**
- Failure to recognize an infestation
- Faulty application of treatment
- Failure to treat close contacts
- Failure to eradicate mites from clothing and bed linen
- Exposure to someone with scabies

The Aboriginal population in some areas may be at risk from a number of additional factors, such as the following:
- Crowded housing, shared beds, crowded schools and daycare centers
- High pediatric population
- Lack of running water, which may predispose to poor hygiene and secondary skin infection

**History**
- Severe itching
- Itching generally worse at night
- Rash on hands, feet, flexural folds

- Symptoms may take 1-2 months to develop after contact with mite
- Symptoms are due to hypersensitivity to mite and its products

**Physical Findings**
- Usually affects interdigital web spaces, flexures of wrists and arms, axillae, belt line, lower folds of buttocks, genitalia, areolae of nipples
- Diffuse red rash
- *Primary lesions*: papules, vesicles, pustules, burrows
- *Secondary lesions*: scabs, excoriations, crusts, nodules, secondary infection
- Lesions in various stages present at the same time
- Secondary lesions may predominate
- Burrows (gray or flesh-coloured ridges 5-15 mm long) may be few or many
- Burrows commonly seen on anterior wrist or hand and in interdigital web spaces
- In infants, burrows are much less common

**Differential Diagnosis**
- Pediculosis
- Impetigo
- Eczema (atopic dermatitis)
- Contact or irritant dermatitis
- Viral exanthem
- Chickenpox
- Drug reaction

**Complications**
- Impetigo
- Cellulitis

**Diagnostic Tests**
None.

**Management**

**Goals of Treatment**
- Eradicate infestation
- Control secondary infection
- Relieve symptoms
**Appropriate Consultation**
Consult physician if you are unsure of the diagnosis.

**Nonpharmacologic Interventions**

**Client Education**
- Counsel parents or caregiver (and child, if old enough) about proper use of medication and its side effects

**Control Measures**
- Prophylactic therapy is essential for all household members, since signs of scabies may not appear for 1-2 months after the infection is acquired
- Treat all household members at the same time to prevent re-infection
- All bed linen (sheets, pillow slips) and clothing worn next to the skin (underwear, T-shirts, socks, jeans) should be laundered in a hot soapy wash and dried with a hot drying cycle, as available
- If hot water is not available, place all bed linen and clothing into plastic bags and store away from the family for 5-7 days, as the parasite cannot survive beyond 4 days without skin contact
- Placing bedding outside in the cold or in ultraviolet light will also help
- Children may return to daycare or school the day after treatment is completed
- Healthcare workers who have had close contact with people who have scabies may themselves require prophylactic treatment
- Community education, aimed at early recognition and awareness of scabies, is important
- In widespread scabies epidemics, prophylactic treatment of a whole community may constitute optimal management

**Pharmacologic Interventions**
Scabicide cream or lotion, applied to entire body, from chin to toes. Emphasize that scabicide must be applied in skin creases, between fingers and toes, between buttocks, under breasts and to external genitalia.

*permethrin 5% dermal cream (A class drug)*
*(drug of choice)*

Leave on skin for 8-14 hours. A single application is usually curative, but medication may be re-applied after 1 week if symptoms persist.

The safety of permethrin for infants <3 months old has not been established.

Pruritus may be a problem, particularly at night. Advise the child and the parents or caregiver that itching will persist for up to 2 weeks.

To manage itching:

*diphenhydramine hydrochloride (A class drug)*

5 mg/kg/day PO, IM, IV  maximum dose 300 mg/day

Topical steroids may be useful after antiscabietic treatment, because the rash and itching may persist for several days:

*hydrocortisone 1.0% (A class drug), applied od or bid*

**Monitoring and Follow-Up**
- Follow up in 1 week to assess response to treatment
- Advise parents or caregiver to bring child back to the clinic immediately if signs of secondary infection develop

**Referral**
Rarely necessary if original diagnosis is correct and adequate eradication treatment is adhered to by the child and his or her contacts.
Impetigo

Definition
Highly contagious, superficial bacterial infection of the skin.

Causes
• Streptococcus, Staphylococcus or both
• Predisposing factors: local trauma, insect bites, skin lesions from other disorders (e.g. eczema, scabies, pediculosis)

History
• More common on face, scalp and hands, but may occur anywhere
• Involved area is usually exposed
• Usually occurs during summer
• New lesions usually due to auto-inoculation
• Rash begins as red spots, which may be itchy
• Lesions become small blisters and pustules, which rupture and drain
• Discharge dries to form characteristic golden yellow crusts
• Lesions painless
• Fever and systemic symptoms rare
• Mild fever may be present in more generalized infections

Physical Findings
• Thick, golden yellow, crusted lesion on a red base
• Numerous skin lesions at various stages present (vesicles, pustules, crusts, serous or pustular drainage, healing lesions)
• Bullae may be present
• Lesions and surrounding skin may feel warm to touch
• Local lymph nodes may be enlarged, tender

Differential Diagnosis
• Infection associated with eczema, contact dermatitis or scabies
• Herpes simplex infection with blisters or crusts
• Chickenpox infection with blisters or crusts
• Shingles (herpes zoster) with blisters or crusts
• Insect bites

Complications
• Localized or widespread cellulitis
• Post-streptococcal glomerulonephritis
• Invasive group A streptococcal disease (invasive GAS)

Diagnostic Tests
• Wound swab for culture and sensitivity (may be confirmatory)

Management
Goals of Treatment
• Control infection
• Prevent auto-inoculation
• Prevent spread to other household members

Appropriate Consultation
Consult a physician if there is no response to therapy.

Nonpharmacologic Interventions
• Warm saline compresses to soften and soak away crusts qid and prn
• Cleanse with an antiseptic antimicrobial agent to decrease bacterial growth

Client Education
• Counsel parents or caregiver about appropriate use of medications (including dose, frequency and compliance)
• Offer recommendations about hygiene as necessary
• Cut fingernails to prevent scratching
• Counsel parents or caregiver about prevention of future episodes
• Suggest strategies to prevent spread to other household members (e.g. proper hand-washing, use of separate towels)

Pharmacologic Interventions
Apply topical antibiotic preparation after each soaking: mupirocin ointment (A class drug), qid for 7-10 days
Oral antibiotics may be necessary if there are multiple lesions that appear infected:
- **cephalexin (C class drug)**, 40 mg/kg per day, divided q6h, PO
- or
- **cloxacillin (C class drug)**, 25-50 mg/kg per day, divided q6h, PO
- or
- **erythromycin (C class drug)**, 40 mg/kg per day, divided q6h, PO

Topical antibiotics such as mupirocin may be used alone for small areas or in conjunction with oral antibiotics for larger areas.

**Monitoring and Follow-Up**
- Follow up in 3 to 5 days to assess response to treatment
- Instruct parents or caregiver to bring the child back for reassessment if fever develops or infection spreads despite therapy

**Referral**
Not usually necessary unless complications develop.
Cellulitis

Definition
Acute, diffuse, spreading infection of the skin, involving the deeper layers of the skin and subcutaneous tissue.

Periorbital cellulitis is a special form of cellulitis that usually occurs in children. In this form of cellulitis, unilateral swelling and redness of the eyelid and orbital area, as well as fever and malaise, are usually present. Be alert for any child who is unable to elevate or move the eyeball and any child with forward displacement of the eyeball, which indicates that the infection has extended into the orbit (orbital cellulitis). See "Periorbital Cellulitis (Preseptal)," in chapter 8, "The Eyes."

Facial, periorbital and orbital cellulitis are particularly worrisome, as they can lead to meningitis.

Causes
• Bacteria: most commonly Staphylococcus or Streptococcus or combination of both
• Predisposing factors: local trauma, furuncle, underlying skin ulcer

If a bite was the original trauma, different organisms are involved. See "Skin Wounds," in chapter 9, "The Skin," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.

Facial cellulitis in children <3 years old may be due to Hemophilus influenzae.

History
• Localized pain
• Redness
• Swelling
• Area increasingly red, warm to touch, painful
• Area around skin lesion also tender
• Mild fever and headache may be present

Physical Findings
• Temperature may be elevated
• Heart rate may be elevated

• Redness, swelling
• Advancing edge of lesion diffuse, not sharply demarcated
• Small amount of purulent discharge may be present
• Skin surrounding lesion red and swollen, may be tense
• Edema
• Tenderness
• Induration (firm to touch)
• Regional lymph nodes may be enlarged and tender

Differential Diagnosis
• Folliculitis
• Foreign body
• Abscess
• Contact dermatitis

Complications
• Extension of infection
• Abscess formation
• Sepsis

Diagnostic Tests
• Swab any wound discharge for culture and sensitivity

Management
Goals of Treatment
• Control infection
• Identify abscess formation

Mild Cellulitis
Treat on an outpatient basis.

Nonpharmacologic Interventions
• Apply warm saline compresses to affected areas qid
• Elevate, rest and gently splint an affected limb

Client Education
• Counsel parents or caregiver about appropriate use of medications (dose, frequency, compliance)
• Encourage proper hygiene of all skin wounds to prevent future infections
• Stress importance of close follow-up

**Adjuvant Therapy**
If original lesion was caused by trauma, check for tetanus immunization; if not up to date, administer tetanus vaccine.

**Pharmacologic Interventions**
Oral antibiotics: *cephalexin (C class drug), 40 mg/kg per day, divided q6h, PO for 7-10 days (for most cases involving limbs and trunk)*

For children who are allergic to penicillin: *erythromycin (C class drug), 40 mg/kg per day, divided q6h, PO for 7-10 days*

Analgesic and antipyretic for pain and temperature control: *acetaminophen (A class drug), 10-15 mg/kg PO q4-6h*

**Monitoring and Follow-Up**
• Follow up daily to ensure that infection is controlled
• Instruct parents or caregiver to bring child back for reassessment immediately if lesion becomes fluctuant, if pain increases or if fever develops

**Moderate To Severe Cellulitis**

**Appropriate Consultation**
Consult physician if any of the following conditions exist:
• Cellulitis is moderate to severe (e.g. large area is involved)

• Cellulitis is progressing rapidly, which may indicate an invasive streptococcal infection
• Condition affects hands, feet, face or a joint
• Child is immunocompromised (e.g. has diabetes mellitus)
• Child is febrile, appears acutely ill or shows signs of sepsis

Do not underestimate cellulitis. It can spread very quickly and may progress rapidly to necrotizing fasciitis. It should be treated aggressively.

**Adjuvant Therapy**
• Start IV therapy with normal saline to keep vein open; adjust rate according to state of hydration and age
• If original lesion was caused by trauma, check tetanus immunization; if not up to date, administer tetanus vaccine

**Pharmacologic Interventions**
Administer IV antibiotics only as directed by a physician: *see Bugs and Drugs, 2001, p75*

Antipyretic and analgesic for fever and pain: *acetaminophen (A class drug), 10-15 mg/kg per dose PO q4-6h prn*

**Monitoring and Follow-Up**
Monitor vital signs and affected area frequently for progression.

**Referral**
Medevac.
Eczema (Atopic Dermatitis)

**Definition**
Inflammatory skin disorder characterized by erythema, edema, pruritus, exudate, crusting, pustules and vesicles. It may be an allergic phenomenon.

Eczema is a common problem in children, and those affected are predisposed to impetigo. Eczema can begin in infancy, often becoming quiescent later in childhood.

Recurrences and exacerbations are common.

**Causes**
- Largely unknown
- Often a familial predisposition
- May be associated with allergic rhinitis and asthma

**History**
- Erythema
- Weeping patches
- Pruritus
  - In infancy, cheeks, face and extensor surfaces of arms and legs are involved
  - In childhood and adolescence, flexural surfaces are common sites

**Physical Findings**
- Erythematous, dry, pruritic lesions
- In severe cases, lesions may weep
- Multiple sites
- Purulent scabs and crusts, indicating superinfection, may be present
- Lesions may be indurated

**Differential Diagnosis**
- Seborrheic dermatitis
- Scabies
- Allergic dermatitis
- Hereditary polymorphic light eruption

**Complications**
- Drying and thickening of skin (lichenification)
- Secondary infection

**Diagnostic Tests**
None.

**Management**

**Goals of Treatment**
- Relieve symptoms
- Identify and control environmental causes (for allergic cases)
- Prevent secondary infection

**Nonpharmacologic Interventions**
- Offer support to child and family, as it can be difficult to live with this irritating chronic condition
- Assist parents (or caregiver) and child to identify precipitating and aggravating factors, and encourage avoidance

**Client Education**
- Counsel parents (or caregiver) and child about appropriate use of medications (dose, frequency, application)
- Encourage proper hygiene, to prevent secondary bacterial infection
- Recommend that child wear loose-fitting cotton clothing and avoid coarse materials and wool
- Recommend that soap not be used on face
- Recommend avoidance of overheating
- Recommend avoidance of irritants
- Recommend avoidance of perfumes, detergents and soap, as much as possible (and use of a soap substitute, such as Aveeno®)
- Suggest that greasy lubricants be applied within minutes of leaving shower or bath to "lock in" moisture (e.g. Lubriderm®, Sofsyn®, Dermabase®, creamy Vaseline®)
- Advise parents or caregiver to stop application of steroid preparations once acute lesions have healed, as steroids do not have any preventive effect and can further irritate and damage the skin

**Wet Lesions**
Promote drying and cooling:
*normal saline compresses, qid prn*
Dry Lesions
Promote lubrication:
Glaxal® base, Nivea® cream or petroleum jelly
bid (i.e. after bathing and pm)

Pharmacologic Interventions
Reduce inflammation if itch is moderate or severe:
hydrocortisone 1% cream or ointment
(C class drug), bid or tid for 1-2 weeks

Steroids should be used only sparingly on the face
and then only for brief periods.

Gels and creams are used for acute, weeping
eruptions. Ointments are used for dry or
lichenified lesions. Lotions are used for hairy
areas.

Monitoring and Follow-Up
Follow up in 1-2 weeks to assess response. Advise
parents or caregiver to bring child back to the
clinic sooner if there are signs of infection
developing.

Appropriate Consultation
Consult a physician if there is no response to
therapy after a 1- to 2-week trial. Higher-potency
steroids, if necessary, must be ordered by a
physician.

Referral
Arrange elective follow-up with a physician if
there is no response to treatment outlined above.
Diaper Rash

Definition
Inflammation of skin over area covered by diaper; may include erythema, papules, vesicles and occasionally bullae.

Causes
• Reaction to friction and prolonged contact with urine and feces
• Candidal dermatitis

History
• Sore, red rash in diaper area
• Candidal infection may be associated with oral antibiotics being given for other reasons
• Candidal infection may be seen in other creased areas, such as neck and axillae, and may be associated with thrush

Physical Findings

Contact Diaper Dermatitis
• Erythematous rash over area covered by diaper
• Creases usually spared in cases of simple contact dermatitis associated with exposure to urine

Candidal Infection
• Erythematous rash with sharply demarcated edges
• Weepy, red rash of diaper area
• Satellite pustules outside demarcated edge
• Rash often involves creases

Differential Diagnosis
• Irritative contact dermatitis
• Candidal infection
• Staphylococcal infection
• Seborrheic dermatitis

Complications
• Secondary infection with other bacteria

Diagnostic Tests
None.

Management

Goals of Treatment
• Reduce exposure to irritants
• Treat any secondary infection

Nonpharmacologic Interventions
• Frequent diaper changes
• Washing with warm water and mild soap and air drying at each change
• Exposure of child's bottom to air for longer periods
• Application of topical protection (e.g. zinc oxide cream) at each change
• Family and caregiver education about bathing, diaper changing and skin maintenance

Pharmacologic Interventions
Contact diaper dermatitis may require mild steroids:
hydrocortisone 1% ointment (C class drug), applied bid until rash resolves (5-7 days)

For candidal diaper dermatitis:
nystatin cream (A class drug), applied qid until rash resolves

For severe cases of candidal diaper dermatitis:
nystatin cream (A class drug), applied qid until rash resolves and hydrocortisone 1% cream (C class drug), bid

Monitoring and Follow-Up
Advise follow-up in 1 week if the rash has not improved, or sooner if there are signs that the infection is worsening.

Referral
Not usually necessary, unless the condition is recurrent or unresponsive to therapy.
Poison Ivy Dermatitis

Definition
A type of contact dermatitis, secondary to exposure to poison ivy.

Cause
• Exposure to poison ivy oleoresin

History
• Recent work or play in the bush
• Intensely pruritic, erythematous, weeping rash

Physical Findings
• Erythema
• Vesicular, bullous lesions
• Weeping rash
• Linear streaks
• Edema of affected tissue

Differential Diagnosis
• Eczema (atopic dermatitis)
• Psoriasis
• Other contact dermatitis

Complications
• Secondary bacterial skin infection

Diagnostic Tests
None.

Management
Goals of Treatment
• Prevent infection
• Relieve itch

Appropriate Consultation
Consult a physician for advice if the rash is severe or widespread.

Nonpharmacologic Interventions
• Cleanse the skin to prevent further eruption
• Wash hands, cleaning especially well under nails
• Wash clothing contaminated by the oleoresin

Client Education
• Counsel parents (or caregiver) and children about appropriate clothing to be worn for outside (bush) activities (e.g. long sleeves, long pants)

Pharmacologic Interventions
For mild to moderate cases: hydrocortisone 1% cream (C class drug), applied tid to affected area

For intense pruritus:
diphenhydramine hydrochloride (A class drug) 5 mg/kg/day, PO, IM, IV, maximum dose 300 mg/day
or
hydroxyzine (C class drug)
Children <6 years old: 50 mg/day, divided q6h
Children ≥6 years old: 50-100 mg/day, divided q6h

Occasionally, a tapering course of oral steroids (prednisone) is required (1-2 mg/kg per day for 14-21 days). Steroids should be given only on the order of a physician.

Monitoring and Follow-Up
Reassess as necessary in 2 or 3 days.

Referral
Usually a self-limiting problem.
Hereditary Polymorphic Light Eruption

Definition
Skin lesions occurring in areas exposed to the sun, without other cause. Commonly seen in Aboriginal people throughout North and South America.

Causes
• Hypersensitivity to sunlight
• Hereditary condition
• Probably an immunologic phenomenon

History
• Erythematous, vesicular, bullous rash and papules in exposed areas, usually occurring in late winter through summer
• Recurrence common
• Often pruritic

Physical Findings
• Erythematous rash on face, hands and other exposed surfaces
• Often involves cheilitis (inflammation of the lips)
• Distribution is a significant clue to diagnosis

Differential Diagnosis
• Eczema (atopic dermatitis)
• Contact dermatitis
• Impetigo
• Seborrheic dermatitis

Complications
• Secondary infection
• Lichenification
• Depigmentation

Diagnostic Tests
None.

Management
Goals of Treatment
• Relieve symptoms
• Decrease exposure to sunlight

Nonpharmacologic Interventions
• Use of high-level (>30 SPF) sunscreens
• Coverage of exposed parts (with clothing, wide-brimmed hats, etc.)
• Family education about dress and sunscreen use

Pharmacologic Interventions
Topical steroids may be tried, starting with: hydrocortisone 1% cream (C class drug), applied od or bid for 1-2 weeks

Fluorinated steroids (e.g. betamethasone) may be necessary on body parts other than the face. Such drugs must be ordered by a physician.

Referral
Refer child to a physician for evaluation if the treatment is unsuccessful.
Hemangiomata

Definition
Vascular nevi, which may be superficial or deep, capillary or cavernous. Often most visible in infancy, tending to diminish in size with age.

Cause
• Congenital vascular defect with genetic propensity

History
• Visible vascular lesion
• Usually from birth or early infancy
• Lesion changes over time

Capillary (Strawberry) Hemangioma
• Usually presents between birth and 2 months of age
• Most common on face, scalp, back or chest
• Expands rapidly initially
• Involved by 5 years of age in 60% of cases
• Involved by 9 years of age in 95% of cases

Cavernous Hemangioma
• Red hemangioma
• Deeper, not as well defined or demarcated as strawberry hemangioma
• Period of growth followed by period of regression

Physical Findings
Capillary (Strawberry) Hemangioma
• Red, protuberant, compressible and sharply demarcated lesion

Cavernous Hemangioma
• Poorly defined red hemangioma
• Lesion may be compressible
• Lesion may be completely covered with skin

Differential Diagnosis
Capillary (Strawberry) Hemangioma
• Cavernous hemangioma

Cavernous Hemangioma
• Capillary (strawberry) hemangioma

Complications
Capillary (Strawberry) Hemangioma
• Secondary infection or breakdown with involution
• Trauma
• Small scars may remain after involution

Cavernous Hemangioma
• Secondary infection
• May involve underlying structures, including bone
• Large cavernous hemangioma may be associated with hemorrhage or thrombocytopenia

Diagnostic Tests
None.

Management
Goals of Treatment
• Reassure child and parents or caregiver
• Treat secondary infection

Nonpharmacologic Interventions
• Reassurance of family

Pharmacologic Interventions
For cavernous hemangioma, steroids (e.g. prednisone [B class drug], 1 mg/kg per day) may be useful. However, steroids can be prescribed only by a physician.

Referral
• Refer child electively to a physician for assessment
• More urgent evaluation may be necessary if there is significant secondary infection, if the hemangioma obscures a vital organ (e.g. the eye), or if the lesion is large enough to trap platelets
• Some children require plastic surgery consultation
Mongolian Spots

Definition
Benign lesions, presenting as bluish black discoloration of the skin. Commonly seen in black, oriental, Inuit and First Nations children. They diminish or disappear during childhood.

Cause
• Unknown

History
• Bluish discoloration
• Asymptomatic
• Lesions fade with age

Physical Findings
• Bluish spots of various sizes
• May occur anywhere on the body, but most common in lumbosacral areas and on back, shoulders and legs

Differential Diagnosis
• Bruising from trauma

These lesions are sometimes confused with bruising and can be inaccurately interpreted as evidence of child abuse.

Complications
None.

Diagnostic Tests
None.

Management
Goals of Treatment
• Make accurate diagnosis

Nonpharmacologic Interventions
• Reassurance of family
Molluscum Contagiosum

**Definition**
Viral condition of the skin, with firm, round, translucent papules.

**Cause**
- Viral infection

**History**
- Clusters of papules occurring anywhere on the body

**Physical Findings**
- Discrete, skin-coloured, dome-shaped papules of various sizes
- Central umbilication
- Occurring anywhere on the body, but with predilection for face, eyelids, neck, axillae and thighs

**Differential Diagnosis**
- Warts

**Complications**
- Rare
- Scarring, if papule becomes infected

**Diagnostic Tests**
None.

**Management**

**Goals of Treatment**
- Make accurate diagnosis
- Prevent secondary infection

**Nonpharmacologic Interventions**
- Benign neglect is the treatment of choice (most of the lesions disappear within 2 years)
- Reassure child and parents or caregiver as to benign nature of lesions
- Advise against scratching or picking at lesions, to prevent secondary infection

**Pharmacologic Interventions**
Podophyllin, silver nitrate or trichloroacetic acid can be used to eradicate the lesions, if necessary. Do not use unless ordered by a physician.

**Referral**
Refer child electively to a physician regarding definitive treatment if the parents (or caregiver) are concerned and desire such treatment.
Ringworm Of The Scalp (Tinea Capitis)

**Definition**
Superficial infection of the scalp by the fungus *Microsporum* or *Trichophyton*.

**Cause**
- Fungal infection, usually acquired through direct contact with an infected person

**History**
- Alopecia
- Other family members with same condition

**Physical Findings**
- Alopecia or patchiness of hair
- Gray scaling
- Broken hairs
- Lesion usually well demarcated

**Differential Diagnosis**
- Seborrhea
- Trichotillomania (hair-pulling)
- Psoriasis
- Alopecia areata

**Complications**
- Damaged hair follicles
- Spread of infection

**Diagnostic Tests**
- Take scrapings of skin or hair for fungal examination
- Wood's lamp test
- Potassium hydroxide (KOH) wet prep

**Management**

**Goals of Treatment**
- Make accurate diagnosis
- Relieve infection

**Appropriate Consultation**
Consult a physician about treatment if you confirm this diagnosis, since topical antifungal agents are ineffective on the scalp.

**Nonpharmacologic Interventions**
- Provide reassurance to parents or caregiver
- Offer support, as therapy is long and arduous

There is no need to shave the head.

**Pharmacologic Interventions**
Topical antifungal agents are ineffective on the scalp.

Consult a physician to order:
*griseofulvin (B class drug), 15 mg/kg per 24 hours for 8-12 weeks*

This drug is not on the nurses' formulary. Griseofulvin can have many side effects, including GI disturbances, hepatotoxicity and leukopenia, but it is generally well tolerated by children.

**Monitoring and Follow-Up**
Follow up every 2 or 3 weeks while the child is receiving medication, to assess adherence, to determine whether there are signs of improvement and to offer support to the parents or caregiver.

It may be necessary to monitor CBC, creatinine level and liver function. Discuss with a physician.
Acne Vulgaris

Definition
Chronic inflammatory disease of the skin with an eruption of papules or pustules.

Most common skin disorder in adolescents and seen to some degree in all adolescents.

Although not life-threatening, acne may have serious psychological effects on self-conscious adolescents.

Causes And Pathogenesis
Acne involves the sebaceous follicles, which are sebaceous glands emptying into hair follicles. Found mainly on the face, chest and back, these follicles are stimulated at puberty by increasing levels of androgen.

The follicles produce greater amounts of sebum (oil), which combines with keratin from the lining of the follicle to form plugs (comedones). Bacteria (specifically Propionibacterium acnes) invade the comedones and produce lipases, which break down the sebum into free fatty acids. These compounds cause inflammation and subsequent rupture of the follicle.

History
• Rash, lesions on face
• Psychological effects, including embarrassment and social withdrawal

Physical Findings
Comedones
• Blocked follicle
• Open comedo (blackhead): epithelium-lined sac filled with keratin and lipids with a widely dilated orifice, cylindrical, 1-3 mm in length; black colour because of melanin pigment in dermis and exposure to air (which causes discoloration of lipids and melanin); colour is not due to dirt
• Closed comedo (whitehead): precursor to inflammatory lesion; small, flask-shaped, skin-coloured, slightly elevated papule just beneath the surface of the skin

Papules
• Develop from obstructed follicles that become inflamed

Pustules
• Larger lesions, more inflamed than papules; superficial or deep

Nodules and Cysts
• Nodules: Formed when deep pustules rupture and form abscesses
• Cysts: End product of pustules or nodules
• Seen in more severe cases
• Prone to re-inflammation
• May scar on healing

Differential Diagnosis
• Fungal infection
• Acne rosacea
• Flat warts

Complications
• Scarring
• Hyper-pigmentation of affected areas of the skin

Diagnostic Tests
None.

Management
Goals of Treatment
• Control symptoms
• Prevent complications

Client Education
• Encourage regular use of non-irritating soaps, since strong soaps may cause irritation and lead to increased production of sebum
• Recommend mild soaps containing sulfur and salicylic acid
• Affected areas should be cleansed two or three times daily
• Encourage persistence with medication (e.g. tretinoin), even if condition worsens temporarily after 2-3 weeks of treatment
• Provide education about the "myths" of acne (e.g. not related to junk food or poor hygiene)
Pharmacologic Interventions

Benzoyl Peroxide (non-formulary)

- Decreases sebum production and comedo formation
- Has antibacterial effects
- Available in 2.5% to 10% gels
- Preferred application: 5% gel bid
- Side effects: dryness and irritation
- Consult physician for prescription

Oral Antibiotics

tetracycline (C class drug), 250 mg tid for 3 weeks, tapering to once a day

This drug may be given over the long term, until acne resolves.

Monitoring and Follow-Up

See adolescent every 2 or 3 weeks at beginning of treatment.

Referral

Refer any adolescent to a physician electively if there is failure to respond to first-line therapies or if the person has severe nodulocystic disease.

Ringworm (Tinea)

See "Ringworm (Tinea)," in chapter 9, "The Skin," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.

Warts (Verrucae)

See "Warts (Verrucae)," in chapter 9, "The Skin," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.
Dermatological Emergencies

Pediatric Burns

Definition
Tissue injuries resulting from thermal injury to skin (epidermis) or mucosal surfaces. May include injury to the underlying dermis, subcutaneous tissue, muscle or bone. The extent of injury (the depth of the burn) depends on the intensity of heat (or other exposure) and the duration of exposure.

Burns are common in children and can cause significant morbidity and mortality. They constitute the leading cause of accidental death in children.

Types Of Burns
First-Degree
• Affects epidermis only
• Painful and erythematous

Second-Degree
• Superficial: Affects epidermis and outer half of dermis; hairs are spared
• Deep: Affects epidermis, with destruction of reticular dermis; can easily convert to full-thickness burn if secondary infection, mechanical trauma or progressive thrombosis occurs

Third-Degree
• Tissue dry, pearly white, charred, leathery
• Healing occurs by epithelial migration from the periphery and by contracture
• May involve adipose, fascia, muscle or bone

Causes
• Sunlight
• Hot fluids
• Steam
• Flame
• Contact with hot objects
• Caustic chemicals or acids (there may be few signs or symptoms for the first few days after exposure)
• Electricity (may result in significant injury with very little damage to overlying skin)

Open flames and hot liquids are the most common cause (heat usually 15°C to 45°C or greater).

Risk Factors
• Excess sun exposure
• Hot water heaters set too high
• Exposure to chemicals or electricity
• Young children with thin skin are more susceptible to injury
• Carelessness with burning cigarettes
• Inadequate or faulty electrical wiring

Specific Pediatric Issues
• Body surface area is proportionately high for weight in younger children
• The relative contribution of various body parts to body surface is different in children than in adults (e.g. head relatively larger, legs relatively smaller)
• In children <3 years old, scald burns from spilled hot liquids are the most common type of burn
• Electrical burns to the mouth can occur in toddlers who chew electrical cords

Intentional Burn Injuries
A form of child abuse that can sometimes be recognized by specific burn patterns. It can be difficult to diagnose. Accurate diagnosis requires a careful history, physical examination and assessment of the child's developmental capabilities, as well as consultation with a physician or admission to hospital for assessment.

• Consider child abuse when a child presents with hot-water burns
• Observe distribution of burns
• Pay attention to straight-line burns, especially if bilateral

History
Defer history until ABCs have been assessed and stabilized.
• Obtain accurate description of exact mechanism of injury
• Inquire about any treatment given at home (e.g. cooling, application of oils)
• Obtain medical history (but only when time permits)
• Determine medications (but only when time permits)
• Determine allergies (but only when time permits)
• Determine tetanus immunization status

**Physical Findings**
• Assess ABCs
• Temperature may be elevated if wounds are infected
• Heart rate may be elevated because of pain
• Blood pressure may be low if child is in shock
• Determine depth (Table 16-1) and extent (Tables 16-2 and 16-3) of the burn
• Determine nature of the burn according to injury pattern (Table 16-4)

**Differential Diagnosis**
• Toxic epidermal necrolysis
• Scalded skin syndrome

**Complications**
• Hypoglycemia (may occur in children because of limited glycogen storage)
• Burn wound sepsis (usually gram-negative organisms)
• Decreased mobility, with possibility of future flexion contractures
• Gastroduodenal ulceration (Curling's ulcer)
• Pneumonia

**Diagnostic Tests**
• Glucose level (hypoglycemia may occur in children because of limited glycogen storage)
• For electric burns, electrocardiogram

**Management**
Management is based on the depth of the burns and an accurate estimate of total body surface area (see Tables 16-2 and 16-3).

**Goals of Treatment**
• Promote healing and restoration of tissue
• Prevent complications
• Prevent recurrences

**First Aid Measures for All Burns**
• **Thermal burn**: Cool the area if it is still warm to the touch. Burns caused by liquid should be cooled rapidly, and any clothing in contact with the area should be removed rapidly, to decrease contact time. Immerse the body part briefly in cool water to reduce heat and prevent extension of burn. Do not immerse or apply cold water if the burns involve more than 10% of the body surface area.
• **Chemical burn**: Irrigate. If dry powder is still visible on the skin, brush it away before irrigating the skin with water. Irrigate with copious amounts of water for at least 15 (preferably 30) minutes after powders have been removed. This process should be started at the accident scene if possible. Alkali burns should be irrigated for 1-2 hours after injury. Call the poison control center for specific instructions.
• **Tar burn**: Cool, clean gently and apply a petrolatum-based antibacterial ointment (e.g. Polysporin®) or other petroleum-based products. Do not attempt to scrape tar off the skin surface, as this can cause further damage. Avoid chemical solvents, which may cause additional burns. After 24 hours the tar can be washed away and the injury treated as a thermal burn.
• **Electrical burn**: Be cautious and observe the child closely. Watch for cardiac arrhythmias. Cardiac monitoring for 24 hours is essential if there was significant exposure to electrical current. Apply a cervical collar. Look for long bone fractures secondary to muscle contraction. An electrical burn may cause thrombosis of any vessel in the body. Clean and dress as for a thermal burn (see below).
# Table 16-1: Assessing Depth of a Burn

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>First degree</th>
<th>Second degree</th>
<th>Third degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blisters</td>
<td>None</td>
<td>Present</td>
<td>None</td>
</tr>
<tr>
<td>Colour</td>
<td>Red</td>
<td>Red</td>
<td>White, charred</td>
</tr>
<tr>
<td>Moisture</td>
<td>Dry</td>
<td>Wet</td>
<td>Dry</td>
</tr>
<tr>
<td>Sensation</td>
<td>Present</td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>Pain</td>
<td>Moderate</td>
<td>Severe</td>
<td>Absent</td>
</tr>
</tbody>
</table>

# Table 16-2: Assessing extent of burns in children

<table>
<thead>
<tr>
<th>Area</th>
<th>Birth to 11 months</th>
<th>1 year</th>
<th>5 years</th>
<th>10 years</th>
<th>15 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>19</td>
<td>17</td>
<td>13</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Neck</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Trunk</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>Buttocks</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Genitals</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Arm</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Hand</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Thigh</td>
<td>5.5</td>
<td>6.5</td>
<td>8.5</td>
<td>8.5</td>
<td>9.5</td>
</tr>
<tr>
<td>Leg</td>
<td>5</td>
<td>5</td>
<td>5.5</td>
<td>6</td>
<td>6.5</td>
</tr>
<tr>
<td>Foot</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
</tr>
</tbody>
</table>

# Table 16-3: Classification of burns by severity (surface area involved)

**Minor**
- < 10% surface area in second-degree burn
- < 1% surface area in third-degree burn

**Moderate**
- 10% to 20% surface area in second-degree burn
- 1% to 10% surface area in third-degree burn

**Severe**
- > 20% surface area in second-degree burn
- > 10% surface area in third-degree burn
- any burns on hands, feet, face, eyes, ears, perineum
- any inhalation injury
Table 16-4: Classification of burns by injury pattern

<table>
<thead>
<tr>
<th>Sunburn</th>
<th>Areas exposed to sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Splash or scald burns</td>
<td>Maximal burns at location of impact, with lesser burns in dependent areas where fluid has cooled and dropped</td>
</tr>
<tr>
<td></td>
<td>Multiple small satellite areas of burned skin may occur around scalded areas of skin</td>
</tr>
<tr>
<td>Electrical burns</td>
<td>Burns of the mouth and lip, mucosal swelling and coagulation</td>
</tr>
<tr>
<td></td>
<td>May have minor entrance and exit wounds, with severe underlying tissue destruction along route of current</td>
</tr>
<tr>
<td>Forced immersion burn</td>
<td>Indicative of abuse</td>
</tr>
<tr>
<td></td>
<td>Areas of severe burn in immersed areas usually separated from normal skin by sharp demarcation, without splash marks</td>
</tr>
<tr>
<td></td>
<td>May be in a stocking distribution or may involve trunk</td>
</tr>
<tr>
<td></td>
<td>Spared sharp-edged areas may be present in dependent areas where part of the body is in contact with immersion container</td>
</tr>
<tr>
<td>Contact burns</td>
<td>Burned areas bear patterns of specific hot object in contact with the skin (e.g. grate, stove element)</td>
</tr>
<tr>
<td></td>
<td>May be accidental or intentional</td>
</tr>
<tr>
<td>Flame burns</td>
<td>Associated inhalation damage may cause acute respiratory failure</td>
</tr>
<tr>
<td>Cigarette burns</td>
<td>Usually discrete circular lesions, well circumscribed</td>
</tr>
<tr>
<td></td>
<td>May be a form of child abuse and can be confused with impetigo</td>
</tr>
</tbody>
</table>


Treatment Of Less Severe Thermal Burns (<10% Body Surface Area)

Nonpharmacologic Interventions

First degree burns
- Cleanse with normal saline or sterile water
- Dressings: Cover area lightly with clean, dry gauze dressing

Second degree (Superficial or Deep) Burns
- Remove any attached clothing and debris
- Cleanse with normal saline or sterile water
- Gently debride using sterile technique
- Small blisters may be left intact
- Remove larger blisters with forceps and scissors (blister fluid is an excellent culture medium)
- Dressings: Small, less severe second-degree burns (superficial partial-thickness burns) do not require antimicrobial ointment or impregnated dressings; instead, apply non-adherent porous mesh gauze dressings (e.g. Jelonet®)
- Elevate a burned extremity to reduce swelling
- Increase fluid intake over the next 24 hours

Client Education
- Counsel family about appropriate use of medications (dose, frequency)
- Suggest that analgesics be taken 1 hour before dressing changes
- Recommend that dressing be kept clean and dry until the area has healed
- Recommend use of sunscreen
- Recommend that child's access to electrical cords and outlets be prevented
- Suggest that household chemicals be placed out of child's reach
• Suggest low temperature setting for hot water heater
• Recommend that household smoke detectors be installed, with special emphasis on maintenance
• Recommend a family and household evacuation plan in case of fire
• Recommend proper storage and use of flammable substances

Adjuvant Therapy
Check whether tetanus immunization is up to date; give tetanus vaccine as needed (refer to the Canadian Immunization Guide, 6th edition. Health Canada 2000)

Pharmacologic Interventions
Analgesic for pain: acetaminophen (A class drug), 10-15 mg/kg per dose, PO q4h prn (for children >6 years old, 325 mg, 1-2 tabs PO q4h prn)

Larger, more severe, deep partial-thickness burns require topical antibiotic ointment or impregnated dressings (ointments can make evaluation of drainage difficult).

Apply:
- bacitracin ointment (A class drug), od or bid
- bactigras dressing (A class drug), od
- silver sulfadiazine (A class drug), od or bid

Relative contraindication to silver sulfadiazine: possible cross-sensitivity to other sulfonamides.

Prophylactic antibiotics should rarely be required but may be considered for:
- immunocompromised children
- any child at high risk of endocarditis

Broad-spectrum coverage with first-generation cephalosporin or with a penicillinase-resistant penicillin plus an aminoglycoside may be used if necessary.
Discuss choice with a physician.

Nonpharmacologic Interventions
 Fluid Resuscitation
Calculate fluid resuscitation from time of burn, not from time treatment begins.
• Start IV therapy with normal saline or Ringer's lactate
• Initiate IV therapy if more than 10% of child's body surface area has been burned
• Replace fluid losses
• Rule of thumb for fluid replacement in children with major burns: 4 mL × body weight (kilograms) × % of body surface area burned
• Half of this volume is given in the first 8 hours, a quarter in the second 8 hours and the last quarter in the third 8 hours
• This quantity is given in addition to maintenance fluids and is adjusted according to urine output and vital signs

Burn shock usually takes hours to develop. If shock is evident on initial presentation, look for other causes of volume loss, such as major injury

Monitoring and Follow-Up
• Follow up in 24 hours and daily until the burn is healed
• Re-evaluate depth and extent of injury
• Monitor for healing and development of infection
• Cleanse and debride prn; tub soaks can help loosen coagulum and speed separation of necrotic debris
• Reapply bacitracin or silver sulfadiazine and dry sterile dressing

Absolute sterility is not mandatory during dressing changes; however, cleanliness and thorough cleansing of hands, sinks, tubs and any instruments used is emphasized. Acetic acid (0.25%) can be applied for pseudomonal prophylaxis.

Treatment Of Major Burns
Appropriate Consultation
Consult a physician as soon as the child's condition is stabilized, and prepare to medevac.

Primary Survey
• Stabilize ABCs
• Establish airway and assist ventilation as required
• Oxygen to keep oxygen saturation ≥97%

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elsewhere in the body. See "Shock," in chapter 20, "General Emergencies and Major Trauma."

**Special Considerations for Resuscitation**

- Restlessness may be secondary to hypoxia
- Assume smoke inhalation; see "Inhalation of Toxic Material," in chapter 3, "Respiratory System," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003
- Monitor for respiratory distress or failure

**Secondary Survey**

- Identify associated injuries
- Insert urinary catheter
- Insert nasogastric tube
- Assess peripheral circulation if child has circumferential burns on extremities
- Monitor colour, capillary refill, paresthesia and deep tissue pain

**Wound Care**

- Cover burns with clean wet dressings
- Do not break blisters
- Do not immerse or apply cold water if burns involve more than 10% of body

**Pharmacologic Interventions**

For analgesia, consult a physician first, if possible; otherwise give:

*morphine (D class drug) in small, frequent doses (0.1 mg/kg per dose), IV*

Be alert for respiratory depression with narcotics.

There is no indication for prophylactic antibiotics.

**Monitoring and Follow-Up**

- Monitor ABCs and vital signs frequently
- Watch for signs of shock (it usually takes hours for burn shock to develop)
- In circumferential burns, extensive extremity burns or electrical burns, watch for vascular or neurologic compromise, which indicates a developing compartment syndrome; immediate escharotomy is required
- Elevate extremities to minimize swelling
- Wrap child in clean sheet and cover with blankets to conserve heat and prevent hypothermia

**Referral**

Medevac (using criteria in Table 16-5).

**Table 16-5: Criteria for transfer of burn patient to hospital**

<table>
<thead>
<tr>
<th>Criteria for Referral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second degree burns over 10% body surface area</td>
</tr>
<tr>
<td>Any third degree burn</td>
</tr>
<tr>
<td>Burns of hands, feet, face or perineum</td>
</tr>
<tr>
<td>Electrical or lightning burns</td>
</tr>
<tr>
<td>Inhalation injury</td>
</tr>
<tr>
<td>Chemical burn</td>
</tr>
<tr>
<td>Circumferential burn</td>
</tr>
</tbody>
</table>
Chapter 17 – Hematology, Endocrinology, Metabolism And Immunology

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Explanatory Note

For this chapter, history and examination of the system are not discussed as such, because hematologic, endocrine, metabolic and immunologic disorders often manifest symptoms and signs in more than one body system. The cardiovascular, GI, neurologic, endocrine and integumentary systems in particular should be evaluated, as problems or symptoms of hematologic, endocrine, metabolic and immunologic disorders commonly manifest in these systems.

See individual chapters for information on history and physical examination relevant to each of these systems.

Common Hematologic Problems

Iron Deficiency Anemia In Infancy

See also "Iron Deficiency Anemia," in chapter 10, "Hematology, Metabolism and Endocrinology," in NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.

Definition
Abnormally low quantities of circulating RBCs, hemoglobin and hematocrit.

Iron deficiency anemia is most common in infancy, and in some communities up to 65% of Aboriginal infants have iron deficiency between 6 and 24 months of age. The peak age is 10 to 15 months.

Normal mean hemoglobin levels vary according to the age of the child (Table 17-1).

Table 17-1: Normal hemoglobin levels in children

<table>
<thead>
<tr>
<th>Age</th>
<th>Hemoglobin level (g/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 month</td>
<td>115 – 180</td>
</tr>
<tr>
<td>2 months</td>
<td>90 – 135</td>
</tr>
<tr>
<td>3 – 12 months</td>
<td>100 – 140</td>
</tr>
<tr>
<td>1 – 5 years</td>
<td>110 – 140</td>
</tr>
<tr>
<td>6 – 14 years</td>
<td>120 – 160</td>
</tr>
</tbody>
</table>

Causes
- Inadequate iron intake
- Excess blood losses
- Defects in hemoglobin structure
- Bone marrow failure

Predisposing Factors
- Low birth weight, prematurity
- Fetal and/or neonatal blood loss
- Low hemoglobin concentration at birth
- Insufficient absorption from mother in utero
- Chronic hypoxia
- Frequent infections
- Intake of non-iron fortified cow's milk for > 4 months without other foods
- Frequent and excessive tea intake
- Low Vitamin C or meat intake
- Breast-feeding for > 6 months without supplemental iron
- Ethnic practices
- Nutritional deficiencies (e.g. folic acid)

History
- Diet consisting almost exclusively of milk
- Child 6-24 months of age (usually)
- Symptoms of irritability or lethargy may be present
- Prematurity

Physical Findings
- Obesity
- Pallor
- Tachycardia
- Systolic murmur
- In severe cases, signs of heart failure may be present (e.g. hepatomegaly, gallop rhythm); see "Cardiac Failure," in chapter 11, "Cardiovascular System"
Differential Diagnosis
• Anemia of chronic disease
• Hemolytic anemia
• Anemia of acute hemorrhage
• Aplastic anemia
• Thalassemia
• Vitamin B12 deficiency
• Folate deficiency
• Failure to thrive because of decreased nutritional intake

Complications
• Frequent infection
• Side effects of iron therapy
• Cardiac failure (only if the anemia is severe)
• Poor weight gain, anorexia, blood in stools, malabsorption, irritability, decreased attention span, exercise intolerance, decreased physical activity

Diagnostic Tests
• CBC
• Blood smear: small, pale RBCs
• Ferritin level: decreased
• Serum iron level: decreased
• Hemoglobin level: decreased for age (<110 g/L)
• Serum iron-binding capacity: increased

Management
Goals of Treatment
• Prevent dietary deficiencies of iron
• Reverse anemia and increase iron stores

Appropriate Consultation
Consult a physician:
• For medication orders once anemia has been identified

Pharmacologic Interventions
For mild anemia without heart failure:
ferrous sulfate (C class drug), 5 mg/mL solution, 6 mg/kg od, for 3 months

The Canadian Task Force on the Periodic Health Examination recommends that high-risk infants be screened for iron deficiency at 9 months of age. Prophylactic iron supplementation of infants weighing less than 2500 g at birth and those receiving excessive amounts of evaporated milk formulas:
ferrous sulfate drops, (C class drug) 2 mg elemental iron per kilogram of body weight per day, from birth

Monitoring and Follow-Up
Reassess at monthly intervals to check adherence to treatment plan and to re-check hemoglobin level.

Referral
Refer the child to a physician if there is no response to iron therapy after 1 month of treatment.
Common Endocrine And Metabolic Problems

Failure To Thrive

Definition
A sign (rather than a diagnosis) characterized by failure to gain weight commensurate with gain in height. Length or height and head circumference are affected in severe cases.

This sign may extend through a range of situations from inexperience on the part of the parents or caregiver to neglect and abuse. It is recognized that the parent-child relationship may play a role in failure to thrive (Bennett 1996).

The prevalence of failure to thrive is unknown. However, 3% to 5% of pediatric inpatient admissions are for evaluation of this common, yet difficult-to-diagnose problem. Most affected children are 6 to 12 months of age, and almost all are <5 years old. Boys and girls are equally affected.

Causes

Environmental Deprivation of Food
- About 70% of cases
- One-third of these cases involve simple educational problems, such as incorrect feeding techniques, incorrect formula preparation and substitution with too much fruit juice
- Other causes are poor maternal-child bonding and child neglect

Organic Causes
- Less than 20% of cases
- Usually a GI or neurologic condition preventing sufficient caloric intake (e.g. cleft palate or choanal atresia)
- Defect in food assimilation (e.g. giardiasis, protein-losing enteropathy such as celiac disease)
- Excessive loss of ingested calories (e.g. through chronic diarrhea, pediatric gastroesophageal reflux disease)
- Immunodeficiency
- Pediatric AIDS
- Malignant lesion
- Cyanotic heart disease
- Renal disease
- Prenatal causes (e.g. intrauterine infection)

Normal, Small-Statured Children
- About 10% of cases
- This is not true failure to thrive

Risk Factors
- Undiagnosed diseases
- Parent(s) or caregiver with psychosocial problems
- Child born prematurely or sick at birth
- Infant with physical deformity
- Unstable, dysfunctional family unit
- Poverty

History
- Parents or caregiver may describe child as having a difficult personality
- Sleep problems
- Previous weight, height and head circumference for comparison (for premature infant, adjust expected values to correct for gestational age at birth)

Feeding History
- Dietary intake
- Psychosocial events associated with feeding time
- Food preparation
- Quality and quantity of food
- Consider detailed 1- to 3-day diary of dietary intake

Nursing and Breast-Feeding
- Infrequent, brief feedings
- Maternal ingestion of milk suppressants (e.g. alcohol, diuretic drugs)
- Inadequate milk supply
- Nipple problems
- Inadequate let-down, poor sucking reflex
- Maternal malnutrition, exhaustion or depression
**Psychosocial History**
- Interference with adequate care-taking

**Family History**
- Height/weight of parents
- Inherited diseases
- Developmental delay

**Risk Factors**
- Economic stress
- Dysfunctional family
- Social isolation
- Parental depression

**Growth Patterns**
Expected weight gain:
- 0-3 months of age: 26-31 g/day
- 3-9 months: 13-18 g/day
- 9-14 months: 10-11 g/day
- 15-24 months: 7-9 g/day

**Physical And Environmental Findings**
- Weight low for age (below third percentile) on more than one occasion, or weight < 80% of ideal weight for age
- Growth chart shows significant deceleration of weight gain (line recording weight gain on growth chart crosses two major percentile lines)
- Child apathetic and withdrawn or watchful and alert
- Poor hygiene
- Signs of inflicted trauma
- Primary caregiver characteristics: psychosocial problems, commonly depressed
- Family characteristics: unstable, dysfunctional
- Signs of neurologic disorders such as fetal alcohol syndrome

**Differential Diagnosis**
- Any condition of sufficient severity to cause failure to gain adequate weight, including child abuse and neglect

**Complications**
The long-term prognosis for children with failure to thrive due to environmental deprivation is not encouraging: many of these children remain small, and most demonstrate developmental and educational deficiencies and personality disorders; only one-third ultimately develop normally.
- Lower scores on intelligence testing
- Poor language development and reading skills
- Social immaturity, more frequent behavior problems
Source: Oates (1985)

**Diagnostic Tests**
Careful, detailed history and physical examination are the most valuable diagnostic tools.
- Observation of infant and his or her interaction with caretakers and environment
- Careful plotting of growth curves, including weight, height and head circumference

Plotting of growth curve should be done at every visit; observe the growth curve carefully.

Routine laboratory work-up should be kept to a minimum and should be done only if, after consultation with a physician, it is decided to manage the case initially on an outpatient basis:
- CBC
- Urinalysis
- Urine culture
- Chemical profile, including BUN, calcium, phosphorus
- Erythrocyte sedimentation rate
- Other studies as dictated by results of history and physical examination (e.g. thyroid activity profile if there are GI symptoms such as diarrhea; stool samples for culture and sensitivity and occult blood)

**Management**
**Goals of Treatment**
- Identify the cause of failure to thrive
- Protect child from permanent sequelae
- Improve parenting skills of caregivers

**Appropriate Consultation**
Consult a physician as soon as possible.

Admission to an inpatient setting is often the first step in sorting out the cause of this condition.
Nonpharmacologic Interventions

Diet
• Provision of balanced, high-calorie diet on both a scheduled and ad lib basis
• Intake should be 150-200 kcal/kg per day
• During observation period, discontinue all solids with fewer calories per ounce than formula or milk

Client Education
• Depends on cause (e.g. provide information about preparing formula if inadequate dietary intake is the suspected cause)
• When environmental deprivation is established, attempts to re-educate the family in a non-punitive way are essential

Behavioral and Family Treatment
• Involve parents or caregiver actively in investigation and therapy
• Recognize that parents or caregiver may experience frustration and guilt
• Restore adequate caregiving
• Modify child’s maladaptive learned feeding responses
• Address interactional difficulties between parents (or caregiver) and child

Other Measures
• Provision of stimulation, cuddling and affection to both inpatients and outpatients

Pharmacologic Interventions
• Routine infant vitamin supplementation

Monitoring and Follow-Up
• When the cause is organic, follow-up depends on the particular disease involved.
• When environmental deprivation is established, extremely close follow-up (weekly, both at home and in the clinic) is essential. If the family fails to comply with necessary measures, child protection authorities must be notified, and foster care may be necessary.

Referral
Referral for investigations to rule out organic causes is advisable. The urgency of such referral depends on the particular situation. Protection of the child from further harm is the most compelling factor.

Long-term multifaceted intervention is necessary for non-organic failure to thrive:
• Support and encourage positive parenting skills
• Psychiatric and social services
• Developmental stimulation
• Community infant-stimulation programs
Diabetes Mellitus In Aboriginal Children

For more detailed information, see "Diabetes Mellitus," in chapter 10, "Hematology, Metabolism and Endocrinology," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003, as well as the 2003 Canadian diabetes guidelines (Meltzer et al. 2003).

Definition
Disorder of carbohydrate metabolism characterized by hyperglycemia, which is due to reduced insulin secretion, increased tissue resistance to insulin action or both.

Classification
There are two main types of diabetes, both associated with serious long-term complications, including cardiovascular diseases, hypertension, kidney failure, retinopathy leading to blindness and neuropathy.

Type 1
• Near complete loss of insulin production
• Onset may occur anytime during childhood or early adulthood
• Without insulin, ketosis develops and death may occur
• Extremely rare (almost non-existent) in Aboriginal children

Type 2
• Previously known as non-insulin-dependent diabetes mellitus
• Relative lack of insulin or blunted response to insulin
• Often associated with obesity
• Ketosis is unusual

In recent years, more and more cases of type 2 diabetes have been recognized in First Nations teenagers and young children.

Other Disorders of Carbohydrate Metabolism
• Impaired fasting glucose tolerance
• Impaired glucose tolerance
The focus here is on type 2 diabetes.

Causes
• Genetic
• Autoimmune disorder

Risk Factors
• Family history
• Central obesity
• High-fat diet

History
• Polyuria (excessive urination), bedwetting
• Polydipsia (excessive thirst)
• Polyphagia (excessive ingestion of food)
• Fatigue
• Irritability
• Blurred vision
• Nausea and vomiting
• Fu-like symptoms that do not resolve
• Family history of diabetes

Past History
• Large-birth-weight infant of a diabetic mother
• Recurrent urinary tract infections or yeast infections (or both)

Current Health
• Eating habits (food choices, meal patterns)
• Physical activity
• Smoking
• Alcohol use

Screening For Type II Diabetes In Aboriginal Children
The College of Physicians and Surgeons of Manitoba recommends offering yearly screening for Type II diabetes to at risk asymptomatic aboriginal children > 7 years.

Particular risk factors include female gender, obesity and positive family history. Recent research has revealed aboriginal adult prevalence rates of 19 to 26 percent and in a Manitoba community-based study a prevalence rate of 8.3 percent in aboriginal females age 10 to 19 years. Note that "aboriginal" in these studies will relate differently to First Nations than to Inuit.
Physical Findings
- Vital signs normal unless there are complications
- Weight changes (child may have a history of weight gain over the years before onset and may lose weight after onset)
- Obesity (most commonly truncal obesity) may be present in association with type 2 diabetes
- Some children may show signs of dehydration (e.g. sunken eyes, dry mucous membranes)
- Most affected children look normal, but may appear ill if the diabetes is of sudden onset

Diagnostic Tests
- Urinalysis for glucose, ketones, protein
- In type 1 diabetes, there may be large amounts of ketones, but these compounds are not usually present in type 2 diabetes

Diagnostic Blood Glucose Levels
Guidelines for diagnosis of diabetes mellitus on the basis of serum blood glucose level:
- Random blood glucose level ≥11.0 mmol/L
- Fasting blood glucose level ≥7.0 mmol/L
- 2-hr pc blood glucose level ≥11.0 mmol/L
- For impaired fasting glucose tolerance: fasting blood glucose 6.1-6.9 mmol/L
- For impaired glucose tolerance: 2-hour pc blood glucose level after oral glucose load 7.8-11.0 mmol/L

In the presence of persistent symptoms, only one abnormal glucose result is required for diagnosis. Without symptoms, two abnormal values are needed for the diagnosis.

Management
Goals of Treatment
- Improve carbohydrate metabolism
- Reduce symptoms
- Prevent long-term complications

Appropriate Consultation
An urgent consultation with a physician is advisable for all children with newly diagnosed diabetes mellitus.

If a diagnosis of type 2 diabetes is confirmed, and the symptoms and signs are not severe, medical treatment is not necessarily urgent. The diagnosis is more likely to constitute a medical emergency if there are moderate to large quantities of ketones in the urine and other clinical signs of ketoacidosis (e.g. dehydration). However, ketoacidosis is rarely seen in type 2 diabetes.

Nonpharmacologic Interventions
Diet is the main focus of diabetes management. It is usually advisable to completely restructure the diet of the entire family.

A diabetic child's diet should be low in raw carbohydrates, moderate in complex carbohydrates (starches) and high in fiber. A system of dietary exchanges, as recommended by the Canadian Diabetes Association, is useful.

Both the parents (or caregiver) and the child should participate in a diabetes education program, including nutritional and lifestyle counseling.

Calorie reduction for weight loss is recommended for obese children.

Exercise reduces blood glucose and facilitates entry of glucose into the cells. Regular exercise also decreases the risk of cardiovascular disease and assists in weight loss. All children with type 2 diabetes should be encouraged to develop a regular exercise program. All community resources (e.g. a physical education teacher at the school and a community recreation director, if there is one) should be asked to help in this effort.

Prevention
Although it is unproven that diabetes can be prevented, there is fairly good evidence that diabetes was rare among Aboriginal people 40 years ago. Changes in diet and lifestyle have probably contributed to the increasing prevalence of this condition.

It makes sense to try to prevent diabetes by increasing community knowledge of nutrition, reducing consumption of sugar (e.g. candy, chocolate bars and soft drinks), teaching about diabetes in the schools, and encouraging regular exercise and development of recreation programs and facilities.
Pharmacologic Interventions
The two main types of drug treatment are insulin and oral hypoglycemic agents. These treatments should not be started without a trial of nonpharmacologic management and may be ordered only by a physician, preferably one who will be following the child over the long term.

Monitoring And Follow-Up
Children with type 2 diabetes need close, regular medical follow-up. The most useful features are weight and general health.

Fasting blood glucose and HbA1c (glycosylated hemoglobin) levels can serve as indicators of diabetes control, but the focus should be on lifestyle, weight loss and exercise.

Monitoring for complications should include blood pressure, eye examination, urinalysis (for protein and microalbuminuria), glucose and renal function, sensory function in extremities and lipid profiles.

The Canadian Diabetes Association has made the following recommendations for screening for complications of diabetes.

Retinopathy
• Type 2 diabetics >15 years old should be screened for retinopathy by an ophthalmologist at the time of diagnosis
• Those with little or no retinopathy should then be screened every 2 years
• Those with retinopathy on initial screening should be followed appropriately by an ophthalmologist according to severity of retinopathy

Nephropathy
• Type 2 diabetics >15 years old should be screened annually for urinary microalbuminuria if dipstick urine shows trace or negative protein
• Recommended screening: albumin to creatinine ratio in a random, daytime urine sample
• If ratio > 2.8 mmol/L for females or > 2.0 mmol/L for males, test should be repeated and possibly confirmed with a 24-hour urine to determine microalbuminuria rate

Neuropathy
• Type 2 diabetics should be assessed annually for peripheral neuropathy (loss or decrease in vibration sense, loss of sensitivity to a 10-g monofilament at the big toes or loss of ankle reflexes, or any combination of these)

Foot Care
• Assess at least annually for structural abnormalities, neuropathy, peripheral vascular disease, ulcers and evidence of infection

Cardiovascular Disease and Hypertension
• Monitor blood pressure at every visit
• Fasting lipid profile should be done for all type 2 diabetics >15 years old, repeated every 1-3 years as clinically indicated

Referral
Medevac if there is evidence of ketonuria or ketoacidosis.

Otherwise, the child should be evaluated by a physician as soon as feasible. Once the child's condition has been stabilized by means of a diabetic regimen, the case should be reviewed by a physician every 3-6 months, including a yearly retinal examination. More frequent follow-up with a physician is advisable if the diabetes is not well controlled or there is evidence of complications.

The long-term management of type 2 diabetes is a collaborative effort between physicians, nurses, CHRs, nutritionists, educators and others.

Type 2 Diabetes In Adolescent Pregnancy
There are special considerations for the management of diabetes in pregnant adolescent girls. Good control of blood glucose is desirable to reduce the risk of a large baby with congenital malformations or stillbirth.

Careful monitoring of glucose and regular care by a physician are indicated.

Pharmacotherapy is often indicated. Oral hypoglycemic agents are contraindicated because of their potential teratogenic effect.
Many of these girls must be treated with insulin during pregnancy and require specialized prenatal care.

For detailed information on diabetes in pregnancy, see "Gestational Diabetes," in chapter 12, "Obstetrics," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.
Common Immunologic Problems

Allergies

**Definition**
Any untoward physiologic event caused by an immunologically mediated response.

Atopy is an allergic condition based on an IgE-mediated mechanism, with a strong genetic predisposition; may manifest as urticaria, anaphylaxis, eczema, asthma, insect sting allergy, food allergy or allergic rhinitis.

**History**
- Age at onset
- Progression of symptoms
- Seasonality (e.g. if allergy occurs in early spring, it is probably related to trees; if in early summer, to grass; if in fall, to ragweed)
- Exposure to animals
- Exposure to dust
- Exposure to mold in damp places
- Complete history of environment (both indoor and outdoor)
- Record of activities, eating habits
- Complete review of systems, since allergic symptoms may involve any system

**Most Common Symptoms**
- Skin: itch, rash, dryness
- Swelling of lips, eyes, ears
- Nasal symptoms: clear discharge, coryza, sneezing, snoring
- Respiratory symptoms: wheezing, difficulty breathing, cough (especially at night)
- GI symptoms: cramps, loose stools

**Physical Findings**
- Vital signs change only with severe reactions (respiratory rate increases, heart rate increases, blood pressure declines)
- Allergic facies: dark circles under eyes, folds below eyes, transverse crease over bridge of nose, adenoid facies caused by chronic mouth breathing, deep nasolabial folds, high arching of palate, enlargement of tonsils and adenoids
- Skin: dry, follicular prominence, scaling, thickening and darkening of skin in flexor creases of elbows and at back of knees
- Rash: when present, includes urticaria and eczema
- Growth: growth failure and failure to thrive may occasionally result from food allergies or from inadequate control of asthma
- Lungs: wheezing from bronchospasm

**Specific Conditions**
The following specific allergic conditions are presented in this chapter:
- Urticaria (hives)
- Milk protein sensitivity
- Lactose intolerance
Urticaria (Hives)

Definition
Red, blotchy wheals of the superficial skin or mucous membranes, which blanch with pressure and are usually very itchy.

Acute urticaria is common among children (approximately 10% to 15% will experience at least one episode).

Causes
Mechanism is release of vasoactive peptides (e.g. histamine, prostaglandins, leukotrienes and platelet-activating factor), which cause dilatation of the blood vessels in the skin and leakage of fluid into the surrounding tissue.

The following are frequent causes of urticaria:
• Drug reactions
• Foods
• Infections (viral, streptococcal)
• Inhalants (e.g. pollen, animal dander)
• Insect bites and stings
• Systemic diseases (e.g. rheumatoid disease, malignant lesions, endocrine problems)
• Hereditary causes
• Physical causes (e.g. exercise, cold, heat, exposure to sun)

History
• Onset
• Duration
• Frequency (if recurrent)
• Diet
• Exposure to inhalants
• Family history
• Fever
• Sore throat
• Other systemic symptoms
• Exposure to drugs

Physical Findings
• Temperature normal
• Heart rate normal or increased
• Blood pressure normal or decreased
• Rash is usually the only symptom

If swelling of the lips and subcutaneous tissues occurs or there is respiratory difficulty or wheezing, emergency treatment is required. See "Anaphylaxis," in chapter 20, "General Emergencies and Major Trauma."

Differential Diagnosis
• Insect bites
• Erythema multiforme
• Vasculitis
• Viral exanthem

Complications
None related to urticaria.

If urticaria is associated with anaphylaxis, respiratory failure and death could ensue. If urticaria is due to an underlying disease, treatment must be directed to the specific disease.

Diagnostic Tests
None. In an older child, allergy testing may be useful. Consult a physician about such testing.

Management
Goals of Treatment
• Eliminate cause
• Provide symptomatic relief

Appropriate Consultation
Consult a physician if urticaria is extensive and acute respiratory symptoms are involved.

Nonpharmacologic Interventions
Avoid contact with anything that appears to be related to the onset of urticaria

Pharmacologic Interventions
If symptoms are mild, some degree of symptomatic relief can be obtained from common antihistamines:

diphenhydramine hydrochloride (A class drug)
5 mg/kg/day, PO, IM, IV, max 300mg/day

For urgent treatment of anaphylaxis, see "Anaphylaxis," in chapter 20, "General Emergencies and Major Trauma."
**Monitoring and Follow-Up**
Follow up in 24 hours to ensure that symptoms are diminishing.

**Referral**
Prepare for possible medevac if symptoms are severe or anaphylaxis is involved. Otherwise, refer child electively to a physician for evaluation.
Milk Protein Sensitivity

Definition
Abnormal GI response related to the protein in cow's milk formula. Manifests in the first 2 months of life. More common in boys and in children with a family history of allergies.

Most children who are allergic to milk protein lose this sensitivity by 2 or 3 years of age.

Cause
• Unknown
• Predisposing factors: significant family history of allergies

History And Physical Findings
• Vomiting
• Diarrhea
• Abdominal pain
• Steatorrhea
• Respiratory symptoms (e.g. wheezing)
• Eczema
• Poor weight gain
• Edema

Differential Diagnosis
• Lactose intolerance
• Malabsorption syndrome
• Gastroenteritis

Complications
• Obstruction of gastric outlet
• GI blood loss leading to anemia
• Protein malabsorption leading to growth retardation (e.g. failure to thrive)
• Edema secondary to hypoproteinemia

Diagnostic Tests
• Serum immunoglobulin E (IgE) elevated (specific to milk)

Management
Outpatient care is acceptable except in cases of malnutrition.

Goals of Treatment
• Primary prevention
• Reduce symptoms
• Prevent complications

Nonpharmacologic Interventions
Allergy avoidance strategies:
• Identify the at-risk infant early (prenatally or soon after birth; document highly atopic families)
• Breast-feeding should be advocated as a means of preventing food allergy, especially in atopic families
• Delay introduction of cow's milk (i.e. not before 12 months of age)
• Calcium-fortified juices now available for those who cannot drink milk
• Awareness of different labeling terms for milk proteins and the types of common foods which may contain milk

Up to 25% of children with cow's milk protein sensitivity may also be allergic to soy protein, so switching to a soy-based formula may not help.

Monitoring and Follow-Up
• Monitor as necessary until symptoms are under control
• Monitor growth to ensure that child is gaining weight

Referral
Refer to a physician for evaluation if symptoms are not controlled by dietary measures or if you are concerned about another underlying pathologic condition, such as inflammatory bowel disease, or if the child is not thriving.
Lactose Intolerance

**Definition**
Inability to digest lactose (the primary sugar in milk) into its constituents, glucose and galactose, because of low levels of lactase enzyme in the brush border of the duodenum.

**Congenital Lactose Intolerance**
- Very rare

**Primary Lactose Intolerance**
- Occurs after weaning, usually beginning in late childhood
- Age at presentation usually teenage or adult
- Symptoms are experienced after consumption of milk
- Intolerance varies with amount of lactose consumed
- Prevalence varies according to ethnic background: 100% among aboriginal people in the United States, 80% to 90% among blacks, Asians, Jews and those of Mediterranean extraction, and less than 5% among descendants of northern and central Europeans

**Secondary Lactose Intolerance**
- Caused by any condition injuring the intestinal mucosa (e.g. diarrhea) or a reduction of available mucosal surface (e.g. because of resection)
- Usually transient, with duration of intolerance determined by the nature and course of the primary condition
- 50% or more of infants with acute or chronic diarrhea (especially those with rotavirus disease) have lactose intolerance
- Also fairly common with giardiasis and ascariasis, inflammatory bowel disease and AIDS malabsorption syndrome
- Age at presentation varies with underlying condition

Breast milk contains a large quantity of lactose but does not seem to worsen diarrhea associated with viral or bacterial diseases.

**Lactose Malabsorption**
- Inability to absorb lactose
- Does not necessarily parallel lactose intolerance

**Causes**

**Primary Form**
- Normal decline in lactase activity in the intestinal mucosa after weaning
- This decline is genetically controlled and permanent, so primary lactose intolerance is also permanent

**Secondary Form**
- Associated with gastroenteritis in children
- Usually temporary, although it may persist for several months after the inciting disease has been cured
- Also associated with non-tropical and tropical sprue, regional enteritis, abetalipoproteinemia, cystic fibrosis, ulcerative colitis and immunoglobulin deficiencies in both adults and children

**History And Physical Findings**
- Bloating
- Cramping
- Abdominal discomfort
- Diarrhea or loose stools
- Flatulence
- Rumbling (borborygmus)
- Vomiting common in children
- Frothy, acidic stool occurs in children
- Malnutrition may occur (see Table 7-4, "Physical Signs of Nutritional Deficiency Disorders," in chapter 7, "Nutrition")
- Inadequate weight gain

Degree of symptoms varies with lactose load and with other foods consumed at the same time.

**Differential Diagnosis**
- Sucrase deficiency
- Diseases mentioned under "Secondary Lactose Intolerance," in "Definition," above, this section
- Cystic fibrosis
- Failure to thrive

**Complications**
- Calcium deficiency
Diagnostic Tests
- Stool samples: low fecal pH and low quantity of reducing substances in stool; such results are valid only when stool has been collected fresh and assayed immediately, and even in these circumstances, the test is fairly insensitive
- Lactose breath hydrogen test is especially useful in children (to be ordered only by a physician)

Management
Outpatient care, except in severe cases of malnutrition.

Nonpharmacologic Interventions
Dietary Adjustments
- Reduce or restrict dietary lactose to control symptoms
- Yogurt and fermented products such as hard cheeses are tolerated better than milk
- Prehydrolyzed milk (Lactaid) is effective
- Calcium-fortified juices for children > 1 year old who cannot drink milk
- Lactose-free formulas (e.g. Prosobee®)

Client Education
- Recommend avoidance of lactose in large quantities, to relieve symptoms
- Suggest that parents (or caregiver) and child learn what level of lactose is tolerable
- Stress that parents or caregiver must read labels on commercial products, because milk sugar is used in many products, which therefore may cause symptoms
- Lactose-intolerant children may tolerate whole milk or chocolate milk better than skim milk
- Lactose is tolerated better when it is consumed with other food products than when it is consumed alone

Pharmacologic Interventions
Lactase (e.g. Lactaid, Lactrase), 1 or 2 capsules or tabs before ingestion of milk products (or may be added to milk before ingestion)

These products are not in the nurses' drug formulary.

These agents vary in effectiveness at preventing symptoms. In some areas, milk with added lactase is available.

Supplementary calcium (calcium carbonate) may become necessary if dietary intake is too low.

Monitoring and Follow-Up
Monitor as necessary until symptoms are under control. Monitor growth to ensure that the child is gaining weight.

Referral
Refer to a physician for evaluation if symptoms are not controlled by dietary measures or if you are concerned about another underlying pathologic condition, such as inflammatory bowel disease, or if the child is not thriving.

Obesity
See "Obesity," in chapter 7, "Nutrition."
Chapter 18 – Communicable Diseases

Common Communicable Diseases

History Of Present Illness And Review Of Systems
Physical Examination
Acquired Immunodeficiency Syndrome (AIDS)
Botulism
Exanthems (Rash)
Rubeola (Measles)
Scarlet Fever
Rubella (German Measles)
Erythema Infectiosum (Fifth Disease)
Roseola Infantum
Chickenpox (Varicella)
Diphtheria
Parotitis (Mumps)
Pertussis (Whooping Cough)
Pinworms
Hepatitis
Tuberculosis
Mononucleosis

Communicable Disease Emergencies
Meningitis

The clinical presentation and management of infectious mononucleosis are the same in adults and children. For information on this condition, see chapter 11, "Communicable Diseases," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.
Common Communicable Diseases

History Of Present Illness And Review Of Systems
When a communicable disease is suspected, a thorough history is essential. Because microorganisms can affect every system, a thorough review of systems is indicated. The following points should be emphasized:
• Onset (date and time) and duration of illness
• Fever, chills or rigors
• Pain
• Rash: site, colour, consistency
• Involvement of mucous membranes or conjunctiva
• Coryza
• Cough
• Sore throat
• Drooling
• Vomiting
• Diarrhea
• Level of consciousness
• Irritability
• Seizures
• Contact with a person with similar symptoms or known communicable disease
• Travel history (specifically, recent travel to an area where a communicable disease is endemic)

Physical Examination

Vital Signs
• Temperature
• Heart rate
• Respiratory rate
• Blood pressure prn

Inspection
• Colour
• Coryza
• Pharynx: redness, lesions
• Mucous membranes: moistness, lesions (e.g. Koplik's spots)
• Skin: rash or petechiae
• Joints: swelling and mobility
• Anal excoriation in diarrheal illnesses

Palpation
• Fontanel (in infants): size, consistency
• Neck rigidity
• Tactile characteristics of rash
• Lymphadenopathy
• Hepatosplenomegaly
• Joint movement
• Skin turgor and hydration

Auscultation (Heart And Lungs)
• Breath sounds
• Crackles
• Wheezing
• Heart sounds
• Pleuritic or cardiac rubs
• Murmurs
Acquired Immunodeficiency Syndrome (AIDS)

AIDS is still rare among children in Canada. However, it may result from neonatal vertical transmission (from mother to newborn) and can occur in adolescents who are involved in prostitution or drug abuse. Adolescents engaged in such activities constitute the child population at greatest risk for AIDS.

Clinical Characteristics

- Insidious onset of illness
- Fever
- Diarrhea
- Fatigue
- Weight loss
- Lymphadenopathy

The person may present with opportunistic infections, sometimes severe and life threatening:

- Pneumocystis carinii pneumonia
- Cryptosporidiosis
- Toxoplasmosis

- Cryptococcus infection
- Tuberculosis

Alternatively, the person may have unusual cancers:

- Kaposi's sarcoma
- Primary brain lymphoma

Other conditions associated with AIDS:

- Wasting syndrome
- Encephalopathy

Refer to HIV Infection and AIDS: Information for Health Professionals. NWT H&SS August 1999. Health Canada's First Nations and Inuit Health Branch (formerly Medical Services Branch) has prepared a manual on HIV infection and AIDS, which contains detailed information about this complicated condition (Medical Services Branch 1995). The reader is also encouraged to refer to the Canadian STD Guidelines (Health Canada 1998).
Botulism

Definition
Illness produced by neurotoxins associated with *Clostridium botulinum* infection, which cause an acute, descending, flaccid paralysis.

There are three forms of botulism:

Classical (food-borne): occurs after ingestion of food containing pre-formed toxins; common in the North

Infantile: suspected to occur when ingested organisms produce toxin in the gut; rare

Wound: occurs after contamination of a wound in which anaerobic conditions develop; rare

Causes
Any one of five neurotoxins produced by *Clostridium botulinum*.

Transmission
• In infants (infantile botulism): probably through ingestion of C. botulinum spores; honey frequently contains such spores, and corn syrup has also been identified as a source of spores
• In older children and adults: ingestion of food contaminated by toxin

Incubation
• Food-borne: 12-36 hours after eating improperly processed food
• Infantile: unknown
• Wound: 4-14 days after contamination of wound

Contagion
Botulism is not known to be contagious; however, the precise mechanism by which infantile botulism is acquired is still unknown.

Communicability
Not applicable.

History

Food-Borne Botulism
• Exposure to home-prepared foods or honey. Botulism has occurred in Inuit communities in the Far North after ingestion of contaminated fermented seal flipper; it may also follow ingestion of improperly home-canned meats, such as salmon on the west coast.
• Vomiting
• Diarrhea, followed initially by constipation
• Weakness
• Dry mouth
• Visual problems (e.g. blurring of vision, loss of accommodation, diplopia)
• Dysphagia
• Dysarthria

Within 3 days, onset of the following symptoms:
• Descending symmetric paralysis
• Cranial nerves affected first
• Mentation clear, except for fear and anxiety

Infantile Botulism
• Constipation often the first symptom
• Weakness
• Progressive lethargy
• Poor feeding

A history of constipation followed by progressive weakness and decreased activity in an afebrile infant should prompt consideration of botulism as the diagnosis.

Occasionally, the onset and progression of lethargy and weakness is rapid, but the usual duration of symptoms before presentation is 1-20 days.

Wound Botulism
• Fever may be present but is not a diagnostic criterion
• Constipation
• Purulent discharge from wound
• Unilateral sensory changes

Physical Findings
• Fever may be present
• Ptosis
• Blurring of vision
• Dysphagia (due to bulbar paralysis)
• Hypotonia and weakness
• Respiratory insufficiency
• Neuromuscular respiratory failure
Differential Diagnosis

• In older children, various infections (e.g. bacterial sepsis, meningitis, poliomyelitis, tic syndrome); however, absence of fever and clear sensorium make sepsis and meningitis less likely
• Guillain-Barré syndrome, which usually presents with ascending paralysis

The descending and symmetric nature of the paralysis, a history of ingestion of home-processed foods and early, more severe involvement of the cranial nerves are clues to the diagnosis.

Complications

• Dehydration
• Aspiration pneumonia
• Paralysis
• Respiratory failure
• Death

Diagnostic Tests

None.

Management

Goals of Treatment

• Provide supportive care

Prevention

Provide instruction in the proper preparation of foods. In particular, boiling of contaminated home-processed foods for a period of 3 minutes destroys the toxins.

In the Arctic, botulism seems to have increased with the introduction of plastic bags, which are now used by many Inuit for caching seal flippers and walrus for fermentation, perhaps because Clostridium grows best in an anaerobic environment. Conversely, there is a suggestion that botulism is less likely if porous material is used for fermentation, because the bacteria grow poorly in an aerobic environment. Education should be provided to those who wish to continue this traditional means of food preservation.

Discourage use of honey or corn syrup in formula and on pacifiers.

Appropriate Consultation

A physician should be contacted immediately if this condition is suspected.

Adjunctive Therapy

• Start IV therapy with normal saline, and run at a rate sufficient to maintain hydration
• Give oxygen if there are signs of respiratory complications

Nonpharmacologic Interventions

• Nothing by mouth

Control

• Notify medical health officer immediately in outbreaks of food-borne disease
• Identify food suspected of causing the outbreak, as antitoxin is recommended for all others who have ingested this food

Pharmacologic Interventions

Antitoxin, which is given when the botulism has been caused by food-borne or wound infection, may be used in older children but is not usually used in infants.

The antitoxin, if available, is administered only on the order of a physician.

Arrangements may be made to have the antidote delivered in an emergency situation.

Antibiotics for wound infection may be instituted on the advice of a physician before transfer: penicillin G sodium (B class drug), 250,000 units/kg per day, divided q6h

Monitoring and Follow-Up

Monitor ABCs, vital signs, airway protective reflexes, lung sounds, pulse oximetry (if available), intake and output.

Referral

Medevac.
Exanthems (Rash)

Definition
A rash that "bursts forth or blooms" in association with some infections.

Characteristically widespread, symmetrically distributed on the child's body, and consisting of red, discrete or confluent flat spots (macules) and bumps (papules) that (at least at first) are not scaly.

Diseases that begin with exanthem or rash may be caused by bacteria, viruses or reactions to drugs.

Some exanthems are accompanied by oral lesions, the most well known of which are the Koplik's spots of rubeola and the oral lesions found in hand-foot-and-mouth disease.

Exanthems were previously numbered according to their chronological appearance in the child:
- First disease: rubeola (measles)
- Second disease: scarlet fever (group A streptococcal infection)
- Third disease: rubella (German measles)
- Fourth disease: Duke's disease (probably coxsackievirus or echovirus); this condition is difficult to distinguish as a diagnostic entity; therefore it is not specifically covered in these guidelines
- Fifth disease: erythema infectiosum (coxsackievirus)
- Sixth disease: roseola infantum (herpes virus 6 infection, exanthem subitum)

Many viral infections of childhood are characterized by a rash occurring toward the end of the disease course. Often, the rash starts on the head and progresses down the body and out on to the extremities. About the time the rash appears, the fever associated with the infection usually disappears and the child starts to feel a lot better. Several viral illnesses are associated with rashes that are reliable for diagnosis (e.g. rubeola, rubella, erythema infectiosum, roseola infantum, chickenpox), but the rashes of most viral illnesses are too variable to allow accurate diagnosis. That is why healthcare professionals often tell the client simply "It's a virus."
Rubeola (Measles)

**Definition**
Exanthematous disease with a relatively predictable course.

**Cause**
- Measles virus

**Transmission**
- Airborne droplets
- Direct contact with secretions

**Incubation**
- About 10 days (range 8-12 days) from exposure to onset of illness

**Contagion**
- High
- Lifelong immunity is likely after a person has this disease.

**Communicability**
The disease may be transmitted during the prodrome and from 1 or 2 days before up to 4 days after appearance of the rash.

**History**
- Exposure to an infected person
- Fever
- Cough
- Coryza
- Malaise
- Pink eye with discharge
- Red rash on face and trunk

**Physical Findings**
- Fever (up to 40°C)
- Koplik's spots (white spots on buccal mucosa early in disease process)

**Rash**
- Appears on day 3 to 7
- Erythematous, maculopapular
- Often starts on face and nape of neck, but then becomes generalized
- Spreads from head to feet
- Lesions may become confluent (blotchy)

- After 3 or 4 days, the rash disappears, leaving a brownish discoloration and fine scaling
- Conjunctivitis, pharyngitis, cervical lymphadenopathy and splenomegaly may accompany rash

**Differential Diagnosis**
- Unspecified viral exanthem
- Rubella (German measles)
- Adverse drug reaction
- Sensitivity to sunlight
- Roseola infantum
- Coxsackievirus infection
- Kawasaki disease (rash much like rubeola; fever lasts 7-10 days; characterized by inflammation of mucous membranes and swelling of cervical lymph nodes; cause unknown)
- Erythema infectiosum (fifth disease) ("slapped-cheek" appearance and "lacy" rash on limbs and trunk, which often comes and goes over several weeks; not usually associated with high fever); see "Erythema Infectiosum (Fifth Disease)," below, this chapter
- Scarlet fever
- Stevens-Johnson syndrome

**Complications**
- Otitis media
- Pneumonia
- Encephalitis

**Diagnostic Tests**
- Blood sample for serum IgG or IgM: a fourfold rise in serum antibody IgG between acute and convalescent serum samples or the presence of measles-specific IgM in cases with compatible clinical features is diagnostic
- Urine for viral culture
- Nasopharyngeal swab for viral culture

**Management**

**Prevention and Control**
- Immunize children at 12 months of age or as soon thereafter as possible
- Measles vaccine (as measles-mumps-rubella [MMR]) is given in two doses: first dose after child's first birthday, second dose at 18 months
• Unimmunized contacts should be given gamma globulin (0.25 mL/kg IM) within 6 days of exposure or measles vaccine within 72 hours of exposure

Goals of Treatment
• Provide supportive care
• Prevent spread of disease to others

Appropriate Consultation
Consult a physician if you are unsure of the diagnosis. Rubeola is not frequently seen in a properly immunized population and can be difficult to diagnose.

Nonpharmacologic Interventions
• Rest
• Fluids in adequate amounts to prevent dehydration
• Keep children home from school for 5 days after rash starts

• Advise families to receive no visitors, especially unimmunized children and pregnant women, for 5 days after rash starts
• Notify public health officer

Pharmacologic Interventions
Antipyretic for fever: acetaminophen (A class drug), 10-15 mg/kg PO q4h prn

Antibiotics are to be used only if bacterial complications occur.

Monitoring and Follow-Up
Advise parents or caregiver to bring the child back to the clinic if there are signs of complications.

Referral
This is usually a self-limiting illness, and referral is usually not necessary. Be alert for complications such as pneumonia, and refer as needed.
Scarlet Fever

Definition
Syndrome caused by a group A streptococcal toxin. It is characterized by the scarlatina form rash.

Cause
- Erythrogenic toxin produced by group A streptococci (which are normal flora of the nasopharynx)
- Usually associated with pharyngitis but, in rare cases, follows streptococcal infections at other sites
- Infections may occur year-round, but prevalence of pharyngeal disease is highest among school-age children (5-15 years of age), in the winter and spring, and in settings of crowding and close contact

Transmission
Person-to-person spread by respiratory droplets is the most common method of transmission.

Incubation
- 12 hours to 7 days

Contagion
- Those affected are contagious during both the acute illness and the subclinical phase
- Occurs predominantly in school-age children (5-15 years of age)

History
Prodrome
- Fever
- Sore throat
- Headache
- Vomiting
- Abdominal pain

Physical Findings
- Child appears moderately ill
- Face flushed, with circumoral pallor
- Fever
- Tachycardia
- Tonsils edematous, erythematous and covered with a yellow, gray or white exudate
- Petechiae on the soft palate
- Tender anterior cervical lymphadenopathy

Characteristics of Scarlatina Rash
- Appears 12-24 hours after the onset of the illness, first on the trunk and then extending rapidly over the entire body to finally involve the extremities
- Usually spreads from head to toe
- Diffusely erythematous
- In some children, rash is more palpable than visible
- Usually has the texture of coarse sandpaper
- Erythema blanches with pressure
- Skin may be pruritic but is not usually painful
- A few days after the rash becomes generalized over the body, it becomes more intense along the skin folds and produces lines of confluent petechiae, known as Pastia's lines (which are caused by increased capillary fragility)
- Three or four days after the onset of the rash, it begins to fade, and the desquamation phase begins, with peeling of flakes from the face; peeling from the palms and around the fingers occurs about 1 week later; desquamation lasts for about 1 month after the onset of the disease

Appearance of Tongue
- During the first 2 days of the disease, the tongue has a white coating through which the red, edematous papillae project; this phase is referred to as white strawberry tongue.
- After 2 days, the tongue also desquamates, which results in a red tongue with prominent papillae, called red strawberry tongue

Differential Diagnosis
- Exfoliative dermatitis
- Erythema multiforme
- Mononucleosis
- Erythema infectiosum (fifth disease)
- Kawasaki disease
- Rubeola (measles)
- Pharyngitis
- Pneumonia
- Rubella (German measles)
- Pityriasis rosea
- Scabies
Staphylococcal scalded skin syndrome
Syphilis
Toxic epidermal necrolysis
Toxic shock syndrome
Drug hypersensitivity
Unspecified viral exanthem

Complications
- Cervical adenitis
- Otitis media or otitis mastoiditis
- Ethmoiditis
- Sinusitis
- Peritonsillar abscess
- Pneumonia
- Septicemia
- Meningitis
- Osteomyelitis
- Septic arthritis
- Rheumatic fever
- Acute renal failure from post-streptococcal glomerulonephritis

Diagnostic Tests
- Throat swab for culture and sensitivity

Management
Goals of Treatment
- Eradicate infection
- Prevent complications
- Prevent spread to others

Appropriate Consultation
Consult a physician if you are unsure of the diagnosis or there are complications.

Nonpharmacologic Interventions
- Rest
- Fluids in adequate amounts to maintain hydration

Prevention
Children should not return to school or daycare until the first 24 hours of antibiotic therapy is complete.

Client Education
- Instruct parents or caregiver that child must complete the entire course of antibiotics, even if symptoms resolve
- Warn parents or caregiver of generalized exfoliation over the next 2 weeks
- Emphasize the warning signs of complications of the streptococcal infection, such as persistent fever, increased throat or sinus pain, and generalized swelling

Pharmacologic Interventions
Antipyretic for fever:
acetaminophen (A class drug), 10-15 mg/kg PO q4-6h prn

Antibiotics:
penicillin V (C class drug) 40 mg/kg/day PO for 10 days
or
penicillin G benzathine (A class drug)

For children <12 years old:
25,000 to 50,000 units/kg IM (one dose only; maximum dose of 1.2 million units)
Children ≥12 years old: 1.2 million units IM (one dose only)

For children allergic to penicillin:
erythromycin (C class drug)
Children <12 years old: 40 mg/kg per day, divided tid, PO for 10 days
Children ≥12 years old: 250 mg PO qid for 10 days

Monitoring and Follow-Up
Follow up in 1 or 2 days. Monitor for signs of complications.

Referral
Usually not necessary unless complications arise. Prognosis for recovery is excellent with treatment.
Rubella (German Measles)

Definition
Viral exanthematous illness, often mild and subclinical. Rarely seen in an adequately immunized population.

Cause
• Rubella virus

Transmission
• Airborne spread of respiratory droplets
• Direct contact with nasopharyngeal secretions
• May also be passed through the placenta to the fetus

Incubation
• 14-23 days

Contagion
• High

Communicability
• 1 week before to 14 days after rash erupts

History
• Mild illness
• Up to 50% of cases are asymptomatic
• Low-grade fever
• Mild systemic signs (e.g. headache, malaise)
• Arthralgia (joint pain), more common in adolescents

Physical Findings
• Low-grade fever
• Conjunctivitis
• Macular rash, which starts on face and progresses to trunk and then the extremities
• Rash does not coalesce and lasts about 3 days
• Lymphadenopathy (especially post-auricular, posterior cervical and suboccipital nodes)
• Arthritis (in adolescents)

Differential Diagnosis
• Rubeola (measles)
• Unspecified viral exanthem
• Adverse drug reaction
• Scarlet fever
• Erythema infectiosum (fifth disease)
• Mononucleosis

Complications

In Fetus
Congenital rubella syndrome may result in any of the following fetal anomalies:
• Deafness
• Cataracts
• Microcephaly
• Mental retardation
• Cardiac lesions
• Hepatosplenomegaly
• Jaundice
The risk is highest in the first trimester.

In Children
• Thrombocytopenia

In Adolescents
• Arthritis
• Encephalitis

Diagnostic Tests
None.

Management

Prevention of Congenital Rubella Syndrome in Fetus
• All female adolescents and women of childbearing age should be given measles-mumps-rubella (MMR) vaccine unless they have documented proof of immunity
• Women immunized against rubella are advised not to become pregnant for at least 1 month after receiving the vaccine
• The vaccine-type virus can cross the placenta; however, no case of congenital rubella has ever occurred in newborns of women who were inadvertently immunized while pregnant
• The fetal risk in women "accidentally" immunized during pregnancy is minimal and does not mandate automatic termination of the pregnancy
• If a pregnant woman is exposed to rubella (native disease, not associated with vaccine), an antibody titer should be obtained immediately; if antibody is present, the woman is immune and not at risk
• If antibody is not detectable, a second titer should be obtained 3 weeks later; if antibody is present in the second specimen, infection has occurred and the fetus is at risk for congenital rubella syndrome
• If antibody is not detectable in the second specimen, a third titer should be obtained 3 weeks later (i.e. 6 weeks after exposure); a negative result at this time means that infection has not occurred, whereas a positive result means that infection has occurred, and the fetus is at risk for congenital rubella syndrome
• Consult a physician about use of immune globulin for prophylaxis during pregnancy, as it predictably and reliably prevents rubella and congenital rubella syndrome

For further information, see the Canadian Immunization Guide, 6th edition (Health Canada 2002).

Prevention and Control of Disease in Children
• Rubella vaccine (as measles-mumps-rubella [MMR]) is given in two doses: first dose after child's first birthday, second dose at 18 months of age

Goals of Treatment
• Treat the symptoms of the illness
• Prevent spread to others

Nonpharmacologic Interventions
• Rest
• Fluids in adequate amounts to maintain hydration
• Parents or caregiver should be advised to limit new visitors to the home, especially pregnant women, for 14 days after appearance of rash
• Report all cases to the public health department

Pharmacologic Interventions
Antipyretic and analgesic for fever and pain: acetaminophen (A class drug), 10-15 mg/kg q4h prn

Antibiotics are to be used only if bacterial complications occur.

Monitoring and Follow-Up
• Advise parents or caregiver to bring the child back to the clinic if there are signs of complications
• Complete recovery usually occurs in 1-2 weeks

Referral
This is usually a self-limiting illness, so referral is usually not necessary. Be alert for complications such as encephalitis, and refer as needed.
Erythema Infectiosum (Fifth Disease)

**Definition**
Usually a benign viral childhood illness characterized by a classic "slapped-cheek" appearance and lacy exanthem.

Slightly more females than males are affected. Approximately 70% of all cases occur in children 5-15 years old, whereas infants and adults are affected infrequently. Disease incidence peaks in winter and early spring. Epidemics of infection with the causative organism appear to occur in cyclic fashion every 4-7 years.

**Cause**
- Human parvovirus B19

**Transmission**
- Respiratory secretions
- Possibly through fomites
- Parenterally by vertical transmission from mother to fetus
- Transfusion of blood or blood products

Fetal transmission may lead to severe anemia resulting in congestive heart failure and fetal hydrops (in fewer than 10% of primary maternal infections). Recent studies have reported that the risk of fetal death in pregnant women exposed to active infection with human parvovirus is 1% to 9%, with greatest risk of fetal loss in the first trimester.

**Incubation**
- Usually 7-10 days, but can range from 4 to 21 days

**Contagion**
- Once the rash appears, the person is no longer infectious

**History**
Usually a biphasic illness: prodrome followed by viral rash, separated by a symptom-free period of about 7 days.

**Prodrome**
- Prodromal symptoms (especially joint symptoms) occur more typically in adults; children remain active and relatively asymptomatic
- Prodromal symptoms usually mild, beginning approximately 1 week after exposure and lasting 2-3 days
- Headache
- Fever
- Sore throat
- Pruritus
- Coryza
- Abdominal pain
- Arthralgias

**Physical Findings**
- Rash seen in approximately 75% of children with human parvovirus B19 but in less than 50% of infected adults
- Begins as bright red, raised, "slapped-cheek" rash with circumoral pallor (nasolabial folds usually spared)
- 1-4 days later, erythematous maculopapular rash appears on proximal extremities (usually arms and extensor surfaces) and trunk (palms and soles usually spared)
- Maculopapular rash fades into classic lace-like or reticular pattern as confluent areas clear
- Rash clears and recurs over a period of several weeks or (occasionally) months, possibly in response to stimuli such as exercise, irritation or overheating of skin from bathing or sunlight
- Rash may be pruritic
- Arthritis may also occur, affecting (in order of frequency) metacarpophalangeal and interphalangeal joints, knees, wrists, ankles

** Rash**
- Typical viral rash (exanthem) occurs in three phases (see "Physical Findings," below, this section)
**Differential Diagnosis**
- Hand-foot-and-mouth disease
- Rubeola (measles)
- Parotitis (mumps)
- Roseola infantum
- Rubella (German measles)
- Scarlet fever
- Systemic lupus erythematosus
- Adverse drug reaction
- Allergic rash
- Unspecified viral exanthem

**Complications**
- Complications most often seen in children with underlying chronic hemolytic anemia or a congenital or acquired immunodeficient state
- Arthralgia or arthropathy occurs in up to 10% of affected children
- Aplastic anemia

**Diagnostic Tests**
None.

**Management**

**Goals of Treatment**
- Provide supportive care

**Nonpharmacologic Interventions**
Rash is usually self-resolving, but may last several weeks or months with exacerbations caused by heat or sunlight.

- Avoid excessive heat or sunlight (which can cause flare-ups of the rash)
- Thorough hand-washing should be encouraged

**Client Education**
- Emphasize in discussion with parents or caregiver that otherwise healthy children are not infectious once the rash appears, so there is no need to isolate or restrict the child from school or daycare
- Infected children with hemolytic disease or immunosuppression may be quite infectious; in these cases, respiratory isolation, especially from pregnant, chronically anemic or immunosuppressed individuals, should be observed

**Pharmacologic Interventions**
Antipyretic and analgesic for fever and pain: acetaminophen (A class drug), 10-15 mg/kg PO q4h prn

**Monitoring and Follow-Up**
Follow up as necessary if complications develop or symptoms do not resolve in the expected period of time (up to 20 days or more).

**Referral**
Usually not necessary unless complications arise.
Roseola Infantum

Definition
Acute benign disease characterized by a prodromal febrile illness, lasting approximately 3 days and followed by defervescence and the appearance of a faint pink maculopapular rash.

May present as an acute febrile illness associated with respiratory or GI symptoms. Most cases present within the first 2 years of life, with the peak age of occurrence between 7 and 13 months. Roseola appears more commonly in the spring and fall.

Cause
Human herpes virus 6 (HHV-6) was identified as the etiologic agent in 1988. There are two major strains of this virus, A and B. Strain B is responsible for most of the primary infections in children.

Transmission
- Probably through respiratory secretions of asymptomatic individuals

Incubation
- About 9 days (range 5-15 days)

Contagion
- Most likely to spread during febrile and viremic phases of the illness
- Viremia usually noted on third day of illness, just before appearance of rash
- By eighth day of illness, antibody activity peaks and viremia resolves

History
Roseola is classically characterized by high fever followed by rapid defervescence and a characteristic rash.
- Prodromal symptoms (in 14% of cases): listlessness, irritability
- Fever (often as high as 40°C)
- Rash (usually fades within a few hours but may last up to 2 days)
- Maculopapular or erythematous lesions
- Rash typically begins on the trunk and may spread to involve the neck and extremities

- Non-pruritic
- Lesions blanch on pressure
- Seizures (in 6% to 15% of cases)
- Diarrhea (in 68% of cases)

Physical Findings
- Child appears alert, not acutely ill
- Fever
- Rash
- Rose-pink macules or maculopapules approximately 2-5 mm in diameter
- Lesions characteristically discrete, rarely coalescing together and blanching with pressure
- Typically involves the trunk or back, with minimal involvement of the face and proximal extremities
- Some lesions may be surrounded by a halo of pale skin
- Nagayama's spots (erythematous papules on the soft palate and uvula)
- Periorbital edema, most commonly in the pre-exanthematous stage
- Cervical, post-auricular and post-occipital lymphadenopathy
- Splenomegaly
- Conjunctival erythema

Differential Diagnosis
- Mononucleosis
- Febrile seizures
- Erythema infectiosum (fifth disease)
- Rubeola (measles)
- Meningitis or encephalitis
- Rubella (German measles)
- Adverse drug reaction

Complications
Roseola is usually a self-limiting illness with no sequelae.
- Seizures during the febrile phase of the illness
- Encephalitis
- Meningitis
- Hepatitis
Fulminate hepatitis, hemophagocytic syndrome and disseminated infection with HHV-6 are extremely rare manifestations.

**Diagnostic Tests**
None.

**Management**

**Goals of Treatment**
- Provide supportive care

**Nonpharmacologic Interventions**
- Rest
- Maintain adequate fluid intake
- Reassure parents or caregiver as to benign nature of illness

**Client Education**
- Educate family about signs and symptoms of complications
- For an older child, recommend that he or she cover nose and mouth when sneezing or coughing

**Pharmacologic Interventions**
Antipyretic for fever: acetaminophen (A class drug), 10-15 mg/kg PO q4h prn

**Monitoring and Follow-Up**
The illness is usually benign and brief. Follow-up is necessary only if complications develop.

**Referral**
Not necessary, unless complications develop.
Chickenpox (Varicella)

**Definition**
Usually benign viral infection characterized by vesicular eruptions.

**Cause**
- Herpes zoster virus

**Transmission**
- Direct contact
- Inhalation of airborne droplets

**Incubation**
- Usually 13-17 days, or up to 3 weeks
- Chickenpox typically develops 2 weeks after contact

**Contagion**
- Very high

**Communicability**
- Most infectious 12-24 hours before the rash appears

**History**
- Slight fever
- Mild constitutional symptoms
- Skin lesions, possibly extensive, in successive crops
- Lesions may involve mucous membranes
- There may be only a few lesions
- Rash usually starts on trunk or neck

**Physical Findings**
- Fever usually mild
- Skin lesions begin as macules
- Skin lesions at various stages may be present concurrently
- Lesions become vesicular after 3-4 days, then break open with development of scabs

Lifelong immunity is likely, although as immunity wanes with age, herpes zoster (shingles) may occur, usually in elderly people. Shingles is a local recurrence of the same virus, and may be slightly contagious to non-immune individuals.

**Differential Diagnosis**
- Scabies
- Impetigo
- Herpes
- Infection with coxsackievirus

**Complications**
- Impetigo
- Cellulitis
- Encephalitis
- Pneumonia

**Management**

**Goals of Treatment**
- Provide supportive care

**Nonpharmacologic Interventions**
- Calamine lotion or Aveeno® baths to control itching and to help dry lesions
- Chickenpox is reportable in the NWT

The Canadian Paediatric Society recommends that children with mild chickenpox be allowed to return to school or daycare as soon as they feel well enough to participate in all activities, regardless of the state of their rash. Practice may vary in your area, depending on local school policy.

**Pharmacologic Interventions**
- Hydroxyzine (C class drug), 2 mg/kg, divided bid or tid, PO
- Diphenhydramine hydrochloride (A class drug) 1.25 mg/kg PO q4-6h prn, maximum 4 doses per day

Immunocompromised children must receive varicella zoster immune globulin (VZIG) with in 24 hours of exposure. Immune globulin is also recommended for newborns and for mothers who develop chickenpox between 5 days before and 48 hours after delivery. Discuss with a physician.

**Monitoring and Follow-Up**
Follow up after 1 week.
Referral
Not usually necessary unless complications arise.

Prevention
A varicella vaccine was licensed in Canada in December 1998.

Varicella vaccine is offered routinely to all infants in the NWT at one year of age.
Diphtheria

Definition
Acute infectious disease affecting primarily the membranes of the upper respiratory tract. Occurs most frequently in children <15 years old who are inadequately immunized.

Cause
• Corynebacterium diphtheria (toxigenic or non-toxigenic strain)

Transmission
• Direct contact with affected person or carrier through airborne respiratory droplets

Incubation
• 1-6 days

Contagion
• Moderate

Communicability
• May be transmitted until virulent bacilli have disappeared from infected person's system
• Rarely, chronic carriers may shed the organism for months

History
• Acute onset
• Fever
• Aural discharge
• Nasal discharge
• Sore throat
• Aural diphtheria presents as otitis externa with a purulent, malodorous discharge
• Nasal diphtheria, common in infants, starts with mild rhinorrhea that gradually becomes serosanguineous, then mucopurulent; discharge is often malodorous
• Pharyngotonsillar diphtheria begins with anorexia, malaise, low-grade fever and sore throat
• Nasal and/or pharyngeal membrane appears within 1 or 2 days
• Cervical lymphadenitis and edema of the cervical soft tissues may be severe, and respiratory and cardiovascular collapse may occur
• Laryngeal diphtheria most often represents an extension of pharyngeal infection and presents clinically as typical croup; acute airway obstruction may occur
• Cutaneous (skin) diphtheria is characterized by non-healing ulcers with a gray membrane that may serve as a reservoir of respiratory diphtheria in endemic areas
• Skin is the major reservoir of infection in Canadian Aboriginal communities

Physical Findings
Findings are variable, depending on the site and the extent of infection, but may include any of the following:
• Fever
• Tachycardia out of proportion to fever
• Child appears acutely ill
• Ear discharge
• Nasal discharge
• Adherent nasal and/or pharyngeal gray or white membrane
• Neck swollen
• Moderate to severe lymphadenopathy
• Skin lesions, which may resemble impetigo
• Cough, hoarseness
• Stridor
• Respiratory distress

Differential Diagnosis
• Streptococcal pharyngitis
• Peritonsillar abscess (quinsy)
• Vincent's infection (Vincent's angina)
• Infectious mononucleosis

Complications
• Respiratory obstruction
• Toxic effects (including nerve palsies and myocarditis) 2-6 weeks after resolution of initial symptoms

Diagnostic Tests
• Obtain throat and/or nasopharyngeal swabs for culture and sensitivity to confirm diagnosis
Management

Prevention
Diphtheria toxoid given as diphtheria-pertussis-tetanus-polio (DPTP) combination vaccine for children <7 years old or as tetanus-diphtheria-polio (Td-Polio) combination vaccine for children ≥7 years old, according to NWT recommended immunization schedule; see also Canadian Immunization Guide, 6th edition (Health Canada 2002).

For Contacts of Index Cases
Antibiotics should be given:
erythromycin (C class drug) for 7 days

• If contact has been previously immunized but has not had a booster in the past 5 years, give booster dose of diphtheria vaccine
• If contact has never been immunized, use antibiotics as described here, obtain culture before and after initiation of antibiotic, and start an age-appropriate series of immunizations with diphtheria vaccine

Goals of Treatment
• ABCs are the first priority
• Stabilize any airway difficulty

Appropriate Consultation
Immediate consultation with a physician is essential.

Adjuvant Therapy
• Start IV therapy with normal saline, and run at a rate sufficient to maintain hydration
• Give oxygen prn if there are signs of respiratory distress

Nonpharmacologic Interventions
• Nothing by mouth
• Bed rest

Pharmacologic Interventions
Antibiotics may be instituted before transfer, but only on the advice of a physician:
Usual antibiotic therapy:
erthyromycin (C class drug), 40 mg/kg per day, divided bid, IM or IV

Carrier state may be treated with:
erthyromycin (A class drug), 40 mg/kg per day, divided qid, PO for 7 days

Monitoring and Follow-Up
Monitor ABCs, pulse oximetry (if available), respiratory, cardiovascular and neurologic systems, hydration status, intake and output.

Referral
Medevac.
**Parotitis (Mumps)**

**Definition**
Acute viral infection characterized by painful swelling of the parotid and other salivary glands.

**Cause**
- Mumps virus

**Transmission**
- Airborne droplets
- Direct contact with saliva

**Incubation**
- 2-3 weeks

**Contagion**
- Low to moderate

**Communicability**
- 6 days before to 9 days after parotitis appears

**History**
- Exposure to infected person
- Inadequate immunization
- Pain and swelling of parotid glands (may be unilateral or bilateral)
- Dysphagia

**Prodrome**
- Fever
- Malaise
- Anorexia
- Headache
- Myalgia (sore muscles)

**Physical Findings**
- Swelling of parotid glands (may be unilateral or bilateral)
- Glands very tender to the touch
- Ear on affected side displaced upward and outward
- Submaxillary and sublingual glands may also be swollen
- Dysphonia

**Differential Diagnosis**
- Sialolithiasis (parotid stones)
- Sjögren's syndrome (parotitis, keratoconjunctivitis, absence of tears)
- Purulent parotitis
- Parotid tumor
- Buccal cellulitis

**Complications**
- Orchitis
- Oophoritis
- Deafness
- Pancreatitis
- Encephalitis
- Aseptic meningitis

**Diagnostic Tests**
None.

**Management**

**Prevention and Control**
Mumps vaccine (as measles-mumps-rubella [MMR]) is given in two doses: see NWT Immunization Schedule and Canadian Immunization Guide, 6th edition (Health Canada 2002)

**Goals of Treatment**
- Provide supportive care
- Prevent complications
- Prevent spread to others

**Appropriate Consultation**
Consult a physician if you are unsure of the diagnosis. Parotitis is not frequently seen in a properly immunized population and so can be difficult to diagnose.

**Nonpharmacologic Interventions**
- Rest
- Fluids in amounts adequate to prevent dehydration
- Child may return to school 9 days after the onset of parotid swelling
- Advise parents or caregiver to limit visitors, especially unimmunized children and pregnant women, for 5 days after swelling starts
- Notify public health officer
Pharmacologic Interventions
Antipyretic and analgesic for fever and pain: acetaminophen (A class drug)
Children <6 years old: 10-15 mg/kg q4h prn
Children 6-12 years old: 325 mg, q4h prn
Children >12 years old: 325-650 mg q4h prn

Antibiotics are to be used only if bacterial complications occur.

Monitoring and Follow-Up
• Advise parents or caregiver to bring the child back to the clinic if there are signs of complications
• Complete recovery usually occurs in 1-2 weeks

Referral
This is usually a self-limiting illness, so referral is usually not necessary. Be alert for complications such as pneumonia, and refer as needed.
**Pertussis (Whooping Cough)**

**Definition**
Acute bacterial illness of the upper respiratory tract.

**Cause**
- *Bordetella pertussis*

**Incubation**
- 7-10 days

**Contagion**
- High in unimmunized people

**Communicability**
- Highly transmissible in early catarrhal stage, before paroxysmal cough stage
- Negligible after 3 weeks
- Usually extends 5-7 days after onset of therapy

**History**

**Catarrhal Stage**
- 1-2 weeks
- Symptoms of URTI: rhinorrhea, fever, conjunctival redness, lacrimation

**Paroxysmal Stage**
- 2-4 weeks or longer
- Paroxysmal cough, increasing in frequency and severity, with a high-pitched inspiratory whoop at end of paroxysm
- Vomiting may occur after coughing paroxysm
- Cyanotic and apneic spells common in infants
- Feeding difficulties

Whoop does not usually occur in young infants and is not necessary for diagnosis.

**Physical Findings**
- Fever
- Rhinorrhea
- Lacrimation (tearing)
- Conjunctival redness
- Apnea and cyanosis (may be seen during paroxysmal stage and may be present without the paroxysmal cough)
- Lungs normal, unless pneumonia or atelectasis have occurred

**Differential Diagnosis**
- Viral infections (consider respiratory syncytial virus, adenovirus, parainfluenza virus)
- Asthma
- Tuberculosis

**Complications**
- Hypoxia
- Apnea in young infants (<6 months old)
- Pneumonia
- Seizures

**Diagnostic Tests**
- CBC (high WBC count, with predominance of lymphocytes)
- Culture of nasopharyngeal specimens using calcium alginate or Dacron swab and special culture media (if these culture materials are available) should be attempted to confirm diagnosis

The causative organism is usually cultured only in the catarrhal or early paroxysmal stage.

**Management**

**Prevention and Control**
- Immunization according to standard schedule with DPTP combination vaccine (2, 4, 6 and 18 months and before starting school [i.e. 4-6 years of age])

**For Contacts of Index Cases**
Close contacts <6 years old who have not received their primary DPTP series should be given one dose of DPTP.

**Goals of Treatment**
- Treat infection
- Prevent complications
- Prevent spread to others
Appropriate Consultation
Consult a physician if you suspect this diagnosis in a younger child, especially in an infant, as this age group is most at risk for complications.

Nonpharmacologic Interventions
• Rest
• Fluids in amounts adequate to maintain hydration
• Report any suspected or confirmed cases to public health officer

Client Education
• Educate the parents or caregiver about the signs of complications
• Counsel the parents or caregiver about appropriate use of medications (dose, frequency, side effects)
• Advise parents or caregiver to limit new visitors to the home until 5 days after antibiotic therapy is started

Pharmacologic Interventions
erythromycin (C class drug), 40 mg/kg per day, divided qid, for 14 days

If the child is allergic to erythromycin, consult a physician for alternatives.

For Contacts of Index Cases
erthyromycin (C class drug), 40 mg/kg per day for household or daycare contacts

Monitoring and Follow-Up
The paroxysmal stage may last up to 4 weeks, and the convalescent stage up to several months. Follow up every 1-2 weeks as necessary, to monitor for complications and to provide support.

Referral
Infants and older children with severe disease manifestations (e.g. apnea, cyanosis or feeding difficulties) should be admitted to hospital for supportive care.
Pinworms

Definition
Parasitic infestation of the cecum of the large bowel. More common in girls, occurring in late fall and winter. Unrelated to personal hygiene.

Cause
• *Enterobius vermicularis*

Transmission
• Direct transfer of eggs from anus to mouth
• Contact with fomites contaminated with eggs

Incubation
• 4-6 weeks (duration of organism's life cycle)

Contagion
• Medium to high

Communicability
• About 2 weeks (as long as eggs are laid on perianal skin and remain intact)

History
• Anal itching, worst at night
• Irritability
• Restlessness during sleep
• Diffuse, non-specific abdominal pain may occur

Physical Findings
• Small white worms visible in perineal area or stool

Differential Diagnosis
• Hemorrhoids
• Tapeworms

Complications
• Perianal excoriation from scratching
• Vulvovaginitis

Diagnostic Tests
• Scotch Tape test: apply transparent tape to perianal region, remove tape early in the morning and examine microscopically for eggs

Management
Goals of Treatment
• Relieve infestation
• Prevent spread to others

Nonpharmacologic Interventions
• Wash bed clothes, towels and clothing
• Vacuum house

Client Education
• Educate all members of the family about personal hygiene (hand-washing, cutting fingernails)

Pharmacologic Interventions
*pyrantel pamoate (C class drug), 11 mg/kg, single dose, tabs or suspension*

The whole family should be given treatment concurrently.

Monitoring and Follow-Up
Symptoms should improve in several days. Usually there is no need to re-treat, although recurrence is common.

Referral
None.
Hepatitis

Hepatitis A And Hepatitis B
See "Hepatitis" in chapter 11 "Communicable Diseases," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003 for detailed information on the clinical presentation and management of acute hepatitis A and hepatitis B.

Control of Hepatitis A
immune serum globulin 0.02-0.04 mL/kg IM to household and daycare contacts

Prevention of Hepatitis B in the Newborn

• If a newborn is exposed to hepatitis B (i.e. mother is positive for hepatitis B surface antigen [HBsAg]), hepatitis B immune globulin (0.5 mL IM) is given within 24 hours of birth, and hepatitis B vaccine (0.5 mL) is administered within 7 days after birth and at 1 and 6 months of age
• All infants in the NWT receive 3 doses of hepatitis B vaccine at birth, 1 and 6 months of age

Tuberculosis

In addition, detailed information on the prevention, diagnosis and treatment of pulmonary tuberculosis can be found in Canadian Tuberculosis Standards (Canadian Lung Association 2000).

Tuberculosis has been a significant cause of morbidity and mortality among Canada's Aboriginal peoples in the past 50 years. Over the past 20 years, the incidence of TB has decreased dramatically in Canada as a whole, although there is currently an upward trend because it occurs frequently in people with AIDS. In addition, TB remains endemic among Aboriginal Canadians.
• Most prevalent in people with crowded living conditions
• Children particularly susceptible

Prevention And Control Of Tb In Children
BCG vaccine is routinely administered to Aboriginal newborns. It protects against TB meningitis and disseminated (miliary) TB. It may be less effective in preventing pulmonary TB.

Mononucleosis
Communicable Disease Emergencies

Meningitis

Definition
Inflammation of the meningeal membranes of the brain or spinal cord. Most cases (70%) occur in children <5 years old. May be secondary to other localized or systemic infections (e.g. otitis media).

Causes
Meningitis may be caused by bacteria, viruses, fungi and (rarely) parasites.

Bacterial
- In children <1 month old: group B Streptococcus, Escherichia coli
- In children 4-12 weeks old: E. coli, Hemophilus influenza type B, Streptococcus pneumoniae, group B Streptococcus, Neisseria meningitidis (meningococcal)
- In children 3 months to 18 years old: Streptococcus pneumoniae (most common cause), N. meningitidis, H. influenza type B (rare)
- Mycobacterium tuberculosis

Viral
- Approximately 70 strains of enteroviruses

Fungal
- Candida

Aseptic
- Lyme disease

All cases of suspected meningitis occurring in northern communities should be treated as bacterial until proven otherwise.

Transmission
- Meningitis caused by H. influenzae: airborne droplets and secretions
- Meningococcal meningitis (caused by N. meningitidis): direct contact with droplets or secretions

Incubation
- Meningitis caused by H. influenzae: 2-4 days
- Meningococcal meningitis (caused by N. meningitidis): 2-10 days

Contagion
- Meningitis caused by H. influenzae: moderate; high risk of transmission in daycare centers and other crowded environments
- Meningococcal meningitis (caused by N. meningitidis): low; spreads most rapidly in crowded conditions

Communicability
- Meningitis caused by H. influenzae: as long as organisms are present; non-communicable within 24-48 hours after treatment is started
- Meningococcal meningitis (caused by N. meningitidis): until organism is no longer present in secretions from nose and mouth

History
- Usually preceded by URTI
- High fever

In children <12 months old the symptoms are non-specific. The following symptoms are commonly reported by the parent or caregiver:
- Irritability
- Child sleeps "all the time"
- Child is "not acting right"
- Child cries when moved or picked up
- Child won't stop crying
- "Soft spot bulging"
- Vomiting (often without preceding nausea)
- Poor feeding

Older children may complain of the following symptoms:
- Photophobia
- Headache that becomes increasingly severe
- Headache made worse with movement, especially bending forward
- Neck pain
• Back pain
• Changes in level of consciousness, progressing from irritability through confusion, drowsiness and stupor to coma
• Seizures may develop
• Rash (purple spots)

**Physical Findings**
Perform a full head and neck examination to identify a possible source of infection.
• Temperature elevated
• Tachycardia or bradycardia with increased intracranial pressure
• Blood pressure normal (low if septic shock has occurred)
• Child in moderate-to-acute distress
•Flushed
• Level of consciousness variable
• Possible enlargement of the cervical nodes
• Focal neurologic signs: photophobia, nuchal rigidity (in children >12 months old), positive Brudzinski's sign (spontaneous hip flexion with passive neck flexion; in children >12 months old), positive Kernig's sign (pain with passive knee extension and hip flexion; in children >12 months old)
• Petechiae with or without purpura may be present in meningococcal meningitis
• Shock (septic)

**Differential Diagnosis**
• Bacteremia
• Sepsis
• Septic shock
• Brain abscess
• Seizures

**Complications**
• Seizures
• Coma
• Blindness
• Deafness
• Death
• Palsies of cranial nerves III, VI, VII, VIII

**Diagnostic Tests**
It is important to culture several specimens before initiating antibiotic therapy in cases of suspected meningitis, to increase the chance of isolating the organism. Consultation with a physician should be attempted before initiating collection of these specimens.
• One blood culture
• Urine for routine and microscopy, culture and sensitivity
• Throat swab for culture and sensitivity

**Management**

**Goals of Treatment**
• Control infection
• Prevent complications

**Appropriate Consultation**
Consult a physician immediately. Do not delay starting antibiotics if this diagnosis is suspected. If you are unable to contact a physician, follow the guidelines below for IV antibiotics.

**Nonpharmacologic Interventions**
• Bed rest
• Nothing by mouth
• Foley catheter (optional if the child is conscious)

**Adjuvant Therapy**
• Start IV therapy with normal saline, and adjust rate according to state of hydration

Do not overload with fluids, as this could lead to brain edema.

**Pharmacologic Interventions**
Antipyretic for fever: *acetaminophen (A class drug), 10-15 mg/kg q4h prn*

Consult a physician before initiating antibiotic therapy, if you are able to do so. Give initial antibiotic dose as soon as possible. These may include: ampicillin, gentamicin, a cephalosporin and vancomycin
*Bugs and Drugs (2001) p 120*

**Monitoring and Follow-Up**
Monitor ABCs, vital signs, level of consciousness, intake and hourly urine output, and watch for focal neurologic symptoms.
**Referral**
Medevac as soon as possible.

**Prevention and Control**
Meningitis caused by Hemophilus influenzae
A vaccine is now routinely given to infants as part of the usual childhood immunizations. In the NWT, the vaccine is usually given at 2, 4, 6 and 18 months of age, along with the DPTP vaccine.

Chemoprophylaxis for household contacts (including adults) in homes where there are children <4 years old:
*rifampin* *(B class drug)*, 20 mg/kg per dose od for 4 days (maximum dose 600 mg)

**Meningococcal Meningitis**
Vaccines for certain subtypes are available and are sometimes used in epidemics.

Vaccine for Meningococcal disease, type C, is now being offered to all children in the NWT and has been added to the routine immunization schedule for infants. (February 2004)

Chemoprophylaxis for household contacts:
*rifampin* *(B class drug)*
- Infants <1 month old: 5 mg/kg bid for 2 days
- Children: 10 mg/kg bid for 2 days
- Adults: 600 mg bid for 2 days
Chapter 19 – Adolescent Health

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For information about injury prevention, see "Injury Prevention Strategies," in chapter 3, "Prevention," these pediatric clinical guidelines.

For information about the clinical presentation and management of STIs, see "Sexually Transmitted Diseases," in chapter 11, "Communicable Diseases," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003. In addition, refer to and follow the Canadian STI Guidelines (Health Canada 1998).

For information about suicide, see "Suicidal Behavior," in chapter 15, "Mental Health," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.
Introduction

Adolescence is a unique time in human development, both physiologically and psychologically. Adolescents in modern society face many health issues, particularly in the areas of mental, emotional and social health. Unfortunately, adolescence is also a period of life when there is little or no contact with healthcare professionals.

Another unfortunate characteristic of adolescence is a propensity for risk-taking behaviors, such as abuse of drugs and alcohol, which cause premature morbidity and death within this age group. Among adolescents, 77% of deaths are caused by accidents, violence and suicide.

Adolescent Development

Requirements for healthy development:
• Supportive environment over the long term
• Graded steps toward autonomy

Other factors assisting in healthy development:
• Mutual positive engagement between adolescents and adults
• School and community programs

Characteristics Of Developmental Stages

Early Adolescence
• Preoccupation with body changes
• High levels of physical activity and mood swings

Mid-Adolescence
• Independence
• Peer group dominates social life
• Risk behaviors more prevalent
• Sexual matters are of most interest

Late Adolescence
• Adult appearance
• More capable of orienting activities toward the future, of mutual caring and of internal control
• Uncertainties about sexuality, future relationships and work possibilities
Adolescent Health Care

An acute medical need is the most frequent reason for an adolescent to seek medical care. It is important to take this opportunity to discuss other topics important to adolescent health. The mnemonic SAFE TIMES is one way of remembering appropriate topics for discussion:

- **S** for sexuality issues
- **A** for affect (e.g. depression) and abuse (e.g. drugs)
- **F** for family (function and medical history)
- **E** for examination (sensitive and appropriate)
- **T** for timing of development (body image)
- **I** for immunizations
- **M** for minerals (nutritional issues)
- **E** for education and employment (school and work issues)
- **S** for safety (e.g. vehicle)

History-Taking

Consider the following points when interviewing an adolescent:

- Ensure that the adolescent is the prime historian. It is preferable to interview the adolescent without his or her parents or caregiver, although it may be necessary to obtain collateral history from parents, caregivers, teachers and others. Assure the adolescent that all important problems will be kept strictly confidential (there are some obvious exceptions, including suicide intention and other high-risk, potentially destructive activity).
- Sensitively explore with the adolescent any problems with sexuality, drugs, alcohol, school and family.
- Try to elicit information about the activities in which the adolescent participates and what his or her peer group is doing. Peer group activities generally reflect the individual's activities.
- If the adolescent is uncommunicative, a multiple-choice approach can be used (e.g. "How would you compare your school performance with that of others? Better, worse or the same?").

Functional Inquiry

A complete history of the health status of the adolescent should be undertaken whenever an opportunity to do so presents itself. A record of pubertal changes and, for young women, a complete menstrual history, are essential components of this history.

Psychosocial Evaluation

Issues related to sexuality, drug or alcohol use, and family and school problems should be systematically reviewed. Questions about school attendance and performance and future plans for school and employment should be part of a complete evaluation.

Comprehensive Physical Examination

Emphasis should be placed on common adolescent concerns. Height, weight and blood pressure should be measured yearly in adolescents. Sexual maturation (according to Tanner stages; see Table 19-1) should be noted.

**Skin**

Obvious problems, particularly acne, should be noted and treated.
**Eyes**
Visual acuity should be screened, as myopia commonly develops during the adolescent growth spurt.

**Mouth**
Dental decay and periodontal disease can be significant problems in adolescence.

**Breasts**
Development and symmetry of the breasts should be assessed, and girls should be taught how to perform breast self-examination.

**Cardiovascular System**
Functional murmurs are common in adolescence, but look for other forms of cardiac pathology (e.g. mitral prolapse).

**Musculoskeletal System**
Sports injuries, knee problems and other problems of the musculoskeletal system are common in adolescence. Routine screening for scoliosis is of questionable value.

**Genitalia**
Assess development of pubic hair to allow Tanner staging (see Table 19-1).

Boys should be examined with respect to normal growth and development of the external genitalia.

Girls who are sexually active should undergo a pelvic examination and Pap smear with appropriate STI screening at least once yearly. General indications for pelvic examination would also include menstrual irregularities, severe dysmenorrhea, vaginal discharge, unexplained abdominal pain or dysuria.

**Rectal Examination**
At some point during the health maintenance program, a rectal examination should be performed on all adolescents, but this can be deferred to the late teens if necessary.

**Puberty**

**Female**
In the female, puberty begins between the ages of 8 and 14 years and is usually complete within 3 years. Menarche usually occurs 2.5 years after the onset of puberty; in North America, the mean age at menarche is 12.5 years. At menarche the adolescent female has generally attained 95% of her adult height. The female adolescent growth spurt usually occurs between Tanner stages II and IV (see Table 19-1), and during this period she will grow an average of 8 cm per year.

**Male**
Puberty usually begins 1.5-2 years later in the male than in the female, and it takes twice as long. The male adolescent growth spurt occurs during Tanner stage V (see Table 19-1). The average increase in height during this period is approximately 10 cm per year.
Table 19-1: Tanner staging of adolescent development*

<table>
<thead>
<tr>
<th>Stage (preadolescent)</th>
<th>Male</th>
<th>Female</th>
<th>Testes and penis in male</th>
<th>Breast development in female</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>No pubic hair present; some fine villous hair covers the genital area</td>
<td>No pubic hair present</td>
<td>Appearance of testes, scrotum and penis identical with that of early childhood</td>
<td>Juvenile breast with elevated papilla and small, flat areola</td>
</tr>
<tr>
<td>II</td>
<td>Sparse distribution of long, slightly pigmented hair at the base of the penis</td>
<td>Sparse distribution of long, slightly pigmented, straight hair bilaterally along medial border of labia</td>
<td>Enlargement of testes and scrotum; reddish coloration and enlargement of penis</td>
<td>Breast bud forms; papilla and areola elevates to form small mound</td>
</tr>
<tr>
<td>III</td>
<td>Pigmentation of pubic hair increases, and hair begins to curl and spread laterally</td>
<td>Pigmentation of pubic hair increases, and hair begins to curl and spread sparsely over mons pubis</td>
<td>Continued growth of testes in scrotum and continued lengthening of penis</td>
<td>Continued enlargement of breast bud and areola; no separation of breast contours</td>
</tr>
<tr>
<td>IV</td>
<td>Pubic hair becomes coarser in texture and takes on adult distribution</td>
<td>Pubic hair begins to curl and becomes coarse in texture; number of hairs continues to increase</td>
<td>Testes and scrotum continue to grow; scrotal skin darkens; penis grows in width, and glans penis develops</td>
<td>Papilla and areola separate from the contour of the breast to form a secondary mound</td>
</tr>
<tr>
<td>V</td>
<td>Mature pubic hair chains and adult distribution, with spread to surface of the medial thigh</td>
<td>Mature pubic hair chains; adult feminine triangle pattern, with spread to surface of medial thigh</td>
<td>Mature adult size and shape of testes, scrotum and penis</td>
<td>Mature areolar mound recedes into general contour of breast, papilla continues to project</td>
</tr>
</tbody>
</table>

*Adapted with permission, from Tanner J M, 1962. Growth at Adolescence, 2nd ed. Oxford: Blackwell Scientific Ltd. †Distribution and coarseness of pubic hair may differ according to ethnic background (e.g. an Aboriginal adolescent may not have the same distribution of coarse hair as a Caucasian adolescent).

**Sexuality**

Recent estimates suggest that approximately 70% of North American teenagers are sexually active by 17 years of age. This may occur earlier among Aboriginal teens in some communities. Given this prevalence of sexual activity, it is obvious that adolescence is an important time for a person to determine his or her sexual identity and attitudes toward sexual orientation.

In addition, the prevalence of STIs and unplanned pregnancies are high among adolescents. These are very important public health concerns for the community. Questions about sexual activity and the adolescent's peer group may help to identify problems.

**Homosexuality**

Complex physical and social issues arise for all homosexual adolescents. Seventeen percent of boys and 11% of girls report having had at least one homosexual experience by the age of 19 years. It is estimated that half of these adolescents will be homosexual in adulthood.
Teen Pregnancy: Testing And Counseling

A high index of suspicion is necessary. Consider the possibility of pregnancy when an adolescent presents with any of the following somatic complaints:

- Irregular menses
- Unusual vaginal bleeding
- Acute or chronic abdominal pain
- Unreliable menstrual history
- Amenorrhea

Urine Pregnancy Testing

Highly specific monoclonal antibody techniques yield positive results in early pregnancy. A urine pregnancy test usually has a positive result by 2 weeks after conception.

Counseling

Counseling the adolescent about her options related to pregnancy is an important role for nurses. Options include carrying the fetus to term and keeping the infant, carrying the fetus to term and placing the child for adoption, or therapeutic termination of the pregnancy. The pregnant adolescent will have to decide which option she will pursue, and referral should be available for all options.

Factors Of Teenage Pregnancy Associated With Risks To Infant

- Poor prenatal care (reluctance to seek care)
- Poor nutrition, leading to intrauterine growth retardation
- Smoking (one-third of pregnant teens)
- Use of illicit drugs
- Associated STIs
- Poor parenting skills

Follow-Up

- Nutritional status and weight gain by the adolescent mother constitute one of the most important features of good prenatal care for this age group
- Because the prevalence of STIs is higher among adolescents, the potential of passing such infections to the baby must be stressed; initial and follow-up cultures, as indicated, should be routine
- Assessment for immunity to rubella virus
- Long-term planning with respect to adoption placement or, more commonly, with respect to support for the adolescent mother once her baby is delivered
- Assessment and counseling for drug and alcohol abuse

Community Health Aims And Interventions

- Repeat pregnancy within 2 years after the first child is born to an adolescent female is a recognized problem
- Counseling and interventions with respect to appropriate postpartum contraception are key
- Ongoing surveillance of the adolescent's coping and parenting skills is of prime importance
- Community education programs to prevent unplanned teenage pregnancies, particularly those aimed at school-age children, are also important

Contraception

Hormonal Contraception

- The most effective non-surgical methods of preventing pregnancy in adolescents are oral contraception and Depo-Provera injection (every 3 months)
- The main problem with oral contraception as a form of birth control is poor compliance and discontinuation of therapy (which occurs in 25% to 50% of North American teenagers for whom this form of contraception has been prescribed)
Discontinuation is usually secondary to adverse effects or to family or community pressures regarding childbearing. Adolescent growth is not affected by the use of hormonal contraceptives.

Management Of Adolescent Females Requiring Contraception

- Detailed history and physical examination, including blood pressure
- Pelvic examination and Pap smear (if the adolescent is not yet sexually active, these tests can be deferred until she becomes sexually active)

Contraceptives And Counseling

The nursing profession has a vital role in educating and counseling adolescents about the risks associated with sexual activity. Use of contraception by sexually active adolescents should be encouraged.

Appropriate counseling addresses the various methods of contraception, presenting both their advantages and their disadvantages. The use of condoms must be heavily emphasized. Both contraceptives and condoms should be made readily available at the nursing station, and condoms should be available at other strategic places in the community.

Follow up at 1, 3 and 6 months after initiation of contraception to ensure no significant side effects and to monitor blood pressure.

Condoms and foam should be used as back-up contraception during the first month of oral contraceptive use. Thereafter, condom use, to prevent STIs, should be recommended.

For detailed information about contraceptive methods and choices for oral contraception, see "Contraception," in chapter 13, "Women's Health and Gynecology," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003.

Other Issues

Compliance

Compliance is a significant problem in adolescents, and lack of compliance is a major factor in the failure of oral contraception.

The adolescent should understand that initially there is a high likelihood of spotting or breakthrough bleeding and missed menses with use of hormonal contraceptives. These side effects usually diminish or disappear within 3-6 months.

Rubella

Adolescent females without documented evidence of rubella immunization should undergo rubella titer testing; if negative, measles-mumps-rubella vaccine should be given. Alternatively, those without any recorded evidence of immunization may be immunized without first undergoing rubella titer testing.

Pap Smear

A Pap smear should be obtained for any sexually active adolescent female - at annual intervals if results are normal or more frequently as dictated by findings.

Sexually Transmitted Infections

The occurrence of STIs in gay males is a significant public health issue. Consideration should be given to hepatitis B vaccination and to HIV, VDRL and STI testing for all sexually active adolescents.

Suicide


Injury Prevention

Alcohol, Nicotine, Drug And Inhalant Abuse

Drug abuse is widespread in North American society. The use of so-called gateway drugs, such as alcohol, tobacco and marijuana, usually begins in adolescence, and today's adolescents experiment at earlier ages than adolescents of previous generations.

Nicotine is the most commonly abused drug, followed by alcohol, marijuana and then stimulants such as amphetamines and cocaine. In Aboriginal communities, gas and solvent sniffing also constitute a significant hazard. Ecstasy (a drug used at raves) is a new drug of abuse. Generally, adolescent boys abuse all forms of drugs and alcohol to a greater extent than do adolescent girls.

Factors Associated With Higher-Risk Behaviors
- Drug and alcohol use
- Sexual activity
- Poor school performance
- Peer pressure

Risk For Substance And Alcohol Abuse
- Family history of alcohol or substance abuse on either side of the family
- Use of alcohol, marijuana or cocaine in early adolescence
- Use of cross-dependent drugs, such as marijuana, sedatives, tranquilizers
- Drug use within peer group
- Adolescents with attention deficit hyperactivity disorder, learning disability or depression
- Adolescents who are suicidal
- Family dysfunction: divorce, alcohol or drug abuse, child abuse, inconsistent or impulsive stealing
- Adolescents with school problems (e.g. absenteeism) or problems with the law

Alcohol

Genetic Risk Factors
One-third of surveyed alcoholics reported that at least one parent was alcoholic. Biological studies support this familial trend.

Preventive Measures
- Incorporate questions about alcohol, drug and cigarette use during routine questioning of adolescents, beginning at an early age. Look for a profile consistent with drug abuse (e.g. the T-ACE questionnaire).
- Any adolescent with school or family problems, depressive symptoms, antisocial behavior, a peer group that uses drugs heavily, or a family history of drug- or alcohol-related problems should be assessed for drug or alcohol abuse.

- Adolescents with a history of repeated accidents, drunk driving offenses, and other similar problems should be considered to have a drug or alcohol problem until proven otherwise.
- Adolescents with antisocial behavior in combination with significant drug or alcohol dependency usually require a long-term treatment program designed for their age group. Finding appropriate treatment programs is difficult, especially in remote areas, and reference to a social worker or a National Native Alcohol and Drug Abuse Program (NNADAP) worker with knowledge of appropriate referral agencies is generally required.
Nicotine

Nicotine is one of the most addictive (and lethal) drugs known. It is estimated that 85% of adolescents who learn to smoke cigarettes will become addicted.

**Nursing Intervention**

- Educate children early (when they are of school age) about the risks of tobacco use
- Counsel about the short-term effects: bad breath, staining of the teeth and fingers, foul-smelling clothes, decreased athletic fitness and high financial cost
- Provide those addicted to tobacco with smoking cessation counseling and support

Source: "Tobacco Use among Aboriginal Children and Youth," (CPS, Indian and Inuit Health Committee 1999)

Marijuana

This is the illicit drug most commonly used by adolescents and young adults. It is associated with an increase in the risk of respiratory cancer, as well as acute panic attacks, confessional states and acute psychotic reactions (especially in those with a genetic risk for mental illness).

Abuse of marijuana may be associated with chronic depressive illness or abuse of alcohol or other drugs.

Inhalants

Dozens of inhalants are available in stores. Commonly used products are liquids (such as model glue), contact cement, lacquers and aerosols (such as gasoline, cooking sprays and toiletries [hair spray, cologne]). Inhalants are most often used by younger adolescents.

Acute depression of the CNS can result, and there is a strong potential for accidents, such as burns or drowning. Sudden sniffing death is rare and is probably the result of rapid nasal or pulmonary absorption of the inhalant, which sensitizes the heart to arrhythmias (generally fatal ventricular arrhythmias).

Long-term neurologic deficit secondary to the inhalation of volatile hydrocarbons such as toluene has been documented, although much research is still needed in this category of drug abuse. Hearing loss and other cranial nerve deficits have been suggested, as well as long-term encephalopathy.

Interventions In Substance Abuse

**Prevention**

Healthcare professionals need to promote awareness about the health hazards of substance abuse to children, adolescents, parents and caregivers, teachers, vendors of volatile substances and community leaders.

Education is considered the most effective prevention strategy, particularly if it is initiated before the usual age of experimentation. A progressive school-based curriculum with developmentally appropriate modules, offered throughout elementary school, is seen as the most efficient strategy and should be implemented, particularly in areas where inhalant abuse is prevalent.

Providing alternative activities, such as recreational facilities, and promoting cultural values encourage positive lifestyles and may
diminish the risk of inhalant abuse and other destructive behaviors.

**Treatment**

Adolescents with significant alcohol, solvent or other drug problems should be referred to the most appropriate social services (e.g. NNADAP). Provincial alcoholism foundations also sponsor treatment programs specifically aimed at teenagers. In remote areas, consultation with a mental health worker or a physician may be indicated to establish the most effective and practical treatment program.

Source: "Inhalant Abuse," (CPS, Indian and Inuit Health Committee 1999)
Chapter 20 – General Emergencies and Major Trauma

Assessment And Management of Pediatric Trauma

- General Comments
- Nuances Of Pediatric Trauma
- Spinal Cord Injury
- General Approach To The Child With Trauma
- Primary Survey
- Resuscitation
- Secondary Survey
- Definitive Care

Major Emergency Situation

- Anaphylaxis
- Shock
- Overdoses, Poisonings And Toxidromes
- Fever Of Unknown Origin (Bacteremia And Sepsis)
**Assessment And Management of Pediatric Trauma**

**General Comments**

Trauma is the single largest most important cause of morbidity and mortality in all childhood age groups, except the first year of life. To reduce morbidity and mortality rates in the critical early hours after trauma has occurred (the "golden period"), early resuscitation and rapid transport are key.

**Nuances Of Pediatric Trauma**

- Multisystem injury is the rule rather than the exception.
- The priorities of pediatric trauma management are the same for children as for adults; however, children's unique anatomic characteristics deserve special consideration.
- Because of smaller body mass, energy from linear forces (e.g. fenders, bumpers, falls) results in greater force applied per unit body area.
- Children have less fat, less elastic connective tissue and close proximity of organs, which leads to more multisystem organ injuries.
- The skeleton is incompletely calcified and more pliable.
- Internal organs may be damaged without evidence of overlying bone fractures.
- If bones are broken, assume that a massive amount of energy was applied.
- The child's ability to interact and cooperate with parents or caregivers is limited, which makes history taking and physical examinations difficult.
- Children have a large body surface area in relation to their weight, relatively thin skin and a lack of insulating fat. These characteristics lead to increased loss of water and heat. Appropriate measures must be taken to ensure that injured children do not become hypothermic (e.g. thermal blankets, warmed IV fluids).
- "Normal" systolic blood pressure can be estimated by adding 80 to two times the child's age in years. Normal diastolic blood pressure is roughly two-thirds of the systolic pressure.
- Because of children's excellent capacity for physiologic adaptation, shock may go unrecognized in its early stages.

**Airway Injury**

The smaller the child, the greater the disproportion between the size of the cranium and the size of the midface. This produces a greater propensity for the posterior pharyngeal area to buckle as the relatively large occiput forces passive flexion of the cervical spine.

**Chest Trauma**

The child's chest wall is very compliant, which allows energy to be transferred to the intrathoracic soft tissues, frequently without any evidence of external chest wall injury. Consequently, pulmonary contusions and intrapulmonary hemorrhage are common.

The mobility of the thoracic structures makes the child more sensitive to tension pneumothorax and flail segments.

**Head Trauma**

Children are particularly susceptible to the secondary effects of brain injury produced by hypoxia, hypotension, seizures and hyperthermia. Shock resuscitation and avoidance of hypoxia are critically important to a favorable outcome.

Young children with open fontanels and mobile cranial suture lines are more tolerant of expansion of intracranial mass lesions, and decompensation may not occur until the mass lesion has become large. A bulging fontanel or a widened suture is an ominous sign.
Spinal Cord Injury

Children may sustain spinal cord injury without radiographic abnormality (known by the acronym SCIWORA). This situation occurs because the pediatric spine is so much more elastic and mobile than the adult spine. The interspinous ligaments and joint capsules are more flexible, the facet joints are flatter, and the relatively large size of the head allows for more angular momentum to be generated during flexion and extension, which in turn results in greater energy transfer. Spinal precautions must be maintained.

General Approach To The Child With Trauma

ABCs are your first priority. Primary survey and resuscitation are followed by secondary survey, definitive care and finally transport.

The primary survey and resuscitation are done simultaneously. During this period, a patent airway is established while control of the cervical spine is maintained.

Maintenance of airway patency is obviously the most critical factor, and cervical spine injury should be assumed in every seriously injured child, until proven otherwise.

The next priorities are as follows:

- Adequate ventilation
- Treatment of shock
- Identification of life-threatening injuries

The child with multisystem trauma may have both cardio respiratory failure and shock. A rapid evaluation of the cardiopulmonary system must be performed, along with a rapid thorax-abdominal examination to detect life-threatening chest or abdominal injuries that might interfere with successful resuscitation. For instance, ventilation and oxygen therapies may be ineffective until tension pneumothorax is treated.

Common errors in resuscitation include failure to:

- Open and maintain the airway
- Provide appropriate and adequate fluid resuscitation to children with head injuries
- Recognize and treat internal hemorrhage

Primary Survey

The primary survey is performed to identify and simultaneously manage life-threatening conditions.

It consists of ABC plus D and E:

- A for **airway** maintenance with cervical spine control
- B for **breathing** and ventilation
- C for **circulation** with hemorrhage control
- D for **disability** (neuralgic evaluation)
- E for **exposure** and environmental control

**Airway**

Assess for signs of airway obstruction such as foreign bodies or facial, mandibular, tracheal or laryngeal fracture.

The cervical spine must be protected (use chin lift or jaw thrust). Do not hyperextend, hyperflex or rotate the cervical spine. Cervical immobilization should be achieved.

**Breathing And Ventilation**

Inspection, palpation, percussion and auscultation should be performed to assess for tension pneumothorax, flail chest, pulmonary contusions, open pneumothorax, fractured ribs and any other condition that might compromise breathing.
Circulation With Hemorrhage Control

- Hypotension after trauma should be considered hypovolemic in origin until proven otherwise.
- It is generally assumed that any child who is hypotensive secondary to hypovolemia has lost at least 25% of the blood volume.
- Reduction in level of consciousness may be caused by cerebral hypoperfusion.
- Ashen gray or white skin color is a sign of hypovolemia.
- Rapid, thready pulses and delay of capillary refill are early signs of hypovolemia.
- Rapid external blood loss should be managed initially by direct manual pressure on the wound.

Disability (Neurologic Evaluation)

Use the AVPU method, as well as pupillary size and reactivity, to assess level of consciousness. The pediatric Glasgow coma score (see Table 20-1, below) is always obtained during the secondary survey.

- A for alert
- V for responds to verbal stimuli
- P for responds only to painful stimuli
- U for unresponsive

Alteration in the level of consciousness should prompt an immediate re-evaluation of oxygenation, ventilation and circulation. If these are adequate, assume that the trauma is the cause of the decrease in level of consciousness. Alcohol or drugs may also reduce the level of consciousness, but they are diagnoses of exclusion in a person with trauma.

Exposure And Environmental Control

Completely undress the child, but protect from hypothermia. Warm blankets, warmed IV fluids and a warm environment must be provided.

Resuscitation

Airway

A person with compromised airways and anyone with ventilatory problems needs an oral airway. The airway must be protected and maintained at all times, and ventilation with bag or mask should be performed as required.

Oxygen

Oxygen should be given to all children with trauma, and should be freely used (10-12 L/min by non-rebreather mask).

Intravenous Therapy

Two large-bore IV lines should be inserted. Remember that if an IV line cannot be placed promptly, an intraosseous needle should be inserted instead (see "Intraosseous Access," in chapter 2, "Pediatric Procedures"). If the child is in severe shock, go directly to intraosseous access.

Do not try to establish intraosseous access in a fractured bone.

Shock

See also "Shock," below, this chapter.

Shock should be assumed to be hypovolemic in origin, since neurogenic shock and cardiogenic shock are rare in children with trauma. Shock should be treated aggressively with fluids.

Fluid resuscitation is generally achieved with normal saline or Ringer's lactate. A fluid bolus of 20 mL/kg is given over a short period of time (e.g. 20 minutes). If normovolemia is not restored, bolus infusions of 20 mL/kg are continued until stabilization is achieved.

A very limited amount of time (60-90 seconds) should be spent establishing a peripheral venous line in the hemodynamically unstable child. Intraosseous infusion provides rapid access to the circulation and is safer. See "Intraosseous Access," in chapter 2, "Pediatric Procedures."
**ECG Monitoring**
If available, ECG monitoring should be used.

- Dysrhythmias, tachycardia, atrial fibrillation, premature ventricular contractions and ST segment changes may all indicate cardiac contusion
- Bradycardia, premature beats or aberrant conduction patterns may indicate hypoxia, hypothermia or hypoperfusion

**Urinary Catheter**
Place a urinary catheter, unless urethral transection or injury is suspected.

Genital and rectal examinations are required before insertion of a urinary catheter.

Contraindications to placing a Foley catheter:
- Blood is apparent at the urethral meatus
- Blood is apparent in the scrotum

Verifying adequate urinary output (1-2 mL/kg per hour) is important in the assessment of fluid replacement, but in the immediate time frame of changes associated with resuscitation, the vital signs are more important.

**Gastric Tube**
A gastric tube should be inserted to reduce stomach distension and to reduce the risk of aspiration.

If fracture of the cribriform plate is confirmed or suspected, consult a physician about inserting a gastric tube.

**Secondary Survey**
The secondary survey begins once the primary survey (ABCs) is completed, resuscitation has commenced, and the child's ABCs have been reassessed.

The secondary survey serves to identify any potentially life-threatening cardiopulmonary injuries that were not immediately evident in the primary survey. It consists of a head-to-toe evaluation, including all vital signs, accompanied by a complete history and physical examination, a complete neuralgic evaluation and the pediatric Glasgow coma score.

1. Record vital signs, including pulse oximetry (if available).

2. Obtain a history of the injury. The history should include especially the time and mechanisms of the injury (e.g. whether it was blunt or penetrating), the child's status at the scene of the incident, any changes in status over time and any complaints the child may have. If the child is younger or unconscious, ask bystanders or witnesses. If the child is unconscious, look for a medical alert tag.

3. The SAMPLE mnemonic is useful in obtaining the history from a conscious child:
- S for symptoms
- A for allergies
- M for medications
- P for past medical history
- L for last meal time
- E for events and environment related to the injury

4. Perform a detailed head-to-toe physical examination. Use log roll maneuver with spine precautions to assess posterior chest wall, flanks, back and rectum. If you find an impaled object, do not remove it. Instead, stabilize the object in place.

**Head And Neck**
First, reassess ABCs.

**Inspection and Palpation of Skull and Face**
- Deformities, contusions, abrasions, penetration, burns, lacerations or swelling
- Tenderness, instability or crepitations
- Battle's sign (bluish discoloration over mastoid process)
- Eyes: conjunctiva, PERRLA (pupils equal, round, reactive to light, accommodation)
- Raccoon-like eyes (which could indicate basal skull fracture)
Clear nasal discharge (which indicates CSF rhinorrhea)
Ears: blood in canal or hemotympanum (bluish purple color behind eardrum, due to presence of blood; occurs with basal skull fracture)
Check for voluntary symmetric movement of facial muscles

**Inspection and Palpation of Neck**
- Distension of neck veins (sign of tension pneumothorax or cardiac tamponade)
- Tracheal deviation
- Deformities, contusions, abrasions, penetration, burns, lacerations or swelling
- Check carotid pulse again
- Assume injury to the cervical spine if trauma has occurred above clavicle
- Ensure adequate immobilization of the neck
- Apply a cervical collar if not already done

**Abdomen**

**Inspection**
- Penetrating wounds, blunt trauma, lacerations
- Bruising (anterior, sides)
- Bleeding
- Distension
- Movement with respiration

**Auscultation**
- Bowel sounds

**Palpation**
- Tenderness
- Abdominal guarding, rigidity
- Rebound tenderness
- Fractures of lower ribs (ruptured spleen, possible penetrating wound, bowel injury and intra-abdominal hemorrhage possible)

**Pelvis And Genitalia**

**Inspection**
- Perineal laceration, hematoma or active bleeding
- Blood coming from urethral meatus

**Palpation**
- Tenderness of iliac crest and symphysis pubis (indicating pelvic fracture)
- Distension of bladder

Remember that pelvic and femoral fractures can cause extensive loss of blood.

**Extremities**

**Inspection**
- Bleeding, lacerations, bruising, swelling, deformity
- Leg position: unusual external rotation of a leg may indicate fracture of the femoral neck or the limb
- Movement of limbs

**Palpation**
- Sensation
- Tenderness
- Crepitus
- Muscle tone
- Distal pulses, capillary refill
- Reflexes: presence, quality

Remember that pelvic and femoral fractures can cause extensive loss of blood.
Perform log roll maneuver with spine precautions to assess back and rectum.

**Back**

**Inspection**
- Bleeding
- Lacerations
- Bruising: posterior chest wall, flanks, low back, buttocks
- Swelling

**Palpation**
- Tenderness
- Deformity
- Crepitus

**Rectum**

**Inspection**
- Occult blood

**Palpation**
- Integrity of walls, sphincter muscle tone

**Central Nervous System**
Perform a neurologic assessment to evaluate the child's present level of function. Determine the level of consciousness according to the pediatric Glasgow coma score (Table 20-1).

**Signs of Skull Fracture**
- Periorbital bruising (indicates basal skull fracture)
- Clear nasal discharge (CSF) (indicates basal skull fracture)
- Bruising behind ears, blood coming from ears, blood behind eardrum (indicates basal skull fracture)
- Skull lacerations with palpable bony irregularity or depression (indicates some form of skull fracture)

Remain calm and think clearly. Try to do things in a logical order, as outlined above.

### Table 20-1: Scoring for the Pediatric Glasgow Coma Score

<table>
<thead>
<tr>
<th>Feature</th>
<th>Score</th>
<th>&gt; 1 year</th>
<th>Age group and response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyes Opening</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Spontaneously</td>
<td>&lt; 1 year</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>To verbal command</td>
<td>Spontaneously</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>To pain</td>
<td>To shout</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>No response</td>
<td>No response</td>
</tr>
<tr>
<td>Best Motor Response</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response</td>
<td>6</td>
<td>Obeys</td>
<td>&lt; 1 year</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Localizes pain</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Flexion withdrawal</td>
<td>Flexion normal</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Flexion abnormal (decorticate rigidity)</td>
<td>Flexion abnormal (decorticate rigidity)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Extension (decerebrate rigidity)</td>
<td>Extension (decerebrate rigidity)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>No response</td>
<td>No response</td>
</tr>
<tr>
<td>Best Verbal Response</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response</td>
<td>5</td>
<td>Oriented and converses</td>
<td>Birth to 23 months</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Disoriented and converses</td>
<td>Smiles, coos, cries appropriately</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Inappropriate words</td>
<td>Cries</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Incomprehensible sounds</td>
<td>Inappropriate crying and/or screaming</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>No response</td>
<td>No response</td>
</tr>
</tbody>
</table>

* Score is obtained by determining the score for each of the three criteria and summing them. Note: NA = not applicable
Definitive Care

- Resuscitative measures initiated earlier are continued (e.g. airway, IV therapy, oxygen)
- Identified conditions should be managed according to their priority
- Ensure that airway is protected in an unconscious child
- Apply suction as needed
- Administer supplemental oxygen, even if breathing appears adequate
- Treat hypotension aggressively with IV fluid replacement (see "Shock," below, this chapter)
- Insert nasogastric tube and apply suction (if not already done), unless the child has facial fractures or a suspected basal skull fracture; if in doubt, do not insert the tube--consult a physician first
- Insert Foley catheter (if no contraindications and not already done)
- Contraindications to catheterization: blood at urethral meatus, blood in scrotum, obvious pelvic fracture

Bandaging And Splinting

- If necessary, finish bandaging and splinting injuries
- Angulated fractures of the upper extremities are best splinted as found
- Fractures of the lower extremities should be gently straightened with traction splints (e.g. Thomas splint)

Monitoring And Follow-Up

- Monitor and reassess ABCs frequently
- Monitor vital signs as frequently as possible until condition is stable
- Anytime the child's condition worsens, perform a reassessment survey
- Anytime you carry out an intervention, perform a reassessment survey
- Monitor hourly urine output (aim for urine output >1 mL/kg per hour)

Irritability or restlessness may be caused by hypoxia, bladder or gastric distension, fear, pain or head injury. However, do not assume head injury. Rule out correctable causes first.

Head injuries are never a cause of hypovolemic shock. Look for other source of hemorrhage elsewhere.

Checklist

- Check airway tubes for patency
- Check oxygen rate
- Check IV lines for patency and rate of infusion
- Check for patency of decompression needle for tension pneumothorax, if inserted
- Check splints and dressings
- Check rate of hyperventilation of any child with decreased level of consciousness

Consultation

- Consult a physician at transfer facility as soon as able (e.g. when child's condition is stabilized).

Referral

- Medevac as soon as possible
- Make sure that child's condition is as stable as possible before leaving health facility
- Pressure effects on certain injuries are accentuated in unpressurized aircraft; maximum flying altitudes are applicable; see Patient Care in Flight Manual (Medical Services Branch 1985)
Major Emergency Situation

Anaphylaxis

Definition
Rare and potentially life-threatening allergic reaction. The symptoms develop over several minutes, may involve multiple body systems (e.g. skin, respiratory system, circulatory system) and may progress to unconsciousness only as a late event in severe cases. Rarely is unconsciousness the sole manifestation of anaphylaxis.

Anaphylaxis must be distinguished from fainting (vasovagal syncope), which is a more common and benign occurrence. Rapidity of onset is a key difference. When a person faints, the change from a normal to an unconscious state occurs within seconds. Fainting is managed simply by placing the person in a recumbent position. Fainting is sometimes accompanied by brief clonic seizure activity, but this generally requires no specific treatment or investigation.

Causes
- Vaccines
- Injectable drugs
- Insect sting (e.g. bee)
- Food allergy (e.g. peanuts)

History
Anaphylaxis usually begins a few minutes after injection of the offending substance and is usually evident within 15 minutes. The symptoms may include the following:
- Sneezing, coughing
- Itching
- "Pins-and-needles" sensation of the skin
- Flushing of the skin
- Facial edema (perioral, oral or periorbital urticaria)
- Nausea, vomiting
- Early respiratory difficulties (e.g. wheezing, dyspnea, tightness of the chest)
- Palpitations
- Hypotension, which may progress to shock and collapse
- Cardiovascular collapse can occur without respiratory symptoms.

Severe Reaction
- Severe respiratory distress (lower respiratory obstruction characterized by high-pitched wheezing, upper airway obstruction characterized by stridor)
- Difficulty speaking
- Difficulty swallowing
- Agitation
- Shock
- Loss of consciousness

Physical Findings
- Tachycardia
- Tachypnea, labored respiration
- Blood pressure low-normal (child hypotensive if in shock)
- Pulse oximetry may show hypoxia
- Child in moderate to severe distress
- Use of accessory muscles of respiration
- Chest: air entry reduced, mild to severe wheezing
- Child flushed and diaphoretic
- Generalized urticaria (hives)
- Facial edema
- Diminished level of consciousness
- Skin feels cool and clammy

Differential Diagnosis
- Asthma
- Foreign-body aspiration
- Angioedema

Complications
- Hypoxia
- Shock
- Airway obstruction due to edema of upper airway
- Convulsions
- Aspiration
- Death

Diagnostic Tests
- None.
**Management**

**Goals of Treatment**
- Improve oxygenation
- Alleviate symptoms
- Prevent complications
- Prevent recurrence

Early recognition and treatment of anaphylaxis are vital.

**Nonpharmacologic Interventions**
- Place the child in a recumbent position (elevating the feet if possible)
- Establish an oral airway if necessary
- Place a tourniquet (when possible) above the site of injection; release for 1 minute every 3 minutes

**Adjuvant Therapy**

**Severe Anaphylaxis**
- Give oxygen by mask, 10-12 L/min by non-rebreather mask; keep oxygen saturations > 97%
- Start IV therapy with normal saline to keep vein open, unless severe anaphylaxis and signs of shock are evident (see "Shock," below, this chapter, for details of fluid resuscitation in shock)

**Pharmacologic Interventions**

**Promptly administer:**
- *aqueous epinephrine (D class drug), 1:1000, 0.01 mL/kg (maximum dose 0.5 mL) SC or IM in the limb opposite that in which the original injection was given*  
  SC epinephrine injection is appropriate for mild cases or those treated early.

In severe cases, an IM injection should be given because this route leads more quickly to generalized distribution of the drug. A single SC injection is usually sufficient for mild or early anaphylaxis. Epinephrine can be repeated twice at 20-minute intervals, if necessary. In severe reactions it may be necessary to give these repeat doses at shorter intervals (10-15 minutes).

If the vaccine causing anaphylaxis was given subcutaneously, an additional dose of *aqueous epinephrine (D class drug) 1:1000 0.005 mL/kg (maximum dose 0.3 mL)* can be injected at the vaccination site to slow absorption of the vaccine. However, if the vaccine was given intramuscularly, local injection of epinephrine at the vaccination site is contraindicated because it will dilate the vessels and speed absorption.

Speedy intervention is of paramount importance. Failure to use epinephrine promptly is more dangerous than using it quickly but improperly.

**Epinephrine Dose**

The epinephrine dose should be carefully determined. Calculations based on body weight are preferred when weight is known. When body weight is not known, the dose of epinephrine (1:1000) can be approximated from the subject's age (Table 20-2).

Excessive doses of epinephrine can compound a subject's distress by causing palpitations, tachycardia, flushing and headache. Although unpleasant, such side effects pose little danger. Cardiac dysrhythmias may occur in older adults but are rare in otherwise healthy children.

**Table 20-2: Epinephrine Dose on the Basis of Age**

<table>
<thead>
<tr>
<th>Age</th>
<th>Dose in mL</th>
<th>Dose in mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 to 6 months*</td>
<td>0.07 mL</td>
<td>0.07 mg</td>
</tr>
<tr>
<td>12 months*</td>
<td>0.1 mL</td>
<td>0.1 mg</td>
</tr>
<tr>
<td>18 months* to 4 years</td>
<td>0.15 mL</td>
<td>0.15 mg</td>
</tr>
<tr>
<td>5 years</td>
<td>0.2 mL</td>
<td>0.2 mg</td>
</tr>
<tr>
<td>6 to 9 years</td>
<td>0.3 mL</td>
<td>0.3 mg</td>
</tr>
<tr>
<td>10 to 13 years</td>
<td>0.4 mL†</td>
<td>0.4 mg</td>
</tr>
<tr>
<td>&gt; 14 years</td>
<td>0.5 mL†</td>
<td>0.5 mg</td>
</tr>
</tbody>
</table>

* Dose for children between the ages shown should be approximated, the volume being intermediate between the values shown or increased to the next larger dose, depending on the practicability.  
† For a mild reaction a dose of 0.3 mL can be considered.

**Severe Anaphylaxis**

In addition to the epinephrine, give the following:
- *diphenhydramine hydrochloride (A class drug) 1-2 mg/kg/dose, max 50 mg/dose*

This drug should be reserved for children who are not responding well to epinephrine or may be used to maintain symptom control in those who have responded (since epinephrine is a short-acting agent), especially if transfer to an acute care facility cannot be effected within 30 minutes. Oral administration of diphenhydramine is preferred.
for conscious children who are not seriously ill, because pain results when the drug is given intramuscularly. This drug has a high safety margin, which means that precise dosing is less important.

The approximate doses of diphenhydramine for injection (50 mg/mL solution) are shown in Table 20-3.

### Table 20-3: Diphenhydramine Dose on the Basis of Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Dose in mL</th>
<th>Dose in mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2 years</td>
<td>0.25 mL</td>
<td>12.5 mg</td>
</tr>
<tr>
<td>2 to 4 years</td>
<td>0.5 mL</td>
<td>25 mg</td>
</tr>
<tr>
<td>5 to 11 years</td>
<td>1 mL</td>
<td>50 mg</td>
</tr>
<tr>
<td>≥ 12 years</td>
<td>1-2 mL</td>
<td>50-100 mg</td>
</tr>
</tbody>
</table>


**For Bronchospasm**

*salbutamol (D class drug)*, by nebulizer, three doses q20min (dose dependent on body weight)

- Weight = 10 kg: 1.25-2.5 mg/dose in 3 mL NS
- Weight = 11-20 kg: 2.5 mg/dose in 3 mL NS
- Weight = 20 kg: 5 mg/dose in 3 mL NS

---

**Monitoring and Follow-up**

**Severe Anaphylaxis**

Monitor ABCs, vital signs and cardiorespiratory status frequently.

**Appropriate Consultation**

**Severe Anaphylaxis**

Consult a physician as soon as child's condition stabilizes; physician may recommend IV steroids and ranitidine.

**Referral**

Medevac as soon as possible. In all but the mildest cases, children with anaphylaxis should be hospitalized overnight or monitored for at least 12 hours.

Because anaphylaxis is rare, epinephrine vials and other emergency supplies should be checked regularly and should be replaced if outdated.
Shock

Definition

A condition that occurs when perfusion of tissue with oxygen becomes inadequate. As a result, the cells of the body undergo shock, and grave cellular changes occur. Eventually cell death follows.

Shock is categorized in many ways, for example, according to the state of physiologic progression that has occurred:

- **Compensated shock**: vital organ perfusion is maintained by endogenous compensatory mechanisms
- **Uncompensated shock**: compensatory mechanisms have failed; associated with hypotension and impairment of tissue perfusion
- **Irreversible shock**: multiple end-stage organ failure and death occur, despite occasional return of spontaneous cardiorespiratory function

Arterial blood pressure is often preserved by compensatory vasoconstrictive mechanisms until very late in shock. Therefore, an over-reliance on arterial blood pressure readings can delay recognition and timely treatment of shock.

Types Of Shock

- **Hypovolemic shock**: inadequate perfusion of vital organs because of reduction in circulating blood volume
- **Cardiogenic shock**: due to the inability of the heart to pump blood to tissues (decreased cardiac output), as in congestive heart failure; rare in children
- **Distributive shock**: due to massive vasodilatation from interference with sympathetic nervous system or effects of histamine or toxins, such as in anaphylaxis, septic shock, neuralgic injury, spinal cord injury, intoxication with some drugs (e.g. tricyclic antidepressants, iron)
- **Obstructive (mechanical) shock**: obstruction of cardiac filling such as that caused by pericardial tamponade or tension pneumothorax
- **Dissociative shock**: oxygen is not released from hemoglobin to the cells (as in carbon monoxide poisoning)
- **Hypoxemic shock**: caused by respiratory failure from lung injury or obstruction, or disruption of the airway
- **Low-volume shock (absolute hypovolemia)**: caused by hemorrhage or other major loss of body fluid
- **High-space shock (relative hypovolemia)**: caused by spinal injury, syncope, severe head injury, vasoconstriction from hypoxia

History

Infant

- May become combative initially, then lethargic
- Poor feeding
- Decreased responsiveness to parents or caregivers
- History of trauma
- History of symptoms of an underlying illness (e.g. cough indicating pneumonia)

Older Child

- Nausea
- Lightheadedness, faintness
- Thirst
- Altered level of consciousness
- Other symptoms depending upon underlying cause
- Trauma

Physical Findings

Remember: ABC’s are the priority.

The physical findings are variable, depending on whether the child is in compensated or decompensated shock. It is generally assumed that any child who is hypotensive secondary to hypovolemia has lost at least 25% of total circulating blood volume. Do not rely on blood pressure readings. In children, blood pressure is preserved by compensatory vasoconstrictive mechanisms until very late in shock. Appearance, breathing and perfusion are more reliable clinical indicators of shock.

Prolonged capillary refill (>2 seconds) is a sign of decreased tissue perfusion and is more beneficial as a sign of shock in children than in adults.

Persistent tachycardia is the most reliable indicator of shock in children.
Compensated Shock
- Appearance: alert, anxious
- Work of breathing: tachypnea or hyperpnea
- Circulation: tachycardia, cool or pale skin, decreased peripheral pulses

 Decompensated Shock
- Appearance: altered mental status, reduced level of consciousness
- Work of breathing: tachypnea or bradypnea
- Circulation: tachycardia or bradycardia, mottled or cyanotic skin, peripheral pulses absent


Differential Diagnosis
- Sepsis
- Anaphylaxis
- Status asthmaticus

Complications
- Myocardial ischemia or infarction
- Cardiorespiratory failure or arrest
- Renal failure
- Death

Diagnostic Tests
- None.

Management
- Remember: ABCs are the priority.

Goals of Treatment
- Restore circulating blood volume
- Improve oxygenation of vital tissues
- Prevent ongoing volume losses

Nonpharmacologic Interventions
- Assess and stabilize ABCs
- Ensure that airway is patent and ventilation is adequate
- Insert oral airway and ventilate with Ambu bag (using oxygen) as needed
- Control any external bleeding: use direct pressure to control bleeding from external wounds
- Place in head-down position

Adjuvant Therapy
- Give oxygen at 12-15 L/min by non-rebreather mask with reservoir; keep oxygen saturation ≥97%
- Start 2 large-bore IV lines with normal saline (or Ringer's lactate)
- Give 20 mL/kg IV fluid rapidly as a bolus over 20 minutes
- Reassess for signs of continuing shock
- If shock persists, continue to administer fluid in 20 mL/kg boluses, and reassess after each bolus
- Adjust IV rate according to clinical response
- Ongoing IV therapy is based on response to initial fluid resuscitation, continuing losses and underlying cause
- For maintenance fluid requirements, see "Fluid Requirements in Children" in chapter 4, "Fluid Management,"
- If unable to access a peripheral vein quickly (in 60-90 seconds or less), institute intraosseous infusion (see "Intraosseous Access," in chapter 12, "Pediatric Procedures")

After Initial Resuscitation
- Insert indwelling urinary catheter
- Insert nasogastric tube prn

Monitoring and Follow-Up
- Monitor ABCs, vital signs (including pulse oximetry, if available) and level of consciousness as often as possible until condition is stable
- Frequent reassessment for continuing blood loss is important
- Monitor hourly intake and urine output
- Identify and manage underlying cause of shock (e.g. manage sepsis with IV antibiotics)
- Assess stability of pre-existing medical problems (e.g. diabetes mellitus)

Referral
- Medevac.
Overdoses, Poisonings And Toxidromes

Definition
Ingestion of a potentially toxic substance, including a drug, a household or industrial chemical, plant material or waste products.

One of the unique features of poisoning during childhood is its two very different scenarios. The first involves the young child between 1 and 5 years of age who accidentally ingests a small amount of a substance that may or may not have pharmaceutical properties. The second involves the teenager who intentionally ingests a large amount of one or more substances, usually pharmaceutical.

Although the latter situation can and does result in significant morbidity, it is quite uncommon in young children. In the younger age group, less than 10% of those who ingest a potentially toxic substance are actually poisoned, either because the ingested substance is inherently non-toxic or because the amount ingested is too small to cause toxic effects.

The management of intentional overdose by teenagers is the same as for adults. See "Overdoses, Poisonings and Toxidromes," in chapter 14, "General Emergencies and Major Trauma," in the NWT Clinical Practice Guidelines for Primary Community Care Nursing (Adult) 2003

Initial Evaluation
ABCs are the first priority.

Ensure that the child's condition is stable. If not, take steps to stabilize before obtaining the history, performing the physical examination and instituting management.

History
Typically the young child is brought to the healthcare provider very soon after the discovery of the accidental ingestion. In most situations, there has not been enough time for symptoms to have occurred.

Determine:
- Circumstances of ingestion
- What and how much was taken
- The time of ingestion
- When the symptoms began, if any
- Whether symptom intensity has decreased, increased or remained the same

Retrieve the container (send someone to the child's home if necessary) and any spilled pills. If the informant can reliably state how much of the substance had already been used, this information can be used in the calculation:

Initial volume or number of pills minus amount remaining = maximum ingestion

Always assume maximum ingestion. For example, if two children have shared a bottle of pills, assume that either child could have ingested the whole amount.

Make inquiries about the circumstances of the ingestion:
- How did the child get at the container?
- Was the container left within easy reach?
- Was the child-resistant closure left disengaged?

This information is useful for preventive counseling at the end of the encounter.

Although most childhood poisonings are accidental, always be on guard for purposeful administration by a parent or caregiver. This should be considered especially in children <1 year old and in any child with repeated ingestion of a potentially toxic substance, particularly if the various incidents involve the same compound.

A careful history is the most important part of the assessment, as there may be no clinical signs at the time of presentation.

Physical Examination
- ABCs are the priority.
- Vital signs: temperature, heart rate, respiratory rate, depth of respiration, blood pressure
- Level of consciousness
• Closely examine cardiovascular, respiratory and central nervous systems

Signs vary with the type of poison. The main systems involved in poisoning are the cardiovascular, respiratory and central nervous systems, but in certain situations there is a need to focus on other systems (e.g. the mouth and the esophagus after ingestion of caustic alkali).

**Management: General Approach**
Opiate poisonings in northern populations are rare. Remember that all features of the classic opiate triad (decreased level of consciousness, depressed respiration and pinpoint pupils) need not be present for diagnosis.

If you are concerned about opiate poisoning in a small child, ask if he or she has had access to cough medications.

**Nonpharmacologic Interventions**
Stabilize ABCs as required.
For all children with decreased level of consciousness without apparent cause:
- Give oxygen, 6-10 L/min or more by mask
- Start IV therapy with normal saline (if there is evidence of compromise in circulation or significant dehydration); run at a rate sufficient to maintain vital signs and hydration

Nasogastric tube may be necessary for a child who is unconscious and who cannot or will not drink.

Administer charcoal therapy (see "GI Tract Decontamination," below, this section).

Insert Foley catheter (in child with altered level of consciousness).

**Pharmacologic Interventions**
If opiate poisoning is suspected:
*naloxone (D class drug), 0.1 mg/kg by IV push*

**GI Tract Decontamination**
Activated charcoal is now recommended as the sole therapy and should be given for ingestion of any toxic material, except iron, hydrocarbons, alcohols and caustic agents. It is most effective within one hour of ingestion.

- Charcoal is supplied in premixed containers as 50 g of charcoal in 250 mL of either water or 70% sorbitol
- Dose for children <6 years old: 25 g of charcoal in water orally or, if child will not drink, by nasogastric tube (use a 12-14 French tube, as smaller ones tend to become clogged)
- The only risk associated with charcoal therapy is aspiration should the child vomit; this might occur if the child ingested theophylline or salicylates or has already been given ipecac
- Shake the bottle thoroughly before opening because the charcoal tends to settle
- Before infusing the charcoal into a nasogastric tube, verify that the tube is in the stomach (by spontaneous return of gastric contents or auscultation of injected air over the left upper quadrant)

**Appropriate Consultation**
The primary consultant for poisonings is your regional poison control center. This service is immediately available at all times. Be prepared to provide the following information:
- Product ingested
- Approximate dose
- Time of ingestion
- Age and weight of child
- Vital signs
- Level of consciousness
- Any pertinent symptoms or signs

The poison control center will advise whether the exposure is potentially toxic, will provide treatment advice and will suggest whether evacuation to a medical facility is required.

Consult a physician to review unfamiliar management and recommendations for evacuation.

**Monitoring and Follow-Up**
- Monitor ABCs, vital signs, level of consciousness, cardiorespiratory function, intake and output frequently if the child's condition is unstable and transfer to hospital is planned
- If child is discharged home, next-day follow-up is recommended
Prevention
Information obtained during the initial history is often very helpful for post-encounter preventive counseling. Poison prevention as well as accident prevention counseling should be a regular part of your follow-up and a regular part of well-baby visits beginning after the child reaches 6 months of age.

Referral
The child should be medevaced if there is a possibility that he or she ingested a toxic amount of the compound or there are clinical symptoms of toxic effects.

Remember to obtain a blood sample before evacuation and to note the time that this sample was obtained.

In your letter of referral, include all of the information requested above, as well as any treatment interventions already undertaken, the interim clinical course and the time at which the blood was drawn.

Table 20-4: Antidotes for Poisonings

<table>
<thead>
<tr>
<th>Toxins and Indications</th>
<th>Antidotes</th>
<th>Required Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaminophen</td>
<td>n-acetylcysteine</td>
<td>Verify protocol with poison control centre and physician</td>
</tr>
<tr>
<td>Ethylene glycol, methanol</td>
<td>Ethanol</td>
<td></td>
</tr>
<tr>
<td>Iron (challenge test or treatment)</td>
<td>Deferoxamine</td>
<td></td>
</tr>
<tr>
<td>Isoniazid (INH)</td>
<td>Pyridoxine</td>
<td>50-75 mg</td>
</tr>
<tr>
<td>Narcotics</td>
<td>Naloxone</td>
<td>0.1 mg/kg per dose or 2-4 mg for children &gt; 5 years old</td>
</tr>
<tr>
<td>Organophosphates or carbamate insecticides; cholinergic crisis</td>
<td>Atropine</td>
<td>0.5 mg slowly IV If symptoms of toxicity persist and there are no cholinergic side effects, re-administer q5min to a maximum of 2 mg</td>
</tr>
<tr>
<td>Most oral toxins</td>
<td>Activated charcoal</td>
<td>25-50 g</td>
</tr>
</tbody>
</table>

Specific Poisonings
Table 20-4 presents the antidotes for specific poisonings likely to occur in the North.

Acetaminophen
This is the most common drug overdose at all ages. Despite the tens of thousands of reported ingestions by children <6 years old, there have been only a few cases of significant toxic effects, primarily because small children usually ingest pediatric formulations. Ingestions of greater than 150 mg/kg should be a cause for concern, but remember that this figure also incorporates a safety factor, such that significant toxic effects actually manifest at a somewhat higher dose. The organ at risk is the liver, with toxic effects occurring a few days after the ingestion.

Toxic effects can be prevented if the antidote N-acetylcysteine is started within 8 hours after the overdose. Although the antidote becomes less effective beyond 8 hours, it is still worthwhile to initiate therapy between 8 and 24 hours after ingestion. In medical facilities, administration of this antidote is determined by acetaminophen blood level, which is unavailable in the nursing station.

History and Examination
Although the child may be completely asymptomatic, there is frequently nausea, vomiting and abdominal cramps in those at risk for hepatic toxicity.
- Obtain history of total maximum ingestion
- Verify ingestion quantity by obtaining the container

Management
See "Management: General Approach," above.

Specific Interventions
All children who have ingested more than 150 mg/kg should receive activated charcoal, and N-acetylcysteine (D class drugs) may be given
according to oral protocol, as follows:
loading dose: 140 mg/kg PO
subsequent doses: 70 mg/kg PO q4h for 17 doses
Once N-acetylcysteine has been started, the child
should be evacuated to a medical facility.
Remember to obtain a blood sample before
evacuation and to note the time at which it was
obtained.

N-Acetylcysteine may also be administered
intravenously or via a nebulizer mask.

Iron poisoning can be quite serious. It usually
results from ingestion of a prenatal supplement or
other adult dosage form. The toxic effects depend
on the amount of elemental iron ingested (ferrous
sulfate is 20% elemental iron, ferrous fumarate is
33% elemental iron, and ferrous gluconate is 12%
 elemental iron). Therefore, for example, a 300-mg
tablet of ferrous sulfate contains 60 mg of
elemental iron.

History
Verify maximum amount ingested.

With greater amounts ingested, degree of toxic
effects also increases. At 20 mg of elemental iron,
expect GI symptoms, such as vomiting and
diarrhea, with the possibility of blood in the
emesis or stool. At 60 mg/kg of elemental iron,
there is significant risk of GI hemorrhage, shock
and acidosis.

Coma occurs late in the overdose and is a
consequence of shock and acidosis.

Management
See "Management: General Approach," above.
Iron overdose is one of the few situations in which
activated charcoal is ineffective.

Specific Interventions
If more than 20 mg/kg of elemental iron has been
ingested, administer syrup of ipecac unless there has
already been significant spontaneous emesis (three or
more episodes)

Protect the airway.

Deferoxamine is the specific antidote for iron
poisoning. It should be administered only after
consultation with a poison control center and a
physician.

Remember to draw a blood sample for determination
of iron level and send it with the child on transfer. It is
especially important to obtain this sample before
initiating deferoxamine therapy, because the antidote
interferes with the laboratory measurement of iron
level.

Referral
Medevac any child:
• who has symptoms of iron toxicity
• who has been treated with deferoxamine
• who has ingested more than 40 mg/kg of elemental
  iron
Fever Of Unknown Origin (Bacteremia And Sepsis)

Definition
Fever in infants and toddlers is defined as rectal temperature greater than 38°C. Neonates may present with hypothermia rather than fever as a manifestation of occult bacterial illness or sepsis.

In infants <2 years old, tympanic membrane temperature is not as reliable, so rectal temperature should be used for decision making.

- Fever of unknown origin: fever in a child with no readily identifiable source of infection, despite a careful history and physical examination
- Occult bacteremia: fever with no obvious focus of infection and a positive result on blood culture
- Sepsis: bacteremia with evidence of systemic invasive infection

General Comments
Febrile infants and children <3 years old commonly present for emergency care. The differential diagnosis is broad, ranging from a simple URTI to occult bacteremia and sepsis.

The child's age, the clinical presentation, the likelihood of a particular diagnosis and risk factors for sepsis or bacteremia are important considerations when evaluating a young child with fever.

Causes Of Occult Bacteremia
Most common pathogens causing occult bacteremia in the fully immunized child:
- Streptococcus pneumoniae (approximately 98% of cases)
- Hemophilus influenzae type B (<2% of cases)
- Neisseria meningitidis, Salmonella and others (<1% of cases)

Most common pathogens causing sepsis in the neonate:
- Escherichia coli
- Group B Streptococcus
- S. pneumoniae
- Listeria monocytogenes

Most common pathogens causing sepsis in infants (>3 months of age):
- S. pneumoniae
- H. influenzae (in the unimmunized child)
- N. meningitidis
- Staphylococcus aureus
- Group A ß-hemolytic Streptococcus
- Gram-negative rods

Risk Factors Influencing Susceptibility to Occult Bacteremia
Age is a significant factor influencing susceptibility: the younger the child, the greater the risk. Newborns are at greatest risk for bacterial sepsis, and this condition becomes uncommon by 2-3 years of age. Older children with a serious bacterial infection are more consistently identified by clinical examination (rather than by fever).

Factors contributing to increased risk in neonates:
- E. coli, L. monocytogenes and group B Streptococcus are the most common pathogens causing serious bacterial infections in this age group
- Findings of physical examination are less reliable in the neonate
- The neonate's immune system is not fully developed

In the absence of dehydration or high environmental temperature, sepsis is a common cause of fever in the first week of life.

Other factors influencing susceptibility to occult bacteremia:
- Exposure to communicable pathogens
- Malignant lesions
- Chemotherapy
- Immunocompromised states (e.g. hyposplenism, sickle cell disease)

History
In general, young infants (<3 months old) with serious bacterial illness present with fever and subtle signs, such as irritability or lethargy. Older children often present with more specific clinical signs.

- Fever documented at home by a reliable caregiver (should be considered equivalent to fever documented in the clinic)
Change in mental status (e.g. lethargy, somnolence or decreased level of activity) may indicate a serious bacterial illness
Recent immunizations
History of prematurity or lack of immunizations (places the child at higher risk)
Recent exposure to sick contacts
Recent antibiotic therapy
Recurrent illnesses
Immunocompromised children are not only at higher risk for serious bacterial illness, but they are also susceptible to different pathogens
Response to antipyretics does not differentiate between bacterial and viral pathogens, nor does it aid in identifying children at risk for serious bacterial illnesses
Impact of environment (over bundling can increase the temperature by 0.4°C to 0.8°C)

Physical Findings
Vital signs may reveal hyperthermia, normothermia, hypothermia, tachycardia, tachypnea or hypotension
If tachycardia is disproportionate to the degree of fever, consider dehydration, sepsis and cardiac abnormalities as potential causes
Tachypnea out of proportion to the degree of fever may suggest the early stages of bronchiolitis, pneumonia or laryngotracheitis
Hypothermia in the neonate or immunocompromised child may be the only diagnostic clue to a serious bacterial infection
Children with sepsis typically appear acutely ill and may exhibit altered mental status (e.g. lethargy), hypotension (easily identified by delayed capillary refill), hypoventilation, hyperventilation or cyanosis

When evaluating infants, the following observational variables can be used as a clinical guide:
Quality of cry
Reaction to parental or caregiver stimuli
Level of arousal
Color
Hydration status
Response to social overtures

In the older infant and child, look for focal findings:
Meningitis in this age group sometimes presents with nuchal rigidity, a positive Kernig's sign (pain with passive knee extension and hip flexion) and a positive Brudzinski's sign (spontaneous hip flexion with passive neck flexion)
The integumentary examination is often overlooked and can sometimes provide diagnostic clues (e.g. presence of petechiae and fever represents a broad differential diagnosis that includes meningococcal sepsis and viral exanthems)

Differential Diagnosis
Bacteremia and sepsis
Bronchiolitis
Chickenpox (varicella)
Croup (laryngotracheobronchitis)
Febrile seizures
Erythema infectiosum (fifth disease)
Gastroenteritis
Hand-foot-and-mouth disease
Kawasaki disease
Meningitis and encephalitis
Otitis media
Pharyngitis
Pneumonia
Roseola infantum
Scarlet fever
Urinary tract infections, pyelonephritis

Complications
Serious focal bacterial infections such as meningitis
Septic shock (which can produce multiorgan system failure)

Diagnostic Tests
Pulse oximetry (if available)
Blood culture (if available) remains the gold standard for identifying children with occult bacteremia: collect blood samples for culture, one blood culture will usually suffice.
WBC count (if available) between 15,000 and 20,000 or less than 5,000
Urinalysis and urine culture should be performed; for infants and for toddlers, the most expedient and reliable method of obtaining urine for urinalysis and culture is by catheter
• Chest x-ray (if available) is useful only if there is clinical evidence of a possible respiratory infection (e.g. tachypnea, cough, retractions, use of accessory muscles, crackles or wheezing); such imaging should be done only in older infants and children who are relatively less sick and only if the result would affect the decision to transfer to hospital

**Management**

The main focus of prehospital care of the febrile child, particularly one who appears acutely ill, should be rapid transport to a hospital emergency department.

**Stabilization Interventions**

- ABCs are your first priority
- Airway management and venous access are indicated if the child has signs of sepsis

**Adjuvant Therapy**

- Start IV therapy with normal saline and run at a rate sufficient to maintain hydration, unless there are signs of septic shock (see "Shock," above, this chapter).
- Oxygen may be necessary if there are signs of sepsis (6-10 L/min or more; keep oxygen saturation > 97%)
- Foley catheter (may be necessary if in septic shock)

**Appropriate Consultation**

Once the child's condition has been stabilized, consult a physician according to the following guidelines:

- All infants <1 month with rectal temperature ≥ 38°C need a full septic work up; therefore medevac
- All infants 1-3 months old
- All infants 3-36 months old who appear acutely ill or who are at increased risk for occult bacteremia or sepsis

**Pharmacologic Interventions**

Antibiotics are the standard of care in the management of children with suspected bacteremia or sepsis. The selection of the drug is based on the child's age and the presence of risk factors for unusual pathogens. Antibiotics should be administered promptly after the results of culture(s) have been obtained. Discuss with a physician first, if possible.

The neonate with bacteremia or sepsis should be treated with combination therapy such as ampicillin and gentamicin. Third-generation cephalosporins, such as ceftriaxone, may provide improved CNS penetration and can be substituted for gentamicin. Older infants and children with bacteremia or sepsis can be treated with ceftriaxone.

**Antibiotic therapy:**

- **Ampicillin (C class drug)**
  - Neonate <7 days and >2000 g: 75 mg/kg per day, divided q8h, IV
  - Neonate 7 days and >2000 g: 100 mg/kg per day, divided q6h, IV
  - Children: 100-200 mg/kg per day, divided q4-6h, IV or IM
- **Gentamicin (B class drug)**
  - Neonate <7 days and >2000 g: 2.5 mg/kg per dose IV q12h
  - Neonate =7 days and >2000 g: 2.5 mg/kg per dose IV q8h
  - Children: 1.5-2.5 mg/kg IV or IM q8-12h
  - Dose and frequency of gentamicin are based on the child's age and renal function.
- **Ceftriaxone (B class drug)**
  - 50-75 mg/kg per day, divided q12-24h, IV or IM

**Monitoring and Follow-Up**

Monitor ABCs, vital signs, pulse oximetry (if available), level of consciousness and urinary output frequently if the child's condition is unstable.

**Referral**

- Medevac all febrile infants ≤1 month old and all children 1-36 months old who appear acutely ill and in whom bacteremia or sepsis is suspected
- Antibiotics may be administered before transfer, on the advice of a physician.
- In some settings, a pediatric transfer team (which often includes a physician) is available for critically ill children
Some febrile infants and children 1-36 months old may be managed as outpatients. Clinical studies have reported the following criteria identifying the children at lowest risk and hence appropriate for outpatient management:

- Reliable caregivers
- Follow-up within 24 hours
- Child does not appear acutely ill
- Term gestation
- Child previously healthy
- No current antibiotics
- Normal results on urinalysis
- Normal results on chest x-ray (when indicated and if available)
- Infants 1-3 months of age should have a CBC, still difficult to judge clinically, WBC ≤15,000 should be considered for treatment (Rochester criteria)

The febrile child 1-36 months old who has a temperature <39°C and no obvious source of infection and who does not appear acutely ill can be managed as an outpatient with administration of antipyretics and close follow-up.

No diagnostic tests are indicated, and antibiotics are not recommended in these children. Avoidance of antibiotics helps to distinguish viral from bacterial meningitis and also to distinguish partial treatment of occult bacteremia from a viral syndrome in the event of clinical deterioration. However, if there are concerns about reliable follow-up or if the child is at higher risk for serious bacterial illness (e.g. presence of immunocompromised state), a more complete diagnostic work-up should be considered.

The management of febrile children 1-36 months old with a temperature ≥39°C, but no identifiable source of infection and without appearance of acute illness, is controversial.

Children in this situation are more likely to have occult bacteremia (approximately 4%), and they may not consistently manifest clinical signs of serious bacterial illness. No matter how extensive the diagnostic evaluation and therapy, these children require close follow-up after discharge to prevent infectious complications. Careful outpatient management should include a reliable caregiver, close follow-up and an established protocol for notification of the parents or primary caregiver of any positive culture results.