

ENTERIC DISEASES

Clinical Definition:

Inflammation of the intestine, more particularly of the mucous and submucous tissues with symptoms that include; abdominal cramps, watery or bloody stools, fever and vomiting. Common causative agents of enteritis are:

- ◆ Bacterial (Campylobacteriosis, Escherichia coli 0157:H7, Salmonellosis, Shigellosis, Listeriosis, and Yersiniosis);
- ◆ Parasitic (Cryptosporidiosis, Giardiasis, Cyclospora and Trichinosis); and
- ◆ Viral (rotovirus, adenovirus, enterovirus, hepatitis A, and Norwalk-like virus).

Public Health Measures:

Special risk groups include:

- ◆ Food Handlers - whose work involves touching foods during preparation and cooking, or touching unwrapped foods to be consumed raw or without further cooking. Contact an Environmental Health Officer (EHO) when a food handler is diagnosed with an enteric disease.
- ◆ Health Care Workers - who have direct contact with susceptible patients for whom an intestinal infection would have serious consequences (immunosuppressed, post-operative, elderly and infants).
- ◆ Children under 5 years of age - attending daycare, play groups, or other similar groups.
- ◆ Older children or adults with poor standards of hygiene - such as those residing in institutions, handicapped, or confined elderly.
- ◆ Case contacts who are in special risk groups - any household or close contact who is in one of the above risk groups.



Principles:

The principles for the management of enteric diseases are:

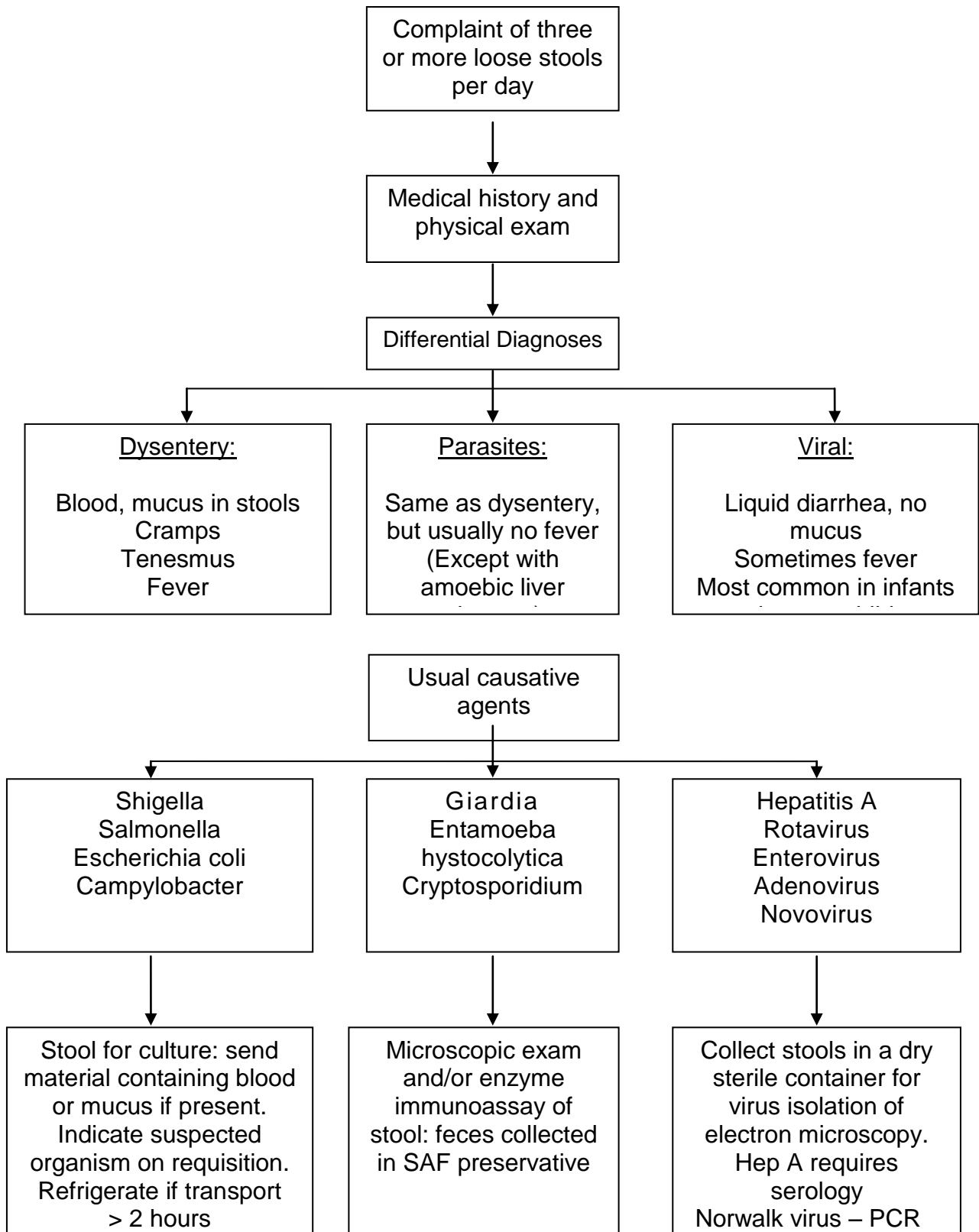
- ◆ All enteric diseases will be investigated in a timely manner upon receipt of the lab report.
- ◆ Upon confirmation of disease, specific information will be offered to infected individuals to minimize complications and transmission of the disease.
- ◆ Sources of specific diseases will be investigated and if necessary, recommendations made related to closure of public facilities, withdrawal of products from shelves, etc.
- ◆ Information will be offered to the public on safe food preservation and handling.
- ◆ All new cases of enteric diseases will be added to the provincial database for notifiable diseases.

Response:

When an enteric disease is confirmed by laboratory or is highly probable following history and exam, the following public health actions are recommended:

- ◆ Notify an Environmental Health Officer (EHO).
- ◆ Complete the *Food & Waterborne Illness Investigation Form* for each case. Include:
 - ◆ Disease information,
 - ◆ General assessment information,
 - ◆ Contact list, and
 - ◆ Food history.
- ◆ Exclude the following from work or school while symptomatic or 14 days from onset (7 days from jaundice), or may require 2 negative stools collected not less than 24 hours apart for:
 - ◆ Food handlers,
 - ◆ Daycare clients and workers,
 - ◆ Health care workers, and
 - ◆ School students
- ◆ Handwashing is a critical prevention measure and should be stressed at every opportunity.

Investigation of Diarrhea



Acute Oral Rehydration Therapy and Early Refeeding in the Management of Childhood Gastroenteritis

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Dr. Nicole Chatel Paediatrician, Stanton Regional Hospital

Acute gastroenteritis is one of the most common illnesses affecting infants and children in Canada and the world. The average child under age 5 experiences 2.2 diarrheal episodes each year. Prolonged diarrhea and malnutrition are a primary cause of morbidity and mortality in our aboriginal populations. Deaths from this cause continue to occur yearly in the North.



Oral rehydration therapy (ORT), using a simple, inexpensive glucose and electrolyte solution, has reduced the number of deaths from dehydration due to diarrhea by about a million per year around the world. In spite of its efficacy, ORT has not been used extensively in developed countries. Recent research suggests that the use of oral rehydration solution (ORS) have many advantages over conventional therapy.

Oral rehydration and maintenance solutions presently in use, although effective in rehydration, do not decrease stool volume because of the relatively high osmolality of the glucose that they contain. Along with improved oral rehydration solutions have come advances in the field of early re-feeding. Fasting has been shown to prolong diarrhea. This may be due to under-nutrition of the bowel mucosa which delays the replacement of mucosal cells destroyed by the infection. Although there is general agreement that breast-feeding should continue in spite of diarrhea, early re-feeding with a lactose-containing formula is usually well tolerated. Early re-feeding should commence 6-12 hours into therapy.

Vomiting is not a contraindication to ORT. ORS should be given slowly but steadily to minimize vomiting. Fluids may be administered by nasogastric tube if required. The child's clinical condition should be frequently assessed. A child should never be kept on ORS fluid alone for more than 24 hours. Early re-feeding should begin within 6 hours. A full diet should be reinstated within 24 to 48 hours, if possible.

There are certain contraindications to the use of ORT:

- a) Protracted vomiting despite small, frequent feedings
- b) Worsening diarrhea and an inability to keep up with losses
- c) Stupor or coma
- d) Intestinal ileus

As ORS can be administered easily by a properly instructed parent, and because dehydration can be corrected quickly, it lends itself well for use in an outpatient department or health centre. At the end of 4 hours, the child can either be sent

home on maintenance therapy or, if dehydration persists, be observed for further therapy.

Any over the counter ORSs are fine. *Gastrolyte*® comes as a powder and would be better for communities or for parents going out in the bush. *Pedialyte*® comes ready mixed in a bottle, as does *Lytren*®. *Pedialyte*® also comes as freezer pops that older children may like better.

The following principles should be followed in treating diarrheal disease:

- ◆ rehydration,
- ◆ replacement of ongoing losses, and
- ◆ maintenance.

Fluid therapy is based on an assessment of the degree of dehydration present. Principles are as follows:

Fluid Therapy Principles

Degree of Dehydration	Clinical Assessment	Treatment Principles
No Dehydration	<ul style="list-style-type: none"> ◆ Diarrhea is present ◆ Normal urinary output 	<ul style="list-style-type: none"> ◆ Normal diet and breast-feeding may continue at home with fluid intake dictated by thirst. ◆ High osmolality fluids such as undiluted juices should be avoided. ◆ Maintenance oral electrolyte solution offered ad libitum.
Mild (<5%)	<ul style="list-style-type: none"> ◆ Watery diarrhea ◆ Decreased urine output ◆ Increased thirst ◆ Slightly dry mucous membranes 	<ul style="list-style-type: none"> ◆ Assessment and treatment under close supervision are indicated. ◆ Rehydration consists of ORS or maintenance solution 10 mUkg/hr with reassessment q4h. ◆ ◆ Breast-feeding continues.
Moderate (5-10%)	<ul style="list-style-type: none"> ◆ Abnormal skin turgor (tenting of abdominal skin lasting < 2 sec). ◆ Sunken eyes ◆ Very dry mucous membranes ◆ ◆ Depressed anterior fontanel 	<ul style="list-style-type: none"> ◆ Rehydration consisting of ORS 15-20 mUkg/hr with direct observation and reassessment q4h is indicated. ◆ If dehydration is corrected, therapy for ongoing losses and maintenance are continued as outline above. ◆ ◆ If not, treatment is repeated as indicated by clinical signs or symptoms.
Severe (>10%)	<ul style="list-style-type: none"> ◆ Signs of moderate dehydration plus any of the following: ◆ Abnormal skin turgor (tenting of abdominal skin lasting >2 sec). ◆ Rapid weak pulse/hypotension ◆ Rapid breathing ◆ Cold extremities ◆ Oligo-anuria ◆ ◆ Lethargy, shock, coma 	<ul style="list-style-type: none"> ◆ Blood pressure should be measured. ◆ Prompt intravenous therapy is indicated with rapid infusion of saline, plasma or colloid sufficient to replete blood volume (20 mUkg boluses given by push). ◆ Intraosseous infusion should be used if an intravenous line cannot be inserted within 90 seconds.

Parents' Guide to Treating a Young Child with Vomiting or Diarrhea

At the Start of Vomiting or Diarrhea:

If breast-feeding:

- ◆ Any over the counter ORSs are fine. Continue to breastfeed on demand and offer oral rehydration solution (ORS).
- ◆ *Gastrolyte*[®] comes as a powder and would be better for communities or for parents going out in the bush.
- ◆ *Pedialyte*[®] comes ready mixed in a bottle, as does *Lytern*[®]. *Pedialyte*[®] also comes as freezer pops that older children may like better.

If NOT breast-feeding:

- ◆ Stop all food and drink and give ORS as follows:

First 6 hours:

- ◆ If 6 months or less give 1-3 oz. every hour
- ◆ If 6-24 months give 3-4 oz. every hour
- ◆ If over 2 years give 4 – 8 oz. every hour
- ◆ **If infant refuses ORS by cup or by bottle**, give this solution using a medicine dropper or small spoon.
- ◆ **If child vomits**, continue to give ORS using a spoon. Give 1 tbsp. every 10 – 15 minutes until vomiting stops, and then give regular amount as indicated above. If vomiting does not stop after 4 – 6 hours, take child to the hospital or health center.

6 – 24 hours: Recovery Stage:

- ◆ Keep giving ORS until diarrhea is less frequent.
- ◆ When vomiting stops, offer usual formula or whole milk or food in small frequent feedings.
- ◆ Do not give fruit juices or sweetened desserts until the diarrhea has stopped.
- ◆ Stools may increase at first (1-2 more each day). It may take 7 – 10 days or longer for stools to become completely formed. This is part of healing the bowel.

12 – 48 hours:

- ◆ Most children can restart their normal diet, avoid fatty greasy foods.

Sample Menu for Infants and Toddlers

Breakfast

Iron-fortified infant cereal
Plain toast and margarine
Formula or whole milk*

Lunch/Dinner

Plain meat
Potato
Rice
Plain vegetable
Plain fruit
Formula or whole milk*
Bananas

*Whole milk is given only after an infant is 12 months of age.

Recommendations

- ◆ Dehydration accompanying infantile gastroenteritis should be treated with early oral rehydration and early re-feeding strategies.
- ◆ Infants with gastroenteritis should be offered maintenance solution to prevent dehydration. Parents and daycare centres should keep maintenance solution on hand in anticipation of episodes of infectious diarrhea.
- ◆ Homemade oral rehydration solutions are discouraged since serious errors in formulation can occur.
- ◆ Antidiarrheal drugs, antibiotics and anti-emetic therapy are rarely indicated in gastroenteritis in childhood and should be discouraged.
- ◆ Infants with mild to moderate dehydration should be treated under medical supervision with ORT in preference to intravenous rehydration.
- ◆ Infants with severe dehydration should initially be treated with intravenous or intraosseous rehydration.
- ◆ Breast-fed infants with dehydration should be given ORT in conjunction with continued breastfeeding.
- ◆ Early re-feeding should commence as soon as vomiting has resolved, approximately 6-12 hours.
- ◆ Non-lactose containing formulae or milks may be used if diarrhea and abdominal cramps persist beyond expected 5 to 7 day course suggesting clinical lactose intolerance.

References:

1. *Oral rehydration therapy and early re-feeding in the management of childhood gastroenteritis - CPS Statement. 94-03.*
2. *What to do when your child is vomiting and has diarrhea. CPS pamphlet.*

Onset, Duration and Symptoms of Food/Waterborne Illness

Approximate Onset Time to Symptoms	Predominant Symptoms	Associated Organism or Toxin
1-6 h, mean 2-4 h	Nausea, vomiting, retching, diarrhea, abdominal pain, prostration.	<i>Staphylococcus aureus</i> and its enterotoxins
8-16 h (2-4 h emesis possible)	Vomiting, abdominal cramps, diarrhea, nausea	<i>Bacillus cereus</i>
2-36 h, mean 6-12 h	Abdominal cramps, diarrhea, putrefactive diarrhea associated with <i>C. perfringens</i> , sometimes nausea and vomiting.	<i>Clostridium perfringens</i> , <i>Bacillus cereus</i> , <i>Streptococcus faecalis</i> , <i>S. faecium</i>
12-74 h, mean 18-36 h	Abdominal cramps, diarrhea, vomiting, fever, chills, malaise, nausea, headache, are possible. Sometimes bloody or mucoid diarrhea, cutaneous lesions associated with <i>V. vulnificus</i> . <i>Yersinia enterocolitica</i> mimics flu and acute appendicitis. Abrupt onset of vomiting and diarrhea	<i>Salmonella</i> , <i>Shigella</i> , <i>Escherichia coli</i> , other <i>Enterobacteriaceae</i> , <i>Pseudomonas aeruginosa</i> , <i>Vibrio Cholerae</i> Rotovirus and Norwalk-like virus
3-5 days	Diarrhea, fever, vomiting, abdominal pain, respiratory symptoms.	Enteric viruses
2-10 days	Watery diarrhea, stomach cramps, an upset stomach, or a slight fever.	<i>Cryptosporidiosis</i> – parasitic disease/food & waterborne
1-6 weeks	Mucoid diarrhea (fatty stools), abdominal pain, weight loss.	<i>Giardia lamblia</i> – parasitic disease/food & waterborne
2 h to 6 days, usually 12-36 h	Vertigo, double or blurred vision, loss of reflex to light, difficulty in swallowing, speaking, and breathing, dry mouth, weakness, respiratory paralysis.	<i>Clostridium botulinum</i> and its neurotoxins
4-28 days, mean 9 days	Gastroenteritis, fever, edema around eyes, perspiration, muscular pain, chills, prostration, labored breathing.	<i>Trichinella spiralis</i>
7-28 days, mean 14 days	Malaise, headache, fever, cough, nausea, vomiting, constipation, abdominal pain, chills, rose spots, bloody stools.	<i>Salmonella typhi</i>

ENTERICS SPECIMEN COLLECTION



General Guidelines

- ◆ Collect specimens before administering medication when possible.
- ◆ Collect specimen with as little contamination as possible.
- ◆ Ensure sample is representative of the infected site.
- ◆ Utilize appropriate collection devices.
- ◆ Use aseptic technique to collect specimens.
- ◆ Clearly label the specimen container with name, date and time of collection.
- ◆ Collect an adequate amount of specimen.
- ◆ Identify specimen source.

Rectal Cultures

- ◆ Pass tip of sterile swab approximately 2 cm beyond the anal sphincter.
- ◆ Carefully rotate the swab to sample anal crypts, and withdraw the swab.
- ◆ Note: stool specimen is preferred if enteric pathogens are suspected.

Stool Specimens for Culture

- ◆ Use a sterile container.
- ◆ Do not use laxatives, antacids, or antidiarrheal medication prior to collection.
- ◆ First pass urine into the toilet.
- ◆ Collect the stool specimen in a wide-mouthed container.
- ◆ The stool specimen must not come in contact with water or urine. Collect the stool sample in a clean wide-mouthed container. Alternately a large plastic bag or plastic wrap may be placed over the toilet opening.
- ◆ Using applicator stick, fill the sterile container to the fill line with stool, especially from any areas which appear bloody, mucousy or watery.
- ◆ Mix thoroughly with preservative if applicable.
- ◆ Do not include any foreign materials, such as toilet paper.
- ◆ Close the screw cap tightly and apply parafilm to prevent leakage. Label sample with identifiers.
- ◆ Wash your hands with soap and water.

Stool Collection for Ova and Parasites (O&P)

- ◆ It is essential that clinical and/or travel information be included on the requisition.
- ◆ Multiple specimens will not be processed unless specific rationale is provided.
- ◆ Use a sterile container.
- ◆ Do not use laxatives, antacids, or antidiarrheal medication prior to collection.
- ◆ First pass urine into the toilet.
- ◆ Collect the stool specimen in a wide-mouthed container.
- ◆ The stool specimen must not come in contact with water or urine.
- ◆ Using the fork/spoon which is attached to the SAF vial, place scoopfuls of stool especially from bloody, mucousy, or watery areas, into vial containing SAF preservative.
- ◆ Add only enough liquid stool to bring it to the fill line.
- ◆ Mix thoroughly.
- ◆ Do not include any foreign materials, such as toilet paper.
- ◆ Close the screw cap tightly. Label sample with identifiers.
- ◆ Wash your hands with soap or water.

Acute, Watery Diarrhea

Initially **only 1** stool sample (not 3) should be ordered for culture or for ova and parasite.

- ◆ If sample is negative for bacterial or parasite, and the patient is still symptomatic, or diarrhea is bloody, take an additional stool sample.
- ◆ Clostridium difficile toxin assay should be ordered if patient has been recently hospitalized or has taken antibiotics.
- ◆ Cryptosporidium and Isospora examination should be specifically requested if daycare exposure is suspected or if patient is immunocompromised especially those who are HIV positive.
- ◆ Transmission from farm animals to humans may occur.

Chronic, Persistent, Relapsing Diarrhea

- ◆ Three sequential stool samples, collected on alternate days, within a 10 day period for ova and parasite are indicated (many cysts or ova are excreted irregularly and multiple infestations are common). Specific reasons for ordering more samples must be indicated.

Guide for Preventing Illness from Food and Water

CLEANING:

- ◆ Thorough hand washing with soap and running water before, during, and after food preparation, before eating, after using the toilet, after handling soiled diapers, bed linen, commodes, and possibly soiled clothing, toys and other articles.
- ◆ Proper disposal of excreta and soiled materials (in the home the toilet may be used for disposal). Soiled clothing and bed linen should be washed in a washing machine with a “hot” cycle. If this is impractical, flush away fecal matter in the toilet and soak the soiled articles in a household disinfectant such as diluted bleach at a concentration of (1:10), then wash as usual. Hands should be thoroughly washed afterwards.
- ◆ Wrap disposable diapers in a plastic bag before discarding in the garbage.
- ◆ Infected individuals should not share toys, towels, dishes, and other articles with others.

SAFE HANDLING OF FOODS:

Clean:

- ◆ Wash hands, countertops, cutting boards, plates, utensils and surfaces with hot soapy water before, during and after preparing foods.
- ◆ Sanitize after use with a solution of 1 teaspoon of household bleach with 1 litre of water (1 tablespoon per gallon).
- ◆ Wash all produce thoroughly before eating or cooking. Special care should be taken when washing fruits and vegetables such as lettuce as it is harder to clean than fruit and vegetables with smooth skins.

Separate:

- ◆ Keep raw meats and poultry away from other foods in the shopping cart and refrigerator and during storage and preparation.
- ◆ Keep separate cutting boards for raw meats and vegetables.
- ◆ Always keep foods covered.
- ◆ Make sure packages are sealed to prevent spilling of juices on other foods.
- ◆ Raw foods should be placed in sealed containers or plastic bags and stored on the lowest shelf of the refrigerator.
- ◆ Never place cooked, ready to eat foods on the same plate that has been used for raw foods.

Cook:

- ◆ The following internal temperatures will ensure safe cooking.
 - ◆ Pork, Veal & Lamb 71°C 160°F
 - ◆ Ground Meat 71°C 160°F
 - ◆ Whole chicken/turkey 82°C 180°F
 - ◆ Poultry Stuffing (inside temperature) 74°C 165°F

- ◆ Chicken/turkey pieces 77°C 170°F
- ◆ Ground poultry 72°C 165°F
- ◆ Beef steak/roasts: Medium rare 63°C 145°F
- ◆ Beef steak/roasts: Medium 71°C 160°F
- ◆ Beef steak/roasts: Well done 75°C 170°F
- ◆ When foods are reheated they should reach an internal temperature (measured by a food thermometer) of 74°C.
- ◆ Hot dogs should therefore be cooked until steaming hot before eating.
- ◆ Prepare foods quickly, and serve immediately so foods don't linger at room temperatures where bacteria can grow.
- ◆ Avoid consumption of raw eggs, unpasteurized milk and cider, undercooked meats, especially poultry and pork.

Chill:

- ◆ Refrigerate or freeze perishable foods, prepared food and leftovers within two hours.
- ◆ Large items such as whole turkeys, roasts or soups may be separated into smaller portions to ensure proper cooling.
- ◆ Make sure the refrigerator is set at a temperature of 4°C (40°F), and keep the freezer at -18°C (0°F).
- ◆ Frozen foods should not be thawed at room temperature.

Choose Safe Foods:

- ◆ Soft cheeses such as Brie, Camembert and queso blanco fresco, as well as feta cheese and refrigerated pâté, may be source of *Listeria monocytogenes* and should be avoided during pregnancy.
- ◆ Pregnant women and immunosuppressed persons should avoid foods from deli counters, such as sliced package meat and poultry products.
- ◆ Avoid refrigerated smoked fish products unless you have cooked them, for example, in a casserole.
- ◆ Use all perishable foods that are precooked for ready-to-eat before expiration date.
- ◆ People at risk should not eat raw or undercooked bivalve shellfish such as clams, mussels and oysters.
- ◆ Seed sprouts (bean sprouts, alfalfa sprouts and others) should not be eaten raw. However sprouts that have been cooked are not risky.
- ◆ Discard any raw fruit or vegetable if the skin or peel is broken or bruised.
- ◆ Avoid canned food if the tin appears "brown" or "swollen".
- ◆ Use only boiled water for mixing formula for infants.

Keeping Your Water Safe

- ◆ Your community water supply has probably been chlorinated. At times, you may also need to filter your water or take extra steps to keep your water safe.
- ◆ Drinking water should be disinfected when:
 - ◆ A boil water advisory is issued for a public water supply.
 - ◆ Water is used directly from a lake or stream.
 - ◆ Tests show that the water contains coliform bacteria.
 - ◆ You are traveling to a country where the water supply may not be safe.

How to Disinfect Water:

Boiling:

- ◆ Boiling is the best way to kill bacteria, viruses, and protozoa in water. A full boil for at least 1 minute is required.
- ◆ Boiled water should be used for drinking, cooking, brushing teeth, washing uncooked fruit and vegetables, making ice cubes and in recipes.

Chlorination:

- ◆ Unscented household bleach can be a good disinfectant if the water is not too heavily contaminated or when Giardia or Cryptosporidium are not a concern. Add 2 drops per litre (4 drops if water is cloudy), mix thoroughly and let stand 30 minutes. A slight chlorine odour should be detected. If odour is not detected, repeat chlorination and let stand a further 5 minutes.

Iodine:

- ◆ Iodine may also be used to disinfect small amounts of water. Manufacturers instructions for use of iodine tablets must be followed. Generally, add 5 drops of Tincture of Iodine (2.5%) to clear water or 10 drops to cloudy water and let stand for 30 minutes. Cloudy water may require several hours standing time.
- ◆ **Note: Pregnant women should not use iodine drops to disinfect water. Iodine should not be used over long periods of time to disinfect water.**

Halzone tablets:

- ◆ These are available through pharmacies and sporting goods stores. If you are traveling, take them with you as they may not be available in the country you visit. Follow manufacturers instructions for use.

Water Filters:

- ◆ Portable water filters can be purchased from sporting goods and travel stores. They should be rated "1 micrometer absolute". Packaging should indicate that the filter will remove bacteria, viruses and protozoa.

Additional Information for Travellers:

In addition to all of the above guidelines, travelers outside of Canada should also do these things:

- ◆ Avoid cold cuts, salads, watermelons, puddings.
- ◆ Drink only canned, carbonated or commercially bottled beverages with unbroken seals, or boiled water.
- ◆ Eat only pasteurized milk and dairy products (cheese, yogurt).
- ◆ Where chlorinated water is not available, avoid both water and ice.
- ◆ Use bottled water for brushing teeth.

Adapted from the Nova Scotia Communicable Disease Control Manual.