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

Excessive 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>
<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>