CHAPTER 18 – COMMUNICABLE DISEASES

First Nations and Inuit Health Branch (FNHB) Clinical Practice Guidelines for Nurses in Primary Care.
The content of this chapter has been revised September 2011.

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For most of these communicable diseases refer to the latest edition of the “Control of Communicable Diseases Manual”. Each nursing station should have the latest edition. Also use the latest “Canadian Immunization Guide” for information on vaccine preventable diseases, available at: http://www.atlantique.phac.gc.ca/naci-ccni/index-eng.php.
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 every body system is indicated. Some of the more common symptoms are detailed below.

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 conjunctivae
- Coryza (head cold)
- 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)
- Dietary history: raw fish; raw, poorly cooked or improperly preserved meat
- Immunization history

PHYSICAL EXAMINATION

Many communicable diseases affect more than one body system, so a thorough head to toe examination is indicated. The most common signs are detailed below.

VITAL SIGNS

- Temperature
- Heart rate
- Respiratory rate
- Oxygen saturation
- Blood pressure

INSPECTION

- Lethargy
- Tachypnea
- Nasal Flaring
- Indrawing
- Colour
- Coryza
- Pharynx: redness, lesions
- Mucous membranes: moistness, lesions (for example, Koplik’s spots)
- Skin: description of rash or petechiae (see pediatric Chapter 16, “Skin”)
- 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

COMMUNICABLE EXANTHEMS (RASH)

A communicable exanthema is a rash that “bursts forth or blooms” in association with some infections, is characteristically widespread, symmetrically distributed on the child’s body and consists of red, discrete or confluent flat spots (macules) and bumps (papules) that (at least at first) are not scaly.

Diseases that begin with an 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 spots of rubeola and the oral lesions found in hand-foot-and-mouth disease.

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 onto 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 (for example, rubeola, rubella, erythema infectiosum, roseola infantum, chickenpox), but the rashes of most viral illnesses are too variable to allow accurate diagnosis. That is why health care professionals often tell the client, “It’s a virus.” A thorough history and physical exam are very important to rule out more serious causes of the rash.

### COMMON COMMUNICABLE DISEASES

#### BOTULISM

Illness produced by neurotoxins produced by Clostridium botulinum, 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
- **Intestinal (infant):** occurs after ingestion of clostridial spores which then germinate and produce botulinum toxins in the gut; rare (although the most common form of botulism in USA), mainly affects infants < 1 year
- **Wound:** occurs after contamination of a wound in which anaerobic conditions develop; rare

#### CAUSES

Any of several neurotoxins produced by *C. botulinum*.

#### Transmission

- In infants (infantile botulism): probably through ingestion of *C. botulinum* spores; raw honey may contain 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. Know the community and events that have taken place

#### Incubation

- Food-borne: 12–48 hours (range 6 hours to 8 days) after eating improperly preserved (home canned) food
- Infantile: unknown
- Wound: 4–14 days after contamination of wound

#### Contagion

Botulism is not contagious. Infantile botulism is acquired through ingestion of *C. botulinum* spores that germinate in the gut with subsequent growth of the bacteria and production of toxins.

#### Communicability

- Not applicable

#### HISTORY

**Food-Borne Botulism**

Exposure to home-preserved foods or honey. Botulism has occurred in Inuit communities 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 (for example, 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
**Communicable Diseases**

**Pediatric Clinical Practice Guidelines for Nurses in Primary Care**

**Infantile Botulism**
- Constipation often the first symptom
- Decreased movement
- Loss of facial expression
- Poor feeding
- Weak cry
- Diminished gag reflex
- Ocular palsies
- Truncal weakness
- Ptosis

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

**Physiological 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 (for example, 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-preserved 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**
- Toxin in stool, serum or gastric aspirate (or food)
- Culture of stool, wound and gastric aspirate for *C. botulinum*

**Management**
Botulism is a reportable disease in most provinces and territories.

**Goals of Treatment**
- Prevention
- Provide supportive care

**Appropriate Consultation**
A physician should be contacted immediately if botulism is suspected.

**Adjuvant Therapy**
- Start intravenous (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

**Monitoring and Follow-up**
- 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 are not used for infantile botulism or adults with suspected gastrointestinal botulism. Antibiotics with anti-anaerobic activity are used only for botulism wound infections and may be instituted on the advice of a physician before transfer.  

penicillin G sodium 250 000 units/kg/day IV/IM, divided q4–6h  

A suitable alternative in penicillin-allergic patients is metronidazole:  

metronidazole 30 mg/kg/day IV, divided q6h (maximum 4 g/day)  

Aminoglycosides should be avoided in patients with suspected botulism because they can cause neuromuscular blockade, potentiating the effects of the toxin.

**Monitoring and Follow-Up**  
Monitor ABCs, vital signs, airway protective reflexes, lung sounds, pulse oximetry (if available), intake and output.

**Referral**  
– Medevac

**PREVENTION**  
Provide education to the community. Provide instruction in the proper preservation (canning) of foods. In particular, boiling of contaminated home-preserved 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 flipper and walrus for fermentation, perhaps because *Clostridium* grows only in anaerobic environment. Botulism is less likely to arise if porous materials are 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.

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**CHICKENPOX (VARICELLA)**

Usually benign viral infection characterized by vesicular eruptions. This is a vaccine preventable disease.

**CAUSES**

– 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, but up to 5 days before rash appears  
– Remains infectious until all lesions crusted  
– Be aware of immunocompromised individuals in the community and monitor if there are cases of chickenpox in the community

**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  
– Immunization history

**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 simplex
- Infection with coxsackie virus

COMPLICATIONS
- Impetigo
- Cellulitis
- Invasive Group A strep
- Thrombocytopenia
- Encephalitis
- Pneumonia

MANAGEMENT

Goals of Treatment
- Prevent spread
- Provide supportive care

Nonpharmacologic Interventions
- Calamine lotion or oatmeal baths (for example, Aveeno) to control itching and to help dry lesions are the general guidelines for any condition causing itching
- Chickenpox is nonreportable in most of Canada, but check provincial or territorial regulations

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

For fever:
- acetaminophen 10–15 mg/kg PO, q4–6h prn (maximum 5 doses/24 hours)

For pruritus:
- diphenhydramine (Benadryl):
  - Children 2 to < 6 years: 6.25 mg PO, q4–6h prn (maximum 37.5 mg/day)
  - Children 6 to < 12 years: 12.5–25 mg PO q4–6h prn (maximum 150 mg/day)
  - Children ≥ 12 years: 25–50 mg PO q4–6h prn (maximum 300 mg/day)
  - hydroxyzine (Atarax): Children < 6 years: 50 mg/day PO divided q6–8h prn
  - Children ≥ 6 years: 50–100 mg/day divided q6–8h prn

Consult a physician for specific antiviral therapy to reduce the number of lesions, shorten the duration of symptoms and accelerate healing and crusting of lesions in certain patient groups:

Immunocompetent host:
- acyclovir started within 24 hours of the onset of rash:
  - ≥ 2 years and ≤ 40 kg: 20 mg/kg/dose PO qid x 5 days (maximum 3200 mg/day)
  - > 40 kg: 800 mg qid x 5 days

Consult a physician for immunocompromised hosts.

Note: Acyclovir should not be used routinely in otherwise healthy children with varicella due to its modest effects. Those at risk of moderate to severe varicella and therefore suitable candidates include:
- children taking intermittent oral or inhaled corticosteroids
- children aged > 12 years
- secondary household contacts
- children taking chronic salicylates (because of the higher risk of Reye syndrome)

For passive immunization:
- Varicella zoster immune globulin (VZIG, VariZIG) is available in Canada and is recommended for certain susceptible groups provided that significant exposure has occurred. Significant exposure is defined as:
  - Continuous household contact with an infected individual
  - Being indoors for > 1 hour with a case of varicella
  - Being in the same hospital room for > 1 hour or having > 15 minutes of face-to-face contact with a patient with varicella
  - Touching the lesions of a person with active varicella or zoster (shingles)

Susceptible persons who should receive VZIG after significant exposure include:
- Immunocompromised patients
- Newborn infants of mothers who develop varicella within 5 days before delivery or 48 hours after delivery

VZIG is of maximal benefit if administered within 96 hours of the first exposure. Discuss with a physician.
Monitoring and Follow-Up
Follow up after 1 week.

Referral
Not usually necessary unless complications arise.

PREVENTION
Several vaccine products containing a live attenuated strain of varicella virus (Oka/Merck strain) are licensed in Canada (Priorix-Tetra, Varilrix, Varivax III)\(^5\). These may be used in young children. See the latest “Canadian Immunization Guide” (available at: http://www.atlantique.phac.gc.ca/naci-ccni/index-eng.php) and your Regional Immunization Manual.

For persons at risk of developing moderate to severe varicella (those older than 12 years):
- Immunize or maintain immunization coverage after consultation with your Medical Officer of Health

DIPHTHERIA

Acute infectious disease affecting primarily the membranes of the upper respiratory tract. Occurs most frequently in children < 15 years old who are inadequately immunized. This is a vaccine preventable disease.

CAUSES
- Corynebacterium diphtheriae (toxigenic or non-toxigenic strain)

Transmission
- Direct contact with affected person or carrier through airborne respiratory droplets
- Contact with articles soiled by lesions of infected people (rare)

Incubation
- 1–6 days

Contagion
- Moderate

Communicability
- Usually 2 weeks or less
- May be transmitted until virulent bacilli have disappeared from infected person’s system
- Rarely, chronic carriers may shed the organism for months (natural or immune-induced immunity does not prevent carriage\(^6\))

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 discharge 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
- Immunization history

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
- Oral syphilis
- Oral candidiasis

COMPLICATIONS
- Respiratory obstruction
- Toxic effects (including nerve palsies and myocarditis) 2–6 weeks after resolution of initial symptoms
- Myocarditis

DIAGNOSTIC TESTS
- Obtain throat and/or nasopharyngeal swabs for culture and sensitivity to confirm diagnosis

MANAGEMENT

Goals of Treatment
- ABCs are the first priority
- Stabilize any airway difficulty

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.

Carrier state may be treated with:
- erythromycin, 40 mg/kg/day PO, divided bid, tid or qid for 7 days (maximum 2 g/day)

Monitoring and Follow-up
Monitor ABCs, pulse oximetry, respiratory, cardiovascular and neurologic systems, hydration status, intake and output.

Referral
- Medevac

PREVENTION
Diphtheria toxoid given as diphtheria-pertussis-tetanus-polio (DPTP) combination vaccine for children < 7 years old or as tetanus-diphtheria (Td) combination vaccine for children ≥ 7 years old, according to recommended immunization schedule; see the latest “Canadian Immunization Guide”, available at: http://www.atlantique.phac.gc.ca/naciccni/index-eng.php.

For contacts of index cases, antibiotics should be given:
- erythromycin 40 mg/kg/day PO, divided bid, tid or qid for 7 days (maximum 2 g/day)

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.

ERYTHEMA INFECTIOSUM (FIFTH DISEASE)

Usually a benign viral childhood illness characterized by a classic “slapped-cheek” appearance and lacy exanthem on trunk and extremities.

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 less frequently.

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.

CAUSES
- 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 fetal 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 13%, with greatest risk of fetal loss in the first trimester.\(^7\)

**Incubation**
- Usually 7–10 days, but can range from 4–21 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, begin approximately 1 week after exposure and last 2–3 days
- Headache
- Fever (low grade)
- Sore throat
- Pruritus
- Coryza
- Abdominal pain
- Arthralgia (more common in adults)

**Rash**
- Typical viral rash (exanthem) occurs in three phases (see “Physical Findings” directly following)

**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

**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**
Pregnant women with known exposure should have their serum IgM antibodies monitored.
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)
- Encourage thorough and frequent hand-washing

**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 (Tylenol), 10–15 mg/kg PO q4–6h prn (maximum 5 doses/day)

**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. Exposed pregnant women should have an ultrasound to look for fetal hydrops.

HEPATITIS A

See “Hepatitis” in the adult Chapter 11, “Communicable Diseases”, for detailed information on the clinical presentation and management of acute hepatitis A. This is a vaccine preventable disease. Also see the latest “Canadian Immunization Guide”, available at: http://www.atlantique.phac.gc.ca/naci-ccni/index-eng.php.

CONTROL
Hepatitis A vaccine may be available in your region through the provincial public health system, as this is the first line of postexposure prophylaxis before Ig, unless the child is less than 1 year of age, then immune serum globulin is to be used.
- immune serum globulin 0.02 mL/kg IM to household and daycare contacts

HEPATITIS B

See “Hepatitis” in the adult Chapter 11, “Communicable Diseases”, for detailed information on the clinical presentation and management of acute hepatitis B. This is a vaccine preventable disease.

PREVENTION IN THE NEWBORN
- Screen prenatal women for hepatitis B
- If a newborn is exposed to hepatitis B, that is, mother has acute or chronic hepatitis B (is positive for HBV DNA or hepatitis B surface antigen [HBsAg]), hepatitis B immune globulin (0.5 mL IM) is given immediately after birth (that is, within 12 hours because its efficacy decreases sharply after 48 hours), together with the first dose of the three-dose series of hepatitis B vaccine
- Because administration of immune globulin and vaccine is not consistent or routine across all provinces, check provincial guidelines
- School programs for hepatitis B vaccines also vary across provinces; check provincial guidelines; see the latest “Canadian Immunization Guide”, available at: http://www.atlantique.phac.gc.ca/naci-ccni/index-eng.php

HUMAN IMMUNODEFICIENCY VIRUS INFECTION (HIV)

HIV is 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, drug abuse or unprotected sexual activity.

Acquired Immunodeficiency Syndrome (AIDS) is the advanced stage of the HIV disease. After a period of time where HIV infects and destroys blood cells, the immune system is weakened and can no longer defend the body from infections, diseases or cancers. When a person with HIV is diagnosed with one of the serious illnesses or cancers which are “AIDS-defining” (for example, pulmonary tuberculosis, recurrent bacterial pneumonia), the person is then said to have AIDS.

**CAUSES**

Human RNA retroviruses HIV-1 and less commonly HIV-2.

**Reservoir**

Humans are the only known reservoir of HIV. The HIV genome integrates into the target cell genome, is copied during DNA replication and persists in infected people for life.

**Transmission**

Established modes of transmission are sexual contact, percutaneous or mucous membrane exposure to blood or body fluids and mother-to-child transmission during pregnancy, around the time of labour and delivery and postnatally through breastfeeding.

**Incubation**

Median age of onset of symptoms is approximately 12–18 months for untreated, perinatally infected infants. There are two patterns of symptomatic infection: the first (affects 15–20% of children) results in rapid disease progression with a median age of death of 11 months; the second, more typical, pattern has a delayed onset of milder symptoms with survival beyond 5 years of age.

Anti-HIV antibodies are detectable between 1–6 months after infection.

**CLINICAL CHARACTERISTICS**

Within 7–10 days of HIV infection, 30–70% of people usually develop a nonspecific flu-like illness (fever, malaise, pharyngitis, anorexia, weight loss, lymphadenopathy, fatigue). This may last up to two weeks.

Manifestations of pediatric HIV infection include generalized lymphadenopathy, hepatomegaly, splenomegaly, failure to thrive, oral candidiasis, recurrent diarrhea, parotitis, cardiomyopathy, hepatitis, nephropathy, central nervous system disease (including microcephaly, hyperreflexia, clonus and developmental delay), lymphoid interstitial pneumonia, recurrent invasive bacterial infections, opportunistic infections and specific malignant neoplasms.

The person with AIDS may present with opportunistic infections, sometimes severe and life-threatening:

- Pneumocystis jirovecii (formerly Pneumocystis carinii) pneumonia
- Cryptosporidiosis
- Toxoplasmosis
- Cryptococcus infection
- Tuberculosis
- Cytomegalovirus

Alternatively, the person may have unusual cancers, such as:

- Kaposi’s sarcoma
- Primary brain lymphoma

**DIFFERENTIAL DIAGNOSIS**

As this may present as a nonspecific viral illness, the list would include:

- Flu
- Immunodeficiency (nonspecific)
- Severe combined immunodeficiency syndrome (SCIDS)

**DIFFERENTIAL DIAGNOSIS**

Acquired immunodeficiency syndrome (AIDS).

**MANAGEMENT**

This requires consultation with a physician and more specifically a physician familiar with the treatment of patients with HIV infection.

**Goals of Treatment**

Prevention of progression of HIV infection to AIDS.


**MONONUCLEOSIS**

Refer to “Mononucleosis” in the adult Chapter 11, “Communicable Diseases”.
PAROTITIS (MUMPS)
Acute viral infection characterized by painful swelling of the parotid and other salivary glands. This is a vaccine preventable disease.

**CAUSES**
- Mumps virus

**Transmission**
- Airborne
- Droplet spread
- 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
- Immunization history

**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
- Orchitis (may be unilateral)

**DIFFERENTIAL DIAGNOSIS**
- Sialolithiasis (parotid stones)
- Sjögren’s syndrome (parotitis, keratoconjunctivitis, absence of tears)
- Purulent parotitis
- Parotid tumour
- Buccal cellulitis

**COMPLICATIONS**
- Orchitis (after puberty)
- Oophoritis
- Arthritis
- Thyroiditis
- Deafness
- Pancreatitis
- Encephalitis
- Aseptic meningitis

**DIAGNOSTIC TESTS**
- Serum IgM to mumps

**MANAGEMENT**
Mumps is a reportable disease in most regions.

**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:
- Children < 6 years old: acetaminophen (Tylenol), 10–15 mg/kg q4–6h prn (do not exceed 5 doses/day)
- Children > 12 years old: acetaminophen (Tylenol), 325–650 mg q4–6h prn (maximum 4 g/day)

Mumps is caused by a virus. 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.

Prevention

- Mumps vaccine (as MMR) is given in two doses: first dose after child’s first birthday, second dose as a booster. The timing of the second childhood MMR dose differs from province to province. Check with the provincial department of health
- Keep immunizations up to date

PERTUSSIS (WHOOPING COUGH)

Acute bacterial illness of the upper respiratory tract. This is a vaccine preventable disease.

CAUSES

- Bordetella pertussis

Incubation

- 7–20 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
- Immunization history

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
- Immunization history

Whooping cough 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**

- Complete blood count (CBC) (high white blood cell [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**

Pertussis is a reportable disease in most provinces and territories.

**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**

Consultation with the Medical Officer of Health is required to initiate treatment of cases, or in the consideration of post-exposure prophylaxis of appropriate “at risk” individuals.

First line prophylaxis is with macrolides: azithromycin, followed by clarithromycin. Erythromycin should be used in consultation with the Medical Officer of Health.

Cough:

There is no proven therapy for cough due to pertussis.¹²

**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 (for example, apnea, cyanosis or feeding difficulties) should be admitted to hospital for supportive care.

**Prevention**

- Immunization according to standard schedule with DPTP combination vaccine (2, 4, 6 and 18 months and before starting school [that is, 4–6 years of age])
- Pertussis vaccine is not currently administered after the child reaches 6 years of age

For contacts of index cases:

Close contacts < 6 years old who have not received their primary DTaP-IPV series should be given one dose of DPTP.
PINWORMS
Parasitic infestation of the cecum of the large bowel. More common in girls, occurring in late fall and winter. Unrelated to personal hygiene.

CAUSES
- *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, nonspecific 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 in hot water
- Vacuum house daily for several days

Client Education
- Educate all members of the family about personal hygiene (washing hands, cutting fingernails)

Pharmacologic Interventions
- *Pyrantel pamoate* (Combantrin), 11 mg/kg PO, single dose (maximum dose 1 g)

The whole family should be treated 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

RABIES
See “Rabies Exposure” in the adult Chapter 11, “Communicable Diseases,” for detailed information on the clinical presentation and treatment of rabies. The treatment is the same for adult and pediatric patients.

ROSEOLA INFANTUM
Acute benign disease characterized by a prodromal febrile illness, lasting approximately 3–5 days, and followed (after the fever disappears) by 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 herpesvirus 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 resolution of the fever and appearance of a characteristic rash.
- Prodromal symptoms (in some 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
- Nonpruritic
- Lesions blanch on pressure
- Seizures
- Diarrhea

**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. This is general teaching for any URI

**Pharmacologic Interventions**
Antipyretic for fever:
acetaminophen (Tylenol), 10–15 mg/kg PO q4–6h prn (maximum 5 doses/day)
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.

RUBELLA (GERMAN MEASLES)
Viral exanthematous illness, often mild and subclinical. Rarely seen in an adequately immunized population. Rubella titre done as part of prenatal screening. This is a vaccine preventable disease.

CAUSES
– 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 7 days after rash erupts
– Infants with congenital rubella syndrome may shed the virus for months after birth

HISTORY
– Mild illness
– Up to 50% of cases are asymptomatic
– Low-grade fever
– Mild systemic signs (for example, headache, malaise)
– Arthralgia (joint pain), more common in adolescents
– Immunization history

PHYSICAL FINDINGS
– Low-grade fever
– 1–5 day prodrome
– 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)
– Roseola
– 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:
– Ophthalmologic
  – Cataracts, microphthalmia, glaucoma
– Cardiac
  – Patent ductus arteriosus, peripheral pulmonary artery stenosis
– Auditory
  – Sensoryneural hearing loss
– Neurologic
  – Behavioural disorders, meningoencephalitis, mental retardation
– Hepatosplenomegaly
– Jaundice
The risk is highest in the first trimester.

In Children
– Thrombocytopenia (hemorrhagic manifestations are rare), leukopenia

In Adolescents
– Arthritis
– Encephalitis
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DIAGNOSTIC TESTS
Acute and convalescent serum titres; viral swab of pharynx may isolate virus.

MANAGEMENT
Rubella is a reportable disease in most provinces and territories.

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 (Tylenol), 10–15 mg/kg q4–6h prn (maximum 5 doses/day)
Rubella is caused by a virus. 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. Refer all non-immune pregnant women who are exposed to the disease to a physician.

Prevention
Congenital Rubella Syndrome in Fetus
– All female adolescents and women of childbearing age should be given MMR vaccine unless they have documented proof of immunity. They should have had it as pre-school children
– Women immunized against rubella are advised not to become pregnant for at least 1 month after receiving the vaccine (3 months after MMR)
– The live attenuated virus contained in the vaccine can cross the placenta; however, no case of congenital rubella has ever been reported 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 titre should be obtained immediately:
  – if antibody is present, the woman is immune and not at risk
  – if antibody is not detectable, a second titre 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 titre should be obtained 3 weeks later (that is, 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
– Immune globulin is sometimes given to a pregnant woman exposed during the first trimester
– Consult a Medical Officer of Health about use of immune globulin for post-exposure prophylaxis during pregnancy. However, immune globulin may not prevent infection or viremia; its value has not been established

For Children
– Rubella vaccine (as MMR) is given in two doses: first dose after child’s first birthday, second dose as a booster prior to school entry
The timing of the second childhood MMR dose differs from province to province. Check with the provincial or territorial department of health.
RUBEOLA (MEASLES)

Exanthematous disease with a relatively predictable course. This is a vaccine preventable disease. This is considered a Public Health Emergency.

CAUSES
- Measles virus

Transmission
- Airborne droplets
- Direct contact with secretions
- Articles freshly soiled with nose and throat secretions

Incubation
- About 10 days (range 8–12 days) from exposure to onset of illness (fever) and 14 days until rash appears

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 and up to 4 days after appearance of the rash.

HISTORY
- Think of the three C’s
  - Cough, coryza and conjunctivitis
- Exposure to an infected person
- Fever
- Malaise
- Red rash on face and trunk
- Immunization history

PHYSICAL FINDINGS
- Fever (up to 40°C)
- Koplik spots (bluish-white spots with an erythematous base on buccal mucosa early in disease process)

Rash
- Appears on day 3–7, lasts 4–7 days
- Erythematous, maculopapular
- Often starts on face and nape of neck (at hairline), 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 discoulouration and fine scaling, desquamation
- 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 section “Erythema Infectiosum (Fifth Disease)”, in this chapter
- Scarlet fever
- Stevens-Johnson syndrome

COMPLICATIONS
- Otitis media
- Pneumonia
- Encephalitis

DIAGNOSTIC TESTS
- Blood sample for serum immunoglobulin G (IgG) or immunoglobulin M (IgM): a four-fold rise in serum antibody IgG between acute and convalescent serum samples or the presence of rubeola-specific IgM in cases with compatible clinical features is diagnostic
- Urine for viral culture
- Nasopharyngeal swab for viral culture
**MANAGEMENT**

Rubeola is a reportable disease in most provinces and territories.

**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 an immunized population and can be difficult to diagnose.

If rubeola is confirmed, it is important to consult the Medical Officer of Health in the most expedient way possible (for example, a phone call).

**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 (Tylenol), 10–15 mg/kg PO q4–6h prn (maximum 5 doses/day)

Rubeola is caused by a virus. 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.

**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 as a booster prior to school entry. The timing of the second childhood MMR dose differs from province to province; check with the provincial department of health
- For further information, see the latest “Canadian Immunization Guide”, available at: http://www.atlantique.phac.gc.ca/naci-ccni/index-eng.php
- Unimmunized contacts should be given immune globulin (0.25 mL/kg [maximum 15 mL] IM) within 6 days of exposure or measles vaccine within 72 hours of exposure. If immune globulin is given and clinical measles does not develop, then the vaccine should be administered 5–6 months later (provided the individual is aged ≥ 1 year). Consult with a physician

**SCARLET FEVER**

Syndrome caused by a group A streptococcal toxin. It is characterized by the scarlatiniform rash.

**CAUSES**

- 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. Direct contact with infected patients or carriers can also spread the illness.

**Incubation**

- 12 hours to 7 days following streptococcal pharyngitis or impetigo
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 onset, the rash 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 if warranted by the history and/or physical.

**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.

- 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 (Tylenol), 10–15 mg/kg PO q4–6h prn (maximum 5 doses per day)

Antibiotics:

penicillin V is the drug of choice
- Children ≤ 27 kg: penicillin V 250 mg PO bid or tid for 10 days
- Children > 27 kg: penicillin V 500 mg PO bid or tid for 10 days

For children allergic to penicillin:
- Children ≤ 27 kg: azithromycin 12 mg/kg/day PO for 5 days
- Children > 27 kg: azithromycin 500 mg PO on day 1, then 250 mg once daily on days 2–5

**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.

**TUBERCULOSIS**

See “Tuberculosis” (TB) in the adult Chapter 11, “Communicable Diseases”, for detailed information on the clinical presentation and management of tuberculosis.

TB is a cause of significant morbidity and mortality among Canada’s Aboriginal peoples. The total number of reported cases of TB in Canada has decreased over the past decade. However, this decrease is, for the most part, a reflection of a decreasing number of cases in the Canadian-born non-Aboriginal population. No significant change in the incidence of TB has occurred in the Canadian-born Aboriginal population. The majority of cases of TB in Canada now occur in the foreign-born. TB may occur in foreign-born children or Canadian-born children of foreign-born parents.

**IMPORTANT CONSIDERATIONS REGARDING DIAGNOSIS AND TREATMENT IN CHILDREN**
- Many young children (especially those under the age of 5 years) with TB are asymptomatic at presentation and are identified through contact tracing of adult cases
- TB in children is considered a sentinel event, usually indicating recent transmission
- Children, especially infants, are at increased risk of progressing from latent TB infection to active and sometimes severe disease
- TB in children (especially those under the age of 5 years) can quickly become a medical emergency. Miliary/disseminated TB disease and CNS TB disease, which are the most life-threatening types of TB disease, are more common in young children. Therefore, children identified as contacts of active cases in adolescents or adults should be considered a high priority for screening and follow up (refer to Canadian TB Standards, 6th Edition, available at: http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tbstand07-eng.php)
Monthly monitoring of body weight is especially important in children as, in general, doses of antituberculosis drugs are adjusted according to body weight of the child and weight will change with growth. The prescribing physician should be notified of any changes in body weight.

The actual ingestion of antituberculosis drugs is an important element of pediatric TB treatment as some children may not tolerate the pill burden well and existing formulations are not child friendly.

Weight loss, or more frequently, failure to gain weight may be a sign of treatment failure.


PREVENTION AND CONTROL OF TB IN CHILDREN

BCG Vaccination

Currently, the National Advisory Committee on Immunization (NACI) does not recommend routine use of BCG vaccination in any Canadian population.

COMMUNICABLE DISEASE EMERGENCIES

MENINGITIS

Inflammation of the meningeal membranes of the brain or spinal cord. Viral meningitis occurs mainly in those < 1 year and those 5–10 years of age. Bacterial meningitis now occurs more frequently in adults than children under 5 due to the introduction of the pneumococcal and Haemophilus influenzae type B vaccines. May be secondary to other localized or systemic infections (for example, otitis media).

CAUSES

Meningitis may be caused by bacteria, viruses, fungi and (rarely) parasites.

However, it does allow that, in some circumstances, consideration of local TB epidemiology and access to diagnostic services may lead to the decision to offer BCG vaccination. This may be the case for some Aboriginal communities across Canada. For further information relating to this advisory statement, see the “Statement on Bacille Calmette Guérin (BCG) Vaccine” (available at: http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/04vol30/acs-dcc-5/index-eng.php).

To become aware of which communities/regions still use BCG or have used BCG, see “BCG Vaccine Usage in Canada – Current and Historical” (available at: http://www.phac-aspc.gc.ca/tbpc-latb/bcgvac_1206-eng.php).

BCG may provide some protection against CNS and disseminated (miliary) TB.

BCG is contraindicated in people with extensive skin disease or burns, or immunodeficient states including congenital immunodeficiency, HIV infection, altered immune status due to malignant disease and impaired immune function secondary to treatment with corticosteroids, chemotherapeutic agents or radiation. Prior to immunizing an infant, the mother should be known to be HIV negative and there should be no family history of immunodeficiency.

Bacterial

- In children < 1 month old: group B Streptococcus, Escherichia coli, Listeria monocytogenes
- In children 4–12 weeks old: E. coli, Haemophilus influenzae type B, Streptococcus pneumoniae, group B Streptococcus, Neisseria meningitidis (meningococcal)
- In children 3 months to 18 years old: Streptococcus pneumoniae, N. meningitidis, H. influenza type B (rare)
- Mycobacterium tuberculosis

Viral

- Approximately 70 strains of enteroviruses
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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 centres 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; noncommunicable 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 upper respiratory tract infection
- High fever

In children < 12 months old the symptoms are nonspecific. 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 does not respond positively to usual comfort measures such as being picked up and cuddled
- 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/stiffness
- 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.
- Three blood samples for culture, drawn 15 minutes apart
- Urine for routine analysis 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 intravenous (IV) antibiotics.

Adjuvant Therapy
- Start IV therapy with normal saline, and adjust rate according to state of hydration
- Restrict fluid to 50% to 60% of maintenance requirements (unless the child is in septic shock)

Do not overload with fluids, as this could lead to brain edema.

Nonpharmacologic Interventions
- Bed rest
- Nothing by mouth
- Foley catheter (optional if the child is conscious)

Pharmacologic Interventions
Antipyretic for fever:
- acetaminophen (Tylenol), 10–15 mg/kg q4-6h prn (maximum 5 doses/day)

Consult a physician before initiating antibiotic therapy, if you are able to do so. Give initial antibiotic dose as soon as possible.

Recommended empiric therapy for suspected bacterial meningitis:

Neonates
AMPICILLIN PLUS CEFOTAXIME (see dosages below)

Infants ≤ 7 days
- ampicillin: 200–300 mg/kg/day IV divided q8h
- cefotaxime (Claforan):
  - For infants weighing between 1200–2000 g: cefotaxime 100 mg/kg/day IV divided q12h
  - For infants weighing > 2000 g: cefotaxime 100–150 mg/kg/day IV divided q8-12h

Infants > 7 days
- ampicillin: 300–400 mg/kg/day IV divided q6h
- cefotaxime (Claforan):
  - For infants weighing between 1200–2000 g: cefotaxime 150 mg/kg/day IV divided q8h
  - For infants weighing > 2000 g: cefotaxime 150–200 mg/kg/day IV divided q6–8h

Children aged six weeks and older
VANCOMYCIN PLUS CEFOTAXIME (for children 3 months of age or less)

or
VANCOMYCIN PLUS CEFTRIAXONE (for children more than 3 months of age)

(see dosages below)

For children 3 months of age or less
- vancomycin 60 mg/kg/day IV divided q6h
- cefotaxime 300 mg/kg/day IV divided q6–8h
For children more than 3 months of age

vancomycin 60 mg/kg/day IV divided q6h
(maximum: 4 g per day)

PLUS

ceftiraxone 100 mg/kg/day IV divided q12h
(maximum: 2 g per dose, and 4g per day)

Note: ceftiraxone safety in younger infants is not established.

Anti-inflammatory treatment to consider:

Dexamethasone

Infants and Children > 2 months:
dexamethasone 0.6 mg/kg/day IV divided q6h for
the first 4 days of antibiotic treatment; starting at the
time of the first dose of antibiotic

**Monitoring and Follow-Up**

Monitor ABCs (airway, breathing and circulation),
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 *Haemophilus influenzae***

– A vaccine is now routinely given to infants as part
of the usual childhood immunizations. The type
of vaccine and the immunization schedule vary by
province. However, the vaccine is usually given
at 2, 4, 6 and 18 months of age, along with the
DPTP vaccine. For further information, see the
latest “Canadian Immunization Guide” (available
at: http://www.atlantique.phac.gc.ca/naci-ccni/
index-eng.php)

Chemoprophylaxis for household contacts (including
adults) in homes where there are children < 4 years
old may be warranted, but must be considered in
consultation with the Medical Officer of Health.

Infants < 1 month old (dose not well established):

rifampin (Rifadin), 10 mg/kg once daily for 4 days

Infants ≥ 1 month and children:

rifampin (Rifadin), 20 mg/kg once daily for 4 days
(maximum dose 600 mg/day)

Adults:

rifampin (Rifadin), 600 mg once daily for 4 days

**Meningococcal Meningitis**

Vaccines for subtypes A, C, Y and W135 are available
and are sometimes used in epidemics. Unfortunately,
the vaccine does not include the subtype (type B) that
commonly causes the disease in the Canadian North.
Consult with a Medical Officer of Health.

Chemoprophylaxis for household contacts:

Infants < 1 month old:

rifampin (Rifadin), 5 mg/kg PO bid x 4 doses

Children ≥ 1 month old:

rifampin (Rifadin), 10 mg/kg PO bid x 4 doses;
(maximum 600 mg/dose

Adults:

rifampin (Rifadin), 600 mg PO bid x 4 doses

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