
ADULT CARE

CHAPTER 11 – COMMUNICABLE DISEASES

First Nations and Inuit Health Branch (FNIHB) Clinical Practice Guidelines for Nurses in Primary Care.
The content of this chapter was revised in February 2017.

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COMMUNICABLE DISEASES COMMON IN CHILDREN AND ADULTS

For information about communicable diseases more commonly seen in children, but also seen in adults, refer to the “Communicable Diseases” chapter of the FNIHB Pediatric and Adolescent Care Clinical Practice Guidelines. The section covers the following topics:

- Chickenpox (varicella)
- Diphtheria
- Erythema Infectiosum (Fifth Disease)
- Measles (Rubeola)
- Mumps (Parotitis)
- Pertussis (Whooping Cough)
- Pinworms
- Roseola Infantum
- Rubella (German Measles)
- Scarlet Fever
- Tuberculosis
- Meningitis

IMMUNIZATION

Immunization represents the single most important preventative measure for many communicable diseases. Immunizations are safe and effective and represent a cornerstone of public health. They make a significant contribution to the control of infectious diseases in Canada. Immunizations are for children, adolescents and adults alike. Lapses in immunization at any age represent a risk to the overall population. When a communicable disease is listed as vaccine preventable it is ad-

visible for the nurse to thoroughly review the immunization records of the individual to ensure the series is complete and all vaccines were administered at correct intervals. For more information on specific immunization, refer to the Canadian Immunization Guide available from: <http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php>. Consult local, provincial/territorial vaccination schedules and regional protocols.

ASSESSMENT OF 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 conjunctiva
- Coryza (head cold)
- Cough
- Sore throat
- Vomiting
- Diarrhea
- Level of consciousness
- 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 or undercooked meat

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

- Colour
- Coryza
- Pharynx: redness, lesions
- Mucous membranes: moistness, lesions (for example, Koplik’s spots)
- Skin: description of rash or petechiae (for more information, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 9 – Skin*)
- Joints: swelling and mobility

Palpation

- Neck for rigidity
- Tactile characteristics of rash
- Lymphadenopathy
- Hepatosplenomegaly
- Joint movement
- Skin turgor and hydration

Auscultation (Heart and Lungs)

- Breath sounds
- Crackles
- Wheezing
- Stridor
- Heart sounds
- Pleural or pericardial rubs
- Murmurs

BOTULISM

OVERVIEW

Please refer to provincial/territorial guidelines for Botulism where available.

Botulism is a neuroparalytic disease caused by a neurotoxin that is produced by the bacterium *Clostridium botulinum* (*C. botulinum*).⁽¹⁾ Botulism develops if a person ingests the toxin or if the organism grows in the intestines or wounds and toxin is released. For recommended practices related to the reporting of botulism, see *Provincial/Territorial Guidelines in Appendix, Section B* of this guideline.

Botulism is a serious illness that should be treated as a medical emergency and may require medical evacuation based on clinical acuity. Consult with physician/nurse practitioner immediately when there is suspicion of botulism.

- There are four naturally occurring forms of botulism:^(1; 2)
 - Foodborne botulism
 - Adult intestinal colonization botulism
 - Infant botulism
 - Wound botulism
- Untreated, botulism can have a case fatality rate of 40 to 50%⁽³⁾

CAUSES

- Foodborne botulism
 - Caused by the ingestion of preformed botulinum toxin in contaminated food or drink⁽¹⁾
- Adult intestinal colonization botulism
 - Occurs when *C. botulinum* germinates and produces toxin in the digestive system
 - Affects adults with altered gastrointestinal anatomy and/or microflora (e.g., those who have had previous intestinal surgery, inflammatory bowel disease,

- Crohn's disease, recent antibiotic therapy or immunocompromised condition)^(1; 4; 5)
- Infant botulism
 - Caused by the ingestion of *C. botulinum* spores. These germinate in the intestine and produce bacteria that releases botulinum toxin.
 - Source rarely determined, but instances have been related to honey⁽⁶⁾
- Wound botulism
 - Rare and results when a wound becomes infected with *C. botulinum*. This results in the production of toxin, which is absorbed systemically.
 - Occurs almost exclusively with intravenous drug use (e.g., black tar heroin)^(7; 14)

TRANSMISSION

Secondary person-to-person transmission of botulism does not occur⁽⁷⁾

INCUBATION PERIOD

- **Foodborne botulism**
 - Symptoms usually begin 12 to 36 hours after eating contaminated food, with a presentation range of 6 hours to 10 days after ingestion.⁽¹⁾
- **Adult intestinal colonization botulism**
 - Incubation period is unknown⁽¹⁴⁾
- **Infant botulism**
 - Incubation period is estimated to be 3 to 30 days⁽²⁾
- **Wound botulism**
 - Incubation period averages 4 to 14 days⁽²⁾

ASSESSMENT

Medication review: Review current medications and over-the-counter, complementary and alternative medicines, including any chemical or substance intake that may impact management.

Allergy history: Screen for medication, latex, environmental or other allergies and determine approximately when and what type of reaction occurred.

RISK FACTORS

- Improperly prepared fish, land and marine mammals (i.e., raw, partially cooked, smoked or fermented)⁽⁸⁾
- Improperly prepared home-canned, low acid foods (e.g., corn, green beans, peas, asparagus, beets, mushrooms, spaghetti sauce, salmon, tuna, salted fish)^(7; 9)
- Improperly prepared meat products, such as ham and sausage⁽⁷⁾
- Improperly stored low-acid fruit/non-fruit juices (e.g., carrot juice)⁽⁹⁾
- Leftover baked potatoes stored in aluminium foil for more than 2 hours at room temperature^(8; 9)
- Ingestion of honey by infants under 1 year of age (honey has been linked to cases of infant botulism and should not be ingested by infants under 1 year)^(2; 9)

HISTORY OF PRESENT ILLNESS

- Review risk factors and collect history of present illness (for additional information on symptoms of the different forms of botulisms, see *Table 1: History of Present Illness Symptoms*).
- Determine toxin source (e.g., food sources, wound)
- Ask client about dietary, travel, activity and work history (e.g., working in a laboratory, abattoir, etc.), as well as history of injection drug use.
- Obtain a food history for the entire suspected incubation period.
- Ask whether close contacts have shared the same foods.⁽¹⁰⁾

TABLE 1

History of Present Illness Symptoms^(1; 6)

FOODBORNE, ADULT INTESTINAL, AND WOUND BOTULISM	INFANT BOTULISM
<p>Foodborne, adult intestinal and wound botulism</p> <ul style="list-style-type: none"> - May have history of fatigue, weakness, vertigo, nausea, vomiting and/or diarrhea, abdominal cramps initially. - Visual disturbance - Dysphagia - Dry mouth and dysphonia - Constipation is a common symptom later in presentation <p>Wound botulism only</p> <ul style="list-style-type: none"> - History of a wound; symptoms as above, however, no gastrointestinal symptoms 	<ul style="list-style-type: none"> - Clinical symptoms usually start with constipation - Loss of appetite - Drooling - Weak suck - Weak cry or voice - Infant and/or infant's head is 'floppy'

PHYSICAL FINDINGS

Perform a physical examination using the IPPA approach.

- Include cranial nerve palsies with full neurological assessment.
- All forms of botulism produce the same distinct clinical syndrome of symmetrical cranial nerve palsies followed by descending, symmetric flaccid paralysis of voluntary muscles.
 - If untreated, palsies may progress to respiratory compromise and death.^(1;6)
- For more information on the function of each cranial nerve, see *Table 3: Cranial Nerves and Function* in *Appendix, Section A* of this guideline.
- Client is usually afebrile.⁽¹⁾
- Client may have any of the following cranial nerve palsy manifestations:⁽¹⁾
 - Ptosis
 - Visual disturbance
 - Dilated and sluggishly reactive/fixed pupils
 - Facial paralysis, expressionless facies

- Dysphonia
- Dysphagia
- Dysarthria
- Weak voice
- Paralysis of the diaphragm and accessory muscles, which may result in respiratory compromise or arrest
- Additional findings related to infant botulism may be:
 - Disconjugate gaze
 - Weak cry/suck
 - Decreased anal sphincter control
 - Hypotonia
 - Significant loss of head control

Wound botulism may appear as a wound or dermal abscess and may resemble mild cellulitis⁽⁶⁾

DIFFERENTIAL DIAGNOSIS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

TABLE 2
Differential Diagnosis for Botulism^(1; 11; 12)

GENERAL	ADDITIONAL DIFFERENTIAL FOR INFANT BOTULISM
<ul style="list-style-type: none"> - Guillain-Barré syndrome - Myasthenia gravis - Poliomyelitis and other enterovirus paralytic infections - Stroke - Paralytic shellfish poisoning - Tick paralysis - Toxic exposures (organophosphates, atropine, carbon monoxide, aminoglycosides) 	<ul style="list-style-type: none"> - Electrolyte-mineral imbalance - Meningitis - Neuromuscular disorders and muscular disorders (e.g., congenital myopathy) - Metabolic encephalopathy - Reyes syndrome - Sepsis

COMPLICATIONS

- Respiratory failure⁽¹³⁾
- Death⁽¹³⁾

DIAGNOSTIC TESTS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

- Diagnostic test selection is based on client history, risk factors, physical examination findings and test availability.
- For recommended practices related to the reporting of botulism, see *Provincial/Territorial Guidelines* in *Appendix, Section B* of this guideline.
- Follow provincial/territorial and/or Botulism Reference Service (BRS) guidelines. BRS is available from: <http://www.hc-sc.gc.ca/fn-an/legislation/guide-ld/botulism-botulisme-prof-eng.php>^(1; 11)

Laboratory

- Testing should be carried out as per provincial/territorial or BRS policies and procedures, which will provide guidance on client specimen collection and retrieval of food samples for lab analysis.
- Botulinum toxin may be detectable in serum, stool, gastric aspirate or food.
- For specimen collection:⁽¹⁾
 - Consult Environmental Health Officer (EHO) for guidance on retrieval of food sample.
 - Collect client specimens as per guidance provided by the BRS (or alternate).

MANAGEMENT

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

GOALS OF TREATMENT

- Prevent complications
- Provide supportive care
- Investigate promptly to determine whether a common source outbreak has occurred

NON-PHARMACOLOGICAL INTERVENTIONS

Interventions

- The client with clinical signs, symptoms, or history suspicious for botulism may require intensive care and monitoring for signs of respiratory failure.^(6; 9)
- Position client for maximal comfort and to optimize respiratory function.
 - Client should not lie flat.
- Provide oxygen if indicated.
- Prepare to provide ventilatory support if client experiences respiratory failure.
- Maintain client NPO.
- For **wound botulism**, wound debridement, drainage and irrigation may be required.⁽¹⁴⁾

Client Education

Inform client and family about ways to prevent foodborne illnesses.

PHARMACOLOGICAL INTERVENTIONS

In addition to consulting a physician/nurse practitioner, review the drug monograph, the FNIHB Nursing Station Formulary or provincial/territorial formulary before initiating treatment.

IV Therapy

- Initiate an IV line and run IV fluid (e.g., 0.9% sodium chloride) at a rate sufficient to maintain hydration.
- For the pediatric client, see *FNIHB Pediatric and Adolescent Care Clinical Practice Guidelines – Chapter 4 – Fluid Management*.

Potential Pharmacological Interventions

- Consult with Public Health Physician and Infectious Diseases Specialist as per provincial/territorial policies and procedures.
- The only available treatment for botulism is the administration of botulism antitoxin or immune globulin, which can arrest the progression and duration of paralysis and dependence on mechanical ventilation.
- If treatment is required, arrange for medical evacuation as soon as possible.

Foodborne botulism

- Within 1 hour of ingesting suspected food, administer the following:
 - Gastric lavage
 - Enema
 - Cathartic agent (e.g., sorbitol, polyethylene glycol (PEG))⁽¹⁴⁾

Wound botulism

- Antibiotic may be required⁽¹⁴⁾

MONITORING AND FOLLOW-UP

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

MONITORING

- Monitor vital signs and respiratory status, including oxygen saturation as indicated by client's condition.⁽¹⁾
- Monitor for cranial nerve palsies.⁽¹⁾
- Monitor intake and output.
- If administering an agent with risk of anaphylaxis, monitor the client closely for 30 minutes.

FOLLOW-UP

- Physician/nurse practitioner to be guided by BRS and EHO for investigation of food source and tracing of other persons who consumed the same sources of suspect foods.

Referral

Arrange for medical evacuation if clinically indicated.

Reporting

- Botulism is reportable. Follow provincial/territorial policies and procedures for notifiable diseases. For more information, see *Provincial/Territorial Guidelines* in *Appendix, Section B* of this guideline.

APPENDIX

SECTION A: SUPPLEMENTAL CLINICAL MANAGEMENT INFORMATION

TABLE 3

Cranial Nerves and Functions⁽¹⁵⁾

CRANIAL NERVE		FUNCTION
I	Olfactory	Sense of smell
II	Optic	Vision
III	Oculomotor	Motor control of some eye muscles and eyelid
IV	Trochlear	Motor control of some eye muscles
V	Trigeminal	Chewing muscles and facial sensation
VI	Abducens	Motor control of some eye muscles
VII	Facial	Motor control of some facial muscles, salivation, taste and cutaneous sensations
VIII	Vestibulocochlear	Equilibrium, sense of balance and hearing
IX	Glossopharyngeal	Tongue and pharyngeal
X	Vagus	Motor control of heart and viscera, sensation from the throat, pharynx and abdominal viscera
XI	Accessory	Motor supply to sternocleidomastoid and trapezius
XII	Hypoglossal	Motor supply to the tongue

Progression of Nerve Paralysis in Botulism and Cranial Nerve Palsies⁽¹⁶⁾

- Cranial nerve palsies are characteristically followed by flaccid descending, completely symmetrical paralysis of voluntary muscles.
 - The extent of paralysis (from a few cranial nerves only, to quadriplegia) depends on the toxin dose.
- Paralysis of the diaphragm and accessory breathing muscles may result in respiratory compromise or arrest and death.
- Pharyngeal collapse secondary to cranial nerve paralysis may compromise the airway and may require intubation in the absence of respiratory muscle compromise.
- Botulism ranges from a mild condition to severe disease that can result in death within 24 hours.

Prevention

The following information may be useful to the client in preventing botulism:⁽¹⁷⁾

Appearance

- Foods contaminated with *C. botulinum* toxin might look, smell and taste normal. The spores of *C. botulinum* are not necessarily destroyed by cooking.

Canning or bottling low-acid foods at home

- Use up-to-date recipes and equipment, and follow all instructions carefully.
- Boil home-canned foods for 10 minutes before eating.⁽¹⁸⁾
- Keep all work surfaces, food, utensils, equipment, and hands clean during all stages of the canning process.
- Date and label all preserves and canned goods.

Honey

- Don't give honey (even pasteurized honey) to children under 1 year old.
- Healthy children over 1 year of age can safely eat honey because they have a very low risk of developing infant botulism.

Canned foods

- Avoid eating food from cans that are damaged.

Aluminum foil for cooking and storing

- Do not use aluminium foil to wrap potatoes or other vegetables for baking, unless the vegetables will be cooked and eaten right away.
- If you want to store them after they have been cooked, unwrap and refrigerate them right away.

‘Keep refrigerated’ label

- Store all low-acid juices (like carrot juice) and other products labelled ‘keep refrigerated’ in the refrigerator.

Home-prepared foods stored in oil

- Be careful with home-prepared foods stored in oil (like garlic, vegetables, herbs and spices).
- If these products are prepared using fresh ingredients, they must be kept refrigerated and be used within 10 days.

Check with EHO for additional information available about food safety including information sessions and courses on safe food handling. For more information on how to prevent botulism infection, see *Prevention in Appendix, Section A* of this guideline.

SECTION B: SUPPLEMENTAL RESOURCES***Provincial/Territorial Guidelines*****Alberta**

Alberta Health and Wellness.
Public Health Notifiable Disease Management Guidelines: Botulism. Available from: <https://open.alberta.ca/publications/botulism>

British Columbia

BC Centre for Disease Control.
Communicable Disease Control Management of Specific Diseases: Botulism. Available from: http://www.bccdc.ca/resource-gallery/Documents/Communicable-Disease-Manual/EPI_Guidelines_CDChapter1_Botulism_Botulism_20100625.pdf

Manitoba

Public Health and Primary Health Care.
Communicable Disease Management Protocols: Botulism. Available from: <http://www.gov.mb.ca/health/publichealth/cdc/protocol/botulism.pdf>

Nova Scotia

Nova Scotia Department of Health and Wellness.
Nova Scotia Communicable Disease Manual: Botulism. Available from: <http://www.novascotia.ca/dhw/cdpc/cdc/documents/botulism.pdf>

Northwest Territories

Northwest Territories Health and Social Services. Communicable Disease Manual. Available from: <http://www.hss.gov.nt.ca> by selecting HSS Professionals (staff only) and entering authorized username and password.

Newfoundland and Labrador

Department of Health and Community Services.
Newfoundland and Labrador Disease Control Manual: Section 2 Enteric, Food and Waterborne Diseases. Available from: <http://www.health.gov.nl.ca/health/publichealth/cdc/control.html>

Ontario

Ontario Ministry of Health and Long-Term Care. Diseases and Conditions: Botulism Guide for Health Care Professionals. Available from: <http://www.health.gov.on.ca/en/pro/publications/disease/docs/botulism.pdf>

Yukon

Yukon Health and Social Services.
Yukon Communicable Disease Control: Botulism. Available from: <http://www.hss.gov>.

[yk.ca/disease_guidelines.php](http://www.healthycanadians.gc.ca/disease_guidelines.php)

Other Resources

Botulism (*Clostridium botulinum*): How do I avoid getting sick? Available from: <http://www.healthycanadians.gc.ca/eating-nutrition/poisoning-intoxication/botulism-botulisme-eng.php>

Food safety for First Nations People of Canada: A Manual for Healthy Practices. Available from: http://www.hc-sc.gc.ca/fniah-spnia/pubs/promotion/_safety-salubrite/manual-manuel-eng.php

Food Safety for First Nations
Available from: <http://www.healthycanadians.gc.ca/eating-nutrition/safety-salubrite/first-premieres-nations-eng.php>

Home Canning Safety
Available from: <https://www.canada.ca/en/health-canada/services/general-food-safety-tips/home-canning-safety.html>

Home canning, bottling of seafood
Available from: <https://www.canada.ca/en/health-canada/services/meat-poultry-fish-seafood-safety/home-canning-bottling-seafood.html>

Food safety
Available from: <http://www.healthycanadians.gc.ca/eating-nutrition/safety-salubrite/index-eng.php>

Safe Food Handling Tips
Available from: <http://www.hc-sc.gc.ca/fn-an/securit/kitchen-cuisine/index-eng.php>

BIBLIOGRAPHY

The following references and other sources have informed the updating of this Clinical Practice Guideline.

REFERENCES

1. Health Canada. Botulism – Guide for Health-care Professionals. [Internet] Ottawa, ON: The Bureau; 2016. Available from: <http://www.hc-sc.gc.ca/fn-an/legislation/guide-ld/botulism->

[botulisme-prof-eng.php](http://www.hc-sc.gc.ca/fn-an/legislation/guide-ld/botulism-)

2. American Academy of Pediatrics. Botulism and infant botulism (*Clostridium botulinum*). In: Kimberlin DW, Brady MT, Jackson MA., Long SS, editors. Red Book, 2015 Report on the Committee on Infectious Diseases. 30th edition. [Internet] Elk Grove Village, IL: American Academy of Pediatrics; c2015. Section 3. Available from: <http://redbook.solutions.aap.org> with authorized username and password.

3. Chalk CH, Benstead TJ, Keezer M. Medical treatment for botulism. *Cochrane Database Syst Rev.* 2014 Feb 20(2): CD008123. doi: 10.1002/14651858.CD008123.pub3.

4. Public Health and Primary Health Care. Botulism. Communicable Disease Management Protocol. Communicable Disease Control. [Internet] Winnipeg, MB: Government of Manitoba; 2012 [cited 2015 April 10]. Available from: <http://www.gov.mb.ca/health/publichealth/cdc/protocol/botulism.pdf>

5. Public Health Ontario. Monthly infectious diseases surveillance report: Botulism. [Internet] Ottawa, ON: Public Health Ontario; 2013; 2(4), p.1-13. Available from: http://www.publihealthontario.ca/en/DataAndAnalytics/Documents/2013_April_PHO_Monthly_Report.pdf

6. Sobel J. Botulism. Food Safety. *Clin Infect Dis.* [Internet] 2005 October 15; 41(8), p.1167-1173. Available from: <https://academic.oup.com/cid/article/41/8/1167/379325/Botulism> doi:10.1093/cid/cis629.

7. World Health Organization. Fact Sheet: Botulism. [Internet] Geneva, Switzerland: World Health Organization; 2016. Available from: <http://www.who.int/mediacentre/factsheets/fs270/en/#>

8. Health Canada. Food safety for First Nations People of Canada: A manual for healthy practices. [Internet] Ottawa, ON: Health Canada; 2012 [cited 2015 October 15]. Available from: http://www.hc-sc.gc.ca/fniah-spnia/pubs/promotion/_

safety-salubrite/manual-manuel-eng.php

9. Public Health Agency of Canada. Fact sheets: Botulism. [Internet] Ottawa, ON: Public Health Agency of Canada; 2013 [cited 2015 March 9]. Available from: <http://phac-aspc.gc.ca/fs-sa/fs-fi/botulism-eng.php>

10. World Health Organization. Foodborne disease outbreaks. Guidelines for investigation and control. [Internet]: Geneva, Switzerland: World Health Organization; 2008. 1–146. Available from: http://www.who.int/foodsafety/publications/foodborne_disease/outbreak_guidelines.pdf

11. Ontario Ministry of Health and Long-Term Care. Botulism guide for health professionals. [Internet] Toronto, ON: Government of Ontario; 2017 August. Available from: <http://www.health.gov.on.ca/en/pro/publications/disease/docs/botulism.pdf>

12. Bodamer OA, Miller G. Neuromuscular junction disorders in newborns and infants. [Internet] Waltham, MA (US): UptoDate; 2016 [cited 2016 June 6]. Available from: <http://www.uptodate.com> with authorized username and password.

13. Pegram PS, Stone SM. Botulism. [Internet] Waltham, MA (US): UptoDate; 2016 [cited 2016 June 6] Available from: <http://www.uptodate.com> with authorized username and password.

14. Public Health Agency of Canada. Pathogen Safety Data Sheet: Clostridium botulinum. [Internet] Ottawa, ON: Public Health Agency of Canada; 2011 [cited 2015 March 29]. Available from: <http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/clostridium-eng.php>

15. Lowenstein DH, Martin JB, Hauser SL. Approach to the patient with neurologic disease. In: Longo DL, Kasper DL, Jameson JL, Fauci AS, Hauser SL, Loscalzo J, editors. *Harrison's Principles of Internal Medicine*. 18th ed. New York:

McGraw Hill Medical; c2012. p. 3236–3237.

16. Sobel J, Maslanka S. Botulism. In: Longo DL, Kasper DL, Jameson JL, Fauci AS, Hauser SL, Loscalzo J, editors. *Harrison's Principles of Internal Medicine*. 18th ed. New York: McGraw Hill Medical; c2012. p. 1201–1203.

17. Government of Canada. Botulism (Clostridium botulinum). [Internet] Ottawa, ON: Government of Canada; 2013 [cited 2015 March 29]. Available from: <http://healthycanadians.gc.ca/eating-nutrition/poisoning-intoxication/botulism-botulisme-eng.php>

18. Centers for Disease Control and Prevention (US). Home-Canned Foods – Protect Yourself from Botulism [Internet] Atlanta, GA (US): Centers for Disease Control and Prevention; National Center for Emerging and Zoonotic Infectious Diseases. 2015 [cited 2015 April 10]. Available from: <https://www.cdc.gov/botulism/>

OTHER SOURCES

Canadian Pharmacists Association. Compendium of Therapeutic Choices: Canada's Trusted Reference for Primary Care Therapeutics (CTC 7). Ottawa: Canadian Pharmacists Association; c2014.

Health Canada. First Nations and Inuit Health Branch (FNIHB) Nursing Station Formulary and

GASTROENTERITIS

OVERVIEW

Please refer to provincial/territorial guidelines for Gastroenteritis where available.

Gastroenteritis represents the inflammation of the stomach and intestines. It causes diarrhea, vomiting, abdominal pain, and cramping. Infectious gastroenteritis is caused by viruses, bacteria, or parasites. Other causes of gastroenteritis are drugs and chemical toxins (e.g., metals such as lead, plant substances).⁽¹⁾

Gastroenteritis is generally caused by the consumption of contaminated food or water, or by contact with the feces of infected humans or animals.⁽¹⁾

Diarrhea is the presence of 3 or more abnormally loose or watery stools in the preceding 24 hours.⁽²⁾

- Acute diarrhea: 14 days or less in duration⁽³⁾
- Persistent diarrhea is an acute episode of diarrhea lasting more than 14 days.⁽³⁾
- Dysentery is the presence of visible blood in stools.⁽²⁾

CAUSES

See the following tables in the *Assessment* section of this guideline:

- Table 1: Campylobacteriosis, nontyphoidal salmonellosis, *E. coli*
- Table 2: Shigellosis, *C. difficile*
- Table 3: Rotavirus, norovirus
- Table 4: Giardiasis, cryptosporidiosis

Bacteria^(1; 2; 4)

- Nontyphoidal *Salmonella* species, *Campylobacter* species, *Escherichia coli* 0157:H7 (*E. coli*), *Shigella*
- *Clostridium difficile* (*C. difficile*) is the main cause of nosocomial antibiotic-associated diarrhea.

Parasites⁽⁴⁾

- *Giardia intestinalis* (also known as *Giardia lamblia* and *Giardia duodenalis*) and *Cryptosporidiosis*
- Other parasites include *Cyclospora*, and *Dientamoeba fragilis*

Viruses^(1; 4)

- *Rotavirus*, *norovirus*

ASSESSMENT

Medication review: Review current medications, over-the-counter, complementary and alternative medicines, as well as any chemical or substance intake that may impact management.

Allergy history: Screen for medication, latex, environmental or other allergies and determine when and what type of reaction occurred.

RISK FACTORS

- The elderly, young children, pregnant women, and immunocompromised individuals are at greater risk of experiencing severe infection and complications from gastroenteritis.^(2; 7)

HISTORY OF PRESENT ILLNESS

Review risk factors and collect history of present illness.

- Diarrhea (record onset), stool frequency, consistency and volume, presence of blood or mucous^(2; 4; 5)
- Anorexia, vomiting⁽¹⁾
- Abdominal discomfort⁽¹⁾
- Epidemiologic clues (e.g., exposure to unsafe foods, untreated water, animals or ill persons, daycare, travel history, recent use of antimicrobials, history of oral-anal sexual activity)^(5; 6)

PHYSICAL FINDINGS

- Perform a physical examination with a focused assessment of hydration status using the IPPA approach.
- For clinical signs of dehydration, see *Table 5: Physical Findings in Association with Degree of Dehydration (Adult)* in *Appendix, Section A* of this guideline.
- For more information on the physical findings associated with gastroenteritis, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 5 – Gastrointestinal System – Diarrhea and Dehydration (Hypovolemia)*.

- For hourly maintenance fluid requirements in adults, see *Table 6: Hourly Maintenance Fluid Requirements in Adults Weighing 20–80 kg (1 hour periods)* in *Appendix, Section A* of this guideline.

Note: Vomiting and diarrhea may cause fluid deficits and electrolyte disturbances. In severe cases, fluid depletion may result in hypotension and tachycardia.⁽¹⁾ Medical evacuation may be required.

Table 1
Campylobacteriosis, nontyphoidal salmonellosis, E. coli

Characteristics	CAMPYLO BACTERIOSIS	NON-TYPHOIDAL SALMONELLOSIS	E. COLI (EHEC,** STEC***)
Transmission	<ul style="list-style-type: none"> - Ingestion of contaminated food or water - Food preparation - Contact with infected animals and their feces - Person-to-person is occasional (young children, neonate of infected mother)⁽⁷⁾ - Fecal-oral 	<ul style="list-style-type: none"> - Ingestion of contaminated food or water - Food preparation - Improperly cooked food - Contact with infected animals and their feces - Person-to-person - Fecal-oral⁽⁸⁾ 	<ul style="list-style-type: none"> - Ingestion of contaminated food or water - Food preparation - Person-to-person⁽⁹⁾ - Fecal-oral
High risk foods	<ul style="list-style-type: none"> - Raw or undercooked poultry, beef, pork, lamb - Raw eggs - Unpasteurized milk and milk products - Raw vegetables - Shellfish - Untreated water⁽⁷⁾ 	<ul style="list-style-type: none"> - Poultry, beef, eggs - Dairy products - Unpasteurized milk and milk products - Raw fruits and vegetables (e.g., sprouts, cantaloupes and their juices) - Homemade products (e.g., salad dressings, hollandaise sauce, mayonnaise) - Ice cream, cookie dough, frostings⁽⁸⁾ 	<ul style="list-style-type: none"> - Raw beef - Undercooked ground beef - Raw fruits and uncooked vegetables (e.g., sprouts and raw leafy vegetables) - Untreated drinking water - Unpasteurized milk and milk products, including raw milk cheese, unpasteurized apple juice or cider⁽⁹⁾
Communicability	<p>Low: person-to-person transmission occurs occasionally⁽¹⁰⁾</p>	<ul style="list-style-type: none"> – For as long as it is excreted in the feces. – Some carriers shed the bacteria for years.⁽¹¹⁾ 	<ul style="list-style-type: none"> – For as long as it is excreted in the feces (7–9 days) – Some children: up to 21 days⁽⁹⁾

Characteristics	CAMPYLO BACTERIOSIS	NON-TYPHOIDAL SALMONELLOSIS	<i>E. COLI</i> (EHEC,** STEC***)
Incubation Period	1-10 days ⁽⁷⁾	6-72 hours ⁽⁸⁾	1-10 days ⁽⁹⁾
Physical findings	<ul style="list-style-type: none"> - Diarrhea (blood or mucus) - Abdominal pain - Nausea and vomiting - Malaise - Fever - May be dehydrated⁽⁷⁾ 	<ul style="list-style-type: none"> - Diarrhea - Abdominal cramps - Nausea and vomiting - Headache - Fever up to 39°C and chills - Dysentery (multiple small, bloody mucoid stools with tenesmus*) is uncommon⁽⁸⁾ 	<ul style="list-style-type: none"> - Severe abdominal cramps and pain - Diarrhea, initially watery (bloody after 2-3 days) - Vomiting - No fever or low-grade fever (usually less than 38.5°C) - Dehydration^(9; 12)
Complications	<ul style="list-style-type: none"> - Reactive arthritis - Meningitis - Guillain-Barré syndrome - Chronic colitis - Sudden gallbladder inflammation - Irritable bowel syndrome - Myocarditis - Pericarditis⁽⁷⁾ 	<ul style="list-style-type: none"> - Bacteremia - Serious illness - Sometimes death - Reactive arthritis⁽⁸⁾ 	<ul style="list-style-type: none"> - Hemolytic uremic syndrome in children^(12; 13) - Thrombotic Thrombocytopenic Purpura (TTP) in adults^(5; 13) - Seizures - Stroke⁽⁹⁾

* Tenesmus is feeling the need to pass stools; may involve straining, pain and cramping.

** EHEC: Enterohemorrhagic *E. coli*

*** STEC: Shiga toxin-producing *E. coli*

Table 2
Shigellosis, *C. difficile*

Characteristics	SHIGELLOSIS (BACTERIAL)	<i>C. DIFFICILE</i>
Transmission	<ul style="list-style-type: none"> - Fecal-oral - Ingestion of contaminated food or water (or water in swimming pools) - Food preparation - Person-to-person (anal sexual activity) - Flies may be a vector⁽¹⁴⁾ 	<ul style="list-style-type: none"> - Fecal-oral route - Ingestion of contaminated foods - Fomites - Hands^(15; 16)
Risk factors	<ul style="list-style-type: none"> - Foods exposed through handling - Foods exposed through polluted water - Contaminated water/swimming pools - Risk factors: <ul style="list-style-type: none"> • Caregivers of affected children • Living in crowded conditions • Men who have sex with men • Unsanitary conditions and limited clean water^(14; 17) 	<ul style="list-style-type: none"> - Antibiotics (e.g., amoxicillin, ampicillin, clindamycin, cephalosporins, fluoroquinolones) - Multiple and/or longer duration of antibiotics - Proton pump inhibitor (PPI) therapy - Immunocompromised condition - Severe underlying illness - Antineoplastic agents, antivirals and narcotics - Hospitalization - Nursing home/Long-term care stay^(15; 16)
Communicability	<ul style="list-style-type: none"> - As long as the organisms are present in excrement - The carrier state usually ceases within 1-4 weeks after onset of illness⁽¹⁴⁾ 	<ul style="list-style-type: none"> - Depends on amount of toxin in the stool; may persist for weeks - Nosocomial transmission from contaminated hands, instruments and environment⁽¹⁸⁾

Characteristics	SHIGELLOSIS (BACTERIAL)	<i>C. DIFFICILE</i>
Incubation period	1-7 days ⁽¹⁴⁾	1 day to several weeks following antibiotic treatment for associated antibiotic diarrhea ⁽¹⁵⁾
Physical findings	<p>Symptoms range from mild watery diarrhea with minimal or no symptoms, to severe symptoms:</p> <ul style="list-style-type: none"> - Mucoid stools with or without blood - Nausea - Vomiting - Loss of appetite - Abdominal cramps (may be severe) - Tenesmus* - Fever - Hypoglycemia occurs more frequently than in other types of diarrheal disease^(14; 17) 	<ul style="list-style-type: none"> - Watery diarrhea (rarely bloody)⁽⁵⁾ - Diarrhea may range from a few days of intestinal fluid loss to life-threatening pseudomembranous colitis - Nausea - Loss of appetite - Abdominal cramps, pain/tenderness - Fever may be present^(15; 16)
Complications	<ul style="list-style-type: none"> - Severe dehydration - Intestinal perforation, toxic mega colon - Septicemia - In children: seizures attributed to high fever and electrolyte abnormalities - Hemolysis - Hemolytic uremic syndrome - Reactive arthritis^(14; 17) 	<ul style="list-style-type: none"> - Severe or life-threatening pseudomembranous colitis - Toxic megacolon - Intestinal perforation - Sepsis - Systemic inflammatory response syndrome (SIRS) - Death^(15; 16)

Table 3
Rotavirus, norovirus

Characteristics	ROTAVIRUS	NOROVIRUS
Transmission	<ul style="list-style-type: none"> - Fecal-oral - Person-to-person or contact with contaminated environmental surfaces - Fecally contaminated food and water^(2; 19) 	<ul style="list-style-type: none"> - Fecal-oral - Person-to-person or contact with contaminated environmental surfaces, aerosols⁽²⁰⁾ - Fecally contaminated food and water⁽²⁾
Risk factors	Rare: contaminated food, water ⁽¹⁹⁾	<ul style="list-style-type: none"> - Contaminated foods - Feasts, banquets, day care centers^(5; 20)
Communicability	Highly contagious ⁽⁵⁾	Highly contagious ⁽⁵⁾
Incubation period	1-8 days ⁽¹⁹⁾	12-48 hours, may persist for 3 weeks or more ⁽²⁰⁾
Physical findings	<ul style="list-style-type: none"> - Associated with above-average severity of gastroenteritis - Fever - Vomiting - Diarrhea and dehydration^(2; 5; 19) 	<ul style="list-style-type: none"> - Abrupt vomiting - Abdominal cramps - Nausea - Diarrhea, may be mucus in stool, dehydration - Fever⁽²⁰⁾
Complications	<ul style="list-style-type: none"> - Dehydration, hypernatremia, acidosis - Death^(2; 19) 	Dehydration ⁽²⁾

Table 4
Giardiasis, cryptosporidiosis

Characteristics	GIARDIASIS	CRYPTOSPORIDIOSIS
Transmission	<ul style="list-style-type: none"> - Fecal-oral - Contaminated food or water (or water in swimming pools) - Person-to-person (oral-anal sexual activity) - Soil and fomites^(21; 22) 	<ul style="list-style-type: none"> - Fecal-oral - Contaminated drinking water (or water in swimming pools) - Person-to-person - Contact with infected animal and their feces - Contaminated food⁽²³⁾
Risk factors	<ul style="list-style-type: none"> - Contaminated water - Contaminated swimming pools - Contaminated hands, food preparation - Oral-anal sexual activity⁽²²⁾ 	<ul style="list-style-type: none"> - Increased crowding - Poor sanitary conditions - Immunocompromised individuals at risk for more severe and prolonged disease - More prevalent in children⁽²³⁾
Communicability	<ul style="list-style-type: none"> - As long as the parasites are present in excrement⁽²⁴⁾ 	<ul style="list-style-type: none"> - As long as the parasites are present in excrement
Incubation period	<ul style="list-style-type: none"> - 1-2 weeks (symptoms may last 2-4 weeks)⁽²²⁾ 	<ul style="list-style-type: none"> - 3-28 days⁽²³⁾
Physical findings	<ul style="list-style-type: none"> - Sudden onset of watery diarrhea; stools are often foul smelling, may float, may be pale-coloured (steatorrhea stools) - Abdominal tenderness and cramps - Flatulence, eructation that smells sulphur-like - Weight loss - Signs of malnutrition - Low-grade fever⁽²¹⁾ 	<ul style="list-style-type: none"> - Scant or voluminous diarrhea; may be acute or chronic, transient, intermittent or continuous - Malaise - Nausea - Anorexia - Crampy abdominal pain - Low-grade fever - Weight loss in clients with chronic diarrhea⁽²³⁾
Complications	<ul style="list-style-type: none"> - Dehydration - Intestinal malabsorption and weight loss - Anemia - Long-term complications (rare) include chronic fatigue syndrome, reactive arthritis, myopathy, irritable bowel syndrome, rash, urticaria⁽²²⁾ 	<ul style="list-style-type: none"> - Dehydration - Persistent diarrhea - Intestinal malabsorption and weight loss - Biliary tract involvement⁽²³⁾ - Respiratory involvement⁽²⁵⁾

DIFFERENTIAL DIAGNOSIS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

- Gastrointestinal: inflammatory bowel disease, appendicitis, intussusception, lactose intolerance⁽²²⁾ or intestinal tapeworms.⁽²⁷⁾
- Other bacterial infections, e.g., *listeriosis*, *Yersiniosis*.^(27; 26)
- Food poisoning secondary to toxins, or toxin-mediated illnesses, e.g.:
 - *Staphylococcus aureus* and *Bacillus cereus* which may cause symptoms between 1 to 6 hours after a contaminated meal.^(27; 28)
 - *Clostridium perfringens* may cause symptoms within 8 to 16 hours of a contaminated meal.⁽²⁸⁾
 - Shellfish and mushroom toxins may cause gastrointestinal and neurological disturbances.⁽²⁷⁾

DIAGNOSTIC TESTS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Diagnostic test selection is to be based on client history, risk factors, physical examination findings and test availability.

Laboratory^(2; 5; 29)

Testing should be carried out as per provincial/territorial policies and procedures. The tests below are for consideration.

Recommended Samples

- Blood glucose
- Electrolytes, BUN, creatinine may be considered⁽¹⁾
- If nosocomial diarrhea suspected (onset is more than 3 days after hospitalization), or if there has been recent antibiotic use (e.g.,

within last 3 months), stool for *C. difficile* cytotoxin assay for one sample.

- If a viral cause is considered, ensure samples are taken as per provincial/territorial policies and procedures.
- Ova and parasite testing may be considered for client at-risk for parasitic infection with *Giardia and Cryptosporidium*; cysts can be excreted intermittently; therefore, multiple stool collections are required to increase sensitivity (i.e., 3 stool samples for ova and parasites are to be collected on separate days).^(24; 25)
- Blood for culture and sensitivity (C+S) if immunocompromised or with severe infection.
- Stool for C+S if 6 or more unformed stools in 24 hours for greater than 5 days^(3; 29)
- Consider collecting stools with diarrhea for less than 5 days' duration if there are additional clinical considerations if the client:^(3; 29)
 - Has severe, inflammatory diarrhea (including bloody diarrhea)
 - Has a temperature greater than or equal to 38.5°C
 - Has a comorbid condition
 - Has a systemic illness with diarrhea, especially if pregnant
 - Is immunocompromised
 - Is of an advanced age

MANAGEMENT

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

For more information on the management of gastroenteritis, see:

- *FNIHB Adult Care Clinical Practice Guidelines – Chapter 5 – Gastrointestinal System - Diarrhea and Dehydration (Hypovolemia)*
- *FNIHB Adult Care Clinical Practice Guidelines – Chapter 14 – General Emergencies and Major Trauma – Shock*

GOALS OF TREATMENT

- Manage dehydration
- Relieve symptoms
- Prevent complications
- Prevent transmission of disease

NON-PHARMACOLOGICAL INTERVENTIONS

Interventions

- Weigh client and assess for degree of dehydration and shock (frequency depends on client's condition)
- Calculate known losses, PLUS maintenance fluids, PLUS replacement fluids. If the client is eating, calculate fluid intake at 75% of the total. For information about hourly maintenance fluid requirements in adults, see *Table 6: Hourly Maintenance Fluid Requirements in Adults Weighing 20-80 kg (1 hour periods)* in *Appendix, Section A* of this guideline.
- Encourage oral fluids and early feeding to reduce illness duration and to improve nutritional outcomes.

Oral Rehydration Therapy (ORT)

- For mild to moderate dehydration, ORT with a commercially available oral rehydration solution (e.g., *Gastrolyte*).^(2, 30)
- ORT is contraindicated in the initial management of severe dehydration.⁽²⁾ Intravenous fluids are required for the client with severe dehydration and for the client who is unable to tolerate oral rehydration therapy.
- If client is able to take in oral fluids, offer small volumes of ORT frequently.

Diet

- Consumption of solid food should be guided by appetite.⁽²⁾ Foods such as soups, crackers, rice, pasta, lentils, peas, mashed potatoes, breads, fresh fruits, lean meats, yogurt, and vegetables are all recommended.⁽³⁰⁾
- When dehydration is corrected, encourage a regular diet as tolerated.

- Avoid carbonated drinks or commercial juices with a high concentration of simple carbohydrates.⁽³⁰⁾ Other drinks that do not contain caffeine or alcohol can also help with mild dehydration; however, these drinks may not replace the nutrients and minerals lost during illness.

Client Education

- For information on preventing gastroenteritis, see *Prevention* in *Appendix, Section A* of this guideline.
- Educate client and family members on proper handwashing, including before and after preparing food, touching soiled material, or after using the washroom.
- Provide client/caregiver and family with food safety information (for more information, see *Food Safety* in *Appendix, Section B* of this guideline).
- If the potential cause is a water-borne illness, recommend water purification by boiling all water used for drinking or cooking for one minute at a rolling boil.⁽³¹⁾
- Educate client about the signs of dehydration and advise to return to the clinic if any signs occur.
- If metronidazole ordered, advise client to avoid alcohol during, and for 48 hours after completion of treatment.
- Counsel client about the appropriate use of medications; dose, frequency, importance of compliance, potential side effects and interactions.

Note: *Shigella* infection is highly contagious; the client should not handle food, provide childcare, or care for others until follow-up stool cultures are negative. A child who is sick with Shigellosis should be kept at home from day-care or school, and contact with other children should be reduced.

PHARMACOLOGICAL INTERVENTIONS

In addition to consulting a physician/nurse practitioner, review the drug monograph, the FNIHB Nursing Station Formulary or provincial/territorial formulary before initiating treatment.

IV Therapy

If a client is dehydrated on presentation, care consists of restoration of volume status through oral rehydration or IV administration of a crystalloid solution. For more information, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 5 – Gastrointestinal System – Dehydration (Hypovolemia)*.

Note: Anti-diarrheal agents such as loperamide or diphenoxylate-atropine (Lomotil) are not recommended. These agents slow bacterial clearance and prolong the exposure of bacteria to intestinal mucosa, thus increasing the risk of precipitating toxic megacolon or systemic illness. They are contraindicated in bloody or suspected inflammatory diarrhea (febrile clients).^(2; 32)

Antibiotic Therapy

Antibiotic therapy is usually not required or recommended. Consult with physician/nurse practitioner before initiating antibiotics.

Analgesic/Antipyretic

Acetaminophen

- Acetaminophen 325 to 650 mg PO q4-6h PRN
- Maximum from all sources: acetaminophen 4,000 mg in 24 hours

Antiprotozoan for Giardiasis⁽²⁴⁾

Metronidazole

- Metronidazole 250 mg PO TID for 5 days

Antinausea/Antiemetic

DimenhyDRINATE

- DimenhyDRINATE (Gravol) 25 to 50 mg PO/IM/IV q4-6h PRN

MONITORING AND FOLLOW-UP

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

MONITORING

- Monitor vital signs as indicated by client's condition.
- If administering an agent with risk of anaphylaxis, monitor the client closely for 30 minutes.

FOLLOW-UP

- Instruct client to return for follow-up in 24–48 hours if symptoms are becoming worse or not improving.
- Household contacts or contacts may require assessment and may require stool samples based on provincial/territorial policies and procedures.
- For *Giardia* or *Cryptosporidium* infection, in addition to the initial three stool samples, repeat stool collection for ova and parasitology in 1–2 weeks to ensure resolution of infection or as per provincial/territorial policies and procedures.

Referral

Arrange for medical evacuation if clinically indicated.

Reporting

- Suspected and confirmed cases are to be reported to the provincial/territorial Public Health Physician as per provincial/territorial policies and procedures.
- If potential water contamination, notify the Environmental Health Officer/Water Technician for water sampling.

APPENDIX

SECTION A: SUPPLEMENTAL CLINICAL MANAGEMENT INFORMATION

Table 5
Physical Findings in Association with Degree of Dehydration (Adult)

CLINICAL SIGN	MILD DEHYDRATION	MODERATE DEHYDRATION	SEVERE DEHYDRATION
Fluid loss (% of body weight)	< 6 %	6 % to 10 %	> 10 %
Radial pulse	Normal	Rapid, weak	Very rapid, feeble
Respiration	Normal	Deep	Deep, rapid
Systolic blood pressure	Normal	Low or orthostatic >10 mm Hg change	Very low or undetectable
Skin turgor	Retracts rapidly	Retracts slowly	Retracts very slowly
Eyes	Normal	Sunken	Very sunken
Mentation	Alert	Restless	Drowsy, comatose
Urine output	Normal	Scant	Oliguria

Note: If dehydration is moderate to severe, there may be associated electrolyte disturbances.

Table 6
Hourly Maintenance Fluid Requirements in Adults Weighing 20 – 80 kg (1 hour periods)

CALCULATION
<ul style="list-style-type: none"> - 4 mL/kg/hour for first 10 kg of body weight <ul style="list-style-type: none"> • Plus 2 mL/kg/hour for the next 10 kg of body weight (over the initial 10 kg of body weight) • Plus 1 mL/kg/hour for each kilogram over 20 kg of body weight

Prevention⁽³⁴⁾

Handwashing is one of the best ways to prevent the spread of foodborne illness. Ensure thorough hand washing with warm water and soap after using the washroom, after changing diapers and before preparing food. Ensure proper disposal of dirty diapers. For more information, see *Food Safety*. Public Health Agency of Canada. [Internet] Available from: <https://www.canada.ca/en/public-health/services/food-safety.html>

SECTION B: SUPPLEMENTAL RESOURCES

Food Safety

Food safety for First Nations. Government of Canada. [Internet] 2013. Available from: <http://www.healthycanadians.gc.ca/eating-nutrition/safety-salubrite/first-premieres-nations-eng.php>

Safe Food Handling Tips. Health Canada. [Internet] 2014. Available from: <http://www.hc-sc.gc.ca/fn-an/securit/kitchen-cuisine/index-eng.php>

Food safety. Government of Canada. [Internet] 2015. Available from: <http://www.healthycanadians.gc.ca/eating-nutrition/safety-salubrite/index-eng.php>

Fact Sheets

Salmonellosis (*Salmonella*). Public Health Agency of Canada. [Internet] 2016. Available from: <https://www.canada.ca/en/public-health/services/diseases/salmonellosis-salmonella.html>

Shigellosis. Public Health Agency of Canada. [Internet] 2013. Available from: <http://www.phac-aspc.gc.ca/fs-sa/fs-fi/shigellos-eng.php>

E. coli. Public Health Agency of Canada. [Internet] 2017. Available from: <http://www.phac-aspc.gc.ca/fs-sa/fs-fi/ecoli-eng.php>

Campylobacter. Public Health Agency of Canada. [Internet] 2013. Available from: <https://www.canada.ca/en/public-health/services/diseases/campylobacteriosis-campylobacter.html>

C. difficile. Public Health Agency of Canada. [Internet] 2014. Available from: <http://www.phac-aspc.gc.ca/id-mi/cdiff-eng.php>

Norovirus. Public Health Agency of Canada. [Internet] 2014. Available from: <http://www.phac-aspc.gc.ca/fs-sa/fs-fi/norovirus-eng.php>

About rotavirus. Centers for Disease Control (US). [Internet] 2016. Available from: <http://www.cdc.gov/rotavirus/about/>

BIBLIOGRAPHY

The following references and other sources have informed the updating of this Clinical Practice Guideline.

REFERENCES

1. Boyce TG. Overview of gastroenteritis. Merck Manual Professional Version. [Internet] Whitehouse Station, NJ: Merck Sharp & Dohme Corp; 2014 [cited 2016 May 29]. Available from: <http://www.merckmanuals.com/professional/gastrointestinal-disorders/gastroenteritis/overview-of-gastroenteritis>

2. Farthing M, Salam M, Lindberg G, Dite P, Khalif I, Salazar-Lindo E, et al. Acute diarrhea in adults and children: a global perspective. [Internet] Milwaukee, WI: World Gastroenterology Organisation (WGO) Guidelines and Publications Committee; 2012 February [cited 2016 May 29]. Available from: <http://www.worldgastroenterology.org/guidelines/global-guidelines/acute-diarrhea/acute-diarrhea-english>

3. Wanke CA. Approach to the adult with acute diarrhea in resource-rich countries. [Internet] Waltham, MA (US): UptoDate; 2015 [cited 2016 May 12]. Available from: www.uptodate.com with authorized username and password.

4. Thomas MK, Murray R, Flockhart L, Pintar K, Fazil A, Pollari F. Estimates of foodborne illness-related hospitalizations and deaths in Canada for 30 specified pathogens and unspecified agents. *Foodborne Pathog Dis*. 2015 Oct;12(10). p. 820–827. doi:10.1089/fpd.2015.1966.

5. Newton JM, Suawicz CM. Infectious gastroenteritis and colitis. In: Guandalini S, Vaziri H., editors. *Diarrhea, Clinical Gastroenterology*. New York, N.Y.; London: Springer. c2011; p. 39-59. doi: 10.1007/978-1-60761-183-7_2.

6. Farthing M, Salam M, Lindberg G, Dite P, Khalif I, Salazar-Lindo E, Ramakrishna BS, et al. World Gastroenterology Organisation Global Guideline: Acute diarrhea in adults and children: a global perspective. [Internet] Milwaukee, WI: World Gastroenterology Organisation (WGO) Guidelines and Publications Committee; 2012. p. 1–24. Available from: <http://www.worldgastroenterology.org/UserFiles/file/guidelines/acute-diarrhea-english-2012.pdf>

7. Public Health Agency of Canada. Fact sheets: *Campylobacter*. [Internet] Ottawa, ON: Public Health Agency of Canada; 2013 [cited 2016 May 30]. Available from: <http://www.phac-aspc.gc.ca/fs-sa/fs-fi/index-eng.php> by selecting *Campylobacter* link in table of contents.

8. Public Health Agency of Canada. Fact sheets: Salmonella. [Internet] Ottawa, ON: Public Health Agency of Canada; 2013 [cited 2016 May 30]. Available from: <http://www.phac-aspc.gc.ca/fs-sa/fs-fi/index-eng.php> by selecting Salmonella link in table of contents.
9. Public Health Agency of Canada. Fact sheets: E.coli. [Internet] Ottawa, ON: Public Health Agency of Canada; 2015 [cited 2016 May 30]. Available from: <http://www.phac-aspc.gc.ca/fs-sa/fs-fi/index-eng.php> by selecting E. coli link in table of contents.
10. American Academy of Pediatrics. Campylobacter infections. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. Red Book: 2015 Report of the Committee on Infectious Diseases. 30th edition. [Internet] Elk Grove Village, IL: American Academy of Pediatrics; 2015. p. 273–275. Available from: <http://redbook.solutions.aap.org> with authorized username and password.
11. American Academy of Pediatrics. Salmonella infections. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. Red Book: 2015 Report of the Committee on Infectious Diseases. 30th edition. [Internet] Elk Grove Village, IL: American Academy of Pediatrics; 2015. Available from: <http://redbook.solutions.aap.org> with authorized username and password.
12. American Academy of Pediatrics. Escherichia coli diarrhea. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. Red Book: 2015 Report of the Committee on Infectious Diseases. 30th edition. [Internet] Elk Grove Village, IL: American Academy of Pediatrics; 2015. p. 343–347. Available from: <http://redbook.solutions.aap.org> with authorized username and password.
13. George JN, Al-Nouri ZL. Diagnostic and therapeutic challenges in the thrombotic thrombocytopenic purpura and hemolytic uremic syndromes. Washington, DC: American Society of Hematology. 2012 December 8; 2012(1) p. 604–9. doi:10.1182/asheducation-2012.1.604.
14. Public Health Agency of Canada. Fact sheets: Shigellosis. [Internet] Ottawa, ON: Public Health Agency of Canada; 2013 [cited 2016 May 30]. Available from: <http://www.phac-aspc.gc.ca/fs-sa/fs-fi/index-eng.php> by selecting Shigellosis link in table of contents.
15. American Academy of Pediatrics. Clostridium difficile. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. Red Book: 2015 Report of the Committee on Infectious Diseases. 30th edition. [Internet] Elk Grove Village, IL: American Academy of Pediatrics; 2015. Available from: <http://redbook.solutions.aap.org> with authorized username and password.
16. Public Health Agency of Canada. Fact sheets: Clostridium difficile (C. difficile). [Internet] Ottawa, ON: Public Health Agency of Canada; 2014 June [cited 2015 April 22]. Available from: <http://www.phac-aspc.gc.ca/id-mi/cdiff-eng.php>
17. American Academy of Pediatrics. Shigella infections. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. Red Book: 2015 Report of the Committee on Infectious Diseases. 30th edition. [Internet] Elk Grove Village, IL: American Academy of Pediatrics; 2015. p. 706. Available from: <http://redbook.solutions.aap.org> with authorized username and password.
18. Ontario Ministry of Health and Long-Term Care. Clostridium difficile Infection (CDI) outbreaks in public hospitals. In: Infectious Diseases Protocol. Appendix A: Disease-Specific Chapters. [Internet] Toronto, ON: Ontario Ministry of Health and Long-Term Care; 2014 January. [cited 2015 April 27]. Available from: http://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/docs/cdi_chapter.pdf

19. American Academy of Pediatrics. Rotavirus. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. Red Book: 2015. Report of the Committee on Infectious Diseases. 30th edition. [Internet] Elk Grove Village, IL: American Academy of Pediatrics; 2015. Available from: <http://redbook.solutions.aap.org> with authorized username and password.
20. American Academy of Pediatrics. Norovirus. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. Red Book: 2015. Report of the Committee on Infectious Diseases. 30th edition. [Internet] Elk Grove Village, IL: American Academy of Pediatrics; 2015. Available from: <http://redbook.solutions.aap.org> with authorized username and password.
21. Pearson RD. Giardiasis. Merck Manual Professional Version. [Internet] Whitehouse Station, NJ: Merck Sharp & Dohme Corp; 2013 September [cited 2016 May 29]. Available from: <https://www.merckmanuals.com/professional/infectious-diseases/intestinal-protozoa-and-microsporidia/giardiasis>
22. Leder K, Ryan ET, Baron EL. Epidemiology, clinical manifestations, and diagnosis of giardiasis. UptoDate [Internet] Waltham, MA (US): UptoDate; 2015 [cited 2015 July 29]. Available from: www.uptodate.com with authorized username and password.
23. Leder K, Weller PF. Epidemiology, clinical manifestations, and diagnosis of cryptosporidiosis. [Internet] Waltham, MA (US): UptoDate; 2016 [cited 2016 August 9]. Available from: www.uptodate.com with authorized username and password.
24. American Academy of Pediatrics. Giardia intestinalis (formerly Giardia lamblia and Giardia duodenalis) Infections. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. Red Book: 2015 Report of the Committee on Infectious Diseases. 30th edition. [Internet] Elk Grove Village, IL: American Academy of Pediatrics; 2015. Available from: <http://redbook.solutions.aap.org> with authorized username and password.
25. Centers for Disease Control and Prevention (US). Parasites - Cryptosporidium (also known as “Crypto”). [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; 2015 [cited 2016 August 9]. Available from: www.cdc.gov/parasites/crypto
26. Public Health Agency of Canada. Food-borne illness in Canada. About the estimates of food-borne illnesses in Canada. [Internet] Ottawa, ON: Public Health Agency of Canada; 2015 August 28. p. 1-10. Available from: <http://www.phac-aspc.gc.ca/efwd-emoaha/efbi-emoa-eng.php>
27. Acheson DWK. Differential diagnosis of microbial foodborne disease. [Internet]. Waltham, MA (US): UptoDate; 2016 [cited 2016 August 2]. Available from: www.uptodate.com with authorized username and password.
28. Noonan L, Freeman J. Bacillus cereus and other non-anthraxis Bacillus species. [Internet]. Waltham, MA (US): UptoDate; 2015 [cited 2016 August 2]. Available from: www.uptodate.com with authorized username and password.
29. British Columbia Ministry of Health Services. Infectious Diarrhea – Guideline for Ordering Stool Specimens. [Internet] Vancouver, BC: Guidelines and Protocols Advisory Committee; 2009 [cited 16 August 2015]. Available from: <http://www2.gov.bc.ca/assets/gov/health/practitioner-pro/bc-guidelines/diarrhea.pdf>

30. Centers for Disease Control and Prevention (US). Guidelines for the management of acute diarrhea after a disaster. [Internet] Atlanta, GA: National Center for Environmental Health; 2014 [cited 2015 August 12]. Available from: <https://www.cdc.gov/disasters/disease/diarrheaguidelines.html>

31. Health Canada. Boil water advisories and boil water orders. [Internet] Ottawa, ON: Health Canada; 2008. [cited 2015 August 9]. Available from: <https://www.canada.ca/en/health-canada/topics/health-environment/water-quality-health/drinking-water/advisories-first-nations-south-60.html>

32. Kao D. Diarrhea. In: *Compendium of Therapeutic Choices: Canada's Trusted Reference for Primary Care Therapeutics (CTC 7)*. Ottawa, ON: Canadian Pharmacists Association; c2014. Chapter 59, p. 717-732.

33. Health Canada. Food safety Handling Tips. [Internet] Ottawa, ON: Health Canada; 2014 [cited 2015 April 20]. Available from: <http://www.hc-sc.gc.ca/fn-an/securit/kitchen-cuisine/index-eng.php>

OTHER SOURCES

Anti-infective Review Panel. *Anti-infective Guidelines for Community-acquired Infections*. Toronto: MUMS Guideline Clearinghouse.

c2013.

Canadian Pharmacists Association. DimenhyDRINATE (Gravol). [Internet] Ottawa, ON: eTherapeutics; 2012. Available from: <http://www.e-therapeutics.ca> with authorized username and password.

Canadian Pharmacists Association. *Compendium of Therapeutic Choices: Canada's Trusted Reference for Primary Care Therapeutics (CTC 7)*. Ottawa: Canadian Pharmacists Association; c2014.

Health Canada. First Nations and Inuit Health Branch (FNIHB) Nursing Station Formulary and Drug Classification System. 2016 April.

DimenhyDRINATE. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015. Available from: <http://online.lexi.com> with authorized username and password.

HUMAN IMMUNODEFICIENCY VIRUS (HIV)

OVERVIEW

Please refer to provincial/territorial guidelines for Human Immunodeficiency Virus where available.

Human Immunodeficiency Virus (HIV) is a chronic viral infection typically acquired by sexual contact. Among the Aboriginal population, injection drug use (IDU) accounts for a greater infection rate.⁽¹⁾ In self-identified Aboriginal youth, IDU accounts for most of the identified HIV cases.⁽²⁾

HIV progresses over time, from the transmission phase to early infection, to chronic HIV and finally to Acquired Immunodeficiency Syndrome (AIDS), which results in the development of severe opportunistic infections due to immunocompromise.

Current antiretroviral therapy (ART) has significantly reduced the number of AIDS-related opportunistic infections (OIs) and deaths, improving life expectancy and quality of life for adults and children.

Pediatric HIV infection occurs almost exclusively through vertical transmission (i.e., mother-to-child). Advances in effective strategies to prevent this mode of transmission significantly reduces the risk to less than 2%.⁽³⁾

PHASES OF HIV

Transmission

- Viral acquisition through exposure to infected blood or body fluids. For more information, see *Risk Factors* in the *Assessment* section of this guideline.

Early HIV Infection⁽⁵⁾

- Refers to the first 6 months following viral acquisition when seroconversion occurs
- Most clients are asymptomatic in early HIV.

Acute Symptomatic HIV Infection

- Clients may present with a mononucleosis-like syndrome (acute retroviral syndrome).⁽⁵⁾
- Typically, the incubation period post-HIV exposure is 2 to 4 weeks, although it may take up to 10 months to exhibit symptoms.^(5;6)

Chronic HIV Infection⁽⁷⁾

- Period following the first 6 months after viral acquisition
- Clients may be initially asymptomatic, but usually have persistent lymphadenopathy.
- Gradual decline in immune function in most clients in the absence of treatment

AIDS⁽⁷⁾

- Advanced HIV infection; defined by a CD4 cell count below 200 cells/microlitre or an AIDS-defining condition. For more information, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 11 – Communicable Diseases – Human Immunodeficiency Virus – Appendix, Section A: Supplemental Clinical Management Information*.
- Clients with advanced HIV infection survive a median of 12 to 18 months if untreated.⁷

CAUSES

Human Immunodeficiency Virus (HIV type 1)⁽⁶⁾

ASSESSMENT

Medication review: Review current medications, over-the-counter, complementary and alternative medicines, as well as any chemical or substance intake that may impact management.

Allergy history: Screen for medication, latex, environmental or other allergies and determine when and what type of reaction occurred.

RISK FACTORS

Note: A high index of clinical suspicion for HIV should be maintained when clients present with symptoms commonly associated with HIV infection as they may be reluctant to fully disclose their high-risk behaviours.⁽⁵⁾

Sexual Transmission Risk Factors

- Viral load; an individual infected with HIV, with a higher viral load, is more likely to transmit the virus.⁽⁷⁾
- Concomitant sexually transmitted infections (STIs); genital ulceration increases the risk of transmission four-fold.⁽⁷⁾
- Sexual practices that cause mucosal disruption and bleeding are considered higher risk.⁽¹⁰⁾ Higher risk sexual practices include:^(5; 10)
 - Unprotected receptive anal intercourse
 - Partner with concurrent STIs
 - Known HIV infected sexual partner
 - Multiple sexual partners
- Uncircumcised males⁽⁷⁾
- Host and genetic factors⁽⁷⁾

Blood-borne Transmission Risk Factors

- Blood-borne risk of HIV transmission is variable, depending on the type of exposure. For more information, see *Table 1: Estimated Per-Act Risk for Acquisition of HIV, by Exposure Type*.

Perinatal Transmission Risk Factors

For an HIV-infected mother, mother-to-child transmission may occur in utero, intrapartum or with breastfeeding.⁽¹¹⁾ The risk of transmission is variable between 15 and 45%, but improves markedly with risk reduction strategies.

HISTORY OF PRESENT ILLNESS

Review risk factors and collect history of present illness.

Early HIV Infection

Opportunistic infections may be the presenting illness; oral and esophageal candidiasis are the most frequent.⁽⁵⁾

Acute Symptomatic HIV Infection

- Present commonly with a constellation of acute symptoms, may be referred to as the acute retroviral syndrome.
- Constitutional symptoms commonly associated with acute HIV include:⁽⁵⁾
 - Fever
 - Fatigue
 - Myalgias, arthralgias
- Additional acute symptoms may include:⁽⁵⁾
 - Lymphadenopathy
 - Sore throat
 - Rash; typically the rash occurs after the onset of fever and persists for up to 8 days
 - Diarrhea, nausea, anorexia, weight loss

TABLE 1

Estimated Per-Act Risk for Acquisition of HIV, by Exposure Type⁽⁹⁾

EXPOSURE ROUTE		RISK PER 10,000 EXPOSURES TO AN INFECTED SOURCE (RISK)
Blood-borne exposure	Blood transfusion	9000 (9/10)
	Needle-sharing injection drug use (IDU)	67 (1/150)
	Percutaneous needle stick	23 (1/435)
	Mucous membrane exposure to blood (e.g., splash to eye)	10 (1/1,000)
Other	Biting, spitting, throwing body fluids (including semen and saliva), sharing sex toys	Negligible

- Headache and other neurologic manifestations

Note: None of these symptoms are specific to HIV infection, but prolonged duration combined with the presence of mucocutaneous ulcers, are suggestive.

Chronic HIV Infection⁽⁸⁾

Non-specific symptoms (e.g., headache, fatigue, low-grade fever, night sweats or weight loss)

AIDS⁽⁷⁾

- AIDS-defining conditions present as opportunistic infections, malignancy, or associated conditions (e.g., encephalopathy or wasting.)
- Clients may report a variety of mucocutaneous lesions.

PHYSICAL FINDINGS

Perform a physical examination using the IPPA approach.

Note: 10 to 60% of individuals with acute HIV infection will be asymptomatic.⁽⁵⁾

Acute and Early HIV Infection⁽⁵⁾

- Most common signs associated with acute infection include:
 - Elevated temperature between 38 to 40°C
 - Lymphadenopathy
 - Oropharyngeal features: pharyngeal edema and hyperemia, painful mucocutaneous ulceration (typically white bases with a ring of erythema)
 - Rash: generalized lesions, small (5 to 10 mm), demarcated, circular, pink to deep red, maculopapular lesions primarily over face, upper thorax, throat
 - Mucocutaneous ulcers may be located on mucosa of the oral cavity, esophagus, anus, or penis.
 - Weight loss

Infants and Children⁽¹²⁾

- Presenting clinical manifestations are variable, and may be nonspecific.
- Early findings may include hepatosplenomegaly and lymphadenopathy.
- Other findings: failure to thrive, oral candidiasis, and developmental delay are common presenting features.

Chronic HIV Infection

Chronic HIV Infection without Severe Immunosuppression⁽⁷⁾

- Full skin examination is indicated.
 - Skin or mucous membrane involvement are predominant, including: vulvovaginal or oral candidiasis, hairy leukoplakia, seborrheic dermatitis, or folliculitis.
- Persistent generalized lymphadenopathy is common on examination; it refers to 2 or more non-contiguous sites of lymphadenopathy persisting for more than 3 to 6 months, with no alternate explanation.
- Focused examinations for indicators of immunocompromise or opportunistic infection:
 - Mental health screen
 - Visual fields and ocular fundi
 - Abdominal and chest examination
 - Pelvic and rectal examination

AIDS and Advanced HIV Infection

- As with chronic AIDS, focused examinations for indicators of immunocompromised or opportunistic infection, including a detailed mucocutaneous examination.⁽⁷⁾

Opportunistic Infections

- Clinical features of bacterial infections may include classic signs (e.g. elevated temperature, elevated WBC count), but may not be consistent in HIV infected children.⁽⁴⁾
- Methods to prevent exposure and reduce the risk of OIs are expanded in the *Prevention* section in *Appendix, Section A* of this guideline.

DIFFERENTIAL DIAGNOSIS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Acute HIV Infection

- Mononucleosis-type syndrome secondary to:⁽⁵⁾
 - Cytomegalovirus
 - Epstein-Barr virus
- Toxoplasmosis
- Rubella
- Syphilis
- Disseminated gonococcal infection
- Viral hepatitis

Clinical Findings to Distinguish Acute HIV from Other Clinical Diagnoses

- Mucocutaneous ulcers are rare in all the above, except syphilis and herpes, and their presence should heighten suspicion of HIV.
- Generalized rash rare in the other disorders
- Abrupt symptom onset, especially pharyngeal edema, diarrhea may be seen in acute HIV

COMPLICATIONS

Complications of HIV relate to disease progression and side effects of treatment.⁽¹³⁾

- In the absence of antiretroviral therapy (ART), HIV will progress more quickly to AIDS.
- AIDS is a condition that occurs with advanced HIV infection.
 - AIDS-defining illnesses span a number of conditions, such as recurrent bacterial pneumonia.⁽¹³⁾ For more information, see *Table 2: AIDS-Defining Conditions in Appendix, Section A* of this guideline.
 - A complete list of the AIDS-defining illnesses can be found in *the PHAC Population-Specific HIV/AIDS Status Report – People living with HIV/AIDS - Section 3.3.1, Acquired Immunodeficiency Syndrome (AIDS)*, available from: <http://www.phac-aspc.gc.ca/aids-sida/publication/ps-pd/people-personnes/index-eng.php>.

- Post- antiretroviral therapy (ART) initiation, Immune Reconstitution Inflammatory Syndrome (IRIS) may impact both adults and children.⁽⁴⁾
 - Immune reconstitution inflammatory syndrome (IRIS) refers to a disease- or pathogen-specific inflammatory response in HIV-infected patients that may be triggered after the initiation or re-initiation of anti-retroviral therapy or change to more active anti-retroviral therapy. IRIS is usually accompanied by an increase in CD4 cell count and/or a rapid decrease in viral load.⁽²⁷⁾
- HIV-infected youth on ART have higher rates of long term sequelae (e.g. dyslipidemia, asthma, eczema, hypertension, diabetes mellitus and thyroid disorders).⁽¹⁴⁾
- HIV-infected youth commonly develop psychiatric conditions (e.g., mood and anxiety disorders) and neurodevelopmental disorders (e.g., learning and communication disorders).⁽¹⁴⁾

DIAGNOSTIC TESTS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Diagnostic test selection is based on client history, risk factors, physical examination findings and test availability.

Laboratory

Testing should be carried out as per provincial/territorial policies and procedures. The tests below are for consideration.

Adult

Note: A fourth generation HIV antigen-antibody screening test may not become positive until 15-20 days after infection.⁽¹⁹⁾ If confirmatory HIV testing is indeterminate or clinical suspicion is high, testing should be repeated using a Nucleic Acid Amplification Test (NAAT) for HIV RNA. NAAT has the shortest window period of all types of HIV tests and can detect HIV infection as early as 7-14 days after infection.⁽²⁰⁾

HIV testing

- Fourth-generation HIV tests can detect HIV infection in 50% of people by 18 days after infection; 95% of people by 34 days after infection; and 99% of people by one and a half months after infection.⁽²⁰⁾
- For individuals undergoing HIV testing, full information regarding HIV testing procedures can be found in the *Human Immunodeficiency Virus HIV Screening and Testing Guide*, available from: <https://www.canada.ca/en/public-health/services/hiv-aids/hiv-screening-testing-guide.html>

Infants and Children

- For diagnosis of HIV infection in infants and children, virologic assays are used: HIV RNA or HIV DNA.^(3; 18)
- For children with or without perinatal exposure who are older than 24 months, HIV antibody testing is used.
- For an infant or young child of an HIV-infected mother, serial HIV virologic assays testing are required.⁽¹⁵⁾

Screening for Concurrent Infections or Conditions⁽¹⁸⁾

- Hepatitis screening (i.e., hepatitis A, B, and C virus). To guide testing, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 11 – Communicable Diseases – Viral Hepatitis – Table 2, Serologic Features of Viral Hepatitis*.

- Sexually transmitted infection (STI) screening should be done on all clients with newly diagnosed HIV infection. For more information, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 11 – Communicable Diseases – Sexually Transmitted Infections (STIs) – Diagnostic Tests*.
- Tuberculosis screening. For additional testing information, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 11 – Communicable Diseases – Tuberculosis – Appendix, Section A – Table 2: Possible Adverse Events to First-Line Antituberculosis Therapy*.
- Pap testing for neoplasia associated with human papilloma virus (HPV) (e.g., cervical cancer, anal cancer).

MANAGEMENT

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

GOALS OF TREATMENT

- Reduce HIV-associated morbidity and mortality
- Improve quality of life
- Slow disease progression
- Decrease viral replication
- Delay emergence of drug-resistant HIV strains
- Prevent transmission

NON-PHARMACOLOGICAL INTERVENTIONS

Interventions

- As part of the initial evaluation, screen all clients infected with HIV for co-infections to consider the need for immunization, treatment or prophylaxis (for more information, see the *Screening for Concurrent Infections or Conditions* section in this guide).⁽¹⁸⁾

Prevention of Mother-to-Child

HIV Transmission⁽¹¹⁾

- Risk reduction/prevention strategies for pregnant clients include:
 - Referral to a specialist with related expertise⁽⁸⁾
 - Antiretroviral therapy (ART) is the foundation of prevention strategies during pregnancy, and labour/delivery.
 - Planned delivery at a health facility capable of providing maternal ART, intrapartum prophylaxis and neonatal prophylaxis is recommended.
 - Breastfeeding is contraindicated in HIV-infected mothers.⁽⁸⁾
 - Replacement feeding is recommended to infants of HIV-infected mothers.⁽¹⁷⁾

Client Education

For information on methods to prevent acquisition of HIV, see *Prevention in Appendix, Section A* of this guideline.

- Counsel client on behaviours to minimize sexual and blood-borne transmission (e.g., proper condom/barrier use for all sexual activity, not sharing equipment for injection drug use (IDU)⁽⁵⁾ and opioid substitution programs.⁽¹⁰⁾
- For clients who are pre-diagnosis; counsel client regarding the ‘window period:’ i.e., as a result of variations in incubation periods, individuals may initially test negative following an HIV exposure because antibodies have not been produced.⁽¹⁹⁾
- For individuals undergoing HIV testing, full information regarding HIV testing procedures can be found in the *Human Immunodeficiency Virus HIV Screening and Testing Guide*, available from: <http://www.phac-aspc.gc.ca/aids-sida/guide/hivstg-vihgdd-eng.php>.
- Counsel client on living with HIV/AIDS; treatment can protect immune system and allow for healthy living.⁽²¹⁾

- Counsel client/family/caregiver about appropriate use of medications: dose, frequency, importance of adherence, potential side effects and interactions.

PHARMACOLOGICAL INTERVENTIONS

In addition to consulting a physician/nurse practitioner, review the drug monograph, the FNIHB Nursing Station Formulary or provincial/territorial formulary before initiating treatment.

Note: HIV medication availability is variable by provincial/territorial formulary; please refer to the Non-Insured Health Benefit (NIHB) list.

Antiretroviral Therapy⁽⁸⁾

Combination Antiretroviral Therapy (cART)

- cART is the standard of care for HIV infection and is a combination of a minimum of 3 antiretroviral medications:
 - First-line therapy includes a combination of two nucleoside (NRTI) or nucleotide (NtRTI) reverse transcriptase inhibitors, plus either a non-nucleoside transcriptase inhibitor (NNRTI) or a ritonavir-boosted protease inhibitor (PI), or an integrase strand transfer inhibitor (ISTI).
 - Additional drug information and pill identification tools can be found at Canadian AIDS Treatment Information Exchange - CATIE, available at <http://www.catie.ca/en/practical-guides/hiv-drug-treatment/appendices/b>
- cART in adolescents mirrors adult principles.⁽¹⁶⁾
- cART is recommended in pregnant women to reduce mother-to-child transmission.⁽²³⁾
- cART reduces the rate of OIs and improves survival.⁽⁴⁾
 - Initiation of cART during an acute OI requires expertise; challenges include drug-drug interactions which may increase toxicity and decrease efficacy.⁽⁴⁾

- The specific medication used is based upon each client’s viral load, genotype and the following specific comorbid conditions, including:⁽²²⁾
 - Kidney dysfunction (eGFR)
 - Heart disease; either present or positive risk factors for heart disease
 - HBV co-infection
 - Presence of osteoporosis⁽⁶⁾
- cART initiation may provide the following benefits:⁽²³⁾
 - Improved morbidity and mortality
 - Attenuation of symptom severity
 - Decreased risk of transmission
 - Decreased viral reservoir and improved ability of immune cells to control the virus
- Potential risks of initiation include:⁽²³⁾
 - Risk of drug-resistant mutations with non-adherence; to counter this, strict adherence is important
 - Toxicity, e.g. negative impact on bone density and renal function
- For HIV-infected children with severe immunocompromise and recurrent or invasive bacterial infections, appropriate antimicrobial treatment may be required.⁽⁴⁾

IRIS Treatment⁽⁴⁾

- IRIS treatment is provided based on disease severity:
 - Mild cases are monitored with laboratory and clinical monitoring
 - Moderate cases may be given NSAIDs to manage symptoms
 - Severe cases may be given corticosteroids, e.g. dexamethasone.

Vaccination⁽⁸⁾

- Clients with advanced HIV infection and low CD4 counts should not receive live-attenuated vaccines.⁽⁴⁾
- Vaccination status should be optimized to protect against vaccine-preventable diseases. In adults with HIV infection the following vaccinations are recommended:
 - Annual Influenza vaccination
 - Pneumococcal vaccination
 - Hepatitis A and Hepatitis B
- Children with HIV infection should be optimized to protect against vaccine-preventable diseases, as age appropriate.⁽⁴⁾

Prophylaxis for HIV Transmission

- Treatment-as-prevention (TAsP): antiretroviral therapy used to reduce transmission risk to sexual partner(s)
- Pre-exposure prophylaxis (PrEP): ongoing antiretroviral therapy for individuals at high risk for HIV acquisition
- Postexposure prophylaxis (PEP): short-term antiretroviral therapy following potential HIV exposure (either occupational or non-occupational)

Prophylaxis for Opportunistic Infections in Persons with HIV⁽⁸⁾

- Prophylaxis for *Pneumocystis pneumonia* (PCP) may be indicated if CD4 count below 200 cells/microlitre.
- Prophylaxis for *Toxoplasma gondii* (toxoplasmosis), if CD4 count below 100 cells/microlitre
- Prophylaxis for *Mycobacterium avium* complex (MAC) may be considered, once active infection is ruled out, and when CD4 is below 50 cells/microlitre.

For detailed information on vaccination of HIV-infected individuals, see *Table 5: Vaccination of HIV-infected persons*. Public Health Agency of Canada. [Internet]. Available from: <https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-3-vaccination-specific-populations/page-8-immunization-immunocompromised-persons.html#p3c7t5>.

Note: BCG immunization is contraindicated for immunocompromised clients, including clients with HIV infection.⁽²⁴⁾

MONITORING AND FOLLOW-UP

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

MONITORING

- Monitor vital signs as indicated by client’s condition.
- Post initiation of cART, clinical and laboratory evaluation should monitor for side effects and toxicity.⁽⁴⁾
- For clients on cART:
 - Screen for cardiovascular disease and hyperlipidemia at regular intervals⁽⁷⁾
- If administering an agent with risk of anaphylaxis, monitor the client closely for 30 minutes.

FOLLOW-UP⁽²⁵⁾

Note: More frequent monitoring may be indicated if any signs of clinical deterioration develop.⁽⁴⁾

- For asymptomatic HIV infected clients, every 3 to 6 months, if not on treatment.
- For HIV-infected clients on treatment, follow-up intervals will vary.
- Clients on cART: regular laboratory viral load and CD4 count as directed by HIV or internal medicine specialist.
- For HIV-infected clients:
 - Vaccination status should be reviewed with each visit and required vaccinations provided⁽⁴⁾
 - Tuberculosis (TB) skin test at baseline, then as clinically indicated
- Infant monitoring (infants of HIV-infected mothers) to include: growth monitoring, immunization adherence, ongoing screening for HIV.

Referral

- Arrange for medical evacuation if clinically indicated.
- Coordinate referral request(s) as required:
 - HIV specialist/local resources for ongoing management, treatment and/or counselling.

Reporting

- HIV infection is reportable in all provinces and territories in Canada.⁽²⁶⁾ Consult provincial/territorial policies and procedures for notifiable diseases.

For more information, see *Chapter 3, HIV Testing and Surveillance Systems in Canada* from *Public Health Agency of Canada* available from: <http://www.phac-aspc.gc.ca/aids-sida/publication/epi/2010/3-eng.php>

APPENDIX

SECTION A: SUPPLEMENTAL CLINICAL MANAGEMENT INFORMATION

TABLE 2

AIDS-Defining Conditions⁽⁷⁾

CONDITIONS ASSOCIATED WITH AIDS
Bacterial infections, multiple or recurrent
Candidiasis of bronchi, trachea, or lungs
Candidiasis of esophagus
Cervical cancer, invasive
Coccidioidomycosis, disseminated or extrapulmonary
Cryptococcosis, extrapulmonary
Cryptosporidiosis, chronic intestinal (>1 month's duration)
Cytomegalovirus disease (other than liver, spleen, or nodes), onset at age >1 month
Cytomegalovirus retinitis (with loss of vision)
Encephalopathy, HIV-related
Herpes simplex: chronic ulcers (>1 month's duration) or bronchitis, pneumonitis, or esophagitis (onset at age >1 month)
Histoplasmosis, disseminated or extrapulmonary
Isosporiasis, chronic intestinal (>1 month's duration)
Kaposi sarcoma
Lymphoma, Burkitt (or equivalent term)
Lymphoma, immunoblastic (or equivalent term)
Lymphoma, primary, of brain
Mycobacterium avium complex (MAC) or Mycobacterium kansasii, disseminated or extrapulmonary
Mycobacterium tuberculosis of any site, pulmonary, disseminated, or extrapulmonary
Mycobacterium, other species or unidentified species, disseminated or extrapulmonary
Pneumocystis jirovecii [PJP (previously known as 'Pneumocystis carinii')] pneumonia
Pneumonia, recurrent
Progressive multifocal leukoencephalopathy
Salmonella septicemia, recurrent
Toxoplasmosis of brain, onset at age >1 month
Wasting syndrome attributed to HIV

Prevention⁽⁹⁾

- **For individuals with HIV infection**, particularly adolescents, strategies to reduce the risk of transmission include condom use and reducing high-risk sexual practices.⁽¹⁶⁾ Male condoms afford a high degree of protection; consistent correct use reduces HIV transmission by 80 to 97%.⁽⁶⁾
- **For individuals at risk for HIV acquisition**, pre- and post-exposure prophylaxis may prevent acquisition. Routine screening with HIV testing to identify early infection and initiate treatment is key to preventing transmission.
- Risk reduction strategies are aimed at minimizing the risk of transmission and acquisition. In children of HIV-infected mothers, reducing the risk of vertical transmission is important. Prevention challenges that impact efficacy include:
 - Women who are pregnant and unaware that they are HIV-infected
 - Access to prenatal care
 - Women who require education regarding active steps to minimize transmission risk
 - Interruption in antiretroviral therapy (ART) during pregnancy, e.g., due to nausea or vomiting

For additional information on HIV in pregnant women, infants and children, see *HIV Among Pregnant Women, Infants, and Children* from *Centers for Disease Control and Prevention*, available from: <http://www.cdc.gov/hiv/group/gender/pregnantwomen/index.html>

SECTION B: SUPPLEMENTAL RESOURCES

Provincial/Territorial Guidelines

Alberta

Alberta Government.
Alberta Guidelines for Non-Occupational, Occupational and Mandatory Testing and Disclosure Act Post-Exposure Management and Prophylaxis: HIV, Hepatitis B, Hepatitis C, and Sexually Transmitted Infections. Available from: <https://open.alberta.ca/publications/6861344>

British Columbia

Office of the Provincial Health Officer.
HIV Testing Guidelines for the Province of British Columbia. Available from: <http://hivguide.ca/>

British Columbia Centre for Excellence in HIV/AIDS.
Primary Care Guidelines. Available from: <http://www.cfenet.ubc.ca/therapeutic-guidelines/primary-care>

OTHER RESOURCES

BC Centre for Disease Control. Chee Mamuk (Aboriginal Health). [Internet] Vancouver, BC: British Columbia Centre for Disease Control; 2017. Available from: <http://www.bccdc.ca/our-services/programs/chee-mamuk-aboriginal-health>

Canadian AIDS Treatment Information Exchange. (CATIE) Ordering Centre. Testing and Diagno-

sis; Treatment; Treatment Update; Treating HIV and Hepatic C Coinfection. [Internet] Toronto, ON: CATIE. Available from: <http://www.orders.catie.ca/>

Government of Canada. HIV and AIDS. [Internet] Ottawa, ON: Government of Canada; 2015. Available from: <https://www.canada.ca/en/public-health/services/diseases/hiv-aids.html>

Public Health Agency of Canada. Human Immunodeficiency Virus - HIV Screening and Testing Guide. [Internet] Ottawa, ON: Public Health Agency of Canada; 2014. Available from: <http://www.phac-aspc.gc.ca/aids-sida/guide/hivstg-vih-gdd-eng.php>

BIBLIOGRAPHY

The following references and other sources have informed the updating of this Clinical Practice Guideline.

REFERENCES

1. National Aboriginal Health Organization. HIV/AIDS – A fact sheet. [Internet] Ottawa, ON: National Aboriginal Health Organization; 2009. Available from: <http://www.naho.ca/documents/naho/english/factSheets/HIV.pdf> (no longer available online).
2. Public Health Agency of Canada. Population-Specific Status Report: HIV/AIDS and Other Sexually Transmitted and Blood Borne Infections among Youth in Canada. [Internet] Ottawa, ON: Public Health Agency of Canada; 2014. Available from: <http://www.phac-aspc.gc.ca/aids-sida/publication/ps-pd/youth-jeunes/index-eng.php>
3. Forbes JC, Alimenti AM, Singer J, Brophy JC, Bitnun A, Read SE. A national review of vertical HIV transmission. *AIDS*. 2012 Mar 27; 26(6), 757–763. doi:10.1097/QAD.0b013e328350995c.
4. Panel on Opportunistic Infections in HIV-Exposed and HIV-Infected Children. Guidelines for the prevention and treatment of opportunistic

infections in HIV-exposed and HIV-infected children. *Pediatr Infect Dis J*. 2013;32, A1–KK1. doi:10.1097/01.inf.0000437856.09540.11.

5. Sax PE. Acute and early HIV infection: Clinical manifestations and diagnosis. [Internet] Waltham, MA (US): UptoDate; 2015. Available from: www.uptodate.com with authorized username and password.

6. Rothman R, Ehmann M. HIV infection. *BMJ Best Practice*. [Internet] London: BMJ Evidence Centre; 2015. Available from: www.bestpractice.bmj.com with authorized username and password.

7. Bartlett JG. The natural history and clinical features of HIV infection in adults and adolescents. [Internet] Waltham, MA (US): UptoDate; 2016. Available from: www.uptodate.com with authorized username and password.

8. Harris M, Montessori V, Montaner JSG. HIV Infection. In: *Compendium of Therapeutic Choices*. 7th edition. Jovaisas B, Arman L, Dandachi F, Hutsul J, Lewis G, Pearson NL, Raghuvver A, editors. [Internet] Ottawa, ON: Canadian Pharmacists Association; c2014. p. 1361–1377.

9. Cohen MS. HIV infection: risk factors and prevention strategies. [Internet] Waltham, MA (US): UptoDate; 2016. Available from: www.uptodate.com with authorized username and password.

10. Ard K. HIV prevention. [Internet] Ipswich, MA: EBSCO Information Services; 2016. Available from: www.dynamed.com with authorized username and password.

11. Flynn PM, Abrams EJ, Fowler MG. Prevention of mother-to-child HIV transmission in resource-limited settings. [Internet] Waltham,

MA (US): UptoDate; 2016. Available from: www.uptodate.com with authorized username and password.

12. Gillespie SL. Pediatric HIV infection: classification, clinical manifestations, and outcome. [Internet] Waltham, MA (US): UptoDate; 2016. Available from: www.uptodate.com with authorized username and password.

13. Public Health Agency of Canada. Chapter 3: Living with HIV and AIDS. *Population-Specific HIV/AIDS Status Report*. [Internet] Ottawa, ON: Public Health Agency of Canada; 2016. Available from: <http://www.phac-aspc.gc.ca/aids-sida/publication/ps-pd/people-personnes/chapter-chapitre-3-eng.php>

14. Mirani G, Williams PL, Chernoff M, Abzug MJ, Levin MJ, Van Dyke RB. Changing trends in complications and mortality rates among US youth and young adults with HIV infection in the era of combination antiretroviral therapy. *Clin Infect Dis*; 2016, 61(12), 1850–1861. doi:10.1093/cid/civ687.

15. Gillespie SL. Diagnostic testing for HIV infection in infants and children younger than 18 months. [Internet] Waltham, MA (US): UptoDate; 2015. Available from: www.uptodate.com with authorized username and password.

16. Gillespie SL. The adolescent with HIV infection. [Internet] Waltham, MA (US): UptoDate; 2016. Available from: www.uptodate.com with authorized username and password.

17. Gillespie SL. Fever in human immunodeficiency virus-infected children. [Internet] Waltham, MA (US): UptoDate; 2015. Available from: www.uptodate.com with authorized username and password.

18. Libman H, Pollack TM. Initial evaluation of the HIV-infected adult. [Internet] Waltham,

MA (US): UptoDate; 2015. Available from: www.uptodate.com with authorized username and password.

19. Public Health Agency of Canada. Human Immunodeficiency Virus: HIV screening and testing guide. [Internet] Ottawa, ON: Public Health Agency of Canada; 2014. Available from: <http://www.phac-aspc.gc.ca/aids-sida/guide/hivstg-vih-gdd-eng.php>

20. Wilton J. HIV testing technologies. [Internet] Toronto, ON: CATIE, Canada's source for HIV and Hepatitis Information; 2015 [cited 2017 February 2]. Available from: <http://www.catie.ca/en/fact-sheets/testing/hiv-testing-technologies>

21. Canadian AIDS Society. Talking about depression, anxiety and HIV/AIDS. [Internet] Ottawa, ON: Canadian AIDS Society; 2014. Available from: <http://www.cdn aids.ca/talking-depression-anxiety-hivaids/>

22. Bartlett JG, Sax PE. Selecting antiretroviral regimens for the treatment-naïve HIV-infected patient. [Internet] Waltham, MA (US): UptoDate; 2016. Available from: www.uptodate.com with authorized username and password.

23. Sax PE. Acute and early HIV infection: Treatment. [Internet] Waltham, MA (US): UptoDate; 2015. Available from: www.uptodate.com with authorized username and password.

24. Public Health Agency of Canada. Canadian Immunization Guide – Part 4 – Active vaccines. [Internet] Ottawa, ON: Public Health Agency of Canada; 2015. Available from: <http://www.phac-aspc.gc.ca/publicat/cig-gci/p04-meas-roug-eng.php>

25. Public Health Agency of Canada Section 5: Management and treatment of specific infections: Human immunodeficiency virus infections. Canadian Guidelines on Sexually Transmitted Infections. [Internet] Ottawa, ON: Public Health

Agency of Canada; 2013. Available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-5-8-eng.php>

26. Public Health Agency of Canada Chapter 3: HIV Testing and Surveillance Systems in Canada. HIV/AIDS Epi Updates. Canadian Guidelines on Sexually Transmitted Infections. [Internet] Ottawa, ON: Public Health Agency of Canada; 2010. Available from: <http://www.phac-aspc.gc.ca/aids-sida/publication/epi/2010/3-eng.php>

27. Sexton DJ, Pien BC. Immune Reconstitution Inflammatory Syndrome [Internet] Waltham, MA (US): UptoDate; 2014. Available from: <http://www.uptodate.com> with authorized username and password.

OTHER SOURCES

Harris M, Montessori V, Montaner JSG. HIV Infection. In: Jovaisas B, Arman L, Dandachi F, Hutsul J, Lewis G, Pearson NL, Raghuveer A, editors. *Compendium of Therapeutic Choices*. 7th edition. Ottawa, ON: Canadian Pharmacists Association; c2014. p. 1361-1377.

Health Canada. First Nations and Inuit Health Branch (FNIHB) Nursing Station Formulary and Drug Classification System. 2016 April.

Health Canada. Non-Insured Health Benefits First Nations and Inuit Health Branch Drug Benefit List. 2015.

Kim KK, Bridges CB, Harriman KH. Advisory committee on immunization practices recommended immunization schedule for adults aged 19 years or older - United States, 2016. Centers for Disease Control and Prevention (US). *Morbidity and Mortality Weekly Report (MMWR)*. [Internet] Atlanta, GA: Centers for Disease Control and Prevention; 2016. Available from: <https://www.cdc.gov/mmwr/volumes/65/wr/mm6504a5.htm>

INVASIVE GROUP A STREPTOCOCCAL (GAS) INFECTION

OVERVIEW

Please refer to provincial/territorial guidelines for Invasive Group A Streptococcal (GAS) infection where available.

Invasive group A Streptococcal (GAS) infection is a serious and potentially life-threatening disease in which GAS bacteria invade parts of the body in which bacteria are usually not found. Invasive GAS infections may manifest as any of several clinical syndromes, including pneumonia, cellulitis, bacteremia, puerperal sepsis, necrotizing fasciitis and streptococcal toxic shock syndrome.⁽¹⁾

Two of the most serious, but least common forms of invasive GAS are necrotizing fasciitis and streptococcal toxic shock syndrome.⁽¹⁾

This Clinical Practice Guideline will primarily focus on necrotizing fasciitis – a relatively rare subcutaneous infection⁽²⁾ characterized by fulminant tissue destruction, systemic signs of toxicity, and high mortality.⁽¹⁾

For more information on streptococcal toxic shock syndrome, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 11 – Communicable Diseases – Toxic Shock Syndrome*.

Necrotizing fasciitis is a surgical and medical emergency. All clients with suspected necrotizing fasciitis must be medically evacuated. Consult with a physician/nurse practitioner immediately.

CAUSES

- Monomicrobial necrotizing fasciitis is typically due to Group A *Streptococci*⁽¹⁾

Note: Group A *Streptococci* may occur alone or in combination with other pathogens, most commonly *Staphylococcus aureus*.⁽¹⁾

TRANSMISSION

- Respiratory droplets
- Direct contact with nasal discharge and infected lesions⁽⁷⁾

INCUBATION PERIOD

- Usually 1 to 3 days, but depends on the route of inoculation⁽⁸⁾

COMMUNICABILITY

7 days prior to symptom onset to 24 hours post-effective antibiotic treatment⁽⁶⁾

ASSESSMENT

Medication review: Review current medications, over-the-counter, complementary and alternative medicines, as well as any chemical or substance intake that may impact management.

Allergy history: Screen for medication, latex, environmental or other allergies and determine when and what type of reaction occurred.

RISK FACTORS

- Diabetes mellitus
- Arteriosclerotic vascular disease
- Venous insufficiency with edema
- Venous stasis or vascular insufficiency⁽²⁾
- Skin breakdown, including surgical and traumatic wounds, varicella, childbirth, injection drug use, and ulcers^(1;2)
- Obesity⁽¹⁾
- Immunocompromised host^(1;3)
- Recent close contact with someone who has necrotizing fasciitis⁽³⁾
- Chronic disease, including heart, lung or liver disease⁽³⁾

HISTORY OF PRESENT ILLNESS

Review risk factors and collect history of present illness.

- High fever
- Rapidly spreading, red, severely painful, hot swelling of the skin (sometimes the swelling starts at the site of a minor injury, such as a small cut or bruise, but in other cases there is no obvious source of infection⁽³⁾)
- Systemic symptoms include malaise, myalgias, diarrhea and anorexia.⁽¹⁾

PHYSICAL FINDINGS

Perform a physical examination using the IPPA approach.

- Acute, rapidly escalating symptoms
- Affected area may be erythematous (without sharp margins), swollen, warm, shiny and extremely tender.⁽¹⁾
- An overlying cutaneous inflammation that may resemble cellulitis⁽²⁾
- Features that suggest involvement of deeper tissues include:
 - Severe pain that seems disproportional to the physical examination findings
 - Systemic toxicity including elevated temperature, tachycardia, hypotension, altered mental status, e.g. disorientation, lethargy.^(1; 2)
 - Failure to respond to initial antibiotic therapy⁽²⁾
 - Hard, wooden feel of the subcutaneous tissue (such that the underlying muscle groups cannot be distinctly palpated) that extends beyond the area of apparent skin involvement^(1; 2)
 - Edema or tenderness extending beyond the cutaneous erythema⁽²⁾
 - Palpable crepitus, indicating gas in the tissues⁽¹⁾
 - Bullous lesions (skin breakdown with bullae containing thick pink or purple fluid)
 - Skin necrosis or ecchymoses, gangrene and anesthesia^(1; 2)
- Lymphangitis and lymphadenitis are infrequent.⁽¹⁾

DIFFERENTIAL DIAGNOSIS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

- Cellulitis
- Deep venous thrombosis
- Gas gangrene⁽¹⁾
- Toxic shock syndrome⁽⁴⁾
- Necrotizing fasciitis due to other aerobic and anaerobic pathogens (monobacterial or polymicrobial infections)⁽²⁾

COMPLICATIONS

- Systemic toxicity/sepsis/shock
- Compartment syndrome
- Limb loss/amputation
- Death⁽¹⁾

DIAGNOSTIC TESTS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Diagnostic test selection is based on client history, risk factors, physical examination findings and test availability.

Laboratory

Testing should be carried out as per provincial/territorial policies and procedures. The tests below are for consideration.

- CBC
- Serum creatinine kinase, lactate and creatinine
- Blood for culture and sensitivity (C+S)⁽¹⁾

MANAGEMENT

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Note: Necrotizing fasciitis is a surgical emergency that requires aggressive debridement of all necrotic tissue, which may include amputation to control the infection. Use of antibiotic therapy without surgical debridement is associated with almost 100% mortality rate.⁽¹⁾

Note: Consult a physician/nurse practitioner immediately if there is suspicion of invasive GAS infection/necrotizing fasciitis. Inclusion of the Public Health Physician will also be necessary to help identify contacts of an index case of invasive GAS/necrotizing fasciitis.

GOALS OF TREATMENT

- Reduce morbidity
- Prevent complications
- Eradicate the infection
- Prevent spread of infection to others

NON-PHARMACOLOGICAL INTERVENTIONS

Interventions

- Protect infected area from further injury while awaiting medical evacuation.
- Administer oxygen therapy as required. For information on oxygen therapy used in the management of shock, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 14 – General Emergency and Major Trauma – Shock*.

Client Education

- Educate client and family about infection prevention and transmission to others.
- Wound care client education:⁽⁵⁾
 - Keep draining or open wounds covered with clean, dry bandages until healed
 - Do not delay first-aid of non-infected wounds such as blisters, scrapes or any break in the skin, even if they appear minor.
 - If client has an open wound or active infection, counsel to avoid using whirlpools, hot tubs, swimming pools until infections are healed.

- Wash hands often with soap and water or – if washing is not possible, use an alcohol-based hand rub.
- Take proper care of minor wounds and cuts. Wash the affected area in warm soapy water, and keep it clean and dry with a bandage.⁽³⁾

PHARMACOLOGICAL INTERVENTIONS

In addition to consulting a physician/nurse practitioner, review the drug monograph, the FNIHB Nursing Station Formulary or provincial/territorial formulary before initiating treatment.

IV Therapy

- If client presents with signs of sepsis or septic shock, aggressive fluid resuscitation is necessary, as follows:
 - Start 2 large-bore IV lines with 0.9% sodium chloride.

For more information on management of shock see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 14 – General Emergency and Major Trauma – Shock*.

Antibiotic Therapy

Surgical exploration is the only way to definitely establish the diagnosis of necrotizing fasciitis and to obtain the specimens used to identify the causative pathogen(s).⁽¹⁾ Therefore, empiric antibiotic therapy for necrotizing fasciitis should consist of broad-spectrum antibiotic therapy, including activity against aerobes, MRSA, and anaerobic organisms; special consideration for GAS and *Clostridium* species should also be taken.^(1;2)

Note: There are multiple agents which may be used in combination as part of empiric antibiotic therapy for necrotizing fasciitis. If MRSA is present or suspected, vancomycin is recommended.⁽²⁾ Consult with transferring health facility to select antibiotics to be initiated while awaiting medical evacuation.

The following are examples of agents which may be used as part of an empiric antibiotic therapy regime:⁽²⁾

Vancomycin

- Vancomycin 15 mg/kg IV q12h

or

CefTRIAxone

- CefTRIAxone 1 to 2 g IV q24h

and

Metronidazole

- metronidazole 500 mg IV q6h

or

Fluoroquinolone and Metronidazole

- A fluoroquinolone and metronidazole

If GAS is confirmed as the causative pathogen, the following regimen should be used:⁽²⁾

Penicillin

- Penicillin G 12 to 24 million units IV in 24 hours divided q4-6h

and

Clindamycin

- Clindamycin 600 to 900 mg IV q8h

Chemoprophylaxis for Close Contacts

The close contacts of any client diagnosed with severe invasive GAS/necrotizing fasciitis may be considered for treatment with antibiotic therapy according to provincial/territorial public health guidelines and in consultation with the Public Health Physician.

For more information on close contacts, see *Close contacts* in *Appendix, Section A* of this guideline, and consult <https://www.cps.ca/en/documents/position/Invasive-group-A-streptococcal-disease> for details on chemoprophylaxis for close contacts.

MONITORING AND FOLLOW-UP

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

MONITORING

- If administering an agent with risk of anaphylaxis, monitor client closely for 30 minutes.
- Monitor vital signs as indicated by client's condition
- Monitor intake and output
- Monitor wound progression

FOLLOW-UP

Referral

- Arrange for medical evacuation if clinically indicated.
- Consult with Public Health Physician and/or provincial/territorial public health guidelines for all suspected or confirmed cases of invasive GAS.

Reporting

Invasive GAS/necrotizing fasciitis is reportable in every province and territory in Canada. Each province/territory has procedures in place for the rapid notification of cases to the Public Health Physician and timely reporting to the appropriate provincial/territorial public health official.⁽⁶⁾

APPENDIX

SECTION A: SUPPLEMENTAL CLINICAL MANAGEMENT INFORMATION

Close contact:⁽⁶⁾

- The household contacts of a case who have spent at least 4 hours/day on average with the case in the previous 7 days or 20 hours/week
- Non-household persons who share the same bed with the case or who have had sexual relations with the case

- Persons who have had direct mucous membrane contact with the oral or nasal secretions of a case (e.g., mouth-to-mouth resuscitation, open-mouth kissing) or unprotected direct contact with an open skin lesion of the case
- Injection drug users who have shared needles with the case
- Selected long term care facility contacts
- Selected child care contacts – especially those who are infected with varicella
- Selected hospital contacts

Note: In order to be considered a close contact, a person must have been exposed to the case between 0-7 days prior to the onset of symptoms and/or within 24 hours after the initiation of antimicrobial therapy.

SECTION B: SUPPLEMENTAL RESOURCES

Provincial/Territorial Guidelines

Alberta

Alberta Health and Wellness. Public Health Notifiable Disease Management Guidelines: Streptococcal Disease – Group A, Invasive. Available from: <https://open.alberta.ca/publications/streptococcal-disease-group-a-invasive>

British Columbia

BC Centre for Disease Control. Communicable Disease Control Manual: Communicable Disease Control: Invasive Group A Streptococcal Disease. Available from: <http://www.bccdc.ca/search?k=igas.pdf>

Manitoba

Public Health and Primary Health Care. Communicable Disease Management Protocols: Reporting of Streptococcal invasive disease (Group A) (*Streptococcus pyogenes*). Available from: <http://www.gov.mb.ca/health/publichealth/cdc/protocol/igas.pdf>

Newfoundland and Labrador

Department of Health and Community Services. Newfoundland and Labrador Disease Control Manual : Section 3 Diseases Transmitted by Respiratory Routes. Available from: <http://www.health.gov.nl.ca/health/publichealth/cdc/control.html>

Northwest Territories

Northwest Territories Health and Social Services. Communicable Disease Manual. Available from: <http://www.hss.gov.nt.ca> by selecting HSS Professionals (staff only) and entering authorized username and password.

Nova Scotia

Nova Scotia Department of Health and Wellness. Nova Scotia Communicable Diseases Manual: Streptococcal Toxic Shock Syndrome [STSS] General Information. Available from: <http://www.novascotia.ca/dhw/cdpc/cdc/documents/STSS-General-Information.pdf>

Ontario

Ontario Ministry of Health and Long-Term Care. Infectious Diseases Protocol: Group A Streptococcal Disease, invasive (iGAS). Available from: http://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/infdispro.aspx

Yukon

Yukon Health and Social Services. Yukon Communicable Disease Control: Invasive Group A Streptococcal Disease. Available from: http://www.hss.gov.yk.ca/pdf/ycdc_igas.pdf

BIBLIOGRAPHY

The following references and other sources have informed the updating of this Clinical Practice Guideline.

REFERENCES

1. Stevens DL, Baddour LM. Necrotizing soft tissue infections. [Internet] Waltham, MA (US): UpToDate; 2014 [cited 2016 April 7]. Available from: <https://www.uptodate.com> with authorized username and password.
2. Stevens DL, Bisno AL, Chambers HF, Dellinger EP, Goldstein EJC, Wade JC. Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. *Clin Infect Dis*; 2014. (59), doi: 10.1093/cid/ciu296.
3. Public Health Agency of Canada. Flesh-eating disease. [Internet] Ottawa, ON: Public Health Agency of Canada; 2016 [cited 2016 May 2]. [no longer available online].
4. Edlich, RF. Necrotizing Fasciitis: Differential Diagnose. [Internet] New York, NY: Medscape; 2016 [cited 2016 May 2]. Available from: <http://emedicine.medscape.com> with authorized username and password.
5. Centers for Disease Control and Prevention (US). Necrotizing fasciitis: A rare disease, especially for the healthy. [Internet] Atlanta, GA: Centers for Disease Control and Prevention (US); 2015. Available from: <https://www.cdc.gov/features/necrotizingfasciitis/>

6. Public Health Agency of Canada. Supplement - Guidelines for the Prevention and Control of Invasive Group A Streptococcal Disease. Canada Communicable Disease Report. [Internet] Ottawa, ON: Public Health Agency of Canada; 2006 [cited 2016 May 30]. Available from: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/06vol32/32s2/index-eng.php>

7. Public Health Agency of Canada. Pathogen Safety Data Sheet: Streptococcus pyogenes. [Internet] Ottawa, ON: Public Health Agency of Canada; 2010 [cited 2016 May 2]. Available from: <http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/strep-pyogenes-eng.php>

8. Public Health and Primary Health Care. Streptococcal Invasive Disease (Group A) Reporting and Case Investigation. Communicable Disease Control. [Internet] Winnipeg, MB: Government of Manitoba; 2016 [cited 2016 December 1]. Available from: <http://www.gov.mb.ca/health/publichealth/cdc/protocol/igas.pdf>

OTHER SOURCES

Canadian Pharmacists Association. Compendium of Therapeutic Choices: Canada's Trusted Reference for Primary Care Therapeutics (CTC 7). Ottawa: c2014.

Health Canada. First Nations and Inuit Health Branch (FNIHB) Nursing Station Formulary and Drug Classification System. 2016 April.

MONONUCLEOSIS (INFECTIOUS)

OVERVIEW

Please refer to provincial/territorial guidelines for Mononucleosis where available.

Infectious mononucleosis is an acute, usually self-limited viral infection characterized by fever, fatigue, malaise, pharyngitis and cervical lymphadenopathy. The duration of the illness is variable: uncomplicated illness can typically last 1 to 4 weeks, while malaise and fatigue can last several months. Infectious mononucleosis is most common among teenagers and young adults, especially college students.^(1;2)

CAUSES

Epstein-Barr virus (EBV), also known as human herpesvirus 4⁽³⁾

TRANSMISSION

- Transmission of infectious mononucleosis occurs mainly by person-to-person contact with saliva of an infected person (hence the other name by which it is sometimes referred: “the kissing disease”).^(3;4)
- Transmission may also occur via:
 - Sexual contact (EBV has been isolated in both cervical epithelial cells and in seminal fluid)
 - Blood transfusion
 - Organ transplantation⁽²⁾

INCUBATION PERIOD

30 to 50 days⁽⁴⁾

COMMUNICABILITY

- The period of communicability is prolonged and indeterminate⁽¹⁾
- After primary infection, EBV remains within the host for life and undergoes intermittent asymptomatic shedding from the oropharynx.⁽¹⁾

- Shedding increases in frequency and titre levels in immunocompromised patients (e.g., organ allograft recipients and people with human immunodeficiency virus (HIV) infection).⁽¹⁾

ASSESSMENT

Medication review: Review current medications, over-the-counter, complementary and alternative medicines, as well as any chemical or substance intake that may impact management.

Allergy history: Screen for medication, latex, environmental or other allergies and determine when and what type of reaction occurred.

RISK FACTORS

- Individuals:
 - Between 15 and 24 years of age⁽³⁾
 - Living in close quarters with a large number of people⁽⁵⁾
 - With lowered immune resistance due to other illness, stress, or fatigue⁽⁵⁾

HISTORY OF PRESENT ILLNESS

Review risk factors and collect history of present illness.

The following may be reported by the client:

- Fever
- Sore throat
- Extreme fatigue, malaise (usually maximal during the first 2 to 3 weeks; may last for months)
- Head and body aches
- Abdominal pain, nausea, or vomiting⁽⁶⁾

PHYSICAL FINDINGS

Perform a physical examination using the IPPA approach.

- Elevated temperature⁽⁴⁾
- Pharyngitis⁽⁴⁾

- Tonsillitis⁽⁴⁾
- Adenopathy: most commonly posterior cervical nodes,⁽³⁾ but may become more generalized^(3; 4)
- Palatal petechiae⁽⁴⁾
- Periorbital edema⁽⁴⁾
- Maculopapular rash, especially in those treated recently with amoxicillin or ampicillin. This rash has also been reported in those recently treated with cephalexin, azithromycin or levofloxacin.^(4; 6)
- Splenomegaly⁽⁴⁾
- Hepatomegaly⁽⁴⁾
- Jaundice⁽⁴⁾
- Orchitis (rare)⁽¹⁰⁾
- Post-transplant lymphoproliferative disease (PTLD) is a recognized complication of both solid organ transplantation and allogeneic hematopoietic stem cell transplantation; PTLD is a common post-transplant malignancy. PTLD is frequently associated with EBV infection, either as a consequence of EBV post-transplantation or from primary EBV infection. Primary infection with EBV may be acquired from the donor graft or, less commonly, from environmental exposure.⁽¹¹⁾

Note: The diagnostic triad of fever, pharyngitis, and adenopathy is present in most clients.

DIFFERENTIAL DIAGNOSIS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

- Cytomegalovirus infection⁽⁷⁾
- Group A streptococcal pharyngitis⁽³⁾
- Hepatitis A, B or C⁽²⁾
- HIV⁽³⁾
- Rubella⁽⁷⁾
- Secondary syphilis
- Toxoplasma infection (rarely)⁽³⁾
- Viral pharyngitis⁽⁸⁾

COMPLICATIONS

- Splenic rupture⁽⁴⁾
- Hepatitis⁽¹⁾
- Hemolytic anemia⁽⁴⁾
- Thrombocytopenia⁽¹⁾
- Agranulocytosis⁽⁹⁾
- Aseptic meningitis⁽³⁾
- Encephalitis⁽⁷⁾
- Guillain-Barré syndrome⁽³⁾
- Myocarditis⁽⁷⁾
- Tonsillar hypertrophy (may be severe leading to airway obstruction)⁽⁷⁾

DIAGNOSTIC TESTS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Diagnostic test selection is based on client history, risk factors, physical examination findings and test availability.

Laboratory

Testing should be carried out as per provincial/territorial policies and procedures. The following tests are for consideration:

- Heterophile antibody (mononucleosis spot) test

Note: The mononucleosis spot test misses about one-third of cases in the first week of illness but is more than 80% sensitive in the second week of illness.

- CBC (lymphocytosis is characteristic)⁽⁷⁾
- Throat swab/rapid antigen detection test (RADT) to rule out Group A streptococcal pharyngitis
 - Liver function tests (e.g., ALT, AST, bilirubin)
 - HIV serology to rule out acute HIV infection for at-risk clients; primary HIV infection resembles acute EBV infection⁽¹⁾

MANAGEMENT

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

GOALS OF TREATMENT

- Provide supportive care until recovery
- Prevent complications
- Prevent transmission

NON-PHARMACOLOGICAL INTERVENTIONS

Client Education

- Advise parent(s)/caregiver(s)/client to:
 - Ensure adequate fluid intake, eat foods as tolerated, but emphasize the importance of well-balanced nutrition
 - Undertake activity as tolerated
 - Decrease stress if possible
 - Avoid heavy lifting⁽¹⁾
 - Avoid contact sports for at least 1 month until splenomegaly has resolved.
 - Return for further assessment if no improvement in signs and symptoms of presenting condition.
 - Use medications appropriately; dose, frequency, importance of adherence, potential side effects and interactions.
- The pediatric client should not receive any acetylsalicylic acid (ASA) or products that contain ASA. Taking ASA increases the risk of getting Reye’s syndrome which can damage the liver and brain.

To decrease the risk of spreading mononucleosis advise client to:

- Avoid bodily fluid exposure, especially saliva
- Avoid sharing drinks, foods, cups, utensils or cigarettes^(2; 7)
- Use good hand-washing technique
- Avoid donating blood until fully recovered from the infection and as advised by Canadian Blood Services.

PHARMACOLOGICAL INTERVENTIONS

In addition to consulting a physician/nurse practitioner, review the drug monograph, the FNIHB Nursing Station Formulary or provincial/territorial formulary before initiating treatment.

Analgesic/Antipyretic

Acetaminophen

- Acetaminophen 325 to 650 mg PO q4-6h PRN
- Maximum from all sources: 4,000 mg in 24 hours

Ibuprofen

- Ibuprofen 200 to 400 mg PO q4-6h PRN**
- **Maximum from all sources: Ibuprofen 1200 mg in 24 hours. Under physician/nurse practitioner supervision, daily doses \leq 2,400 mg may be used.

Consult physician/nurse practitioner for children less than 12 years of age.

MONITORING AND FOLLOW-UP

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

MONITORING

- Monitor vital signs as clinically indicated.
- If administering an agent with risk of anaphylaxis, monitor the client closely for 30 minutes.

FOLLOW-UP

- Follow-up once weekly until symptoms such as fatigue, sore throat and/or splenomegaly resolve.
- Follow-up if there are complications or if no improvement in presenting condition.

BIBLIOGRAPHY

The following References and Other Sources have informed the updating of this Clinical Practice Guideline.

REFERENCES

1. Kaye KM. Infectious Mononucleosis - Herpesviruses. Merck Manual Professional Version. [Internet] Whitehouse Station, NJ: Merck Sharp & Dohme Corp; 2013 [cited 2016 May 29]. Available from: <https://www.merckmanuals.com/professional/infectious-diseases/herpesviruses/infectious-mononucleosis>
2. Centers for Disease Control and Prevention (US). Epstein-Barr Virus and Infectious Mononucleosis. [Internet] Atlanta, GA: Centers for Disease Control and Prevention; 2014 [cited 2015 August 12]. Available from: <http://www.cdc.gov/epstein-barr/about-mono.html>
3. Aronson MD, Auwaerter PG. Infectious mononucleosis in adults and adolescents. [Internet] Waltham, MA (US): UptoDate; 2014 [cited 2015 March 30]. Available from: <http://www.uptodate.com> with authorized username and password.
4. Public Health Agency of Canada. Pathogen Safety Data Sheet: Epstein-Barr Virus. [Internet] Ottawa, ON: Public Health Agency of Canada; 2011 [cited 2015 April 17]. Available from: <http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/epstein-barr-eng.php>
5. Mount Sinai Hospital. Mononucleosis. [Internet] New York, NY: Mount Sinai Health System; 2015. Available from: <http://www.mountsinai.org/patient-care/health-library/diseases-and-conditions/mononucleosis>
6. DynaMed Plus. Epstein-Barr virus-associated infectious mononucleosis. [Internet] Ipswich, MA: EBSCO Information Services; 2013 [cited 2015 March 27]. Available from: <http://www.dynamed.com/home/> with authorized username and password.
7. Cunha BA, Bronze MS. Infectious Mononucleosis Follow-up: Further Outpatient Care, Further Inpatient Care, Deterrence/Prevention. [Internet] New York, NY: Medscape; 2014 [cited 2015 June 14]. Available from: <http://emedicine.medscape.com> with authorized username and password.
8. Ebell MH. Epstein-Barr virus infectious mononucleosis. Am Fam Physician. [Internet] Leawood, KS (US): American Academy of Family Physicians; 2004; 70(7), 1279–87. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/15508538>
9. Lennon P, Crotty M, Fenton JE. Infectious mononucleosis. BMJ. [Internet] London, GB: BMJ; 2015 April 21 [cited 2015 June 1]; 350:h1825. Available from: <http://www.bmj.com/content/350/bmj.h1825>
10. Shenot PJ. Orchitis. Merck Manual Professional Version. [Internet] Whitehouse Station, NJ: Merck Sharp & Dohme Corp; 2015 [cited October 19, 2015]. Available from: <http://www.merckmanuals.com/professional/genitourinary-disorders/penile-and-scrotal-disorders/orchitis>
11. Garfin PM, Shapiro R, Twist CJ. Posttransplant Lymphoproliferative Disease. [Internet] New York, NY: Medscape; 2015 [Cited 2015 June 14]. Available from: <http://emedicine.medscape.com> with authorized username and password.

OTHER SOURCES

Canadian Pharmacists Association. Acetaminophen (Tylenol). [Internet] Ottawa, ON: eTherapeutics; 2012 [cited 2015 May 13th]. Available from: <http://www.e-therapeutics.ca> with authorized username and password.

Canadian Pharmacists Association. Ibuprofen (Advil). [Internet] Ottawa, ON: eTherapeutics; 2012 [cited 2015 May 13]. Available from: <http://www.e-therapeutics.ca> with authorized username and password.

Health Canada. First Nations and Inuit Health Branch (FNIHB) Nursing Station Formulary and Drug Classification System. 2016 April.

Ibuprofen. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015 [cited 2015 May 13]. Available from: <http://online.lexi.com> with authorized username and password.

Acetaminophen. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015 [cited 2015 May 13]. Available from: <http://online.lexi.com> with authorized username and password.

RABIES EXPOSURE

OVERVIEW

Please refer to the provincial/territorial guidelines for rabies exposure where available.

Rabies is a rare, almost invariably fatal, viral infection affecting the central nervous system (CNS).⁽¹⁾ For more information, see Canadian Immunization Guide: Part 4 – Active Vaccines – Rabies Vaccine at www.phac-aspc.gc.ca/publicat/cig-gci/p04-rabi-rage-eng.php.

CAUSES

Rabies virus⁽¹⁾

TRANSMISSION

- Bites from an infected wild or domestic animal are the main route of exposure:⁽¹⁾
 - Animals such as bats, foxes, skunks, racoons, dogs and cats are the most common sources of transmission to humans. However, ferrets, coyotes, squirrels, chipmunks, beavers, groundhogs, cows, and horses can also potentially transmit the infection.
 - Bites from bats may not be felt and may not leave any visible mark.
- The virus then gains access to the central nervous system through peripheral nerves and causes acute encephalitis and meningo-encephalitis.^(1;2)
- Rare instances of transmission involving saliva of an infected animal have been noted to occur through a scratch, broken skin, the mucous membranes or the respiratory tract and following an organ transplantation from a contaminated individual.⁽¹⁾

INCUBATION PERIOD

The incubation period may vary from days to years (most commonly between 3 to 8 weeks), depending on the distance from the portal of entry to the brain.⁽¹⁾

ASSESSMENT

Medication review: Review current medications, over-the-counter, complementary and alternative medicines, as well as any chemical or substance intake that may impact management.

Allergy history: Screen for medication, latex, environmental or other allergies and determine when and what type of reaction occurred.

RISK FACTORS

The following groups of people are considered to be at a higher risk for exposure to rabies:⁽¹⁾

- Individuals whose activities (such as hunting and trapping) place them in close proximity to potentially rabid animals where rabies is found
- Individuals who work closely with animals, or whose work may expose them to the rabies virus (e.g., veterinarians and veterinary staff, animal control and wildlife workers, laboratory workers, etc.)
- Individuals bitten in the face by a wild animal
- Individuals who may approach animals but be unlikely to report any bites or scratches (e.g., children)

HISTORY OF PRESENT ILLNESS

- Review risk factors and collect history of present illness.
- Obtain a client health history and complete a risk assessment related to the exposure to the potentially rabid animal and evaluate the client's need for post-exposure prophylaxis.⁽¹⁾
- Obtain a history of the following:⁽¹⁾
 - Species of the animal
 - Behaviour of the animal (e.g., unusual behaviour, foaming at the mouth)
 - Type of exposure (e.g., bite, scratch, or contact with a bat) and severity
 - Circumstance of the exposure (provoked or unprovoked)

- The anatomical location of bite or scratch, as this may have implications for the incubation period (depending on the proximity to the brain)
- Vaccination status
- Age of the exposed client

For more information on factors to consider, see *Table 1: Risk Assessment Related to the Exposure to the Potentially Rabid Animal*, available from: <http://www.phac-aspc.gc.ca/publicat/cig-gci/p04-rabi-rage-eng.php>

If rabies is suspected, follow your provincial/territorial policies and procedures/guidelines for consultation and reporting.

PHYSICAL FINDINGS

Note: The wound must be cleansed immediately. For more information, see *Initial Wound Management* in the *Non-Pharmacological Interventions* section of this guideline.

Perform a physical examination using the IPPA approach.

- Examine extent and severity of the wound(s).
- Assess for type of wound(s) and site(s).
- Assess for signs of infection.
- For signs and symptoms of rabies, see *Rabies Spectrum of Clinical Illness* in *Appendix, Section A* of this guideline.

DIFFERENTIAL DIAGNOSIS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Conditions mimicking the paralytic presentation of rabies include the following:

- Guillain-Barre syndrome^(2; 3)
- West Nile virus disease⁽³⁾
- Cerebral malaria⁽³⁾

Conditions mimicking the encephalitic presentation include the following:

- Botulism⁽³⁾
- Diphtheria⁽³⁾
- Viral or post-infectious encephalomyelitis (following influenza, measles, mumps, herpes simplex, or other infections)^(3; 4)
- Substance abuse, alcohol withdrawal with delirium tremens⁽³⁾
- Tetanus^(3; 5)

COMPLICATIONS

For an infected, unimmunized individual whose wound is untreated, complications of rabies include:^(1; 2)

- Delirium
- Convulsions
- Flaccid paralysis
- Respiratory depression
- Coma
- Death

DIAGNOSTIC TESTS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Diagnostic test selection is based on client history, risk factors, physical examination findings and test availability.

Laboratory

Testing should be carried out as per provincial/territorial policies and procedures for laboratory confirmation of infection.

MANAGEMENT

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Follow your provincial/territorial policies and procedures/guidelines for consultation management and reporting; also follow direction from the Environmental Health Officer.

Post-exposure to rabies (potential and actual) management may include all of the following:⁽¹⁾

- Immediate initial wound management (for more information, see *Initial Wound Management* in the *Non-pharmacological Interventions* section of this guideline).
- Evaluating the exposure to the potentially rabid animal
- Provision of post-exposure rabies prophylaxis
- Tetanus prophylaxis and antibiotic prophylaxis may also be considered

- Management of the potentially rabid animal, if it is available

For more information, see *Table 2: Summary of Post-exposure Prophylaxis for Persons Potentially Exposed to Rabies, by Animal Type*, available from: <http://www.phac-aspc.gc.ca/publicat/cig-gci/p04-rabi-rage-eng.php>.

GOALS OF TREATMENT

- Prevent rabies disease
- Provide supportive care
- Prevent complications

NON-PHARMACOLOGICAL INTERVENTIONS

Interventions

The objective of post-exposure management is to neutralize the rabies virus at the site of infection before the virus can enter the central nervous system (for additional information on wound management, see *Table 1: Post exposure management of the wound*).

TABLE 1
Post Exposure Management of the Wound

<i>Initial wound management</i> ^(1; 2; 6)	
<i>Things to know</i>	<ul style="list-style-type: none"> – Immediate wound treatment is essential even if the client presents long after exposure. – Care should be taken to clean the wound to its full depth and avoid making the wound larger.^(1; 2)
<i>Wound treatment</i>	<p>Wound treatment consists of:</p> <ul style="list-style-type: none"> – Immediate washing and flushing for 15 minutes with soap and water, or water alone – Disinfecting wound with detergent, ethanol (70%), iodine (tincture or aqueous solution), or other substance with virucidal activity⁽⁶⁾
<i>Wound closure</i>	<p>Primary wound closure is not recommended; suturing should be delayed.</p> <ul style="list-style-type: none"> – The exception may be the face; however, the decision to suture any wound should be individualized and in consultation with the physician/nurse practitioner.^(1; 2)
<i>Bleeding</i>	<p>Bleeding at any wound site indicates potentially severe exposure.^(2; 6)</p> <ul style="list-style-type: none"> – The wound may require infiltration with rabies immune globulin (RabIg) as per provincial/territorial policies and procedures.

Client Education

- Teach client or parent(s)/caregiver(s) wound care and signs of infection (e.g., fever, purulent wound drainage, increased pain at the wound site).
- Counsel the client to return for further assessment if signs and symptoms of infection occur.
- Advise client to return for follow-up and stress the importance of completing the vaccine schedule.
- Provide client and/or parent(s)/caregiver(s) with a planned schedule to return for follow-up.
- The client should not receive any acetylsalicylic acid (ASA) or products that contain ASA. Taking ASA increases the risk of getting Reye’s syndrome which can damage the liver and brain.
- If metronidazole ordered, advise client to avoid alcohol during, and for 48 hours after completion of treatment.
- Counsel client or parent(s)/caregiver(s) about appropriate use of medications; dose, frequency, importance of adherence, potential side effects and interactions.

PHARMACOLOGICAL INTERVENTIONS

In addition to consulting a physician/nurse practitioner, review the drug monograph, the FNIHB Nursing Station Formulary or provincial/territorial formulary before initiating treatment.

Intravenous (IV) Therapy

- If required, initiate an IV line and run IV fluid (e.g., 0.9% sodium chloride, at a rate sufficient to maintain hydration).
- For the pediatric client, see *FNIHB Pediatric and Adolescent Care Clinical Practice Guidelines – Chapter 4 – Fluid Management*.
- For the adult client, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 5 – Gastrointestinal System - Dehydration (Hypovolemia)*.

Rabies Post-exposure Prophylaxis⁽¹⁾

- If exposure to rabies is considered highly likely, start post-exposure prophylaxis as soon as possible.
- Follow provincial/territorial policies and procedures for accessing rabies vaccine and rabies immune globulin (RabIg) as necessary.

Note: Rabies vaccine and rabies immune globulin should never be mixed in the same syringe and are to be administered at different anatomical sites.

Post-exposure Prophylaxis with Rabies Vaccine⁽¹⁾

- All rabies cases and certain suspected rabies cases will require rabies vaccine.
- The number of doses will be dependent on several factors.
- Consult your Public Health Physician or physician/nurse practitioner as per provincial/territorial policies and procedures.
- For general vaccination guidelines, see *Rabies Vaccine Post-Exposure Schedule in Appendix, Section A* of this guideline.

Recommended Administration Sites

- Children less than 2 years of age: Anterolateral thigh
- Children 2 years of age or older and adults: Deltoid muscle⁽⁸⁾

Note: Rabies vaccine must never be administered into the gluteal muscle because the fat content in this region delays the absorption of antigen and hence impairs the generation of optimal immune response.

Post-exposure Rabies Immune Globulin (RabIg)⁽¹⁾

- RabIg (along with rabies vaccine) is required for the client who has not received rabies vaccine in the past.
- If, for any reason, RabIg is not administered at the initiation of the rabies vaccine series, it can be administered up to and including day 7 after the initiation of the vaccine. It should not be administered after that time.

- Prior to starting wound infiltration with RabIg, ensure the area has been washed, flushed and cleansed as directed in the *Wound Management* section of this guideline, under *Non-Pharmacological Interventions*. For more information, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 9 – Skin – Skin Wounds*.
- The recommended dose for RabIg is 20 units/kg on day 0, with as much as possible infiltrated into and around the wound. For additional guidance, see provincial/territorial policies and procedures or *Provincial/Territorial Guidelines in Appendix, Section B* of this guideline.
- If RabIg is administered, advise client that he or she should not receive live vaccines for 4 months.⁽⁷⁾

Tetanus Prophylaxis

- The need for active immunization with tetanus toxoid vaccine, with or without passive immunization with tetanus immune globulin (TIg), depends on the condition of the wound and the client's vaccination history.
- To determine if tetanus prophylaxis is required, refer to the *Canadian Immunization Guide*, available from: <https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-22-tetanus-toxoid.html>

Analgesic/Antipyretic

For Adult Clients^(9; 10)

Acetaminophen

- Acetaminophen 325 to 650 mg PO q4-6h PRN
- Maximum from all sources: acetaminophen 4,000 mg in 24 hours

Ibuprofen

- Ibuprofen 200 to 400 mg PO q4-6h PRN**
- **Maximum from all sources: Ibuprofen 1200 mg in 24 hours. Under physician/nurse practitioner supervision, daily doses \leq 2,400 mg may be used.

For Pediatric Clients

Note: Since neonates and infants (less than 3 months of age) are less able to mount a febrile response, when they do become febrile, it is more likely to indicate a major illness.^(11; 12) Consult physician/nurse practitioner particularly for children less than 3 months of age.

Acetaminophen^(13; 14)

- Acetaminophen 10 to 15 mg/kg/dose PO q4-6h PRN
- Maximum from all sources: acetaminophen 75 mg/kg in 24 hours or 4,000 mg in 24 hours, whichever is less

Ibuprofen

Infants <6 months

- Limited data available in infants

For 6 Months to 12 Years of Age:

- Ibuprofen 5 to 10 mg/kg/dose PO q6-8h PRN
- Maximum 400mg/dose*

For Greater than 12 Years of Age:

- Ibuprofen 200 to 400 mg PO q4-6h PRN*

*Maximum from all sources for all ages:

- Ibuprofen 40 mg/kg in 24 hours or 1200 mg in 24 hours, whichever is less. Under physician/nurse practitioner supervision, daily doses \leq 2,400 mg may be used.

Antibiotic Prophylactic Therapy for Adult and Pediatric Clients

- Prophylaxis with antibiotics for bites is controversial, but almost always recommended for high-risk wounds to prevent secondary bacterial infection due to mixed bacteria typically found in animal bites, particularly *Pasteurella* species.^(17; 18)
- Prophylactic antibiotic therapy for 3 to 5 days is recommended for the following:⁽¹⁸⁾
 - Clients who are immunocompromised or asplenic, or
 - Clients who have advanced liver disease, pre-existing or resultant edema of the affected area, moderate to severe injuries (especially in the hands or face), or injuries that have penetrated the periosteum or joint capsule

- Intravenous antibiotics may be required in some circumstances and will be initiated at the discretion of the physician/nurse practitioner.

For more information on antibiotics, see *Table 2: Antibiotic Dosing for Adults and Pediatric Clients*.

TABLE 2
Antibiotic Dosing for Adults and Pediatric Clients

ANTIBIOTIC	ADULT DOSING	PEDIATRIC DOSING
Preferred Treatment		
Amoxicillin/clavulanic acid	<ul style="list-style-type: none"> - 875 mg/ 125 mg PO BID, or - 500 mg/ 125 mg PO TID⁽¹⁹⁾ 	<p>Less than 38 kg:</p> <ul style="list-style-type: none"> - Calculate using amoxicillin 40 mg/kg in 24 hours PO divided TID^(17; 20) <p>Greater than 38 kg:</p> <ul style="list-style-type: none"> - Use adult dose⁽¹⁹⁾
Alternate Treatment: If Known or Suspected Allergy to Penicillin and/or Cephalosporin		
Doxycycline	<p>Day 1:</p> <ul style="list-style-type: none"> - 100 mg PO BID <p>Then:</p> <ul style="list-style-type: none"> - 100 mg PO once daily⁽¹⁷⁾ 	<p>Greater than 8 years of age, less than/equal to 45 kg:</p> <p>Day 1:</p> <ul style="list-style-type: none"> - Calculate 2 to 4 mg/kg in 24 hours PO divided BID on first day <p>Then:</p> <ul style="list-style-type: none"> - Half dose once daily⁽¹⁷⁾ - Maximum 200 mg in 24 hours⁽²¹⁾ <p>Greater than 8 years of age, greater than 45 kg:⁽²¹⁾</p> <ul style="list-style-type: none"> - Use adult dose
OR		
Trimethoprim/sulfamethoxazole	<ul style="list-style-type: none"> - 160 mg/ 800 mg (one double-strength tablet) PO BID^(18; 23) 	<ul style="list-style-type: none"> - Calculate using trimethoprim 8 to 12 mg/kg in 24 hours PO divided BID; - Maximum 160 mg of trimethoprim/dose^(18; 23)
Avoid in infant less than 2 months of age due to risk of kernicterus⁽²²⁾		
<u>with/without</u>		
Metronidazole	<ul style="list-style-type: none"> - 500 mg PO TID^(17; 18; 23) 	<ul style="list-style-type: none"> - Calculate 15 to 30 mg/kg in 24 hours PO divided TID; - Maximum 2,000 mg of metronidazole in 24 hours⁽²⁴⁾
Note: Clindamycin may be used as an alternate treatment to metronidazole. ⁽¹⁷⁾ Consult with physician/nurse practitioner		

MONITORING AND FOLLOW-UP

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

MONITORING

If administering an agent with risk of anaphylaxis, monitor the client closely for 30 minutes.

FOLLOW-UP

- Follow-up wound management as indicated.
- Schedule for vaccination and/or immune globulin as indicated.
- Update the immunization record.

Referral

- Arrange for medical evacuation if clinically indicated.

Reporting

- Rabies is reportable. Follow provincial/territorial policies and procedures for notifiable diseases. For more information, see *Provincial/Territorial Guidelines in Appendix, Section B* of this guideline.

APPENDIX

SECTION A: SUPPLEMENTAL CLINICAL MANAGEMENT INFORMATION

Rabies Vaccine Post-Exposure Schedule

Note: Refer to provincial/territorial policies and procedures.

For the Client Who Has Previously Been Immunized with Rabies Vaccine

- Arrange for administration of a repeat rabies vaccine 1 mL IM on day 0 and day 3 (total of 2 doses).⁽¹⁾

For the Client Who Has NOT Been Previously Immunized with Rabies Vaccine

- Arrange for administration of repeat rabies vaccine 1 mL IM on day 0, day 3, day 7 and day 14 (total of 4 doses).⁽¹⁾

For the Immunocompromised Client or the Client on Antimalarial Drugs who has NOT Been Previously Immunized with Rabies Vaccine

- Arrange for administration of rabies vaccine 1 mL IM on day 0, day 3, day 7, day 14 and day 28 (total of 5 doses).⁽¹⁾

Rabies Immune Globulin (RabIg) Administration⁽¹⁾

- Because of possible interference of RabIg with the immune response to the rabies vaccine, the dose of RabIg is not to be exceeded.
- If possible, the full dose of RabIg should be thoroughly infiltrated into the wound and surrounding area.
- Any remaining volume of RabIg should be injected IM at a site distant from the vaccine administration.
- When more than one wound exists, each wound should be locally infiltrated with a portion of the RabIg using a separate needle.
- In such instances, RabIg can be diluted 2-3 fold in a solution of 0.9% sodium chloride to provide RabIg in sufficient volume for thorough infiltration of all wounds.
- If the site of the wound is unknown, the entire dose should be administered IM at a separate site from the site of rabies vaccination; for more information on acceptable injection volumes see *Table 3: Intramuscular Injection Site Max Volumes – Adults in Appendix, Section A* of this guideline.

TABLE 3
Intramuscular Injection Site Max Volumes – Adults⁽²⁵⁾

INJECTION SITE	MAX INJECTION VOLUME	ADVANTAGES	DISADVANTAGES
Deltoid	0.5 to 2 mL	Accessible	Limited capacity for number, and volume of injections: small area
Dorsogluteal	4 mL		Nerves and vessels present, slow absorption
Ventrogluteal	2.5 to 5 mL	No nerves or vessels, less fat (vs. dorsogluteal)	
Rectus femoris	5 mL	Client self-injection	Pain
Vastus lateralis	5 mL	Accessible No nerves or vessels	

Note: The above volumes are for considerations when RabIg administration is required.

For more information, see *Provincial/Territorial Guidelines in Appendix, Section B* of this guideline.

Rabies Spectrum of Clinical Illness⁽¹⁾

- Early symptoms of rabies may include: headache, malaise, fever, fatigue and discomfort or pain at the exposure site (i.e., the site where the person was bitten).
- Symptoms progress quickly as the CNS is attacked. The illness generally presents in one of two ways:
 - The more common, agitated (furious) form presents with the classic symptoms of hydrophobia and aerophobia (severe laryngeal or diaphragmatic spasms and a sensation of choking when attempting to drink or when air is blown in the face) with a rapidly progressing encephalitis and death.
 - The paralytic (often called dumb) form of the disease manifests in progressive flaccid paralysis, has a more protracted course, and is more difficult to diagnose.

Prevention

Client Education

- Have pets vaccinated regularly according to the veterinarian recommendations.
- Report unusual animal behaviour to veterinarian and environmental health officers.
- Be vaccinated if at high risk of occupational exposure.

Pre-exposure Prophylaxis Rabies Vaccine Recommended Dose, Schedule, and Injection Site

- Pre-exposure prophylaxis is warranted for people who are considered to be a higher risk for exposure to rabies (for more information, see *Risk Factors* in the *Assessment* section of this guideline).
- Rabies vaccine 1 mL IM should be administered on day 0, day 7 and any time between days 21 to 28 for a total of 3 doses.
- Pre-exposure immunization is not publicly funded.

- **Note:** Rabies vaccine must never be administered into the gluteal muscle because the fat content in this region retards the absorption of antigen and hence impairs the generation of optimal immune response.⁽¹⁾
- Rabies vaccine may be administered in the deltoid muscle in older children and adults or into the anterolateral thigh in infants.⁽¹⁾
- For more information, see *Canadian Immunization Guide: Part 3 – Vaccination of Specific Populations*, available from: <http://www.phac-aspc.gc.ca/publicat/cig-gci/p03-eng.php>

SECTION B: SUPPLEMENTAL RESOURCES

Provincial/Territorial Guidelines

Alberta

Alberta Health and Wellness. Public Health Notifiable Disease Management Guidelines: Rabies. Available from: <https://open.alberta.ca/publications/rabies>

British Columbia

BC Centre for Disease Control. Communicable Disease Control Manual: Management of Specific Diseases: Rabies. Available from: <http://www.hss.gov.yk.ca/fr/pdf/ycdcrabies.pdf>

Manitoba

Public Health and Primary Health Care. Communicable Disease Management Protocols: Rabies, Protocol for Management of Human Rabies and Management of Animal Exposures to Prevent Human Rabies. Available from: http://www.gov.mb.ca/health/publichealth/cdc/protocol/rabies_protocol.pdf

Nova Scotia

Nova Scotia Department of Health and Wellness. Rabies Response Plan. Available from: <https://novascotia.ca/dhw/cdpc/documents/CDPC-Rabies-Response-Plan.pdf>

Northwest Territories

Northwest Territories Health and Social Services. Communicable Disease Manual. Available from: <http://www.hss.gov.nt.ca> by selecting HSS Professionals (staff only) and entering authorized username and password.

Newfoundland and Labrador

Department of Health and Community Services. Newfoundland and Labrador Disease Control Manual: Section 6, Vectorborne and other Zoonotic Diseases: Rabies. Available from: <http://www.health.gov.nl.ca/health/publichealth/cdc/control.html>

Ontario

Ontario Ministry of Health and Long-Term Care. Diseases and Conditions: Rabies. Available from: <http://www.health.gov.on.ca/en/pro/publications/disease>

Yukon

Yukon Health and Social Services. Communicable Disease Guidelines: Rabies. Available from: <http://www.hss.gov.yk.ca/fr/pdf/ycdcrabies.pdf>

BIBLIOGRAPHY

The following references and other sources have informed the updating of this Clinical Practice Guideline.

REFERENCES

1. Public Health Agency of Canada. Canadian Immunization Guide – Part 4 – Active vaccines: Rabies vaccine. [Internet] Ottawa, ON: Public Health Agency of Canada; 2015 [cited 2015 Apr 17]. Available from: <http://www.phac-aspc.gc.ca/publicat/cig-gci/p04-rabi-rage-eng.php>

2. Crowcroft NS, Thampi N. The prevention and management of rabies. London, GB: BMJ. 2015 Jan 14; 1-9. doi: 10.1136/bmj7827.
3. Nigg AJ, Walker PL. Overview, prevention, and treatment of rabies. *Pharmacotherapy*. 2009 Oct; 29(10): 1182–1195.
4. Jackson AC. Rabies and other rhabdovirus infections. In: Longo DL, Kasper DL, Jameson JL, Fauci AS, Hauser SL, Loscalzo J, editors. *Harrison's Principles of Internal Medicine*. 18th ed. New York: McGraw Hill Medical; c2012. p. 1611-1617.
5. Grompf, SG, Bronze MS, Rabies differential diagnosis. [Internet] New York, NY: Medscape; 2014 [cited 2015 May 3]. Available from: <http://emedicine.medscape.com> with authorized username and password.
6. World Health Organization. WHO guide for rabies pre and post exposure prophylaxis in humans. [Internet]: Geneva, Switzerland: World Health Organization; 2014 [cited 2015 Apr 17]. Available from: http://www.who.int/rabies/PEP_Prophylaxis_guideline_15_12_2014.pdf?ua=1
7. Public Health Agency of Canada. Canadian Immunization Guide – Part 1 – Key immunization information. [Internet] Ottawa, ON: Public Health Agency of Canada; 2014. Available from: <http://healthycanadians.gc.ca/publications/healthy-living-vie-saine/1-canadian-immunization-guide-canadien-immunisation/index-eng.php>
8. Public Health Agency of Canada. Canadian Immunization Guide – Part 5 – Passive immunizing agents. [Internet] Ottawa, ON: Public Health Agency of Canada; 2014. Available from: <http://www.phac-aspc.gc.ca/publicat/cig-gci/p05-eng.php>
9. Acetaminophen. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015 [cited 2015 May 13]. Available from: <http://online.lexi.com> with authorized username and password.
10. Canadian Pharmacists Association. Ibuprofen (Motrin). [Internet] Ottawa, ON: eTherapeutics; 2015 [Cited 2015 April 22]. Available from: <https://www.e-therapeutics.ca> with authorized username and password.
11. Smitherman HF, Macias CG. Evaluation and management of the febrile young infant (7 to 90 days of age). [Internet] Waltham, MA (US): UptoDate; 2016 [cited 2016 May 5]. Available from: www.uptodate.com with authorized username and password.
12. El Khoury AC, Durden E, Ma L, Markson LE, Lee AW, Duan Y, et al. Perception and management of fever in infants up to six months of age: a survey of US pediatricians. *BMC Pediatrics*; 2010 Dec;10(1), 95:115-24. doi: 10.1186/1471-2431-10-95.
13. Acetaminophen (Pediatric). [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015 [cited 2015 May 13]. Available from: <http://online.lexi.com> with authorized username and password.
14. Acetaminophen. In: Chen, J, Lau, E, editors. 2015 Drug Handbook and Formulary. 33rd ed. [Internet]. Toronto, ON, Hudson, OH: The Hospital for Sick Children, Lexi-Comp Inc.; 2014. p. 38. Available from: <http://online.lexi.com> with authorized username and password.
15. Ibuprofen. In: Chen, J, Lau, E, editors. 2015 Drug Handbook and Formulary. 33rd ed. [Internet]. Toronto, ON, Hudson, OH: The Hospital for Sick Children, Lexi-Comp Inc.; 2014. p. 156. Available from: <http://online.lexi.com> with authorized username and password.

16. Ibuprofen (Pediatric). [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015 [Cited 2015 May 22]. Available from: <http://online.lexi.com> with authorized username and password.
17. Anti-infective Review Panel. Bites: Cat, dog, wild animal and human. Anti-infective guidelines for community-acquired infections. Toronto: MUMS Guideline Clearinghouse; 2013. p. 53-54.
18. Stevens DL, Bisno AL, Chambers HF, Dellinger EP, Goldstein EJC, Wade JC. Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. *Clin Infect Dis*; 2014. (59), doi: 10.1093/cid/ciu296.
19. Amoxicillin: Clavulanic acid (Clavulin). [Internet] Brentford, GB: GlaxoSmithKline Inc.; c2014. Available from: <http://ca.gsk.com/media/590864/clavulin.pdf>
20. Amoxicillin and Clavulanate. In: Chen, J, Lau, E, editors. 2015 Drug Handbook and Formulary. 33rd ed. [Internet] Toronto, ON, Hudson, OH: The Hospital for Sick Children, Lexi-Comp Inc.; 2014. p. 52-53. Available from: <http://online.lexi.com> with authorized username and password.
21. Doxycycline. In: Chen, J, Lau, E, editors. 2015 Drug Handbook and Formulary. 33rd ed. [Internet] Toronto, ON, Hudson, OH: The Hospital for Sick Children, Lexi-Comp Inc.; 2014. Available from: <http://online.lexi.com> with authorized username and password.
22. Canadian Pharmacists Association. Sulfamethoxazole-Trimethoprim product monograph. [Internet] Ottawa, ON: eTherapeutics; c2013. Available from: <https://www.e-therapeutics.ca/>
23. Sulfamethoxazole and Trimethoprim. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015 [cited 2015 April 21]. Available from: <http://online.lexi.com> with authorized username and password.
24. Metronidazole. In: Chen, J, Lau, E, editors. 2015 Drug Handbook and Formulary. 33rd ed. [Internet]. Toronto, ON, Hudson, OH: The Hospital for Sick Children, Lexi-Comp Inc.; c2015. p. 191.
25. Hopkins U, Arias CY. Large-volume IM injections: A review of best practices. *Oncol Nurse Advis*. [Internet] New York, NY: Haymarket Media, Inc.; 2013. Available from: <http://www.oncologynurseadvisor.com>.

OTHER SOURCES

Health Canada. First Nations and Inuit Health Branch (FNIHB) Nursing Station Formulary and Drug Classification System. 2016 April.

SEXUALLY TRANSMITTED INFECTIONS (STIs)

OVERVIEW

Please refer to provincial/territorial guidelines for Sexually Transmitted Infections (STIs) where available.

Sexually transmitted infections (STIs) are acquired by sexual contact. They are passed person-to-person in blood and bodily fluids. For more information on specific syndromes and infections, see the latest *Canadian Guidelines on Sexually Transmitted Infections*. Available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/index-eng.php>.

CAUSES

STIs may be caused by bacteria, viruses, parasites or fungi.

ASSESSMENT

Medication review: Review current medications, including over-the-counter, complementary and alternative medicines, as well as any chemical or substance intake that may impact management.

Allergy history: Screen for medication, latex, environmental or other allergies and determine when and what type of reaction occurred.

RISK FACTORS^(1; 2; 3)

Individuals at risk of contracting an STI include those who:

- Inject drugs or engage in other substance use, especially if associated with sexual activity
- Engage in unsafe sexual practices such as:
 - Unprotected sex
 - Sexual activities with blood exchange
 - Sharing of sex toys
- Are men who have sex with men (MSM)
- Engage in ‘survival sex,’ (e.g., exchanging sex for money, drugs, shelter or food; sex workers and their clients)
- Are on the streets and/or homeless
- Engage in anonymous sexual partnering
- Are the victims of sexual assault or abuse
- Have been previously infected with an STI

Clients with STIs are often asymptomatic. If a client is asymptomatic but has one or more risk factors, consider screening for STIs according to the *Canadian Guidelines on Sexually Transmitted Infections* (available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/index-eng.php>), or consult provincial/territorial policies and procedures.

HISTORY OF PRESENT ILLNESS

Review risk factors and collect history of present illness.

- A detailed, comprehensive sexual history is mandatory:⁽³⁾
 - Site(s) of sexual contact (vaginal, oral, anal)
 - Sexual orientation (homosexual, bisexual, heterosexual)
 - Use of condoms to prevent STIs
 - Use of other birth control methods
 - Number of sexual partners in recent past
 - History of sex with injection drug users
 - Injection drug use, needle-sharing
 - Exchange of sex for money or drugs
 - Present symptoms of STIs in client and in his or her partner(s)
 - Previous history of STIs (including HIV); either testing or treatment
 - History of last sexual contact
 - History of sexual assault or abuse
- Systemic symptoms:⁽³⁾
 - Fever or chills

- Weight loss
- Enlargement of lymph nodes
- Joint pain⁽²⁾
- Conjunctivitis⁽²⁾
- Rash⁽⁴⁾
- Review immunization history with client to determine if at increased risk due to incomplete vaccination:
 - Key immunization history for sexual health: hepatitis A, B, and human papillomavirus (HPV)

Men

- Testicular pain or inguinal pain or swelling
- Genital rashes or lesions; may be painless or painful
- Rectal discharge or pain
- Urethral irritation, urethral itch, painful discharge; note amount, colour, time of day that the discharge is most noticeable (urethritis finding - discharge from urethra most prominent after a long period without voiding)

Women

- Dysuria
- Painful intercourse; may be painful at introitus, or with penetration, or felt as deep dyspareunia (dyspareunia primarily associated with gonorrhoea)
- Bleeding post-coital, mid-cycle or excessive menstrual blood loss
- Last menstrual period and possibility of pregnancy
- Genital rashes or lesions; may be painless or painful
- Vaginal or rectal:
 - Pruritus or pain
 - Discharge; note amount, colour, and time of day the discharge is most noticeable⁽¹⁾

Social

For more information on social STI risk factors, see *Risk Factors* in this guide.

PHYSICAL FINDINGS

Perform a physical examination using the IPPA approach.⁽³⁾

- Assess conjunctiva, pharynx and all mucous membranes; skin on the lower abdo-

men, thighs, buttocks, palms, forearms and soles for rash and for signs of infection.

- Perform a comprehensive genitourinary examination including:
 - Inspect and palpate external genitalia for lesions, inflammation, irregularities or discharge.
 - Inspect perianal region for lesions, fissures, discharge.

Note: Additional examination, including anoscopy or digital rectal examination may be required if client reports rectal symptoms and has practiced receptive anal intercourse.

- Inspect pubic hair for lice and nits.
- Palpate for inguinal lymphadenopathy

Men⁽³⁾

- Inspect glans; if foreskin present, retract and examine
- Assess for urethral discharge: milk urethra (client or examiner) from base of penis to glans 3 or 4 times
- Palpate testicles and epididymis for heat, tenderness, swelling or nodules.

Women⁽³⁾

- Separate the labia to visualize the vaginal introitus.
- Perform a speculum exam with adequate visualization of the vaginal walls and cervix to evaluate for vaginal and endocervical discharges, erythema, friability, edema or lesions. This examination may be deferred in circumstances such as presence of primary herpes (visible lesions) or vaginitis for client comfort.
- Perform a bimanual exam to detect uterine or adnexal masses, or tenderness.⁽³⁾

DIFFERENTIAL DIAGNOSIS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

The following table provides an overview of some STI-associated signs and symptoms, and the possible conditions or related diagnoses.

TABLE 1
Signs and Symptoms of Some Sexually Transmitted Infections⁽⁵⁾

SIGNS AND SYMPTOMS	POSSIBLE CONDITION	COMMON CAUSES
<ul style="list-style-type: none"> - Urethral discharge - Burning on urination - Urethral or meatal erythema - Irritation or itch 	<ul style="list-style-type: none"> - Urethritis - Prostatitis 	<ul style="list-style-type: none"> - Chlamydia - Gonorrhoea - Herpes (HSV) - Mycoplasma - Ureaplasma - Trichomonas
<ul style="list-style-type: none"> - Mucopurulent cervical discharge - Cervical friability - Strawberry cervix - Vaginal discharge 	<ul style="list-style-type: none"> - Cervicitis 	<ul style="list-style-type: none"> - Chlamydia - Gonorrhoea - HSV - Trichomonas
<ul style="list-style-type: none"> - Painful internal or external genital ulcers or lesions - Painful inguinal lymph nodes 	<ul style="list-style-type: none"> - Genital Ulcer Disease 	<ul style="list-style-type: none"> - HSV 1 or 2 - Lymphogranuloma venereum (LGV)
<ul style="list-style-type: none"> - Painless genital lesion(s) usually singular with or without lymphadenopathy 	<ul style="list-style-type: none"> - Genital Ulcer Disease 	<ul style="list-style-type: none"> - T. pallidum (syphilis)
<ul style="list-style-type: none"> - Asymmetrical, multiple and/or polymorphic growths in genital or anal region or on mucous membranes; may be itchy, may bleed or cause obstruction 	<ul style="list-style-type: none"> - Papular anal/genital lesions 	<ul style="list-style-type: none"> - Human papillomavirus (HPV) - Molluscum contagiosum (with dimpled center) - Skin tags - Carcinoma
<ul style="list-style-type: none"> - Unilateral testicular pain/swelling, with/without urethral discharge - Fever 	<ul style="list-style-type: none"> - Epididymitis 	<ul style="list-style-type: none"> - Chlamydia - Gonorrhoea - Coliforms - Pseudomonas
<ul style="list-style-type: none"> - Lower abdominal pain - Deep dyspareunia - Abnormal bleeding - Fever - Cervical motion tenderness 	<ul style="list-style-type: none"> - Pelvic Inflammatory Disease⁽⁶⁾ 	<ul style="list-style-type: none"> - Chlamydia - Gonorrhoea - Genital tract mycoplasma - Anaerobic and other bacteria
Vaginal: <ul style="list-style-type: none"> - Discharge - Odour - Pruritus - Dysuria - Erythema 	<ul style="list-style-type: none"> - Vaginal discharge 	<ul style="list-style-type: none"> - Bacterial vaginosis - Candidiasis - Trichomoniasis
<ul style="list-style-type: none"> - Rectal discharge - Anorectal pain, constipation - Bloody stools - Diarrhea - Nausea - Abdominal pain/cramps, bloating - Fever 	Intestinal and enteric syndromes: <ul style="list-style-type: none"> - Proctitis - Proctocolitis - Enteritis 	<ul style="list-style-type: none"> - Chlamydia (including LGV) - Gonorrhoea - T. pallidum (syphilis) - HSV - Entamoeba histolytica - Campylobacter - Salmonella - Shigella - Giardia lamblia

For a complete discussion of the clinical presentation and treatment of STIs, refer to the *Canadian Guidelines on Sexually Transmitted Infections*, available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/index-eng.php>

COMPLICATIONS

- Numerous complications can arise from STIs; each infection has specific sequelae.
- Cervical cancer and increased risk of viral transmission (including HIV)^(1; 4)
- Gonorrhoea and chlamydia complications can include:
 - Ectopic pregnancy
 - Pelvic Inflammatory Disease (PID)
 - Reiter’s syndrome or
 - Infertility^(1; 2)

DIAGNOSTIC TESTS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Diagnostic test selection is based on client history, risk factors, physical examination findings and test availability.

For selected screening and serology tests, see *Section 2: Primary Care and Sexually Transmitted Infections* and *Section 3: Laboratory Diagnosis of Sexually Transmitted Infections*, in the *Canadian Guidelines on Sexually Transmitted Infections*, available from: <https://www.canada.ca/en/public-health/services/infectious-diseases/sexual-health-sexually-transmitted-infections/canadian-guidelines/sexually-transmitted-infections.html#toc>

Laboratory

Testing should be carried out as per provincial/territorial policies and procedures. The following tests are for consideration when there are no provincial/territorial policies available.

Recommended Sites for Testing:⁽⁸⁾

- Endocervix
- Rectum
- Urethra (males)
- Pharynx
- Vagina (prepubescent females, women without a cervix)
- Lesion
- Urine

Recommended Samples

- Remove any overlying blood or secretions prior to obtaining cervical specimens.
- Swabs for culture and/or nucleic acid amplification test (NAAT) can be used to collect samples from sites, as appropriate.
- Urine sample for NAAT testing is commonly used
- Urine for culture and sensitivity, if appropriate
- Viral culture for genital lesions
- Wet mount or a ‘whiff test’ of vaginal secretions may aid in diagnosing bacterial vaginosis, trichomoniasis and candidiasis as differential diagnoses. For more information, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 11 – Communicable Diseases – Vulvovaginitis*.
- Obtain serology samples for syphilis, HIV, hepatitis B and hepatitis C.
- Serology samples are not diagnostically useful for acute chlamydial or gonococcal infections.⁽¹⁾

For information on recommended sites and tests, refer to *Section 3*, in the *Canadian Guidelines on Sexually Transmitted Infections*, available from: <https://www.canada.ca/en/public-health/services/infectious-diseases/sexual-health-sexually-transmitted-infections/canadian-guidelines/sexually-transmitted-infections/canadian-guidelines-sexually-transmitted-infections-18.html>.

NAAT urine test for Chlamydia and Gonorrhoea can diagnostically replace urethral, endocervical and vaginal swabs. NAAT testing does not provide sensitivity results to guide choice of anti-infective agent. Availability of NAAT testing varies; refer to provincial/territorial lab resource guidance.

MANAGEMENT

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Many STIs are reportable diseases. Be aware of which STIs are reportable in your province/territory. Contact tracing is a critical strategy to maintain control of a number of STIs. For more information, see *Contact Tracing* in *Appendix, Section A* of this guideline.

GOALS OF TREATMENT

- Cure infection, when possible
- Relieve symptoms
- Prevent recurrence, when possible
- Prevent STI (including HIV) transmission
- Prevent complications

NON-PHARMACOLOGICAL INTERVENTIONS

- Additional considerations are needed if a client is a child, pregnant or lactating. For more information, see *Section 6* in the *Canadian Guidelines in Sexually Transmitted Infections*, available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-lcits/section-6-1-eng.php>

Client Education⁽²⁾

- To avoid gonococcal and chlamydial reinfections, instruct clients and their contacts to abstain from unprotected sexual contact until:
 - 7 days after completion of a single-dose anti-infective therapy; or
 - Completion of multi-dose anti-infective regimen; and
 - Treatment of all partner(s) is completed
- Educate client on how to decrease their risk for sexually transmitted and blood-borne infections (STBBIs).

- Recommend HIV testing and offer counselling as per provincial/territorial policies and procedures (obtain informed consent if client agrees to HIV testing).
- Teach client about proper use of condoms, lubricants and other barriers such as dental dams.
- Advise sexually active clients to avoid products containing nonoxynol-9 as they irritate the mucosa and can actually increase infection risk. Information on risks associated with nonoxynol-9 is available from: <http://www.who.int/mediacentre/news/notes/release55/en/>
- Counsel client about appropriate use of medications; dose, frequency, importance of adherence, potential side effects and interactions.

PHARMACOLOGICAL INTERVENTIONS

In addition to consulting a physician/nurse practitioner, review the drug monograph, the FNIHB Nursing Station Formulary or provincial/territorial formulary before initiating treatment.

- Unless treating client presumptively for syndromic management (e.g., PID, epididymitis), consider management choices based on the site of infection, available lab results, and provincial/territorial policies and procedures.^(1; 2)
- Directly observed therapy (DOT) with single-dose regimens is preferred.^(1; 2)
- If lab samples are required, they should be obtained prior to initiating treatment.

Gonorrhea⁽²⁾

Note: If treated for gonorrhea, clients should also be treated for chlamydial infection^(2; 7)

- Consult physician/nurse practitioner for other gonococcal presentations and for treatment of children.

- Combination gonorrhoea therapy using medications with 2 different mechanisms of action is thought to improve treatment efficacy and potentially delay the emergence of resistant gonorrhoea.
- If treated for gonorrhoea, clients should also be treated for chlamydial infection^(2; 7) as chlamydia occurs frequently in the presence of gonococcal infection.⁽²⁾

Uncomplicated Anogenital Infection

MSM

- For MSM, the preferred treatment is cefTRIAxone 250 mg IM, together with azithromycin 1 g PO for 1 dose.⁽²⁾
 - CefTRIAxone is the preferred treatment in this group due to reported cefixime treatment failures primarily among MSM.⁽²⁾

Other populations

- For other populations, the preferred treatment is cefTRIAxone 250 mg IM or cefixime 800 mg PO for 1 dose, together with azithromycin 1 g PO for 1 dose.⁽²⁾

Pharyngeal Infection

- For all populations, the preferred treatment is cefTRIAxone 250 mg IM, together with azithromycin 1 g PO for 1 dose.⁽²⁾
 - CefTRIAxone is recommended as the preferred treatment because it has higher tissue penetration in the oropharynx to achieve cure compared to cefixime.⁽²⁾

Gonorrhoea Resistance⁽²⁾

- Canadian data shows increasing rates of antimicrobial resistance for *N. gonorrhoeae*; combination antibiotic therapy aims to improve treatment efficacy and delay resistance.⁽²⁾
- Quinolones such as ciprofloxacin or ofloxacin are no longer routinely recommended.

For more information on gonorrhoea diagnosis and management of resistant gonorrhoea, see *Appendix, Section A* and *Antimicrobial Resistance in N. gonorrhoeae: In Brief*, available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/assets/ppt/5-set-amrgc-clean-eng.pptx>

Alternative Treatment Options⁽²⁾

- If anaphylactic allergy to penicillin, or known sensitivity to a 3rd generation cephalosporin, monotherapy with azithromycin may be considered; consult with provincial/territorial Public Health guidelines.
- A test of cure should be performed when an alternative treatment option is used.

Chlamydia⁽¹⁾

Non-pregnant, non-lactating adults

- For non-pregnant, non-lactating adults with urethral, endocervical, rectal, or conjunctival infection, use azithromycin 1 g PO for 1 dose^(1; 2) or doxycycline 100 mg PO BID for 7 days.^(1; 8)
 - Client adherence to treatment duration of 7 days may be problematic in certain individuals.

Pregnant or Lactating Clients

Azithromycin 1 g PO for 1 dose is preferred for the pregnant or lactating client.⁽⁹⁾

Children

For treatment of children, additional consideration is needed; consult with physician/nurse practitioner.

Management of other Sexually Transmitted Infections

- For guidance on treatment of STIs not addressed in this chapter, see the *Consideration for other STIs* section in the *Canadian Guidelines on Sexually Transmitted Infections*, available from: <http://www.phac-aspc.gc.ca>, along with provincial/territorial policies and procedures.
- For information on epididymitis/epididymo-orchitis, see *Epididymitis* in *FNIHB Adult Care Clinical Practice Guidelines – Chapter 6 – Genitourinary System*.
- For information on presentation and treatment of vulvovaginitis, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 11 – Communicable Diseases – Vulvovaginitis*.

MONITORING AND FOLLOW-UP

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

MONITORING

If administering an agent with risk of anaphylaxis, monitor the client closely for 30 minutes.

FOLLOW-UP^(1; 2)

- Counsel client to return for further assessment if there is no improvement in signs and symptoms of presenting condition following treatment.
- Rescreening is recommended 6 months after treatment for chlamydia and gonorrhea due to the high re-infection rate.

Test of Cure for Gonorrhea

- Test of cure is recommended after treatment in all cases and is particularly important under the following circumstances:
 - For all children
 - For all pregnant women, including women undergoing therapeutic abortion
 - If treatment adherence is a concern
 - If persistent symptoms post-treatment
 - If there is re-exposure to an untreated partner
 - For all treated pharyngeal infections
 - If an alternative treatment regimen has been used
 - If positive history of treatment failure for gonorrhea
 - If antimicrobial resistance is suspected or documented in the individual
 - If the individual is linked to a case with documented antimicrobial resistance to the given treatment
 - For disseminated gonococcal infection
 - For pelvic inflammatory disease if gonorrhea was isolated
- Test of cure by culture should be done 3 to 7 days after completion of treatment.
- If culture is not available, test of cure using a NAAT should be done 2 to 3 weeks after completion of treatment.

Test of Cure for Chlamydia

- Test of cure for chlamydia is not usually indicated if a recommended treatment is taken and there are no persisting signs or symptoms and there is no repeat exposure to an untreated partner. Test of cure is recommended under the following circumstances:⁽¹⁾
 - If treatment adherence is a concern
 - If an alternative treatment regimen has been used
 - For all children
 - For all pregnant women
- Test of cure using a NAAT, if needed, should be performed 3 to 4 weeks after completion of treatment.

Reporting Diseases and Contact Tracing General Principles^(1; 2)

Reporting: Children

Any child with rectal, genital, or pharyngeal gonorrhea and/or chlamydia should be considered at risk of sexual abuse.

- Consultation with physician/nurse practitioner and/or health care provider experienced with suspected sexual abuse is required.
- Legislation requires that suspected or confirmed sexual abuse of children is to be reported to provincial/territorial Children and Family Services agencies.

Reportable Diseases

Chlamydia and gonorrhea are reportable diseases. Follow provincial/territorial policies and procedures for notifiable diseases. For more information regarding contact tracing, see *Contact Tracing* in *Appendix, Section A* of this guideline.

Treatment Failures

- Treatment failure is determined by a positive test of cure following a course of treatment.
- Treatment failure with cefixime, cefTRIAXone, or azithromycin should be reported to the provincial/territorial public health department; PHAC uses treatment failure data to track patterns of antimicrobial resistance.

APPENDIX

SECTION A: SUPPLEMENTAL CLINICAL MANAGEMENT INFORMATION

Antimicrobial Resistance in Gonorrhoea

- A national enhanced surveillance protocol that tracks laboratory, epidemiologic, and treatment failure data is in place.
- Resistance to penicillin and/or tetracycline is high in Canada.
- Provincial/territorial public health department to be notified of all treatment failures with cefixime, azithromycin or cefTRIAxone.
- Refer to your provincial/territorial public health offices for detailed information on antimicrobial resistance patterns.

For additional information on diagnosis and management of gonorrhoea, refer to *Antimicrobial Resistance in N. gonorrhoeae: In Brief*, available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/assets/ppt/5-set-amrgc-clean-eng.pptx>.

Specimen Collection

- Complete recommendations available from <http://www.phac-aspc.gc.ca/>.
- Specimens for *both* gonococcal and chlamydial infections should be taken simultaneously due to the high rate of concomitant infection.

Contact Tracing

An index case is a term describing the first case reported to authorities.⁽²⁾

- Clients who present with STI symptoms should be considered an index case until proven otherwise.
- Obtain a list of all sexual contacts in the past 60 days or longer if warranted by history.^(1; 2)
- Reassure client that their confidentiality will be maintained at all times if their contacts are called.
- Refer to your provincial/territorial Public Health offices for detailed information on requirements.

If the Test Results are Negative for an STI

Further steps are not required.

If the Test Results are Positive for an STI

- Follow-up with contacts while maintaining confidentiality of the index case.
- Fill out appropriate reporting forms and send them to your provincial/territorial Public Health Department or as per protocol.
- Treat each contact as if he or she were a new index case and complete appropriate testing.
- Treat each contact with the appropriate medication(s) without waiting for test results. This prevents delays in treatment of potential positive cases and decreases the risk of re-infecting the partner(s).

Prevention

- Reinfection prevention requires that partners be assessed, tested, treated, and counseled.⁽¹⁾
- Community healthy living and harm reduction approaches incorporating traditional and western services are outlined by the Ontario Aboriginal HIV/AIDS Strategy⁽¹⁰⁾ (for more information, see <http://www.oahas.org>).

Patient Education/Counselling

Topics commonly addressed when providing STI education or counselling include:

- Serial monogamy considerations
- Initiation of sexual activity
- Contraceptive advice
- Safer sex counselling
- STI prevention steps, including barrier methods

Additional information is available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-2-eng.php#a4>

SECTION B: SUPPLEMENTAL RESOURCES

Provincial/Territorial Guidelines

Alberta

Government of Alberta.
Alberta Treatment Guidelines for Sexually Transmitted Infections (STI) in Adolescents and Adults. Available from: <https://open.alberta.ca/publications/treatment-guidelines-for-sti-2018>

British Columbia

BC Centre for Disease Control .
British Columbia Treatment Guidelines - Sexually Transmitted Infections in Adolescents and Adults 2014. Available from: http://www.bccdc.ca/resource-gallery/Documents/Communicable-Disease-Manual/Chapter%205%20-%20STI/CPS_BC_STI_Treatment_Guidelines_20112014.pdf

Saskatchewan

Saskatchewan Ministry of Health.
Communicable Disease Control Manual - Section 5: Sexually Transmitted Infections. Available from: <https://www.ehealthsask.ca/services/manuals/Documents/cdc-section-5.pdf>

Manitoba

Manitoba Health .
Communicable Disease Control - Sexually Transmitted and Blood-Borne Infections. Available from: <http://www.gov.mb.ca/health/publichealth/cdc/sti/>

Public Health and Primary Health Care.
Communicable Disease Management Protocols. Available from; <http://www.gov.mb.ca/health/publichealth/cdc/protocol/>

New Brunswick

Office of the Chief Medical Officer of Health (Public Health).
Sexually Transmitted and Blood-Borne Infections (STBBI). Available from: http://www2.gnb.ca/content/gnb/en/departments/ocmoh/cdc/content/sexually_transmitteddiseasesandinfections.html

Newfoundland and Labrador

Department of Health and Community Services.
Newfoundland and Labrador Disease Control. Manual: Section 5 Sexually Transmitted Infections and Bloodborne Pathogens. Available from: <http://www.health.gov.nl.ca/health/publichealth/cdc/control.html>

Northwest Territories

Northwest Territories Health and Social Services. Communicable Disease Manual. Available from: <http://www.hss.gov.nt.ca> by selecting HSS Professionals (staff only) and entering authorized username and password.

Nova Scotia

Nova Scotia Department of Health and Wellness. STI Guidelines for Gonococcal Infections. Available from: <http://www.novascotia.ca/dhw/cdpc/documents/canadian-sti-guide-lines-for-gonococcal-infections.pdf>

Ontario

Ontario Ministry of Health and Long-Term Care. HIV and AIDS in Ontario. Available from: <http://www.health.gov.on.ca/en/pro/programs/hiv aids/default.aspx>

Provincial Infectious Diseases Advisory Committee. Sexually Transmitted Infections Case Management and Contact Tracing Best Practice Recommendations. Available from: <http://www.publichealthontario.ca/en/eRepository/STIs%20Case%20Management%20Contact%20Tracing.pdf>

Quebec

Ministère de la Santé et des Services Sociaux.
Guide québécois de dépistage des infections
transmissibles sexuellement et par le sang.
Available from: <http://publications.msss.gouv.qc.ca/msss/document-000090/>

Yukon

Yukon Health and Social Services.
Yukon Treatment Guidelines for Sexually Transmitted Infections (STI) in Adolescents and Adults. Available from: <http://www.hss.gov.yk.ca/pdf/stitreatmentguidelines.pdf>

BIBLIOGRAPHY

The following references and other sources have informed the updating of this Clinical Practice Guideline.

REFERENCES

1. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections. Section 5: Management and treatment of specific infections. Chlamydial Infections. [Internet] Ottawa, ON: Public Health Agency of Canada; 2013. [cited 2016 July 28]. Available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-5-2-eng.php>
2. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections. Section 5: Management and treatment of specific infections. Gonococcal Infections. [Internet] Ottawa, ON: Public Health Agency of Canada; 2013. [cited 2016 July 28]. Available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-5-2-eng.php>
3. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections. Section 2: Primary care and sexually transmitted infections. [Internet] Ottawa, ON: Public Health Agency of Canada; 2013. Available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-2-eng.php#a2>
4. Sax PE. Acute and early HIV infection: Clinical manifestations and diagnosis. [Internet] Waltham, MA (US): UptoDate; 2015. Available from: www.uptodate.com with authorized username and password.
5. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections. Section 4: Management and treatment of specific syndromes - Syndromic management of sexually transmitted infections. [Internet] Ottawa, ON: Public Health Agency of Canada; 2014. [cited 2016 July 28]. Available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-4-1-eng.php>
6. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections. Section 4: Management and treatment of specific syndromes. Pelvic Inflammatory Disease. [Internet] Ottawa, ON: Public Health Agency of Canada; 2014. [cited 2016 July 28]. Available from: <https://www.canada.ca/en/public-health/services/infectious-diseases/sexual-health-sexually-transmitted-infections/canadian-guidelines/sexually-transmitted-infections/canadian-guidelines-sexually-transmitted-infections-22.html>
7. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections. Section 1: Foreword. [Internet] Ottawa, ON: Public Health Agency of Canada; 2013. Available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-1-eng.php>

8. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections. Section 3: Laboratory diagnosis of sexually transmitted infections. [Internet] Ottawa, ON: Public Health Agency of Canada; 2014. Available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-3-eng.php>

9. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections. 2014 planned update/new content: Changing epidemiological trends. [Internet] Ottawa, ON: Public Health Agency of Canada. [cited 2015 March 9]. Available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/updates-eng.php>

10. Ontario Aboriginal HIV/AIDS Strategy. A Strategic Plan for the Years 2010 - 2015. [Internet] Toronto, ON: Ontario Aboriginal HIV/AIDS Strategy; 2010. Available from: <http://www.acckwa.com/wp-content/uploads/2013/09/Ontario-Aboriginal-HIV-AIDS-Strategic-Plan-2010-2015.pdf>

OTHER SOURCES

Canadian Pharmacists Association. Doxycycline (Vibramycin). [Internet] Ottawa, ON: eTherapeutics; 2010. Available from: <http://www.e-therapeutics.ca> with authorized username and password.

Canadian Pharmacists Association. Azithromycin (Zithromax). [Internet] Ottawa, ON: eTherapeutics; 2014. Available from: <http://www.e-therapeutics.ca> with authorized username and password.

Canadian Pharmacists Association. CefTRIAxone. [Internet] Ottawa, ON: eTherapeutics; 2015. Available from: <http://www.e-therapeutics.ca> with authorized username and password.

Canadian Pharmacists Association. Cefixime (Suprax). [Internet] Ottawa, ON: eTherapeutics; 2012. Available from: <http://www.e-therapeutics.ca> with authorized username and password.

Canadian Pharmacists Association. Compendium of Therapeutic Choices: Canada's Trusted Reference for Primary Care Therapeutics (CTC 7). Ottawa: Canadian Pharmacists Association; c2014.

Health Canada. First Nations and Inuit Health Branch (FNIHB) Nursing Station Formulary and Drug Classification System. 2016 April.

Doxycycline. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015. Available from: <http://online.lexi.com> with authorized username and password.

Azithromycin. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015. Available from: <http://online.lexi.com> with authorized username and password.

CefTRIAxone. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015. Available from: <http://online.lexi.com> with authorized username and password.

Cefixime. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015. Available from: <http://online.lexi.com> with authorized username and password.

TOXIC SHOCK SYNDROME (TSS)

OVERVIEW

Please refer to provincial/territorial guidelines for Toxic Shock Syndrome where available.

Toxic shock syndrome (TSS) is a life-threatening illness characterized by sudden onset of high fever, hypotension, diffuse erythematous rash, and multiorgan failure (e.g., acute respiratory distress syndrome (ARDS)), coagulopathy, liver failure, renal failure, altered mental status.^(1;2) TSS is precipitated by an infection and it may progress rapidly.⁽³⁾ Morbidity and mortality associated with TSS is high, particularly when caused by Group A *Streptococci* (GAS).^(1;2)

Toxic shock syndrome is a medical emergency. All clients with suspected toxic shock syndrome must be medically evacuated as soon as possible. Consult with a physician/nurse practitioner immediately.

CAUSES

- *Staphylococcus aureus* (*S. aureus*)⁽²⁾
- Group A *Streptococci* (GAS)⁽¹⁾
- *Clostridium sordelli*, an uncommonly reported condition that is associated with gynecologic procedures, childbirth and abortion (spontaneous, surgical and medical)⁽⁴⁾

ASSESSMENT

Medication review: Review current medications, including over-the-counter, complementary and alternative medicines, as well as any chemical or substance intake that may impact management.

Allergy history: Screen for medication, latex, environmental or other allergies and determine approximately when and what type of reaction occurred.

RISK FACTORS

Colonization with *S. aureus* or GAS^(1;2)

Risk Factors Associated with *S. aureus* TSS⁽²⁾

- Using high absorbency tampons
- Using tampons continuously for more days of the menstrual cycle
- Keeping a single tampon in place for a long period of time
- Surgical or postpartum wound infections
- Secondary to other infections, including:
 - Burns
 - Scalds
 - Mastitis
 - Septorhinoplasty
 - Sinusitis
 - Osteomyelitis
 - Arthritis
 - Skin lesions (especially of the extremities, perianal and axillae)
 - Respiratory infections (e.g., influenza) and enterocolitis

Risk Factors Associated with Invasive GAS TSS⁽¹⁾

- Minor trauma, including injuries resulting in hematoma, bruising or muscle strain
- Recent surgery, e.g. liposuction, hysterectomy, bunionectomy, bone pinning, caesarean section
- Recent viral infection, e.g. influenza, varicella
- Postpartum
- Clients with chronic diseases including Human Immunodeficiency Virus (HIV), diabetes mellitus, cancer, ethanol abuse

HISTORY OF PRESENT ILLNESS

Review risk factors and collect history of present illness. The following may be reported by the client.

- Symptoms and signs that develop rapidly and may include:^(1;2)
 - Fever and chills
 - Malaise

- Headache
- Sore throat
- Myalgias
- Fatigue
- Nausea and vomiting
- Abdominal pain and diarrhea
- Dizziness or syncope^(1; 2)
- Median onset of menstrual-associated toxic shock syndrome is 2 to 3 days after onset of menstruation⁽²⁾
- The most common presenting symptom of clients with streptococcal toxic shock syndrome is pain that precedes physical findings of infection.⁽¹⁾
- The pain typically involves soft tissue of an extremity but may also mimic other conditions, including:⁽¹⁾
 - Peritonitis
 - Pelvic inflammatory disease
 - Pneumonia
 - Acute myocardial infarction
 - Cholecystitis

PHYSICAL FINDINGS

Perform a physical examination using the IPPA approach. Signs of TSS usually include some or all of the following:

- Fever (most common; although hypothermia may be present in patient with shock)^(1; 2)
- Hypotension^(1; 2) (e.g., systolic blood pressure less than or equal to 90 mm Hg for adults)⁽⁵⁾
 - Client may rapidly become hypotensive.^(1; 2)
- Skin manifestations:
 - Staphylococcal TSS; desquamation, erythematous, sunburn-like rash that also involves the palms and soles⁽²⁾
 - Streptococcal TSS; localized swelling and erythema, followed by skin sloughing, and often progressing to necrotizing fasciitis or myonecrosis⁽¹⁾
- Multiorgan failure involving any organ system:
 - Gastrointestinal symptoms are common (e.g., profuse diarrhea, vomiting)^(1; 2)

- Altered mental status is very common;^(1; 2) clients may present with agitation, disorientation, confusion or seizure activity⁽²⁾
- Renal failure^(1; 2)
- Liver failure^(1; 2)
- ARDS⁽¹⁾

DIFFERENTIAL DIAGNOSIS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

- Sepsis^(1; 2)
- Septic shock⁽⁶⁾
- Cellulitis⁽⁶⁾
- Drug eruptions⁽⁶⁾
- Meningococemia^(1; 2)
- Staphylococcal scalded skin syndrome⁽³⁾
- Typhoid fever^(1; 2)
- Leptospirosis^(1; 2)
- *Streptococcus pneumoniae* infection⁽¹⁾
- Heat stroke⁽¹⁾

COMPLICATIONS

- Shock⁽⁷⁾
- Sepsis⁽⁷⁾
- Amputation⁽⁸⁾
- Disseminated intravascular coagulation with thrombocytopenia⁽⁷⁾
- Death⁽⁷⁾

DIAGNOSTIC TESTS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Diagnostic test selection is based on client history, risk factors, physical examination findings and test availability.

Laboratory

Testing should be carried out as per provincial/territorial policies and procedures. The tests below are for consideration.

- Diagnosis of toxic shock syndrome is based on clinical presentation.⁽²⁾
- Laboratory diagnosis can support a clinical diagnosis of toxic shock syndrome and can direct antibiotic therapy.^(1; 2)
- Tests that may be considered to assess organ failure include:^(1; 2)
 - CBC
 - BUN
 - Creatinine
 - Liver function tests
 - Creatinine phosphokinase
- Tests that may confirm the causative organism:
 - Culture and sensitivity (C+S) to isolate the organism (i.e., using blood, wound or mucosal swabs)⁽³⁾
 - Staphylococcal TSS (usually negative for blood cultures but can be recovered from local wounds and mucosal sites);⁽²⁾
 - Streptococcal TSS (positive for blood cultures at least 60% of the time)⁽¹⁾

MANAGEMENT

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Note: Inclusion of the Medical Officer of Health will also be necessary to help identify contacts of an index case of toxic shock syndrome, particularly caused by invasive GAS. The Medical Officer of Health will also be able to provide advice on the appropriate management of these contacts.

GOALS OF TREATMENT

- Reduce morbidity⁽⁹⁾
- Prevent complications⁽⁹⁾
- Eradicate the infection⁽⁹⁾

NON-PHARMACOLOGICAL INTERVENTIONS

Interventions

- Stabilize airway, ABCs and provide aggressive supportive care to treat shock and multiorgan failure (e.g., fluid resuscitation, ventilatory and circulatory support).⁽³⁾
- Protect infected area from further injury.
- If menstrual-related TSS is suspected, remove menstrual products.
- If wound is involved, cleanse wound
 - May require surgical debridement of involved site^(2; 8)
 - Cover wound with an appropriate dressing

Oxygen Therapy

Administer oxygen therapy as required.

Client Education

Counsel client about appropriate use of medications; dose, frequency, importance of adherence, potential side effects and interactions.

PHARMACOLOGICAL INTERVENTIONS

In addition to consulting a physician/nurse practitioner, review the drug monograph, the FNIHB Nursing Station Formulary or provincial/territorial formulary before initiating treatment.

Supportive Therapy

IV Therapy

- Initiate an IV line and run IV fluid (e.g. 0.9% sodium chloride).
- If client presents with signs of sepsis or septic shock, aggressive fluid resuscitation is necessary, as follows:
 - Start 2 large-bore IV lines with 0.9% sodium chloride; for more information on management of shock, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 14 – General Emergency and Major Trauma – Shock*.

Antibiotic Therapy

- Antibiotic therapy is needed to eradicate organisms and to prevent recurrences.⁽²⁾
- Antibiotic therapy may be started while waiting for medical evacuation.
- In consultation with physician/nurse practitioner and in consideration of provincial/territorial susceptibility data to guide treatment, consider the following for management of TSS:

Staphylococcal TSS

For suspected methicillin sensitive *S. aureus* (MSSA):^(10–11)

CeFAZolin

- CeFAZolin 2 g IV q8h

and

Clindamycin

- Clindamycin 600 to 900 mg IV q8h

For suspected methicillin-resistant *S. aureus* (MRSA) or if known or suspected allergy to penicillin and/or cephalosporin:^(10; 11; 12)

Vancomycin

- Vancomycin 15 mg/kg/dose IV divided q12h (maximum 2,000 mg in 24 hours)

and

Clindamycin

- Clindamycin 600 to 900 mg IV q8h

Streptococcal TSS

If streptococcal TSS is suspected, provide a combination of antibiotics:^(10; 11; 13)

Clindamycin

- Clindamycin 600 to 900 mg IV q8h

and

Penicillin

- Penicillin G 12 to 24 million units in 24 hours IV divided q4-6h

or

If known or suspected allergy to penicillin and/or cephalosporin:

Vancomycin

- Vancomycin 15 mg/kg/dose IV divided q12h (maximum 2,000 mg in 24 hours)

MONITORING AND FOLLOW-UP

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

MONITORING

- Monitor vital signs.
- Monitor respiratory status.
- Monitor intake and output.
- Monitor wound progression.
- If administering an agent with risk of anaphylaxis, monitor the client closely for 30 minutes.

FOLLOW-UP**Referral**

Arrange for urgent medical evacuation.

Reporting

Toxic shock syndrome may be reportable. Follow provincial/territorial policies and procedures for notifiable diseases. For more information on provincial/territorial policies and procedures, see *Communicable Diseases Provincial/Territorial Resources for Toxic Shock Syndrome* in Appendix, Section B of this guideline.

APPENDIX**SECTION A: SUPPLEMENTAL CLINICAL MANAGEMENT INFORMATION****Prevention⁽¹⁴⁾**

- Instruct client to keep any skin wounds clean to help prevent infection.
- Instruct client to avoid scratching any skin lesions.
- Avoid using tampons and barrier contraceptives during the first 12 weeks after childbirth.

- Follow the directions on package inserts for tampons and barrier contraceptives regarding appropriate use.
- Recommend proper handwashing hygiene, particularly after contact with any lesions
 - Information on handwashing is available from: Health Canada at <https://www.canada.ca/en/health-canada/services/healthy-living/your-health/diseases/benefits-hand-washing.html>.

Note: If the client has had staphylococcal toxic shock syndrome, instruct client not to use tampons, barrier contraceptives, or an intrauterine device (IUD).

Chemoprophylaxis for Household Contacts

The close contacts of any client diagnosed with toxic shock syndrome may be considered for treatment with antibiotic therapy according to provincial/territorial public health guidelines and in consultation with the Medical Officer of Health.

SECTION B: SUPPLEMENTAL RESOURCES

Provincial/Territorial Guidelines

Alberta

Alberta Health and Wellness.
Public Health Notifiable Disease Management Guidelines: Toxic Shock Syndrome (*Staphylococcus aureus*). Available from: <https://open.alberta.ca/publications/toxic-shock-syndrome-staphylococcus-aureus>

Alberta Health and Wellness.
Public Health Notifiable Disease Management Guidelines: Streptococcal Disease – Group A, Invasive. Available from: <https://open.alberta.ca/publications/streptococcal-disease-group-a-invasive>

British Columbia

BC Centre for Disease Control. Communicable Disease Control Management of Specific Diseases: Invasive Group A Streptococcal Disease. Available from: <http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Epid/CD%20Manual/Chapter%201%20-%20CDC/iGAS.pdf>

Manitoba

Public Health and Primary Health Care.
Invasive Group A Streptococcal Disease. Available from: <http://www.gov.mb.ca/health/publichealth/cdc/protocol/igas.pdf>

Northwest Territories

Northwest Territories Health and Social Services. Communicable Disease Manual. Available from: <http://www.hss.gov.nt.ca> by selecting HSS Professionals (staff only) and entering authorized username and password.

Nova Scotia

Department of Health and Wellness.
Nova Scotia Communicable Diseases Manual: Streptococcal Toxic Shock Syndrome [STSS] General Information. Available from: <http://www.novascotia.ca/dhw/cdpc/cdc/documents/STSS-General-Information.pdf>

Ontario

Ministry of Health and Long-Term Care.
Infectious Diseases Protocol: Group A Streptococcal Disease, invasive (iGAS). Available from: http://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/docs/gas_chapter.pdf

Yukon

Yukon Health and Social Services .
Yukon Communicable Disease Control. Communicable Disease Guidelines: Invasive Group

A Streptococcal. Available from: http://www.hss.gov.yk.ca/pdf/ycdc_igas.pdf

BIBLIOGRAPHY

The following references and other sources have informed the updating of this Clinical Practice Guideline.

REFERENCES

1. Stevens DL. Epidemiology, clinical manifestations, and diagnosis of streptococcal toxic shock syndrome. [Internet] Waltham, MA (US): UptoDate; 2014 [cited 2016 February 23]. Available from: <http://www.uptodate.com> with authorized username and password.
2. Chu VH. Staphylococcal toxic shock syndrome. [Internet] Waltham, MA (US): UptoDate; 2015. [cited 2016 February 23]. Available from: <http://www.uptodate.com> with authorized username and password.
3. Bush LM, Perez MT. Toxic shock syndrome. Merck Manual Professional Version. [Internet] Whitehouse Station, NJ: Merck Sharp & Dohme Corp; 2014 [cited 2016 February 25]. Available from <http://www.merckmanuals.com/en-ca/professional/infectious-diseases/gram-positive-cocci/toxic-shock-syndrome-tss>
4. Spelman D. Toxic shock syndrome due to *Clostridium sordellii*. [Internet] Waltham, MA (US): UptoDate; 2016 [cited 2016 August 5]. Available from: <http://www.uptodate.com> with authorized username and password.
5. Centers for Disease Control and Prevention (US). Toxic shock syndrome (other than Streptococcal) (TSS) 2011 Case Definition. [Internet] Atlanta, GA: Centers for Disease Control and Prevention; 2011 [cited 2016 February 24]. Available from: <https://www.cdc.gov/nndss/conditions/toxic-shock-syndrome-other-than-streptococcal/case-definition/2011/>
6. Venkataraman R, Sharma S. Toxic shock syndrome: Differential diagnosis. [Internet] New York, NY: Medscape; 2015 [cited 2016 March 1]. Available from: <http://emedicine.medscape.com> with authorized username and password.
7. Venkataraman R, Sharma S. Toxic shock syndrome: Follow-up. [Internet] New York, NY: Medscape; 2015 [cited 2016 March 1]. Available from: <http://emedicine.medscape.com> with authorized username and password.
8. Stevens DL, Bisno AL, Chambers HF, Dellinger EP, Goldstein EJC, Wade JC. Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. *Clin Infect Dis*; 2014. (59), doi: 10.1093/cid/ciu296.
9. Venkataraman R, Sharma S. Toxic shock syndrome: Medication. [Internet] New York, NY: Medscape; 2015 [cited 2016 March 1]. Available from: <http://emedicine.medscape.com> with authorized username and password.
10. Stevens DL, Bisno AL, Chambers HF, Dellinger EP, Goldstein EJC, Wade JC. Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. *Clin Infect Dis*; 2014. (59), doi: 10.1093/cid/ciu296.
11. Gilbert DN, Moellering RCJ, Eliopoulos GM, Chambers HF, Saag MS, editors. The Sanford guide to antimicrobial therapy 2012. 42nd ed. Sperryville, VA: Antimicrobial Therapy, Inc.; 2012.
12. Liu C, Bayer A, Cosgrove SE, Daum RS, Fridkin SK, Chambers HF. Clinical practice guidelines by the Infectious Diseases Society

of America for the treatment of methicillin-resistant *Staphylococcus aureus* infections in adults and children. *Clin Infect Dis*. 2011; 52(3). doi:10.1093/cid/ciq146.

13. Qaseem A. Streptococcal toxic shock syndrome. [Internet] Ipswich, MA: EBSCO Information Services; 2014 [cited 2016 May 2]. Available from: <http://www.dynamed.com> with authorized username and password.

14. Healthwise Staff. Toxic shock syndrome. [Internet] Vancouver, BC: HealthLinkBC; 2015 [cited 2016 February 24]. Available from: <https://www.healthlinkbc.ca/health-topics/hw140188>

OTHER SOURCES

Canadian Pharmacists Association. *Compendium of Therapeutic Choices: Canada's Trusted Reference for Primary Care Therapeutics (CTC 7)*. Ottawa: Canadian Pharmacists Association; c2014.

Health Canada. First Nations and Inuit Health Branch (FNIHB) Nursing Station Formulary and Drug Classification System. 2016 April.

TUBERCULOSIS (TB)

OVERVIEW

Please refer to provincial/territorial guidelines for TB where available.

Tuberculosis (TB) is an infectious bacterial disease which most commonly affects the lungs ('pulmonary TB').⁽¹⁾ The term, 'non-respiratory TB' refers to TB disease in any site not associated with the lungs.⁽²⁾ Infection occurs when airborne droplet nuclei particles containing *Mycobacterium tuberculosis* bacteria are inhaled.

CAUSES

Mycobacterium tuberculosis bacteria⁽³⁾

TB Subgroups

Active Tuberculosis Disease (Active TB)

- Active TB is the presence of disease and active replication of TB bacteria in the lungs or other organ systems.⁽³⁾ This requires prompt assessment and treatment to avoid complications.⁽⁴⁾
- Features of active TB include:⁽⁵⁾
 - M. Tuberculosis organisms recovered from pulmonary or non-pulmonary specimens
 - Abnormal chest x-ray (in pulmonary TB)
 - Symptomatic presentation (cough, fever and weight loss are the most common features)
 - Clinical signs and symptoms related to non-respiratory TB⁽⁴⁾

Early Disease Progression (Primary TB)⁽³⁾

- Some individuals recently infected with TB are unable to contain the infection.
 - As a result, there is progression to early active disease in a matter of months.
 - This is more likely to happen in young children and immunocompromised individuals.
- In severely immunocompromised individuals, early disease often manifests as intrathoracic adenopathy.

Latent Tuberculosis Infection (LTBI) or Inactive TB

- LTBI is the presence of latent or dormant infection with *M. tuberculosis*.
- Clients with LTBI are non-infectious and have:⁽⁶⁾
 - No evidence of clinically active disease
 - No radiographic changes suggestive of active disease
 - Negative microbiologic tests
 - The risk of transition from LTBI to active TB is largely dependent on the immune competence of the host.⁽⁷⁾
- Risk of progression to active TB is greatest during the first 2 years after infection, and disease may be referred to as either primary or reactivation TB.

Late Disease Progression (Reactivation TB)⁽³⁾

- In Canada, most TB is understood to be 'reactivation' TB (i.e., occurring 18 to 24 months (or more) after the initial infection).
- It usually presents as adult-type pulmonary disease, although it may also present as nonrespiratory TB.
- In any population group, reactivation of LTBI that leads to active TB disease occurs more frequently in immunocompromised individuals and young children under 5 years of age.⁽⁸⁾

For more information on tuberculosis, see *Canadian Tuberculosis Standards, 7th edition*, available from: <http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tb-canada-7/index-eng.php>

TRANSMISSION⁽³⁾

- Transmission from a case of active pulmonary, laryngeal and/or cavitary TB is airborne.
- Bacilli in minute droplets of moisture (droplet nuclei) are inhaled by individuals and go on to produce TB infection or disease.
- TB is rarely acquired by ingestion or percutaneously.

- The likelihood of transmission increases if the source individual has any of the following:
 - Frequent and severe cough
 - Close and prolonged contact with others
 - Crowded living conditions with poor ventilation
- The initial TB infection is usually self-limited and followed by a period of latency (latent infection [LTBI]), which can transition to active TB in a proportion of those infected.
- The most effective ways to reduce transmission risk include early diagnosis and treatment of clients with active pulmonary TB and following infection prevention and control procedures.

COMMUNICABILITY

- Primary or Active TB is spread through infectious airborne droplet nuclei.⁽³⁾
- LTBI is not communicable.⁽⁹⁾
- Non-respiratory TB is rarely communicable.

ASSESSMENT

Medication review: Review current medications, as well as over-the-counter, complementary and alternative medicines, and any chemical or substance intake that may impact management.

Allergy history: Screen for medication, latex, environmental or other allergies and determine approximately when and what type of reaction occurred.

RISK FACTORS⁽¹⁰⁾

- Individuals with a history of active TB disease
- Individuals exposed to a source case of active TB
- Recreational injection drug users
- Individuals with HIV
- Aboriginal Canadians living in communities at high risk for TB and with high rates of LTBI
- Staff and residents of homeless shelters
- Correctional staff and inmates (including individuals previously incarcerated)

- Healthcare workers serving at-risk groups
- Individuals living or working in crowded areas with poor ventilation⁽³⁾
- Immunocompromised individuals⁽³⁾
- Individuals who are malnourished⁽³⁾

For more information on the risks of - and those at risk for - TB, see *Who is most at risk?* in *Risks of tuberculosis (TB)*, available from: <http://www.healthycanadians.gc.ca/diseases-conditions-maladies-affections/disease-maladie/tuberculosis-tuberculose/risks-risques-eng.php>

HISTORY OF PRESENT ILLNESS

- Review risk factors and collect history of present illness.
- Tuberculosis should be considered if a client from a high risk group presents with:
 - An unexplained cough and/or
 - Concerning symptoms that persist for more than a few weeks or
 - Pneumonia that fails to resolve in *any* client.⁽¹¹⁾
- The following symptoms may be reported by the client:
 - Chronic cough (productive or non-productive) for 2 or more weeks
 - Fever (may be absent in children and elderly)
 - Night sweats (may be absent in children and elderly)
 - Fatigue
 - Hemoptysis (generally associated with advanced disease)
 - Decreased appetite (anorexia generally associated with advanced disease)
 - Weight loss (generally associated with advanced disease)

Past Medical History

- Exposure to active TB
- History of active TB and questionable adequacy of previous treatment
- History of positive Tuberculin Skin Test (TST) and questionable prophylaxis adequacy, if the client previously received LTBI prophylaxis

PHYSICAL FINDINGS

- Perform a complete physical examination using the IPPA approach.
- Respiratory and non-respiratory TB can occur concurrently; it is important to rule out evidence of respiratory TB when non-respiratory TB has been diagnosed, and vice versa. A normal examination is the most common physical finding in pulmonary TB.⁽¹¹⁾

Common findings:^(2; 11)

- Fever
- Weight loss
- Chest findings:
 - Adventitia: bronchial breathing, rales or crepitations
 - Signs of pleural effusion on chest examination and auscultation
- Lymphadenopathy, particularly cervical lymph nodes
- Abdominal or bone and joint involvement⁽²⁾
- Other signs based on site of TB infection

DIFFERENTIAL DIAGNOSIS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Diagnosis of active TB is based on characteristic diagnostic findings and clinical presentation. Clinicians are recommended to have a high index of suspicion for TB in at-risk individuals.

Differential diagnosis may include:

- Bronchiectasis
- Chronic obstructive pulmonary disease
- Infections (e.g., fungal infection (including fungal pneumonia), non-tuberculosis mycobacterial infection)⁽¹⁰⁾
- Lymphoma, Kaposi sarcoma,⁽¹²⁾ lung cancer or other malignancy
- Pulmonary embolism⁽¹²⁾

COMPLICATIONS

- Bronchiectasis⁽¹⁰⁾
- Death⁽¹⁾
- Empyema⁽¹⁰⁾
- Massive hemoptysis⁽¹¹⁾
- Pneumothorax⁽¹⁰⁾
- Sepsis or septic shock⁽¹²⁾
- Vital organ failure (e.g., respiratory failure)⁽¹⁰⁾

DIAGNOSTIC TESTS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Diagnostic test selection is based on client history, risk factors, physical examination findings and test availability.

Laboratory

Testing should be carried out as per provincial/territorial policies and procedures. The tests below are for consideration.

Recommended Samples

- Three 5 to 10 mL sputum samples (one of which should be an early morning specimen, if possible) for:⁽¹¹⁾
 - Acid-fast bacilli (AFB) and
 - *M. tuberculosis* culture +/- PCR
- 3 sputum specimens can be collected on the same day, at least 1 hour apart, in a well ventilated area or outdoors.⁽¹¹⁾

For more information on the collection of sputum samples see *Appendix, Section A*, of this guideline.

Additional Lab Investigations

- CBC
- Liver function tests (e.g., ALT, AST, bilirubin)
- Creatinine
- HIV serology
- Hepatitis B and C serology (P. Jessamine, the Ottawa Hospital; 2017 January.)
- If there is reason to suspect genitourinary TB, obtain 3 to 6 first morning void urine samples for AFB smear and culture.⁽²⁾

X-ray

- X-rays may be required to confirm a diagnosis⁽¹¹⁾ or monitor response to treatment.⁽¹³⁾
- Frequency of films will vary and are at the discretion of the attending respirologist or TB expert.

MANAGEMENT

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

GOALS OF TREATMENT

- Ensure adequate treatment of active disease⁽⁴⁾
- Interrupt transmission⁽⁴⁾
- Prevent drug resistance⁽⁴⁾
- Provide a lasting cure⁽⁴⁾
- Prevent death⁽⁴⁾
- Identify and screen contacts for evidence of active disease or latent infection⁽¹⁴⁾

NON-PHARMACOLOGICAL INTERVENTIONS**Interventions**

- To reference the recommended isolation for suspected or confirmed active respiratory TB disease in the home, see Figure 2 in the *Canadian Tuberculosis Standards, 7th edition, Chapter 15, Prevention and Control Health Care and Other Settings*, available from: <http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tb-canada-7/assets/pdf/tb-standards-tb-normes-ch15-eng.pdf>
- Especially in active disease, advise client to get:
 - Adequate rest
 - Adequate nutrition
 - Adequate exposure to fresh air
- Contact identification and management (for more information on managing contacts, see *Contact Tracing Principles* in *Appendix, Section A* of this guideline).

Recommendations for Home Isolation⁽¹³⁾

- It is recommended that clients suspected of having active respiratory TB disease be isolated immediately rather than waiting for confirmation of disease.
- Home isolation may be required at outset of treatment or until the client may be transferred out of the community to a tertiary hospital.

For more information on conditions for home isolation, see *Appendix, Section A* of this guideline.

Client Education⁽¹⁰⁾

- Provide caregiver(s)/client with information about:
 - TB
 - the signs and symptoms of TB
 - the difference between TB disease and LTBI
 - the expected treatment plan

For more information, see Health Canada's *Tuberculosis is Curable, Information about TB fact sheet*, available from http://www.hc-sc.gc.ca/fniah-spnia/alt_formats/pdf/diseases-maladies/tuberculos/factsheet-fiche-fn-pn-eng.pdf

Treatment

- Explain the purpose, process and importance of directly observed treatment (DOT).
- Stress the importance of strict adherence to medication regimen to ensure cure of TB and to prevent drug resistance.
- Encourage use of DOT to promote adherence and monitoring. All medication should be taken at the same time of day.
- Stress the importance of close follow-up to successful treatment and early detection of drug side effects.
 - Explain to client that TB medications may cause side effects that are best managed promptly; careful monitoring for side effects, especially during the first 3 months of treatment, includes blood tests and self-monitoring.⁽⁴⁾

- Stress that self-monitoring is recommended for clients on TB medications and that they must notify their healthcare provider *immediately* if they experience any of the following signs/symptoms:⁽¹⁵⁾
 - Change in vision⁽¹⁶⁾
 - Nausea and/or vomiting
 - Loss of appetite
 - Jaundice
 - Dark urine
 - Fever that lasts 3 or more days and has no obvious cause

Medication

Counsel client/caregiver(s) about:

- Appropriate use of medications; dose, frequency, importance of adherence, potential side effects and interactions.
- Potential common side effects (for more information, see *Table 2: Possible adverse events to first line antituberculosis therapy* in *Appendix, Section A* of this guideline)
- Significant drug-drug and drug-food interactions with TB medications (for more information, see Heartland National TB Centre’s *Tuberculosis medication drug and food interactions*, available from: http://www.heartlandntbc.org/assets/products/tuberculosis_medication_drug_and_food_interactions.pdf.)

Advise client/caregiver(s) to avoid:

- Ingestion of alcohol and
- Other potential hepatotoxins as they may potentially worsen drug-induced hepatitis.⁽¹⁶⁾

If client smokes, assess tobacco use status at each visit and offer smoking cessation support. Smoking cessation products are an open-benefit through the FNIHB program (for more information, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 15 – Mental Health – Nicotine Dependence*.)

PHARMACOLOGICAL INTERVENTIONS

In addition to consulting a physician/nurse practitioner, review the drug monograph, the FNIHB Nursing Station Formulary or provincial/territorial formulary before initiating treatment.

Active Disease⁽⁴⁾

TB medications are routinely prescribed by TB specialists. In some provinces/territories however, they may be initiated and/or prescribed by an alternate physician/nurse practitioner. All oral TB medications are provided to clients through Provincial/Territorial Public Health Programs.

- Unless contraindicated, first-line treatments are typically comprised of:
 - Isoniazid (INH),
 - Rifampin (RMP),
 - Ethambutol (EBM)
 - Pyrazinamide (PZA) (for usual daily dosages, see *Table 1 Dosages for First Line Antituberculosis Medications in Adults* in *Appendix, Section A* of this guideline).
- For clients with suspected TB meningitis or tuberculous pericarditis, an anti-inflammatory such as dexamethasone or prednisone may be initiated by the TB specialists or physician/nurse practitioner.⁽²⁾

Isoniazid (INH) and Pyridoxine (Vitamin B6)

- When isoniazid (INH) is prescribed, vitamin supplementation with pyridoxine (vitamin B6) should also be prescribed because of the increased risk of symptoms related to pyridoxine deficiency, especially in clients with diabetes, renal failure, malnutrition, substance abuse, seizure disorders, HIV infection, and/or women who are pregnant and/or breastfeeding.

Notes: Pyridoxine dose of 25 mg per day is sufficient as higher dose may interfere with INH activity.

Ethambutol (EMB)

- Ethambutol (EMB) should be discontinued as soon as drug susceptibility testing (DST) result is available indicating that the bacterium is fully susceptible, or if the source case is known to be fully drug-susceptible.

Treatment length

- Treatment length will vary depending on the TB infection sites, prescribed anti-TB medications regimen, disease severity and client risk factors.⁽²⁾

Initiating TB therapy

- Initiating TB therapy requires the client to be followed closely to monitor and minimize the risk of toxicity and to ensure therapy is completed.⁽¹⁷⁾
- For effective TB treatment, 100% of prescribed doses must be taken.
- DOT is recommended at a minimum for clients with risk factors for non-adherence.
- Consider alternate methods of DOT (e.g., videoconference) where available.

Phases of therapy

Active disease therapy is always with multiple drugs for 6 months or longer. Therapy is initiated in 2 phases:

- The initial phase, which lasts 2 months
- The continuation phase, which lasts 4 months or longer

Initial Phase of Treatment (duration: 2 Months)⁽⁴⁾

- **Standard regimen:** 4 medications should be prescribed (INH, rifampin, ethambutol, pyrazinamide)
- **Alternate regimen** (owing to the toxicity of pyrazinamide): at least 3 medications (INH, rifampin, ethambutol). When only 3 medications are used in this phase, the continuation phase with INH and rifampin is 3 months longer.
- Pyrazinamide (PZA) is the most toxic of the standard first-line drugs and the most common cause of drug-induced hepatotoxicity in clients treated for TB disease.

- Clients at risk of hepatotoxic effects, such as those with a history of alcoholism, the elderly, and/or clients with pre-existing mild to moderate liver dysfunction may not tolerate this agent.

Continuation Phase of Treatment

(duration: 4 months or longer)⁽⁴⁾

- **Standard regimen:** At least 2 effective medications should be prescribed (INH and rifampin for 4-7 months except in cases of drug resistant isolates)
- If antituberculosis drugs are to be given intermittently (for example, a schedule of 3 times a week in the continuation phase), the client must be fully supervised for DOT.
- Prolonging the continuation phase beyond 4 months (in which case the total course of treatment would be beyond 6 months) is recommended in the following circumstances:
 - If there is persistent presence of cavity on the chest x-ray after 2 months or at the end of effective anti-TB therapy, persistent smear and/or culture positivity after 2 months of therapy, or HIV infection.⁽¹³⁾
 - In some cases of non-respiratory TB infections (i.e., meningeal TB, bone and joint TB)⁽²⁾ (for additional information regarding the different types of non-re-spiratory TB, refer to the *Canadian Tuberculosis Standards, 7th edition, Chapter 7, Nonrespiratory Tuberculosis*, available from: <https://www.canada.ca/en/public-health/services/infectious-diseases/canadian-tuberculosis-standards-7th-edition/edition-19.html>)
 - When second-line regimens are required and particularly if drug-resistant TB is identified (for more information regarding the different types of drug resistance, see *Canadian Tuberculosis Standards, 7th edition, Chapter 8, Drug Resistant Tuberculosis* available at <https://www.canada.ca/en/public-health/services/infectious-diseases/canadian-tuberculosis-standards-7th-edition/edition-20.html>)

Latent Tuberculosis Infection (LTBI)

Treatment regimens for LTBI may vary according to provincial/territorial treatment guidelines.

TB control offices are to be consulted for further information.

- **Standard regimen:** INH for 9 months daily⁽¹⁸⁾
- **Alternative regimens:**⁽¹⁸⁾
 - INH plus rifampin daily for 3-4 months
 - Rifampin daily for 4 months

Note: When isoniazid (INH) is prescribed, vitamin supplementation with pyridoxine (vitamin B6) should also be prescribed because of the increased risk of symptoms related to pyridoxine deficiency, especially in clients with diabetes, renal failure, malnutrition, substance abuse, seizure disorders, HIV infection and/or women who are pregnant and/or breastfeeding. Pyridoxine dose of 25 mg per day is sufficient as higher dose may interfere with INH activity.⁽⁴⁾

- For detailed information on the use of shorter rifampin-based regimens for the treatment of LTBI, see:
 - *Canadian Tuberculosis Standards, 7th edition, Table 4, in Chapter 6, Treatment of Latent TB* <https://www.canada.ca/en/public-health/services/infectious-diseases/canadian-tuberculosis-standards-7th-edition/edition-16.html> **or**
 - *Latent tuberculosis infection: An overview*, available from: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/17vol43/dr-rm43-3-4/ar-01-eng.php>
- Additional therapeutic options may include rifapentine and INH for a 3 month course.⁽¹⁸⁾

MONITORING AND FOLLOW-UP

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

MONITORING

If administering an agent with risk of anaphylaxis, monitor the client closely for 30 minutes.

FOLLOW-UP

Clients on antituberculosis treatment require close follow-up. Consider the following:

- Chest x-ray should be performed at certain intervals during therapy to assess response, potential complications and risk of relapse.⁽⁴⁾
- For a client suspected of treatment failure, two sputum smears and cultures (with drug susceptibility testing if culture-positive) are recommended.⁽⁴⁾
- Clients who are sputum direct smear AFB should be closely followed for clinical and objective response to therapy. The quality of a sputum sample is directly related to the effort expended by the client in producing the sample. Smear examination should be collected no more frequently than on alternate weeks. (P. Jessamine, the Ottawa Hospital, 2017 January)
- 3 consecutive negative AFB sputum samples are required from clients who have smear positive and culture positive TB before isolation can be stopped.⁽¹³⁾
- When sputum direct smears are AFB negative, a culture should be done at the end of the second month of therapy to assess risk of relapse, then again towards the end of therapy.⁽⁴⁾
- During active TB treatment, clients should be seen at least monthly to assess adherence (DOT), response to therapy, and to detect adverse events; response to treatment should be gauged clinically, radiographically and microbiologically. Microbiologic monitoring is considered the most reliable method.⁽⁴⁾ Consult provincial/territorial policies and procedures for additional guidance.
- Monitor clients on standard first-line anti-tuberculosis treatment for signs and symptoms of hepatotoxicity.
- Liver function tests should be checked regularly, as per physician/nurse practitioner direction.⁽⁴⁾

Clients on Ethambutol (EMB)

- Clients receiving ethambutol should have a baseline visual acuity and red-green color discrimination screen monthly (frequency may vary according to the provincial/territorial treatment guidelines and/or the treating physician/nurse practitioner).
- Clients who take ethambutol for longer than just the initial phase of treatment should be referred to an ophthalmologist for periodic assessment of visual acuity, colour vision and visual fields.⁽⁴⁾

Referral

- Arrange for medical evacuation if clinically indicated.
- Clients with suspected active TB may require medical evacuation for investigation and treatment.
- If suspected or confirmed active TB, clients may need to follow additional precautions during transportation; refer to provincial/territorial policies and procedures for guidance.

APPENDIX**SECTION A: SUPPLEMENTAL CLINICAL MANAGEMENT INFORMATION****Prevention⁽¹⁰⁾**

- Adequate balanced nutrition, which aids in healing, may help prevent active TB in those with latent infection.
- TB education may help to increase knowledge and decrease any stigma associated with TB in the community.
- Promotional activities may help to encourage early detection of active disease.
- Training may help to highlight the importance of identifying individuals in the community who would benefit from LTBI treatment, as well as the reasoning behind LTBI treatment.

Contact Tracing Principles

- Guidelines for contact tracing may vary slightly by province/territory. Check with the TB control officer in the province/territory of residence for additional information. For more information, see *Canadian Tuberculosis Standards, 7th edition – Chapter 12*.
- Young children less than 5 years old and the immune-compromised are a high priority as they are more likely to progress to active disease if infected.⁽¹⁴⁾
- All TST of high priority contacts who were negative should be repeated 8 weeks after last contact with infectious client.
- Medium and low priority contacts should have a TST done only once at 8 weeks after last contact with an infectious case.⁽¹⁴⁾

Conditions for Home Isolation⁽¹³⁾

- The person does not share common air-space with non-household members and the household air is not being recirculated to other housing units.
- All household members should have been previously exposed to the source case.
- If any household members are TST non-reactive, they should be informed and understand the potential risk.
- No children under 5 or persons with immunocompromising conditions are present in the home (an exception would be if they are receiving treatment for active TB disease or preventive treatment for latent TB infection).
- No visitors should be allowed in the home except for health care workers.
- The person is counselled on, and is willing and able to comply with limitations to their movement outside of the home (e.g., does not go to work, school or any other public indoor environment).
- The person should not be allowed to use any form of public transportation (if absolutely necessary, a taxi can be used to attend essential healthcare appointments, provided the person is wearing a mask).

- The person should be allowed to ambulate outdoors since the risk of transmission is negligible provided they are not in very close contact with susceptible individuals for prolonged periods of time.
- Home isolation may be discontinued by the treating physician/nurse practitioner when the client has clinical evidence of improvement, 3 consecutive negative sputum smears for AFB and there is evidence of adherence to at least 2 weeks of effective therapy.

Tuberculin Skin Test (TST) (Mantoux Test)⁽⁷⁾

- This diagnostic test is used to identify LTBI.
- The TST consists of the intradermal injection of 0.1 ml of purified protein derivative (PPD) from *M. tuberculosis* bacteria.
- Improper intradermal injection technique may result in inaccurate results.
- Individuals with cell-mediated immunity to tuberculin antigens may have a delayed hypersensitivity reaction within 48-72 hours.
 - The reaction will cause localized swelling and will manifest as an induration of the skin at the injection site.
- Indications for TST testing include:
 - Diagnosis of LTBI in individuals at increased risk of development of active TB and who would therefore benefit from treatment
 - Only those who would benefit from treatment should be tested, so a decision to test presupposes a decision to treat if the test is positive. In general, elderly clients should not be tested because the risk of treatment of LTBI in elderly clients outweighs the benefits.
 - Supportive evidence of active disease in young children and those with nonrespiratory TB
 - Identification of newly infected LTBI cases in contact tracing; initial plus 8 week post-exposure TST is recommended for household and other high-priority contacts.⁽¹⁴⁾

- A single TST 8 weeks post-exposure is recommended for contacts who are medium or low priority.⁽¹⁴⁾

The TST should not be performed on clients in the following situations:

- Previous severe blistering reactions to the TST
- Documented reactive or significant TST result in the past that was read by a knowledgeable health care practitioner
- Known to have active TB or who has been treated adequately in the past for active TB
- Extensive burns or eczema present over intended testing site
- Client has had a viral infection (such as measles, mumps, and varicella) in the past month or has received vaccination with a live-virus vaccine in the past month, as TST result may be false negative. However, in this situation a clinician may still choose to administer a TST even with a risk of a theoretical false negative. TST may be administered on the same day as a live vaccine.

Interpreting TST Results:

- Window for reading TST results is between 48 to 72 hours
- Reaction to the TST includes: measuring the diameter of the induration in millimetres, not the erythema

False Negative Results:

- May occur in infants less than 6 months of age, the elderly, the seriously ill, or anergic people (e.g., those with HIV/AIDS, other immune deficiencies or those on corticosteroids), or those with active TB.

False Positive Results:

- Client history of the Bacille Calmette-Guérin (BCG) vaccination may trigger a positive TST result.

How to Perform a TST⁽⁷⁾

Handling the tuberculin solution:

- Tubersol 5 tuberculin units (5-TU) of PPD-S (purified protein derivative-standard) is recommended in Canada.
- The solution can be adversely affected by exposure to light. PPD should be stored in the dark.
- Discard the solution if the vial has been in use for longer than 1 month or for an undetermined amount of time (the potency of the solution may be diminished).

Preparing the client to be tested:

- Use the inner aspect of the forearm, preferably the nondominant arm about 10 cm (4 inches) below the elbow; avoid areas with abrasions, swelling, visible veins or lesions. If there is a localized rash, a burn or localized eczema, avoid this area.
- Do not use local anesthetic cream as application has been reported to cause localized edema, which could easily be confused with a positive TST result.

Injecting the PPD tuberculin solution:

- Use a 0.6 to 1.3 cm (¼ to ½ inch), 26- or 27-gauge needle with a disposable plastic tuberculin syringe.
- Position the bevel of the needle so that it opens facing up.
- Administer the PPD by the slow intradermal injection of 0.1 mL of 5-TU.
- A discrete, pale elevation of the skin (a wheal) 6 to 10 mm in diameter should appear. The wheal will typically disappear in 10 to 15 minutes. The size of the wheal is not completely reliable, but if a lot of liquid runs out at the time of injection and there is no wheal, repeat the injection on the opposite forearm, or on the same forearm as before, but at least 5 cm from the previous injection site.
- Clients should be advised not to massage the site to avoid squeezing out the PPD and disrupting the test.

- Do not cover the site with a bandage.
- Advise the client that they should not scratch the site but may perform all normal activities, including showering/ bathing.
- The TST should be read by a trained health professional. Individuals without experience in reading a TST may not feel a slight induration.
- When interpreting a reactive or significant TST, it is important to consider much more than simply the size of the reaction.
- Reading should be performed 48-72 hours after administration, as maximum induration can take up to 48 hours to develop, but after 72 hours it is difficult to interpret a reaction. Reactions may persist for up to one week.
- If the TST cannot be read within 72 hours due to unforeseen circumstances, it should be repeated at an injection site far enough from that of the previous test that the reactions do not overlap. No minimum wait time is required before the repeat test.
- The forearm should be supported on a firm surface and slightly flexed at the elbow.
- See the *Mantoux Tuberculosis Skin Test Facilitator Guide* for detailed instructions on the correct method of reading the skin test results, available from: <https://www.cdc.gov/tb/education/mantoux/pdf/mantoux.pdf>
- Record TST result in millimetres. No induration is recorded as 0 mm.
- Disregard and do not record erythema when reading results.
- Approximately 2-3% of people tested will have localized redness or rash (without induration) occurring within the first 12 hours. These are minor allergic reactions, are not serious and do not indicate TB infection. They are not a contraindication to future TSTs.

Interferon Gamma Release Assays (IGRAs)

- IGRAs are in vitro blood tests of cell-mediated immune response; they measure T cell release of interferon gamma (IFN-gamma) following stimulation by antigens specific to *M. tuberculosis*. IGRAs require fresh blood samples.
- IGRAs are not affected by BCG vaccination status, and are useful for evaluating LTBI in BCG-vaccinated individuals. Further, although the finding is based on limited evidence, IGRAs appear to be unaffected by most infections with non-tuberculosis mycobacteria, which can cause false-positive TSTs. IGRA sensitivity is diminished by HIV infection. Confirm provincial/territorial availability of IGRA testing.

Collection of Sputum Samples⁽¹⁹⁾

Provide clients with detailed instructions on the number and timing of sputum samples to be collected.

- Key information to provide clients regarding collection:
 - Collect your sputum sample away from other people; outdoors or with an open window
 - Take two deep breaths and exhale slowly, then cough hard until sputum comes into your mouth, then spit it into the collection container
 - After sample collection, wash hands

For more information on sputum collection for TB testing, see *Sputum Collection for Tuberculosis (TB) Testing*, available from: <https://www.healthlinkbc.ca/hlbc/files/documents/healthfiles/hfile51b.pdf>.

TABLE 1

Dosages for First Line Antituberculosis Medications in Adults⁽⁴⁾

MEDICATIONS	USUAL DAILY DOSES
Isoniazid	5 mg/kg, maximum 300mg
Rifampin	10 mg/kg, maximum 600 mg
Pyrazinamide	20-25 mg/kg, maximum 2000 mg
Ethambutol	15-20 mg/kg, maximum 1600 mg

Monitoring for Adverse Events to Antituberculosis Therapy**TABLE 2**

Possible Adverse Events To First-Line Antituberculosis Therapy⁽⁴⁾

MEDICATIONS	COMMON ADVERSE EVENTS	UNCOMMON BUT IMPORTANT ADVERSE EVENTS
Isoniazid	Rash, hepatitis, neuropathy	Central nervous system toxicity, anemia
Rifampin	Drug interactions, rash	Hepatitis, flu-like illness, neutropenia, thrombocytopenia
Pyrazinamide	Hepatitis, rash, arthralgia	Gout
Ethambutol	Eye toxicity	Rash

SECTION B: SUPPLEMENTAL RESOURCES

Provincial/Territorial Guidelines

Alberta

Alberta Health and Wellness. Tuberculosis Prevention and Control Guidelines for Alberta. Available from: <https://open.alberta.ca/publications/tuberculosis-prevention-and-control-guidelines-for-alberta>

British Columbia

BC Centre for Disease Control. Chapter 4: Tuberculosis Manual. Available from: <http://www.bccdc.ca/health-professionals/clinical-resources/communicable-disease-control-manual/tuberculosis>

Manitoba

Public Health Branch. Communicable Disease Control - Manitoba Tuberculosis Protocol. Available from: <http://www.gov.mb.ca/health/publichealth/cdc/protocol/tb.pdf>

Newfoundland and Labrador

Department of Health and Community Services. Guideline for Preventing the Transmission of Mycobacterium tuberculosis across the Continuum of Care. Available from: http://www.health.gov.nl.ca/health/publichealth/cdc/tuberculosis_management.pdf

Northwest Territories

Northwest Territories Health and Social Services. NWT Tuberculosis Manual. Available from: <http://www.hss.gov.nt.ca> by selecting HSS Professionals (staff only) and entering authorized username and password.

Nova Scotia

Nova Scotia Department of Health and Wellness. Communicable Disease Prevention and Control, Tuberculosis. Available from: <https://novascotia.ca/dhw/CDPC/tuberculosis.asp>

Ontario

Ontario Ministry of Health and Long-Term Care. Ontario Public Health Standards: Tuberculosis Prevention and Control. Available from: http://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/docs/protocols_guidelines/Tuberculosis_Prevention_And_Control_Protocol_2018_en.pdf

Saskatchewan

Government of Saskatchewan. Tuberculosis. Available from: <https://www.saskatchewan.ca/residents/health/diseases-and-conditions/tuberculosis>

Yukon

Yukon Health and Social Services. TB Control Manual. Available from: <http://www.hss.gov.yk.ca/tbmanual.php>

Other Resources

Alvarez GG, Orr P, Wobeser WL, Cook V, Long R. Chapter 14: Tuberculosis Prevention and Care in First Nations, Inuit and Metis Peoples. In: *Ca-nadian Tuberculosis Standards*. 7th ed. [Internet] Her Majesty the Queen in Right of Canada; 2014. Available from: <https://www.canada.ca/en/public-health/services/infectious-diseases/canadian-tuberculosis-standards-7th-edition/edition-10.html>

BIBLIOGRAPHY

The following references and other sources have informed the updating of this Clinical Practice Guideline.

REFERENCES

- Halverson J, Ellis E, Gallant V, Archibald C. Chapter 1: Epidemiology of tuberculosis in Canada. In: *Canadian Tuberculosis Standards*. 7th ed. [Internet] Her Majesty the Queen in Right of Canada; 2014 p. 7-25. Available from: <http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tb-canada-7/tb-standards-tb-normes-ch1-eng.php>

2. Fisher D, Elwood K. Chapter 7: Non-respiratory tuberculosis. In: Canadian Tuberculosis Standards. 7th ed. [Internet] Her Majesty the Queen in Right of Canada; 2014 p. 153-185. Available from: <http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tb-canada-7/tb-standards-tb-normes-ch7-eng.php>
3. Long R, Schwartzman K. Chapter 2: Pathogenesis and transmission of tuberculosis. In: Canadian Tuberculosis Standards. 7th ed. [Internet] Her Majesty the Queen in Right of Canada; 2014 p. 25-43. Available from: <http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tb-canada-7/tb-standards-tb-normes-ch2-eng.php>
4. Menzies D, Elwood K. Chapter 5: Treatment of Tuberculosis Disease. In: Canadian Tuberculosis Standards. 7th ed. [Internet] Her Majesty the Queen in Right of Canada; 2014 p. 97-125. Available from: <http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tb-canada-7/tb-standards-tb-normes-ch5-eng.php>
5. Centers for Disease Control and Prevention (US). National Notifiable Diseases Surveillance System (NNDSS): Tuberculosis (TB) 2009 Case Definition, CSTE Position Statement (09-ID-65). [Internet] Atlanta, GA: Centers for Disease Control and Prevention. Available from: www.cdc.gov/nndss/conditions/tuberculosis/case-definition/2009/
6. Appendix A: Glossary. In: Canadian Tuberculosis Standards. 7th ed. [Internet] Her Majesty the Queen in Right of Canada; 2013 p. 7-25. Available from: <http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tb-canada-7/appendix-annexe-a-eng.php>
7. Pai M, Kunimoto D, Jamieson F, Menzies D. Chapter 4: Diagnosis of Latent Tuberculosis Infection. In: Canadian Tuberculosis Standards. 7th ed. [Internet] Her Majesty the Queen in Right of Canada; 2014 p. 63-97. Available from: <http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tb-canada-7/tb-standards-tb-normes-ch4-eng.php>
8. Menzies D, Alvarez G, Khan K. Chapter 6: Treatment of Latent Tuberculosis Infection. In: Canadian Tuberculosis Standards. 7th ed. [Internet] Her Majesty the Queen in Right of Canada; 2014 p. 125-153. Available from: <http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tb-canada-7/tb-standards-tb-normes-ch6-eng.php>
9. Centers for Disease Control and Prevention (US). Latent Tuberculosis Infection: A Guide for Primary Health Care Providers. [Internet] Atlanta, GA: Centers for Disease Control and Prevention; 2013. Available from: <http://www.cdc.gov/tb/publications/tbi/>
10. Pozniak A. Clinical manifestations and complications of pulmonary tuberculosis. [Internet] Waltham, MA (US): UpToDate; 2014. Available from: <https://www.uptodate.com> with authorized username and password.
11. Pai M, Minion J, Jamieson F, Wolfe J, Behr M. Chapter 3: Diagnosis of active tuberculosis and drug resistance. In: Canadian Tuberculosis Standards. 7th ed. [Internet] Her Majesty the Queen in Right of Canada; 2014 p. 43-63. Available from: <http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tb-canada-7/tb-standards-tb-normes-ch3-eng.php>
12. Pulmonary tuberculosis. [Internet] Ipswich, MA: EBSCO Information Services; 2015. Available from: www.dynamed.com with authorized username and password.
13. Ogunremi T, Menzies J, Embil D. Chapter 15: Prevention and Control of Tuberculosis Transmission in Health Care and Other Settings. In: Canadian Tuberculosis Standards. 7th ed. [Internet] Her Majesty the Queen in Right of Canada; 2014 p. 361-405. Available from: <http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tb-canada-7/tb-standards-tb-normes-ch15-eng.php>

14. Rea E, Rivest P. Chapter 12: Contact Follow-up and Outbreak Management in Tuberculosis Control. In: Canadian Tuberculosis Standards. 7th ed. [Internet] Her Majesty the Queen in Right of Canada; 2014 p. 293-321. Available from: <http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tb-canada-7/tb-standards-tb-normes-ch12-eng.php>
15. Mayo Clinic. Patient Care and Health Information - Diseases and Conditions: Tuberculosis. Rochester, MN: Mayo Foundation for Medical Education and Research; 2014. Available from: <http://www.mayoclinic.org/diseases-conditions/tuberculosis/basics/treatment/con-20021761>
16. Canadian Pharmacists Association. Compendium of Therapeutic Choices: Canada's Trusted Reference for Primary Care Therapeutics (CTC 7). Ottawa: Canadian Pharmacists Association; c2014.
17. Kitai I, Demers AM. Chapter 9: Pediatric Tuberculosis. In: Canadian Tuberculosis Standards. 7th ed. [Internet] Her Majesty the Queen in Right of Canada; 2014 p. 219-247. Available from: <http://www.phac-aspc.gc.ca/tbpc-latb/pubs/tb-canada-7/tb-standards-tb-normes-ch9-eng.php>
18. Kiazzyk S, Ball TB. Latent tuberculosis infection: An overview. Canada Communicable Disease Report (CCDR). [Internet] Ottawa, ON: Public Health Agency of Canada; 2017 March 2 [cited 2017 March 6]. Available from: <http://www.phac-aspc.gc.ca/publicat/ccdr-mtc/17vol43/dr-rm43-3-4/ar-01-eng.php?>
19. BC Centre for Disease Control. Sputum Collection for Tuberculosis (TB) Testing. [Internet] Vancouver, BC: HealthLink; 2014. Available from: <https://www.healthlinkbc.ca/healthlinkbc-files/sputum-tuberculosis-testing>
- Canadian Pharmacists Association. Ethambutol. [Internet] Ottawa, ON: eTherapeutics; 2012. Available from: <http://www.e-therapeutics.ca> with authorized username and password.
- Ethambutol. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015. Available from: <http://online.lexi.com> with authorized username and password.
- Health Canada. First Nations and Inuit Health Branch (FNIHB) Nursing Station Formulary and Drug Classification System. 2016 April.
- Canadian Pharmacists Association. Isoniazid. [Internet] Ottawa, ON: eTherapeutics; 2012. Available from: <http://www.e-therapeutics.ca> with authorized username and password.
- Isoniazid. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015. Available from: <http://online.lexi.com> with authorized username and password.
- Canadian Pharmacists Association. Pyrazinamide. [Internet] Ottawa, ON: eTherapeutics; 2012. Available from: <http://www.e-therapeutics.ca> with authorized username and password.
- Pyrazinamide. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015. Available from: <http://online.lexi.com> with authorized username and password.
- Canadian Pharmacists Association. Rifampin (Rifadin). [Internet] Ottawa, ON: eTherapeutics; 2012. Available from: <http://www.e-therapeutics.ca> with authorized username and password.
- Rifampin. [Internet]. Hudson, OH: Lexi-Comp. Inc.; 2015. Available from: <http://online.lexi.com> with authorized username and password.

OTHER SOURCES

Canadian Pharmacists Association. Compendium of Therapeutic Choices: Canada's Trusted Reference for Primary Care Therapeutics (CTC 7). Ottawa: Canadian Pharmacists Association; c2014.

VIRAL HEPATITIS

OVERVIEW

Please refer to provincial/territorial guidelines for Viral Hepatitis where available.

Hepatitis is a condition associated with inflammation of the liver, usually due to viral infection.⁽¹⁾ In Canada, viral hepatitis types include hepatitis A, B, C, D and E, with A, B, and C the most common.⁽¹⁾ Although other virus types can induce hepatitis, they will not be discussed in this clinical practice guideline. All types of viral hepatitis can be transmitted. When appropriate, supportive care is provided; the majority of clients with acute hepatitis A or B will recover completely and will not experience chronic complications.⁽²⁾ By contrast, the majority of clients with hepatitis C will become chronically infected. Hepatitis is a significant health concern due to the burden of illness for each individual, the potential for outbreaks and the spread to contacts.

CAUSES

- Hepatitis A virus (HAV)⁽¹⁾
- Hepatitis B virus (HBV)⁽¹⁾
- Hepatitis C virus (HCV)⁽¹⁾
- Hepatitis D virus (HDV)⁽¹⁾
- Hepatitis E virus (HEV)⁽¹⁾

Other causes of viral hepatitis include:⁽²⁾

- Coxsackie virus
- Cytomegalovirus
- Epstein-Barr virus

Hepatitis A Virus (HAV)⁽³⁾

- HAV is vaccine-preventable.
- HAV occurs primarily in children.
- Children often present asymptotically, and may have some mild viral symptoms.⁽⁴⁾
- Clinical illness is more severe in adults than in children.

- Clinical features typically appear within 3 to 5 weeks of infection and include:
 - Jaundice
 - Hepatomegaly
 - Hepatitis
- HAV usually resolves spontaneously in 4 to 8 weeks, without complications, and without chronic infection.
- No specific antiviral treatment required; only supportive care is indicated.

Hepatitis B Virus (HBV)⁽⁵⁾

- HBV is vaccine-preventable.
- Most children with HBV present asymptotically.
- Immunocompromised adults and children under 7 are more likely to develop chronic infection.
- Acute clinical illness occurs in 30 – 50% of individuals with HBV greater than 5 years of age. Clinical features include non-specific, mild viral symptoms (e.g., fever, malaise, nausea, and right upper quadrant (RUQ) abdominal pain).⁽⁶⁾
- Acute HBV infection in adults varies in clinical presentation, with 70% of cases manifesting sub-clinically, 30% of cases manifesting with icteric hepatitis, and less than 1% manifesting with fulminant hepatitis. During the chronic phase, HBV manifests in a number of ways: as an asymptomatic carrier, chronic hepatitis, cirrhosis, and/or hepatocellular carcinoma.⁽²⁾

Hepatitis C Virus (HCV)⁽⁸⁾

- Most acute cases of HCV are asymptomatic
 - 25% have jaundice or mild viral symptoms
- 50-85% of acutely infected clients progress to chronic HCV infection
- The most common cause of liver disease in Canada

Hepatitis D Virus (HDV)⁽⁷⁾

- HDV occurs either as:
 - An acute infection with acute HBV or
 - a superinfection with chronic HBV⁽⁹⁾
- Acute HDV may present with viral symptoms, including:
 - Jaundice
 - Gastrointestinal symptoms
 - Fever
 - Discoloured urine or stool
 - Fatigue
- HDV has been shown to:
 - Accelerate liver fibrosis (cirrhosis) and
 - May progress to fulminant hepatitis in association with HBV⁽⁹⁾

Hepatitis E Virus (HEV)

- Acute HEV clinically presents the same way as HAV.⁽¹¹⁾
- Chronic HEV is occasionally encountered in immune compromised patients, including liver transplant recipients.⁽¹⁰⁾
- HEV is more common in endemic regions outside North America.⁽¹¹⁾
- HEV is rare in Canada.⁽¹¹⁾
- The infection is generally self-limiting⁽¹¹⁾
- Results in a high mortality rate in pregnant women (15 to 20%)⁽¹⁰⁾

TRANSMISSION**HAV and HEV**

- Transmitted via the fecal-oral route.⁽³⁾
 - Fecal-oral route of transmission involves person-to-person spread by close contact or consumption of contaminated water and/or food.⁽¹⁾

HBV, HCV, HDV and HEV

- Transmission occurs person-to-person via blood and/or bodily fluids⁽¹⁾
- The common modes of transmission are:
 - Percutaneous (injection drug use)
 - Perinatal
 - Horizontal
 - Sexual
 - Transfusion
 - Organ transplantation
 - Nosocomial (e.g., needle stick injury)
- Injection drug users who are HBV-positive have a high prevalence of HDV.
- HBV is highly contagious.

For more information about transmission, see *Table 1, Comparison of Five Forms of Viral Hepatitis*.

INCUBATION PERIOD

TABLE 1
Comparison of Five Forms of Viral Hepatitis⁽¹⁾

FORM	TRANSMISSION	INCUBATION TIME	CHRONICITY (RISK OF CHRONIC INFECTION IN INFECTED CLIENTS)
A	Adult or Pediatric: - Fecal-oral - Sexual ⁽¹⁾	15-50 days	None
B	Adult or Pediatric: - Parenteral - Sexual - Vertical - Blood - Organs	45-180 days	Yes; chronicity occurs in: - 70 to 90% of infants - 10 to 30% of children under 7 - 5% of adults
C	Adult or Pediatric: - Parenteral - Vertical - Sexual	14-180 days ⁽¹²⁾	Yes; chronicity occurs in: - 50 to 85% of cases
D	Adult or Pediatric: - Parenteral; always coexists with hepatitis B	14-56 days	Yes
E	Adult and Pediatric: - Fecal-oral - Blood transfusion Pediatric: - Vertical	14-60 days	Usually not, except in immune-compromised individuals

ASSESSMENT

Medication review: Review current medications, including over-the-counter, complementary and alternative medicines, as well as chemical or substance intake that may impact management

Allergy history: Screen for medication, latex, environmental or other allergies and determine approximately when and what type of reaction occurred.

RISK FACTORS

HAV⁽⁴⁾

- Travel or work in regions with high rates of HAV
- Household or close contact of a person with acute HAV

- Attends childcare or works in a childcare centre
- Men who have sex with men (MSM)⁽¹³⁾
- Illicit drug users
- Contact with contaminated food or water
- Residents of some Aboriginal communities (may be attributed to inadequate water supply and overcrowding)
- Residents of certain institutions (including correctional facilities)

HBV⁽¹⁴⁾

- High risk sexual activities (e.g., unprotected sex, multiple sexual partners, MSM)
- Substance use that includes sharing of equipment (i.e., injection and inhalational)
- Infants born to infected mothers
- Household and sexual contacts of HBV carriers

- Sharing personal care items (e.g., razors, toothbrushes, nail clippers) with HBV-positive person
- Occupational exposure to blood or body fluids
- Blood or blood product transfusion or medical procedure in Canada prior to 1970
- Contaminated medical or personal services equipment (e.g., instruments used for tattooing or piercing)
- Birth or living in/travelling to a region of HBV endemicity
- Residents of certain institutions (including correctional facilities)

HCV^(15; 16)

- Substance use with sharing of equipment (injection and inhalation)
- Blood or blood product transfusion and organ transplantation prior to 1992
- Contaminated medical, dental or personal services equipment (e.g., instruments used for tattooing or piercing)
- Occupational exposure to blood
- Infants born to infected mothers
- Multiple sexual partners and risky sexual behaviours leading to blood-to-blood contact
- Co-infection with other sexually transmitted infections (STIs)
- Sharing personal care items (razors, toothbrushes, nail clippers) with HCV-positive person
- MSM
- Incarcerated populations
- Aboriginal peoples
- Immigrants from countries with high HCV prevalence

HISTORY OF PRESENT ILLNESS

- Review risk factors and collect history of present illness.
- Hepatitis, regardless of type, presents with similar clinical features but is variable in severity; lab investigations confirm the type of hepatitis.

Acute Hepatitis

- Prodromal symptoms (which may precede the cardinal symptoms):⁽³⁾

- Fever
- Skin rash
- Arthralgia
- Arthritis

Note: Fever is common in HAV cases but rare with hepatitis B or C.

- Cardinal symptoms:⁽³⁾
 - Nausea
 - Fatigue
 - RUQ abdominal pain
 - Loss of appetite
 - Jaundice (common)
 - Vomiting
 - Headache
 - Pale-coloured stools
 - Pruritus
 - Dark urine

Chronic Hepatitis

- Most clients present asymptotically or may have non-specific constitutional symptoms (e.g. fatigue).⁽³⁾
- In the presence of advanced, decompensating/decompensated liver disease, clients may be symptomatic with signs of end-stage liver disease (ESLD):
 - Ascites
 - Bleeding
 - Encephalopathy

PHYSICAL FINDINGS

Perform a physical examination using the IPPA approach. Physical findings vary depending upon the phase of illness (i.e., acute or chronic).

Acute phase of hepatitis:⁽³⁾

- Client may appear mildly to moderately ill.
- Findings may vary and early signs may include right upper quadrant pain, dark urine, pale stools, fever followed by jaundice
- Extrahepatic manifestations may include: skin rashes, arthralgia, arthritis and fever
- Most patients with acute HCV are asymptomatic⁽⁸⁾ but they may also have these typical findings.

Chronic phase of hepatitis:⁽¹⁷⁾

- Prevalent clinical features include palmar erythema, jaundice (sclera, skin), spider nevi, splenic or hepatic enlargement, abdominal findings (e.g., ascites)
- Increased jugular venous distension
- Peripheral edema⁽⁷⁾
- Extrahepatic manifestations (e.g., fever, skin rashes, arthralgia, arthritis)

Note: Behavioural changes (e.g., lethargy, encephalopathic behaviours) may occur in either acute or chronic phase.⁽³⁾ For more information, see *Hepatic Encephalopathy* in *Appendix, Section A* of this guideline.

DIFFERENTIAL DIAGNOSIS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

- Alcohol-induced hepatitis⁽¹⁷⁾
- Auto-immune hepatitis⁽¹⁷⁾
- Cirrhosis⁽¹⁷⁾
- Drug- or toxin-induced hepatitis⁽¹⁷⁾
- Hepatocellular carcinoma⁽¹⁷⁾
- Obstructive jaundice (related to cholelithiasis, pancreatic tumour)⁽¹⁷⁾
- Other causes of viral hepatitis (e.g., infectious mononucleosis and cytomegalovirus (CMV))⁽¹⁷⁾

COMPLICATIONS

- Cirrhosis⁽³⁾
- Decompensated liver disease with or without hepatic encephalopathy⁽³⁾. For more information, see *Hepatic Encephalopathy* in *Appendix, Section A* of this guideline.
- Hepatocellular carcinoma⁽³⁾
- Fulminant hepatitis (rare)⁽³⁾ (for more information on this condition, see *Fulminant Hepatitis* in *Appendix, Section A* of this guideline).

Note: HAV is usually a self-limiting disease, with a low rate of complications.⁽³⁾

Clients presenting with signs of fulminant hepatitis are at risk for severe decompensation and require medical evacuation.

DIAGNOSTIC TESTS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Diagnostic test selection is based on client history, risk factors, physical examination findings and test availability.

Laboratory

Testing should be carried out as per provincial/territorial policies and procedures. The tests below are for consideration.

- Liver studies (e.g., albumin, alkaline phosphatase (ALP), ALT, AST, bilirubin, GGT)⁽¹⁷⁾
- Albumin⁽¹⁷⁾
- INR, PT,⁽¹⁷⁾ aPTT
- Blood glucose
- Urinalysis (to determine if positive for bilirubin)⁽³⁾
- Hepatitis serology⁽³⁾ (for more information on hepatitis screening and interpretation of laboratory tests, see *Table 2, Serologic features of viral hepatitis* in *Appendix, Section A* of this guideline).
- HIV

MANAGEMENT

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

GOALS OF TREATMENT

- Provide supportive care
- Prevent spread of infection⁽²⁾
- Minimize liver damage and reduce mortality⁽²⁾

NON-PHARMACOLOGICAL INTERVENTIONS

Interventions for Acute Hepatitis A, B and C⁽³⁾

Supportive care is appropriate for clients who are symptomatic with acute hepatitis. Supportive care consists of:

- Adequate fluid intake with rehydration if clinically appropriate
- Healthy diet with no dietary restriction
- Activity as tolerated

Client Education For Clients with HAV

Interventions to minimize infection spread:⁽⁴⁾

- Stringent hand-washing
- Sanitary disposal of feces
- Avoid alcohol with appropriate support.
- Client with HAV should be excluded from school, work or daycare until a week after jaundice resolves.⁽¹⁹⁾
- Client with HAV should not prepare food until a full week after jaundice resolves.
- In the event of school exposure, mass vaccination is not recommended.

For Clients with HBV and HCV

- Inform all healthcare providers of viral status (e.g., HBV positive).⁽²⁾
- Do not donate organs,⁽²⁾ tissue, blood or semen.⁽¹⁸⁾
- Do not share personal hygiene materials, recreational drug equipment or needles.^(2; 22)
- Clean up blood spills with diluted bleach and water (1 part bleach to 9 parts water).⁽¹⁴⁾
- Reduce and avoid hepatotoxic medications.⁽¹⁴⁾
- Avoid alcohol with appropriate support.⁽²⁾
- Recommend smoking cessation program if available.^(2; 14)
- Ensure all susceptible close contacts are vaccinated (HBV only).⁽¹⁴⁾
- Use condoms during sexual activities until partners are immune (HBV only).⁽¹⁴⁾

- Advise client and parent(s)/caregiver(s) that the client (pediatric) should not receive any acetylsalicylic acid (ASA) or products that contain ASA. Taking ASA increases the risk of getting Reye’s syndrome which can damage the liver and brain.
- Counsel client and parent(s)/caregiver(s) about appropriate use of medications, dose, frequency, importance of adherence, potential side effects and interactions.

PHARMACOLOGICAL INTERVENTIONS

In addition to consulting a physician/nurse practitioner, review the drug monograph, the FNIHB Nursing Station Formulary or provincial/territorial formulary before initiating treatment.

Acute Hepatitis

By definition, acute viral hepatitis is a systemic viral infection that has been present for less than 6 months (often less than 6 weeks), causing inflammation of the liver.⁽²⁰⁾ In most cases of acute viral hepatitis, specific antiviral therapy is not recommended. Since clinical presentations are the same for all types of acute viral hepatitis until confirmed by serologic testing, it is important to provide appropriate supportive care.

IV Therapy

If the client is dehydrated, initiate an IV line and run IV fluid (e.g., 0.9% sodium chloride), at a rate sufficient to maintain hydration, as necessary. For the adult client, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 5 – Gastrointestinal System*. For the pediatric client, see *FNIHB Pediatric and Adolescent Care Clinical Practice Guidelines – Chapter 4 – Fluid Management*.

Other Supportive Therapies⁽²⁰⁾

- If required, use the following pharmacological interventions with caution and consult with physician/nurse practitioner: acetaminophen, anti-inflammatory agents such as ibuprofen, and/or anti-emetic such as dimenhydrinate (Gravol) or ondansetron.

- Vitamin K and/or lactulose may be required to manage coagulopathy and hepatic encephalopathy, respectively, as required.
- Review all of the client’s medications, including herbal products, with a physician/nurse practitioner/pharmacist to consider stopping medications that are hepatotoxic (e.g., oral contraceptive).
- Provide appropriate supportive treatment to clients with history of chronic alcohol use to avoid alcohol withdrawal.

Chronic Hepatitis

Antiviral treatment is recommended for some clients with chronic hepatitis B, and all clients with chronic hepatitis C. Treatment is complex and routinely prescribed by a specialist, yet in some provinces/territories, it may be initiated and/or prescribed by an alternate physician/nurse practitioner. Antiviral medications may be accessed for clients through the Non-Insured Health Benefit (NIHB) Program.

Chronic Hepatitis B⁽²⁰⁾

- For clients with chronic hepatitis B, antiviral treatment may be either with an injection (peginterferon alfa-2a), or an oral antiviral (tenofovir, entecavir), depending on the client-specific characteristics, the results of hepatitis B virus serum markers, and the client’s co-morbidities.
- The duration of treatment with peginterferon alfa-2a injection is finite with weekly injection for 48 weeks; whereas the optimal duration of therapy for the oral drugs is not well-established. Most patients receiving oral antiviral therapy will require at least 4 to 5 years of treatment, and some may require indefinite treatment (e.g., in the presence of advanced liver fibrosis).
- Clients on peginterferon alfa-2a injection may experience numerous side effects, such as depression, severe cytopenias and anemia; thus close monitoring is recommended.

For more information on side effects and contraindications of antiviral treatment, see the most up-to-date *Compendium of Pharmaceuticals and Specialties* (CPS), manufacturer drug monograph, or other approved drug information systems.

Chronic Hepatitis C

- It is recommended that all clients with chronic hepatitis C are considered for antiviral therapy, especially those with advanced liver fibrosis and extrahepatic manifestations (i.e., vasculitis, glomerulonephritis) regardless of liver disease severity.⁽¹⁵⁾
- Dual therapy with peginterferon and ribavirin is no longer the standard of care.⁽¹⁵⁾
- New oral antiviral medications are recommended as first-line therapy because of the significantly improved efficacy, tolerability, ease of administration and shortened duration of treatment (8 to 12 weeks).⁽¹⁵⁾
- New oral antivirals are known as direct-acting-antiviral agents (DAAs), where they interfere directly in replication processes of the hepatitis C virus, and are classified as polymerase inhibitors (-buvir), replication complex inhibitors (-asvir), and protease inhibitors (-previr).⁽²¹⁾ An example of a common oral combination treatment is sofosbuvir (400mg)/ledipasvir (90mg) (Harvoni[®]).
- For more information on management of hepatitis C and their side effects, refer to: <http://www.catie.ca/en/treatment/hepatitis-c/#guidelines>
- The potential for drug interactions must be reviewed prior to starting DAA therapy. Some drug interactions with DAAs may be serious. For example, sofosbuvir and amiodarone can lead to significant symptomatic bradycardia. To access information on drug interactions with antiviral medications, refer to: <http://www.hep-druginteractions.org/>

Other Supportive Therapies (for chronic hepatitis B or C)

- If required, use the following pharmacological interventions with caution and consult with physician/nurse practitioner: acetaminophen, anti-inflammatory agents such as ibuprofen, and/or anti-emetics such as dimenhydrinate (Gravol) or ondansetron.

- Lactulose may be used to prevent the recurrence of hepatic encephalopathy (30 to 60 mL in 2 to 3 divided doses so that the client passes 2 to 3 soft stools per day).⁽²¹⁾

Active and Passive Immunization

Vaccines are available for HAV and HBV, but not for HCV.⁽²⁾

- Hepatitis A:
 - HAV vaccine is recommended for pre-exposure immunization of individuals 6 months of age and older at increased risk of infection or severe hepatitis A.
 - For adult clients and children older than 6 months who are exposed to an infectious case of HAV, HAV vaccine should be administered as soon as possible (preferably within 14 days of last exposure).⁽¹³⁾
 - For children younger than 6 months or if HAV vaccine is contraindicated or unavailable, immune globulin (Ig) is recommended for post-exposure prophylaxis to HAV (administered up to 14 days after last exposure).
 - For immunocompromised individuals, those with chronic liver disease and susceptible adults 60 years of age and older, both Ig and HAV vaccine should be considered for post-exposure prophylaxis.⁽¹³⁾
 - Clients with HBV should be vaccinated against HAV if not immune.⁽²⁾
- Hepatitis B:
 - Consult provincial/territorial immunization guidelines for HBV routine immunization schedule.
 - Post-exposure HBV vaccination and hepatitis B immune globulin (HBIg) should be given to infants born to HBV-positive mothers.⁽²²⁾
 - HBIg provides immediate, short-term passive immunity against HBV.⁽²⁾ Immune globulin may be indicated in clients with acute exposure, or who are at higher risk of contracting the virus.

- Clients with HCV should be vaccinated against HAV and HBV if not immune.⁽²⁾
- To access standard immune globulin (for Hepatitis A) and Hepatitis B immune globulin (HBIg), follow provincial/territorial policy and procedures as necessary.

For additional information, contact the immunization coordinator and/or see the *Canadian Immunization Guide – Part 4 – Active Vaccines*, available from: <https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines.html>

MONITORING AND FOLLOW-UP

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

MONITORING

- Monitor vital signs, ABCs, as indicated by client's condition.
- Monitor for deterioration or change in neurological status, cognitive status or alertness.
- If administering an agent with risk of anaphylaxis, monitor the client closely for 30 minutes.

FOLLOW-UP

Acute Hepatitis

HAV

- Follow-up as clinically indicated. HAV is typically a self-limiting illness with complete recovery.

HBV and HCV

- Follow up for acute hepatitis B and C is variable depending on clinical presentation. The following tests are generally recommended. Consultation with nurse practitioner or physician is recommended for guidance.
- Liver studies should be monitored until normalized.⁽²⁾
- For clients with acute HBV, HBsAg should be repeated at 6 months to determine if infection has resolved.⁽³⁾
- For clients with acute HCV, HCV RNA should be monitored regularly.⁽³⁾

Chronic Hepatitis (HBV and HCV)

- Follow-up for chronic HBV and HCV will be determined by specialist.
- Liver studies should be monitored periodically.
- Clients on antiviral therapy require scheduled laboratory tests (for more information, see *Lab Investigations for Clients on Anti-viral Therapy* in *Appendix, Section A* of this guideline).
- Smoking cessation is recommended to decrease the risk of liver cancer in clients with hepatitis. If client smokes, assess tobacco use status at each visit, and offer smoking cessation support as smoking cessation products are open-benefit through FNIHB program (for more information, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 15 – Mental Health – Nicotine Dependence*).
- Alcohol avoidance is recommended to decrease progression of liver disease and liver cancer and to reduce associated mortality in clients with hepatitis.⁽¹⁴⁾

Referral

- Arrange for medical evacuation if clinically indicated, particularly if client presents with decompensation/ hepatic encephalopathy.
- Coordinate referral request(s) as required:⁽¹⁴⁾
 - HBV and HCV cases are usually seen by Infectious Disease or other specialists, e.g., Internal Medicine, hepatology.⁽²⁾
 - For clients using interferon who experience suicidal symptoms or depression, consult physician/nurse practitioner and consider mental health referral.
 - Provincial/territorial resources for urgent referral if deteriorating clinical status/ signs of complications and/or chronic hepatitis management.

Reporting

- Follow provincial/territorial policies and procedures for notifiable diseases.
- Conduct contact tracing, with screening and vaccination as clinically appropriate.

APPENDIX**SECTION A: SUPPLEMENTAL CLINICAL MANAGEMENT INFORMATION**

TABLE 2
Serologic Features Of Viral Hepatitis⁽³⁾

VIRUS	SEROLOGIC MARKER	INTERPRETATION
A	IgM anti-HAV	Current or recent infection ⁽¹⁴⁾
	IgG anti-HAV	Remote infection and immunity
B*	Anti-HBs	Immunity due to natural infection or vaccination
	HBsAg	Acute or chronic disease
	HBeAg	Active replication and at increased risk of transmission of HBV
	IgM anti-HBcAg	Acute disease
	Total Anti-HBcAg (IgM and IgG)	Acute or chronic disease
	HBsAg positive	Acute or chronic disease
	HBsAg negative	Not infected
C	Anti-HCV test	Acute, chronic or unresolved disease
	HCV RNA	

*Additional information on interpretation of HBV serologic markers:⁽²⁾

- Persistence of HBsAg beyond 6 months is likely in chronic HBV infection
- If IgM anti-HBcAg is absent (HBcAg), it excludes acute HBV. A positive HBcAg does not provide sufficient distinction between acute disease and a flare-up of existing hepatitis.
- HbeAg correlates with a high level of active viral replication

Lab Investigations for Clients on Anti-viral Therapy

Laboratory investigations for clients on anti-viral therapy should be done periodically to provide information on response to treatment and any adverse effects of medications.

HBV

The frequency of monitoring is individualized according to client clinical status, complexity, and response to therapy.⁽²³⁾

- HBV DNA⁽²⁾
- CBC,⁽²³⁾ INR⁽²⁾
- Liver studies (e.g., albumin, alkaline phosphatase (ALP), ALT, AST, bilirubin, and GGT)⁽²⁶⁾
- Creatinine⁽²⁷⁾

HCV⁽³⁾

- HCV viral load
- CBC, INR
- Liver function tests (e.g., albumin,⁽¹⁵⁾ alkaline phosphatase (ALP), ALT, AST, bilirubin, and GGT)
- Creatinine

Fulminant Hepatitis

Clients presenting with signs of fulminant hepatitis are at risk for severe decompensation and require medical evacuation.

Fulminant hepatitis, also referred to as acute liver failure, describes a rare and severe presentation of acute viral hepatitis. Fulminant hepatitis and its related liver damage results in coagulopathy and encephalopathy. If untreated, the prognosis of fulminant hepatitis is poor. Clients require urgent consultation and will likely require medical evacuation.

- Cardinal signs of fulminant hepatitis are hepatic encephalopathy and prolonged bleeding time.⁽²⁴⁾
- Other clinical signs may include:
 - RUQ tenderness
 - Hepatomegaly
 - Jaundice

Hepatic Encephalopathy⁽²⁵⁾

Hepatic encephalopathy is a term used to describe a range of brain dysfunctions related to liver dysfunction. Symptoms may be either acute or chronic. It presents with a range of cognitive, neurologic or muscular findings that range from memory issues to significant impairment, including progression to coma if untreated.⁽²⁵⁾ Findings may include:

- Cognitive changes:
 - Reduced level of consciousness
 - Sleep pattern inversion
 - Slow response time
 - Lethargy
 - Disorientation
 - Somnolence
 - Confusion
 - Semi-stupor
 - Coma
- Intellectual function changes:
 - Subtle impairments with numerical computation
 - Decreased attention span
 - Gross impairment
 - Disorientation
 - Loss of self
 - Minimal intellectual function
- Behaviour/personality changes:
 - Exaggerated behaviour
 - Depression or euphoria
 - Talkativeness
 - Irritability
 - Lowered inhibitions
 - Inappropriate or atypical behaviour
 - Bizarre behaviour
 - Paranoia or anger
 - Rage
 - Flat personality and behaviour
- Neurologic/coordination changes:
 - Tremor
 - Incoordination
 - Asterixis (liver flap)
 - Inability to handwrite
 - Speech slurring
 - Ataxia
 - Abnormal reflexes
 - Nystagmus
 - Rigidity

- Dilated pupils
- Coma

Antiviral Therapy Side Effects

Note: Antiviral treatment using interferon and ribavirin require close monitoring as there is a risk of suicide and depression.

Clients on antiviral therapy report flu-like side effects and significant mental health alterations (including suicidal ideation and depression); frequent monitoring is recommended.⁽¹⁵⁾

- Antiviral side effects may include:
 - Dose-dependent renal toxicity, with modifications required for renal dysfunction⁽²⁶⁾
 - Depression (one of the most common side effects)⁽¹⁵⁾
 - Suicide (clients are at highest risk during the first 12 weeks of therapy)

Prevention

- Vaccination and risk behaviour modification may decrease the risk of acquiring and spreading viral hepatitis.⁽¹⁸⁾
- Prophylactic vaccination for HAV and HBV
- Avoid exposure to blood; practice safer sex, avoid sharing personal items
- Universal precautions for blood and body fluids should be observed
- Household surfaces contaminated by blood from a person infected with hepatitis require cleaning using gloves and a diluted bleach solution (1 part bleach to 9 parts water).

SECTION B: SUPPLEMENTAL RESOURCES

Other Resources

For additional information on immunization for HAV or HBV, see the Canadian Immunization Guide at <https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines.html>

For additional information on prevention of hepatitis C, see *Prevention of hepatitis C* at <https://www.canada.ca/en/public-health/services/diseases/hepatitis-c/prevention-hepatitis-c.html>

BIBLIOGRAPHY

The following references and other sources have informed the updating of this Clinical Practice Guideline.

REFERENCES

1. Public Health Agency of Canada. Hepatitis. [Internet] Ottawa, ON: Public Health Agency of Canada;2015. Available from <https://www.canada.ca/en/public-health/services/infectious-diseases/hepatitis.html>
2. Canadian Pharmacists Association. Compendium of Therapeutic Choices: Canada's Trusted Reference for Primary Care Therapeutics (CTC 7). Ottawa: Canadian Pharmacists Association; c2014.
3. Mauss S, Berg T, Rockstrok J, Sarrazin C, Wedemeyer H. Hepatology. A Clinical Textbook. 6th. Ed. [Internet] New York, NY: Flying Publisher; 2016. Available from: <http://www.HepatologyTextbook.com>
4. Lai M, Chopra S. Overview of hepatitis A virus in adults. [Internet] Waltham, MA (US): Uptodate; 2016. Available from: <http://www.uptodate.com> with authorized username and password.
5. Jonas MM, Block JM, Haber BA, Karpen SJ, London WT, Murray KF, et al. Treatment of Children With Chronic Hepatitis B Virus Infection in the United States: Patient Selection and Therapeutic Options. Meeting Report. In: Hepatology. [Internet] Alexandria, VA (US): American Association for the Study of Liver Diseases. 2010 December; 52(6) p. 2192 - 2205. Available from: <http://www.hepb.org/assets/Uploads/Jonas-2010-Treatment-of-children-w-chronic-HBV.pdf>. doi:10.1002/hep.23934

6. Broderick MB, Jonas MM. Overview of hepatitis B virus infection in children and adolescents. [Internet] Waltham, MA (US): UptoDate; 2016. Available from: <http://www.uptodate.com> with authorized username and password.
7. Lok, ASF. Clinical manifestations and natural history of hepatitis B virus infection. [Internet] Waltham, MA (US): UptoDate; 2015. Available from: <http://www.uptodate.com> with authorized username and password.
8. Chopra S. Clinical manifestations and natural history of chronic hepatitis C virus infection. [Internet] Waltham, MA (US): UptoDate; 2015. Available from: <http://www.uptodate.com> with authorized username and password.
9. Negro F, Lok AS. Pathogenesis, epidemiology, natural history and clinical manifestations of hepatitis D virus infection. [Internet] Waltham, MA (US): UptoDate; 2014. Available from: <http://www.uptodate.com> with authorized username and password.
10. Umashanker R, Chopra S. Hepatitis E Virus Infection. [Internet] Waltham, MA (US): UptoDate; 2016. Available from: <http://www.uptodate.com> with authorized username and password.
11. Public Health Agency of Canada. Pathogen Safety Data Sheet: Hepatitis E Virus. [Internet] Ottawa, ON: Public Health Agency of Canada; 2010. Available from: <http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/hepe-eng.php>
12. Centers for Disease Control and Prevention (US). The ABCs of Hepatitis. [Internet] Atlanta, GA: Centers for Disease Control and Prevention; 2016. Available from: <https://www.cdc.gov/hepatitis/resources/professionals/pdfs/abctable.pdf>
13. Public Health Agency of Canada. Canadian Immunization Guide – Part 4 – Active vaccines: Hepatitis A vaccine. [Internet] Ottawa, ON: Public Health Agency of Canada; 2016. Available from: <https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-6-hepatitis-a-vaccine.html>
14. Public Health Agency of Canada. Primary Care Management of Hepatitis B – Quick Reference. [Internet] Ottawa, ON: Public Health Agency of Canada; 2014. Available from: <http://www.phac-aspc.gc.ca/publicat/hep/hbv-vhb/index-eng.php>
15. Myers RP, Shah H, Burak KW, Cooper C, Feld JJ. An update on the management of chronic hepatitis C: 2015 consensus guidelines from the Canadian Association for the Study of the Liver. *Can J Gastroenterol Hepatol.* 2015 Jan-Feb; 29(1):19-34
16. Ha, S., Totten, S., Pogany, L. Wu, J. & Gale-Rove, M. Hepatitis C in Canada and the importance of risk-based screening. [Internet] Ottawa, ON: Public Health Agency of Canada; 2016. Available from: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/16vol42/dr-rm42-3/ar-02-eng.php>
17. Friedman LS. Approach to patient with abnormal liver biochemical and function tests. [Internet] Waltham, MA (US): UptoDate; 2015. Available from: <http://www.uptodate.com> with authorized username and password.
18. Infectious Disease Society of America (IDSA). HCV Guidance: Recommendations for Testing, Managing, and Treating Hepatitis C. Infectious Disease Society of America (IDSA). [Internet] 2016 [cited 2016 March 4]. Available from: <https://www.hcvguidelines.org/>

19. Quiros-Tejeira, RE. Overview of hepatitis A virus infection in children. [Internet] Waltham, MA (US): UptoDate; 2016. Available from: <http://www.uptodate.com> with authorized username and password.
20. Kevork M, Peltekian MD, Hirsch G. Viral Hepatitis. In: Jovaisas B, Arman L, Dandachi F, Hutsul J, Lewis G, Pearson NL, Raghuvver A, editors. *Compendium of Therapeutic Choices*. 7th edition. Ottawa, ON: Canadian Pharmacists Association; c2014. p. 807-825.
21. Pockros PJ. Direct-acting antivirals for the treatment of hepatitis C virus infection. [Internet] Waltham, MA (US): UptoDate; 2016. [cited 2016 Jan 1] Available from: <http://www.uptodate.com> with authorized username and password.
22. Public Health Agency of Canada. Canadian Immunization Guide – Part 4 – Active vaccines: Hepatitis B vaccine. [Internet] Ottawa, ON: Public Health Agency of Canada; 2016. Available from: <https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines.html>
23. National institute for Health and Care Excellence. Hepatitis B. [Internet] London (GB): National institute for Health and Care Excellence; 2014. Available from: <https://www.nice.org.uk/guidance/qs65>
24. Lee W, Larson A, Stravitz R. AASLD position paper: the management of acute liver failure: Update. [Internet] Alexandria, VA (US): American Association for the Study of Liver Diseases; 2011. [cited 2015 May 20]. p. 1-88. Available from https://www.aasld.org/sites/default/files/guideline_documents/alfenhanced.pdf
25. Vilstrup H, Amodio P, Cordoba J, Perenci P, Mullen KD, Weissenborn K, et al. AASLD Practice Guideline - Hepatic Encephalopathy in Chronic Liver Disease: 2014 Practice Guideline. *Hepatology*. [Internet] Alexandria, VA (US): American Association for the Study of Liver Diseases; 2010 December. 60(2), 715–735. Available from: https://www.aasld.org/sites/default/files/guideline_documents/hepaticencephenanced.pdf
26. Fung J, Seto WK, Yuen MF. Extrahepatic effects of nucleoside and nucleotide analogues in chronic hepatitis B treatment. *J Gastroenterol Hepatol*. 2014 Mar. 29(3):428-34. doi: 10.1111/jgh.12499.
27. Coffin CS, Fung SK, Ma MM. Management of chronic hepatitis B: Canadian Association for the Study of the Liver consensus guidelines. *Can J Gastroenterol*. 2012 Dec. 26(12): 917–938.

OTHER SOURCES

Canadian Pharmacists Association. *Compendium of Therapeutic Choices: Canada's Trusted Reference for Primary Care Therapeutics (CTC 7)*. Ottawa: Canadian Pharmacists Association; c2014.

Health Canada. First Nations and Inuit Health Branch (FNIHB) Nursing Station Formulary and Drug Classification System. 2016 April.

VULVOVAGINITIS (CANDIDIASIS, TRICHOMONAS AND BACTERIAL VAGINOSIS)

OVERVIEW

Please refer to provincial/territorial guidelines for Vulvovaginitis (Candidiasis, Trichomonas and Bacterial Vaginosis) where available.

Vulvovaginitis is an infection and/or inflammation of the vagina, vulva and/or abnormal vaginal discharge.⁽¹⁾ This clinical practice guideline is for use with the adolescent or adult female with signs and symptoms of vulvovaginitis. For additional information on this content, see *Canadian Guidelines on Sexually Transmitted Infections – Section 4 – Management and Treatment of Specific Syndromes*, available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-4-8-eng.php>

CAUSES

Bacterial vaginosis (BV), Vulvovaginal candidiasis (VVC) and Trichomoniasis are the most common infections associated with abnormal vaginal discharge.⁽¹⁾

Bacterial Vaginosis^(1; 2)

- BV is a polymicrobial clinical syndrome wherein normal vaginal flora are replaced with anaerobic bacteria.
- Typical microbiologic findings of vaginal specimens show increased concentrations of *Gardnerella vaginalis*, *Mycoplasma hominis*, *Prevotella* species, *Mobiluncus* species, and *Ureaplasma species*.

Vulvovaginal Candidiasis^(1; 2)

90% of VVC is caused by *Candida albicans*; the remaining 10% is caused by various other species, including *Candida glabrata*.

Trichomoniasis^(2; 3)

- *Trichomonas vaginalis*, a protozoa, causes trichomoniasis and is the most common non-viral sexually transmitted infection (STI) globally.
- It commonly co-exists with other conditions, particularly with *Neisseria gonorrhoeae* (*N. gonorrhoeae*) and *Chlamydia trachomatis* (*C. trachomatis*) infections and BV.

TRANSMISSION

Trichomonas is considered a sexually transmitted infection, while BV and VVC are not usually considered sexually transmitted. For more information, see *Table 1: Sexual Transmission Risk Factors and Predisposing Risk Factors* in this guide.

ASSESSMENT

Medication review: Review current medications, including over-the-counter, complementary and alternative medicines, as well as any chemical or substance intake that may impact management.

Allergy history: Screen for medication, latex, environmental or other allergies and determine approximately when and what type of reaction occurred.

RISK FACTORS

TABLE 1

Sexual Transmission Risk Factors and Predisposing Risk Factors⁽¹⁾

	BACTERIAL VAGINOSIS	CANDIDIASIS	TRICHOMONAS
Sexual Transmission	- Not usually considered sexually transmitted	- Not usually considered sexually transmitted	- Sexually transmitted
Predisposing Factors	- Often absent - More common if sexually active - New sexual partner - Intrauterine device (IUD) use	- Often absent - More common if sexually active - Current or recent antibiotic use - Pregnancy - Corticosteroids - Poorly controlled diabetes - Immunocompromised	- Multiple partners

HISTORY OF PRESENT ILLNESS

Review risk factors and collect history of present illness. The severity of inflammation correlates with severity of symptoms. History findings do not allow for a definitive diagnosis since there is considerable overlap in symptoms among the different etiologies of vulvovaginitis. For more information, see *Table 2: Symptoms and Signs of Vulvovaginitis* in this guide.

The following may be reported by the client:⁽¹⁾

- Vaginal irritation, itching or burning
- May or may not have vaginal discharge
- Change in vaginal discharge or odour
- Vaginal bleeding or spotting

- Superficial dyspareunia (pain felt at entry/introitus)⁽⁴⁾
- Urinary symptoms (e.g., dysuria, frequency)

PHYSICAL FINDINGS

Perform a physical examination, including a speculum and bimanual examination, using the IPPA approach. Assess for signs and symptoms associated with vulvovaginitis (various causes) as presented in *Table 2: Symptoms and Signs of Vulvovaginitis* in this guide.

TABLE 2
Symptoms and Signs of Vulvovaginitis^(1; 5–7)

	BACTERIAL VAGINOSIS	CANDIDIASIS	TRICHOMONAS
Symptoms	<ul style="list-style-type: none"> - Vaginal discharge - Fishy odour - 50% asymptomatic 	<ul style="list-style-type: none"> - Vaginal discharge - Vaginal/vulvar pruritus - External dysuria - Superficial dyspareunia - Up to 20% asymptomatic 	<ul style="list-style-type: none"> - Vaginal discharge - Burning - Pruritus - Dyspareunia - Post-coital bleeding - Dysuria and frequency - Lower abdominal pain - 10-50% are asymptomatic
Signs	<ul style="list-style-type: none"> - Grey to white, thin, ‘fishy’ foul-smelling vaginal discharge; often copious amounts - Inflammation and erythema of vagina are unusual with Bacterial Vaginosis 	<ul style="list-style-type: none"> - White, clumpy, curdy discharge - Erythema and edema of vagina and vulva 	<ul style="list-style-type: none"> - Profuse amount of foul-smelling off-white/green/yellow, frothy discharge (occurs in 10 to 30% of symptomatic women) - Erythema of vagina and exocervix - ‘Strawberry cervix’ (hemorrhagic spots that bleed easily)

DIFFERENTIAL DIAGNOSIS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

- Concurrent STIs (e.g., gonorrhea, chlamydia, syphilis, HIV, hepatitis B⁽¹⁾ and genital herpes)⁽⁸⁾
- Cystitis⁽⁹⁾
- Excessive physiologic secretions
- Atrophic vaginitis⁽⁸⁾
- Foreign bodies^(6; 7)
- Cancer of the vagina, cervix, or endometrium⁽⁹⁾
- Vulvodynia (vulvar pain)^(8; 9)
- Irritant or allergic dermatitis⁽⁸⁾ (e.g., from latex, bubble baths, soap, perfume, fabric softeners, urine, feces)⁽⁹⁾
- Dermatological disorders (e.g., genital psoriasis, lichen planus, lichen sclerosus)⁽⁸⁾

COMPLICATIONS

Bacterial Vaginosis⁽²⁾

- Premature rupture of membranes
- Preterm labour
- Spontaneous abortion
- Chorioamnionitis
- Postpartum endometritis
- Subclinical pelvic inflammatory disease (PID)
- Increased risk of acquisition and transmission of HIV⁽¹⁾ and *N. gonorrhoeae*, *C. trachomatis*, Herpes Simplex Virus Type 2⁽¹⁰⁾
- PID and vaginal cuff cellulitis following invasive procedures (e.g., placement of an IUD, endometrial biopsy, uterine curettage)^(1; 2)
- Post-caesarean delivery wound infections

Vulvovaginal Candidiasis

- VVC is often recurrent and more severe in HIV-positive females and/or in women with diabetes⁽²⁾

Trichomoniasis

- An increased risk of HIV acquisition and transmission in women^(1; 2)
- Premature rupture of membranes^(10; 11)
- Preterm delivery⁽²⁾

DIAGNOSTIC TESTS

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

Diagnostic test selection is based on client history, risk factors, physical examination findings and test availability. Definitive diagnosis is based upon laboratory testing.

Laboratory

Testing should be carried out as per provincial/territorial policies and procedures. The tests in *Table 3: Diagnostic Features and Laboratory Diagnosis* of this guideline are for consideration. For point-of-care specimen collection guidelines, see *Table 4: Point-of-Care Specimen Collection* in *Appendix, Section A* of this guideline.

- Obtain a vaginal swab for Gram stain smear for diagnosis of BV, trichomoniasis and candidiasis.⁽¹⁾
- Point-of-care tests that may aid in diagnosis^(1; 12) include vaginal pH, wet mount and ‘whiff test,’ where available.

Additional Lab Investigations

- If cystitis is a consideration, collect a urine sample for culture and sensitivity (C+S).⁽⁸⁾
- If STI is a consideration, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter II – Communicable Diseases – Sexually Transmitted Infections*.
- If appropriate, offer testing for sexually transmitted and blood-borne infections (STBBI) based on client and partner’s risk factors; review immunization status in the case of hepatitis B.

TABLE 3
Diagnostic Features and Laboratory Diagnosis ^(1; 5–7; 12)

TEST	BACTERIAL VAGINOSIS	CANDIDIASIS	TRICHOMONAS
Vaginal pH	> 4.5	4.0 to 4.5	> 4.5
Saline wet mount	<ul style="list-style-type: none"> - Polymorphonuclear leukocytes (PMNs) - Clue cells (vaginal epithelial cells covered with numerous coccobacilli) 	<ul style="list-style-type: none"> - Budding yeast - Pseudohyphae 	<ul style="list-style-type: none"> - Motile flagellated protozoa (38–82% sensitivity)
Potassium hydroxide (KOH) wet mount and whiff test	<ul style="list-style-type: none"> - Whiff test: Positive amine (fishy) odour - KOH not appropriate for testing cells, PMNs for diagnosing BV* 	<ul style="list-style-type: none"> - Whiff test: negative - Budding yeast - Pseudohyphae 	<ul style="list-style-type: none"> - Whiff test: negative - KOH not appropriate for testing cells, PMNs for diagnosing Trichomonas*
Gram stain	<ul style="list-style-type: none"> - Clue cells - Decreased normal flora - Predominant Gram-negative curved bacilli and coccobacilli 	<ul style="list-style-type: none"> - PMNs - Budding yeast - Pseudohyphae 	<ul style="list-style-type: none"> - PMNs - Trichomonads

*While KOH destroys cellular debris and allows the clear detection of yeast cells and pseudohyphae (branching structure of a fungus), it also destroys the epithelial cells in the clue cells required to diagnose BV and lyses trichomonads. Therefore, saline is necessary for vaginitis.⁽¹⁾

MANAGEMENT

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

GOALS OF TREATMENT

- Cure infection, when possible
- Relieve symptoms⁽¹³⁾
- Prevent recurrence, when possible
- Decrease risk of acquisition of other STIs⁽¹³⁾
- Prevent complications

NON-PHARMACOLOGICAL INTERVENTIONS

Client Education

- Teach client to:
 - Perform proper perineal hygiene
 - Avoid scented soap, perfumed products and bubble baths
 - Take showers rather than baths
 - Avoid tightly fitting synthetic underwear
- Instruct clients being treated for Trichomoniasis to:
 - Abstain from intercourse until client and partner have finished treatment and are asymptomatic
- Instruct client with male partner with candidal balanitis to:
 - Abstain from intercourse until client and partner have completed treatment and both are asymptomatic.
- Counsel client that oil-based ovules and creams (e.g., clotrimazole) may cause latex condoms or diaphragms to fail.⁽¹⁾
- Counsel client about appropriate use of medications; dose, frequency, importance of adherence, potential side effects and interactions; counsel client to complete the full course of antibiotics to help prevent resistance.
- If metronidazole is ordered, advise client to avoid alcohol during, and for 48 hours after completion of treatment.

For more information on client education, see *Prevention in Appendix, Section A* of this guideline.

PHARMACOLOGICAL INTERVENTIONS

In addition to consulting a physician/nurse practitioner, review the drug monograph, the FNIHB Nursing Station Formulary or provincial/territorial formulary before initiating treatment.

Unless treating presumptively for syndromic management, consider management choices based on site of infection and available lab results.⁽¹⁴⁾ Results of microbiologic testing are not immediately available in most nursing stations.

- When particular symptoms and signs are present, a syndromic diagnosis may be made and treatment and post-test counselling provided.
- STI syndromes include chlamydia, gonorrhoea, genital herpes, trichomoniasis, PID, cervicitis, non-gonococcal urethritis, genital ulcer disease and syphilis.⁽¹⁵⁾

Suspected Co-existing STI

- For the client presenting with vaginal discharge who has a suspected or confirmed gonococcal and/or chlamydial infection, see *FNIHB Adult Care Clinical Practice Guidelines – Chapter 11 – Communicable Diseases – Sexually Transmitted Infections*.

Asymptomatic Bacterial Vaginosis⁽¹⁾

- Asymptomatic BV requires treatment only in the following cases:
 - High-risk pregnancy (history of preterm delivery)
 - Prior to IUD insertion, gynecologic surgery, therapeutic abortion or upper genitourinary (GU) tract instrumentation

Symptomatic Bacterial Vaginosis⁽¹⁾**Preferred Treatment**

- Metronidazole 500 mg PO BID for 7 days

Alternate Treatment

Higher failure rates have been reported with single dose metronidazole.⁽¹⁶⁾

- Metronidazole 2 g PO for 1 dose,

or

- Clindamycin 300 mg PO BID for 7 days

Treatment of Recurrent Bacterial Vaginosis⁽¹⁾ The definition for recurrent BV is 3 or more epi-sodes of BV in a 12 month period.⁽¹⁷⁾ Recurrence occurs in 15 to 30% of clients within the first 1 to 3 months after treatment.

- If recurrence is suspected, reconfirm diagnosis
- Metronidazole 500 mg PO BID for 10 to 14 days may be ordered.

Note: Consultation with the physician/nurse practitioner is required and discussion should occur regarding treatment choices.

Uncomplicated Vulvovaginal Candidiasis

- Asymptomatic VVC does not require treatment.
- For symptomatic, uncomplicated VVC, consider one of the following:

Clotrimazole

- Clotrimazole 1% cream :
 - Apply intravaginally daily at bedtime for 6 days.
- Clotrimazole 2% vaginal tablet (3-day combination pack):
 - Insert 1 tablet intravaginally daily at bedtime for 3 consecutive days;

and

- Apply external vaginal cream topically daily or BID PRN for up to 7 days

Fluconazole

- Fluconazole 150 mg PO for 1 dose (contraindicated in pregnancy)

Complicated Vulvovaginal Candidiasis

For more information on vulvovaginal candidiasis, see *Canadian Guidelines on Sexually Transmitted Infections – Section 4 – Management and Treatment of Specific Syndromes - Vaginal Discharge (Bacterial Vaginosis, Vulvovaginal Candidiasis, Trichomoniasis)*, available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgs-ti-ldcits/section-4-8-eng.php>.

Note: Consultation with the physician/nurse practitioner is required and discussion should occur regarding treatment choices and possible referrals.

Complicated VVC is defined as any the following:⁽¹⁾

- Recurrent VVC (i.e., 4 or more episodes of VVC within a 12-month period)
- Severe VVC (i.e., extensive vulvar erythema, edema, excoriation or fissure formation)
- VVC with a non-albicans species
- VVC occurring in an immunocompromised host (e.g., client on corticosteroids, uncontrolled diabetes)

Recurrent Vulvovaginitis Candidiasis⁽¹⁾

- Conventional antimycotic agents are not as effective against non-albicans species. Therefore, consider culture and sensitivity of yeast for these clients.
- For clients with diabetes, improving blood glucose control can reduce the recurrence of vulvovaginitis candidiasis.
- For recurrent infection due to *Candida albicans*, physician/nurse practitioner may consider ordering fluconazole 150 mg PO every 72 hours for 3 doses, then weekly for 6 months.^(1; 10; 16)

Severe Vulvovaginitis Candidiasis⁽¹⁾

Physician/nurse practitioner may consider ordering fluconazole 150 mg PO every 72 hours for 2 doses or a topical azole (e.g., clotrimazole).

Non-albicans Vulvovaginitis Candidiasis⁽¹⁾

Immunocompromised hosts and women with diabetes are more susceptible. For treatment, see the *Canadian Guidelines on Sexually Transmitted Infections: Section 4, Management and Treatment of Specific Syndromes; Vaginal Discharge (Bacterial Vaginosis, Vulvovaginal Candidiasis, Trichomoniasis)* – Table 8: Treatment of non-albicans vulvovaginal candidiasis, available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-4-8-eng.php>

Trichomonas Vaginalis**Metronidazole**

- Metronidazole 2 g PO for 1 dose now (preferred)

or

- Metronidazole 500 mg PO BID for 7 days

Treatment of Sexual Partner

Treat sexual partner(s) with metronidazole 2 g PO for one dose. Follow provincial/territorial policies and procedures or guidelines for follow-up with sexual partner(s).

MONITORING AND FOLLOW-UP

Consult physician/nurse practitioner when practice is outside legislated scope and without authorized delegation.

MONITORING

If administering an agent with risk of anaphylaxis, monitor the client closely for 30 minutes.

FOLLOW-UP

- Ensure client knows to return to clinic if fever, chills or pain develop.
- Counsel client to return for further assessment if no improvement in signs and symptoms of presenting condition following treatment.

Bacterial Vaginosis⁽¹⁾

- No follow-up is necessary unless the client is pregnant or symptoms recur.
- Treatment of sexual partner is not indicated and does not prevent recurrence.
- If client is pregnant, testing should be repeated after 1 month to ensure that therapy was effective.

Vulvovaginal Candidiasis⁽¹⁾

- No follow-up necessary for VVC unless symptoms persist or recur
- If VVC is not responding to appropriate therapy, or if infection recurs, consider culture and sensitivity of yeast.
- If VVC is recurrent, check blood glucose.
- Routine screening and treatment of male partners is not indicated. However, male partner should be treated if Candida balanitis is present.⁽¹⁾
- For oral contraceptive pill (OCP) users with frequent infections, the OCP may be a contributing factor.

Trichomonas⁽¹⁾

- No follow-up necessary unless symptoms recur, usually due to reinfection
- Treatment of sexual partner is indicated.

Reporting

- BV is not a reportable disease.
- VVC is not a reportable disease.
- Trichomoniasis is reportable in some provinces/territories.

APPENDIX

SECTION A: SUPPLEMENTAL CLINICAL MANAGEMENT INFORMATION

TABLE 4

Point-of-Care Specimen Collection^(1; 12)

TEST	PROCEDURE	NORMAL RESULT
Vaginal pH	<ul style="list-style-type: none"> - Apply a narrow range pH test paper (4.0 to 5.5) for a few seconds to the vaginal sidewall. or - Swab vaginal sidewall with a dry swab and roll swab onto the pH paper.⁽¹⁵⁾ 	4.0 to 4.5
Saline wet mount	<ol style="list-style-type: none"> 1. Place a drop of vaginal discharge on a slide. 2. Mix with a drop of normal saline (0.9%). 3. Apply a cover slip. 4. Examine under microscope at low and high power. <p>Examine for:</p> <ul style="list-style-type: none"> - polymorphonuclear leukocytes (PMNs) - clue cells (vaginal epithelial cells covered with numerous coccobacilli) - lactobacilli - yeast - trichomonads <p>Note: a negative wet mount does not rule out an infectious cause of vaginitis.</p>	Epithelia cells and rare white blood cells
KOH wet mount and whiff test	<ol style="list-style-type: none"> 1. Place a drop of vaginal discharge on a slide. 2. Mix with a drop of 10% KOH. <ul style="list-style-type: none"> • An amine (fishy) odour after applying the KOH is a positive test. 3. Apply a cover slip. 4. Examine under a microscope at low and high power. 5. Examine for yeast. 	Negative

While KOH destroys cellular debris and allows yeast cells and pseudohyphae (branching structure of a fungus) to be more easily detected, it also destroys the epithelial cells in clue cells which are needed to diagnose BV and lyses trichomonads. Therefore, saline is necessary for vaginitis.⁽¹⁾

For interpretation of the point of care test(s), see *Table 3: Diagnostic Features and Laboratory Diagnosis* in this guide.

Prevention^(18; 19)

- Trichomoniasis is sexually transmitted and can be prevented by practicing safer sex.⁽²⁰⁾
- Rinse genitals with water and/or pat dry after toileting.
- Avoid use of baby wipes or scented toilet paper.
- Avoid tight and restrictive clothing; cotton underwear is preferred.
- Avoid douching which can upset the normal healthy balance of bacteria in the vagina and can flush harmful bacteria into the upper genital tracts (uterus, fallopian tubes).
- Use condoms consistently.
- Limit the number of sexual partners; women with multiple sex partners have a higher risk of developing BV and STIs.

- Bacterial vaginosis may be passed between women during sexual contact.
- Bacterial vaginosis is generally not considered an STI, but if you are exposed to an STI while you have bacterial vaginosis, you are more likely to develop the STI.

BIBLIOGRAPHY

The following references and other sources have informed the updating of this Clinical Practice Guideline.

REFERENCES

1. Public Health Agency of Canada. Canadian guidelines on sexually transmitted infections. Section 4: Management and treatment of specific syndromes vaginal discharge (bacterial vaginosis, vulvovaginal candidiasis, trichomoniasis). [Internet] Ottawa, ON: Public Health Agency of Canada; 2013. Available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-4-8-eng.php>
2. Van Schalkwyk J, Yudin MH, Infectious Disease Committee. Vulvovaginitis: Screening for and management of trichomoniasis, vulvovaginal candidiasis, and bacterial vaginosis. *J Obstet Gynaecol Can.* [Internet] Toronto, ON: Society of Obstetricians and Gynaecologists of Canada; 2015. 37(3), 266–274. Available from: [http://www.jogc.com/article/S1701-2163\(15\)30316-9/fulltext](http://www.jogc.com/article/S1701-2163(15)30316-9/fulltext)
3. American Academy of Pediatrics. Committee on Infectious Diseases. Trichomoniasis. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. *Red Book: 2015 Report of the Committee on Infectious Diseases*. 30th edition. [Internet] Elk Grove Village, IL: American Academy of Pediatrics; 2015. p. 798–800. Available from: <http://redbook.solutions.aap.org/> with authorized username and password.
4. Heim, LJ. Evaluation and differential diagnosis of dyspareunia. [Internet] Leawood, KS (US): American Academy of Family Physicians; 2001; 63(8), 1535–1544.
5. Sobel JD. Trichomoniasis. [Internet] Waltham, MA (US): UptoDate; 2016 [cited 2016 July 12]. Available from: <http://www.uptodate.com> with authorized username and password.
6. Sobel JD. Candida vulvovaginitis. [Internet] Waltham, MA (US): UptoDate; 2016 [cited 2015 July 12]. Available from: <http://www.uptodate.com> with authorized username and password.
7. Sobel JD. Bacterial vaginosis. [Internet] Waltham, MA (US): UptoDate; 2015 [cited 2016 July 12]. Available from: <http://www.uptodate.com> with authorized username and password.
8. Lamont J, Bajzak K, Bouchard C, Burnett M, Byers S, Cohen T. et al. Female sexual health consensus clinical guidelines. *J Obstet Gynaecol Can.* [Internet] Toronto, ON: Society of Obstetricians and Gynaecologists of Canada; 2012. 34(8), 769–75. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22947409> with payment.
9. Barad DH. Vaginal itching and discharge. *Merck Manual Professional Version*. [Internet] Whitehouse Station, NJ: Merck Sharp & Dohme Corp; 2015. Available from: <http://www.merckmanuals.com/professional>
10. Freiden TR, Jaffe HW, Cono J, Richards CL, Iademarco MF, Shaffner W. Sexually transmitted diseases treatment guidelines. *MMWR Recommendations and Reports*. Atlanta, GA: Centers for Disease Control and Prevention; 2015. Available from: <https://www.cdc.gov/std/tg2015/toc.htm>
11. Coleman JS, Gaydos CA, Witter F. Trichomonas vaginalis vaginitis in obstetrics and gynecology practice: New concepts and controversies. *Obstet Gynecol Surv.* 2013 Jan. 68(1):43-50. doi: 10.1097/OGX.0b013e318279fb7d
12. Sobel JD, Barbiera RL, Eckler K. Approach to women with symptoms of vaginitis. [Internet] Waltham, MA (US): UptoDate; 2015 [cited 2015 July 12]. Available from: <http://www.uptodate.com> with authorized username and password.

13. American Academy of Pediatrics. Committee on Infectious Diseases. Bacterial Vaginosis. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. Red Book: 2015 Report of the Committee on Infectious Diseases. 30th edition. [Internet] Elk Grove Village, IL: American Academy of Pediatrics; 2015. p. 273-275. Available from: <http://redbook.solutions.aap.org/> with authorized username and password.
14. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections. Section 5: Management and treatment of specific infections. Gonococcal Infections. [Internet] Ottawa, ON: Public Health Agency of Canada; 2013. Available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-5-6-eng.php>
15. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections. Section 2: Primary care and sexually transmitted infections. [Internet] Ottawa, ON: Public Health Agency of Canada; 2013. Available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-2-eng.php>
16. Canadian Pharmacists Association. Infectious diseases: Sexually transmitted infections. [Internet] Ottawa, ON: e-Therapeutics; 2015 [cited 2015 April 13]. Available from: <http://www.e-therapeutics.ca> with authorized username and password.
17. Canadian Pharmacists Association. Metronidazole. [Internet] Ottawa, ON: e-Therapeutics; 2015 [cited 2015 April 22]. Available from: <http://www.e-therapeutics.ca> with authorized username and password.
18. Sobel JD, Barbiera RL, Eckler K. Patient information: Bacterial vaginosis (Beyond the Basics). [Internet] Waltham, MA (US): UptoDate; 2015 [cited 2015 July 15]. Available from: <http://www.uptodate.com> with authorized username and password.
19. Sobel, JD. Patient information: Vaginal discharge in adult women. [Internet] Waltham, MA (US): UptoDate; 2015. [cited 2015 July 12]. Available from: <http://www.uptodate.com> with authorized username and password.
20. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections. Supplementary statement for recommendations related to the diagnosis, management, and follow-up of Vaginal Discharge: March 2014. [Internet] Ottawa, ON: Public Health Agency of Canada; 2014. [cited 2015 April 2]. Available from: <https://www.canada.ca/en/public-health/services/infectious-diseases/sexual-health-sexually-transmitted-infections/canadian-guidelines/sexually-transmitted-infections/canadian-guidelines-sexually-transmitted-infections-8.html>

OTHER SOURCES

Anti-infective Review Panel. Anti-infective guidelines for community-acquired infections. Toronto: MUMS Guideline Clearinghouse; 2013.

Canadian Pharmacists Association. Compendium of Therapeutic Choices: Canada's Trusted Reference for Primary Care Therapeutics (CTC 7). Ottawa: Canadian Pharmacists Association; c2014.

Canadian Pharmacists Association. Fluconazole (Diflucan). [Internet] Ottawa, ON: e-Therapeutics; 2014. Available from: <http://www.e-therapeutics.ca> with authorized username and password.

Canadian Pharmacists Association. Clotrimazole (Canesten Topical). [Internet] Ottawa, ON: e-Therapeutics; 2011. Available from: <http://www.e-therapeutics.ca> with authorized username and password.

Canadian Pharmacists Association. Clotrimazole (Canesten Vaginal). [Internet] Ottawa, ON: e-Therapeutics; 2011. Available from: <http://www.e-therapeutics.ca> with authorized username and password.

Canadian Pharmacists Association. Metronidazole (Flagyl). [Internet] Ottawa, ON: e-Therapeutics; 2013. Available from: <http://www.e-therapeutics.ca> with authorized username and password.

Canadian Pharmacists Association. Clindamycin. [Internet] Ottawa, ON: e-Therapeutics; 2014. Available from: <http://www.e-therapeutics.ca> with authorized username and password.

Health Canada. First Nations and Inuit Health Branch (FNIHB) Nursing Station Formulary and Drug Classification System. 2016 April.

Fluconazole. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015. Available from: <http://online.lexi.com> with authorized username and password.

Clotrimazole. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015. Available from: <http://online.lexi.com> with authorized username and password.

Clindamycin. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015. Available from: <http://online.lexi.com> with authorized username and password.

Metronidazole. [Internet] Hudson, OH: Lexi-Comp. Inc.; 2015. Available from: <http://online.lexi.com> with authorized username and password.