

Appendix A: Disease-Specific Chapters

Chapter: Listeriosis

Effective: February 2019

Listeriosis

Communicable

Virulent

**Health Protection and Promotion Act:
O. Reg. 135/18 (Designation of Diseases)**

1.0 Aetiologic Agent

Listeriosis is an opportunistic infection caused by the agent *Listeria monocytogenes* (*L. monocytogenes*), a facultative anaerobic, nonspore-forming, motile, gram-positive bacillus that produces a narrow zone of hemolysis on a blood agar medium.¹ Human infections are usually caused by serovars 1/2a, 1/2b, and 4b.²

2.0 Case Definition

2.1 Surveillance Case Definition

Refer to [Appendix B](#) for Case Definitions.

2.2 Outbreak Case Definition

The outbreak case definition varies with the outbreak under investigation. Please refer to the *Infectious Diseases Protocol, 2018* (or as current) for guidance in developing an outbreak case definition as needed.

The outbreak case definitions are established to reflect the disease and circumstances of the outbreak under investigation. The outbreak case definitions should be developed for each individual outbreak based on its characteristics, reviewed during the course of the outbreak, and modified if necessary, to ensure that the majority of cases are captured by the definition. The case definitions should be created in consideration of the outbreak definitions.

Outbreak cases may be classified by levels of probability (*i.e.* confirmed and/or probable).

3.0 Identification

3.1 Clinical Presentation

A person with listeriosis usually has fever, diarrhea, and sometimes, nausea and vomiting. In invasive disease, the bacteria may infect the brain and the membrane lining the brain causing meningitis or septicemia. The onset of meningitis may be sudden, with fever, intense headache, nausea, and vomiting. Complications include endocarditis (the bacteria infects the membrane lining of the cavities of the heart), and internal and external abscesses.²

Infected pregnant women may have mild non-specific symptoms – fever, headache, myalgia, and gastrointestinal symptoms. An infected pregnant woman may unknowingly pass on the illness to her unborn child *in utero*. Placental invasion can lead to fetal infection resulting in premature delivery, spontaneous abortion, stillbirth or neonatal infection (presenting septicemia or meningitis).²

Twenty to thirty percent of neonatal infections are fatal. If onset of illness occurs within the first four days of life, the case-fatality rate is 50%.²

Note: individuals may present with mild enteric symptoms, but could progress to more severe forms of disease.

3.2 Diagnosis

See [Appendix B](#) for diagnostic criteria relevant to the Case Definitions.

For further information about human diagnostic testing, contact the Public Health Ontario Laboratories or refer to the Public Health Ontario Laboratory Services webpage: <http://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/default.aspx>

Listeriosis cannot be diagnosed clinically, given the many causative agents that may present with similar non-specific symptoms.

4.0 Epidemiology

4.1 Occurrence

Occurrence is worldwide.² Foodborne transmission causes outbreaks and sporadic infections in humans.¹ In recent years, about 134 cases of invasive listeriosis were reported annually in Canada.³

Between 2013 and 2017, an average of 62 cases of listeriosis were reported per year in Ontario.*

Please refer to Public Health Ontario's (PHO) Reportable Disease Trends in Ontario reporting tool and other reports for the most up-to-date information on infectious disease trends in Ontario.

<http://www.publichealthontario.ca/en/DataAndAnalytics/Pages/DataReports.aspx>

For additional national and international epidemiological information, please refer to the Public Health Agency of Canada and the World Health Organization.

* Data included in the epidemiological summary are from January 1, 2013 to December 31, 2017. Data were extracted from Query on February 7, 2018 and therefore are considered preliminary.

4.2 Reservoir

Listeria is found in soil, water, animals, and humans. Animal reservoirs include domestic and wild mammals and fowl. Asymptomatic fecal carriage is common in humans. Bacteria can thrive and multiply at refrigeration temperatures.²

4.3 Modes of Transmission

The main route of transmission is foodborne, through ingestion of contaminated food such as ready-to-eat meats (e.g., deli meats), unpasteurized milk and soft cheeses, and raw vegetables and cantaloupe melons. *Listeria* biofilms in food production systems can be transferred to food products. Vegetables can become contaminated from the soil or from manure used as fertilizer.^{1,2}

In utero or perinatal transmission can occur.^{1,2}

4.4 Incubation Period

The incubation period for self-limiting, febrile gastroenteritis following ingestion of a large inoculum is 24 hours, illness typically lasts 2 to 3 days.¹ For invasive disease incubation period is typically 2 to 3 weeks; however, cases have occurred up to 70 days following a single exposure to a contaminated product.^{1,2} The incubation period for pregnancy-associated cases is longer than for nonpregnancy-associated cases.¹

4.5 Period of Communicability

Infected persons can shed the bacteria in stool for several months.² Mothers of infected newborns may shed the infectious agent in vaginal discharges or urine for 7 to 10 days after delivery.

4.6 Host Susceptibility and Resistance

Those at highest risk for severe disease are fetuses and neonates, the elderly, immunocompromised persons, and pregnant women. Disease is frequently superimposed on other conditions such as cancer, organ transplantation, diabetes and HIV/AIDS. There is no evidence of acquired immunity.²

5.0 Reporting Requirements

As per Requirement #3 of the “Reporting of Infectious Diseases” section of the *Infectious Diseases Protocol, 2018* (or as current), the minimum data elements to be reported for each case are specified in the following:

- *Ontario Regulation 569 (Reports)* under the *Health Protection and Promotion Act (HPPA)*;⁴
- The iPHIS User Guides published by PHO; and
- Bulletins and directives issued by PHO.

6.0 Prevention and Control Measures

6.1 Personal Prevention Measures

Preventive measures:^{1,2}

- High-risk individuals such as pregnant women and immunocompromised persons should avoid high-risk foods such as ready-to-eat meats, smoked fish, soft cheeses and unpasteurized dairy products;
- Cook and reheat food thoroughly to the appropriate temperatures. For temperatures, see the ministry's publication "Food Safety" available at: <http://www.health.gov.on.ca/en/public/programs/publichealth/foodsafety/cook.aspx#4>;
- Avoid consuming raw or unpasteurized milk and dairy products;
- Thoroughly wash raw fruits and vegetables before consuming;
- Prevent cross-contamination between raw foods and ready-to-eat foods during food preparation and storage; and
- Wash hands, clean and sanitize utensils and food preparation surfaces after contact with raw or uncooked foods.

6.2 Infection Prevention and Control Strategies

Refer to PHO's website at www.publichealthontario.ca to search for the most up-to-date information on Infection Prevention and Control.

6.3 Management of Cases

In addition to the requirements set out in the Requirement #2 of the "Management of Infectious Diseases – Sporadic Cases" and "Investigation and Management of Infectious Diseases Outbreaks" sections of the *Infectious Diseases Protocol, 2018* (or as current), the board of health shall investigate cases to determine the source of infection. Refer to Section 5: Reporting Requirements above for relevant data to be collected during case investigation. Additional disease specific information may include:

- History of out-of-province or international travel including earliest and latest exposure dates;
- Food history for the 4 weeks prior to onset of symptoms;
- Occupation; and
- Residency at an institution and history of multiple institutional admissions.

Exposure investigation:

- Collect samples of suspected food sources for laboratory analysis (obtain product details for trace-back purposes if applicable); and
- Conduct appropriate food premises inspections of potential sources of infection.

Testing is not recommended for asymptomatic individuals exposed to the suspected food source.

Note: Treatment is under the direction of the individual's health care provider.

6.4 Management of Contacts

Listeriosis is rarely spread person-to-person. Persons exposed to the same source should be investigated, particularly if part of the at risk group such as the elderly, immunocompromised and pregnant women.

6.5 Management of Outbreaks

Please see the *Infectious Diseases Protocol, 2018* (or as current) for the public health management of outbreaks or clusters in order to identify the source of illness, manage the outbreak and limit secondary spread.

Two or more cases linked by time, common exposure, and/or place are suggestive of an outbreak.

For more information regarding specimen collection and testing, please see the Public Health Inspector's Guide to the Environmental Microbiology Laboratory Testing (2017, or as current).⁵

Refer to Ontario's Foodborne Illness Outbreak Response Protocol (ON-FIORP) 2013 (or as current) for multi-jurisdictional foodborne outbreaks which require the response of more than two Parties (as defined in ON-FIORP) to carry out an investigation.

7.0 References

1. Committee on Infectious Diseases, American Academy of Pediatrics. Section 3: Summaries of Infectious Diseases: *Listeria monocytogenes* Infections. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. Red Book: 2018 Report of the Committee on Infectious Diseases. 31 ed. Itasca, IL: American Academy of Pediatrics; 2018.
2. Heymann DL, editor. Control of Communicable Diseases Manual. 20 ed. Washington, D.C: American Public Health Association; 2015.
3. Government of Canada. Surveillance of listeriosis (*Listeria*) [Internet]. Ottawa, ON: Her Majesty the Queen in Right of Canada; 2016 [updated August 29, 2016; cited June 15, 2018]. Available from: <https://www.canada.ca/en/public-health/services/diseases/listeriosis/surveillance-listeriosis.html>
4. Health Protection and Promotion Act, R.R.O. 1990, Reg. 569, Reports, (2018). Available from: <https://www.ontario.ca/laws/regulation/900569>
5. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Public Health Inspector's Guide to Environmental Microbiology Laboratory Testing. 5th ed. Toronto, ON: Queen's Printer for Ontario; 2017. Available from: <https://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/PHIGuide.aspx>

8.0 Document History

Table 1: History of Revisions

Revision Date	Document Section	Description of Revisions
April 2015	General	New template. Section 9.0 Document History added.
April 2015	1.0 Aetiologic Agent	Revised “an aerobic” to “a facultative anaerobic”.
April 2015	2.1 Surveillance Case Definition	Added: “Sporadic cases of the diarrheal form of listeriosis are not reportable.”
April 2015	2.2 Outbreak Case Definition	First paragraph revised. First bullet: Removed “laboratory”. Second bullet: Added “(i.e., increase in endemic rate)”. Fourth bullet: Removed “and/or of the aetiologic agent”. Added fifth and sixth bullets.
April 2015	3.2 Diagnosis	Removed: “Diagnosis is confirmed by isolation of the bacterium from CSF, blood, amniotic fluid, placenta, meconium, lochia, gastric washings and other sterile sites of infection.” Added: “Listeriosis cannot be diagnosed clinically, given the many causative agents that may present with similar non-specific symptoms.” Added: PHO Laboratory Services webpage link for information about human diagnostic testing.
April 2015	4.1 Occurrence	Removed: “Listeriosis is not a common disease in Ontario. There have been an average of approximately 40 cases per year between 2003 and 2007. Between one and eight cases occur every month, with no clear seasonal pattern.” Replaced with: “In 2008, an outbreak of listeriosis linked to ready-to-eat meats occurred in Canada affecting several provinces with a total of 56 cases and 21 deaths. Forty-one cases were from Ontario with 16 deaths. Between 2009 and 2011, an average of 57 cases of listeriosis were reported per year in Ontario.” Added: Reference to the website link for Public Health Ontario Monthly Infectious Diseases Surveillance Reports and other infectious diseases reports for more information on disease trends in Ontario.

Revision Date	Document Section	Description of Revisions
April 2015	4.2 Reservoir	Replaced "The bacteria" with " <i>Listeria</i> ".
April 2015	4.3 Modes of Transmission	Added: "(e.g. deli meats)" after "ready-to-eat meats". Removed: "Inhalation of the organism has been reported and papular lesions on hands and arms may occur from direct contact with infectious material. Nosocomial transmission associated with contaminated equipment have resulted in a nursery outbreak."
April 2015	4.6 Host Susceptibility and Resistance	Added: "Host" to title. Second sentence: Added "Healthy" to "children and young adults are generally resistant".
April 2015	5.1 To local Board of Health	Removed: "Confirmed and suspected cases" and replaced with "Individuals who have or may have listeriosis..."
April 2015	5.2 To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry	Section title revised from "To Public Health Division" to "To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry". Revised "Report only case classifications specified in the case definition to" to "Cases shall be reported". The documents that specify the minimum data elements to be reported have been updated.
April 2015	6.0 Infection Prevention and Control (IPAC) Measures	Section title revised from "Prevention and Control Measures" to "Infection Prevention and Control (IPAC) Measures".
April 2015	6.1 Personal Prevention Measures	Entire section revised.
April 2015	6.2 Infection Prevention and Control Strategies	First bullet: Added "Apply" to beginning of sentence (Apply routine precautions). Added: Reference to PHO website link and link to Provincial Infectious Diseases Advisory Committee (PIDAC) best practice documents on IPAC.

Revision Date	Document Section	Description of Revisions
April 2015	6.3 Management of Cases	<p>Removed: "Treatment: Listeriosis is treated with antibiotics. Depending on the form of the disease, treatment may take up to six weeks or more. Antibiotics given to pregnant women with Listeriosis can often reduce the risk of infection in the newborn or the unborn child. There is no vaccine to prevent Listeriosis.</p> <p>Refer to the resources listed below for more information." replaced with "Note: Treatment is under the direction of the individual's health care provider."</p> <p>First bullet under Exposure investigation: Added "(obtain product details for trace-back purposes if applicable)"</p> <p>Second bullet under Exposure investigation: Revised from "Conduct appropriate inspections of implicated potential sources of infection" to "Conduct appropriate food premises inspections of potential sources of infection."</p> <p>Revised "No testing is recommended for asymptomatic exposed individuals" to "Testing is not recommended for asymptomatic individuals exposed to the suspected food source."</p> <p>Third bullet: Replaced 3 weeks with 4 weeks in "Food history for the 4 weeks prior to onset of symptoms".</p>
April 2015	6.4 Management of Contacts	Added: "part of" to "particularly if part of the at risk group such as..."
April 2015	6.5 Management of Outbreaks	Revised "Two or more unrelated cases of the same serotype of listeriosis with a common exposure is suggestive of an outbreak" to read "Two or more cases linked by time, common exposure, and/or place is suggestive of an outbreak."
April 2015	7.0 References	Updated.
April 2015	8.0 Additional Resources	Updated.
February 2019	General	Minor revisions were made to support the regulation change to Diseases of Public Health Significance, the epidemiology section and references were updated and Section 8.0 Additional Resources was deleted.

