Appendix A: Disease-Specific Chapters

Chapter: Listeriosis

Revised April 2015
**Listeriosis**

[ ] Communicable

[ ] Virulent

**Health Protection and Promotion Act:**
*Ontario Regulation 558/91 – Specification of Communicable Diseases*

**Health Protection and Promotion Act:**
*Ontario Regulation 559/91 – Specification of Reportable 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, 1/2c and 4b.\(^2\)

### 2.0 Case Definition

#### 2.1 Surveillance Case Definition

[See Appendix B](#)

Sporadic cases of the diarrheal form of listeriosis are not reportable.

#### 2.2 Outbreak Case Definition

Outbreak case definitions are established to reflect the disease and circumstances of the outbreak under investigation. Confirmed outbreak cases must, at a minimum, meet the criteria specified for the provincial surveillance confirmed case classification. Consideration should also be given to the following when establishing outbreak case definitions:

- Clinical and/or epidemiological criteria;
- The time frame for occurrence (i.e., increase in endemic rate);
- A geographic location(s) or place(s) where cases live or became ill/exposed;
- Special attributes of cases (e.g., age, underlying conditions);
- Further strain typing (e.g. pulsed field gel electrophoresis or PFGE) as appropriate, which may be used to support linkage; and
- Outbreak cases may be classified by levels of probability (i.e., confirmed, probable and/or suspect).

### 3.0 Identification

#### 3.1 Clinical Presentation

A person with listeriosis usually has fever, muscle aches, diarrhea, and sometimes, nausea and vomiting. The bacteria may infect the brain and the membrane lining the brain causing
meningoencephalitis. The onset of meningoencephalitis may be sudden, with fever, intense headache, nausea, and vomiting.

Complications include septicemia, endocarditis (the bacteria infects the membrane lining of the cavities of the heart), and internal and external abscesses. Infected pregnant women may have minimal symptoms, characterized by a mild flu-like illness. An infected pregnant woman may unknowingly pass on the illness to her unborn child \textit{in utero}. Infection during pregnancy may lead to premature delivery, infection of the newborn that may lead to meningitis, spontaneous abortion or stillbirth.

Thirty percent of infant infections are fatal. If onset of illness occurs within the first four days of life, the case-fatality rate is 50%.³

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

3.2 Diagnosis
See Appendix B for diagnostic criteria relevant to the Case Definition.

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

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.

4.0 Epidemiology

4.1 Occurrence
Occurrence is worldwide. Cases usually occur sporadically; however, several outbreaks have been recognized in recent years.³

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.⁴

Between 2009 and 2011, an average of 57 cases of listeriosis were reported per year in Ontario.

Please refer to the Public Health Ontario Monthly Infectious Diseases Surveillance Reports and other infectious diseases reports for more information on disease trends in Ontario, available at: http://www.publichealthontario.ca/en/DataAndAnalytics/Pages/DataReports.aspx.⁵,⁶

4.2 Reservoir
\textit{Listeria} is found in soil, water, animals and humans. Asymptomatic fecal carriage is common in humans.² Bacteria can thrive and multiply at refrigeration temperatures.
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.\(^1\) *Listeria* biofilms in food production systems can be transferred to food products.\(^2\) Vegetables can become contaminated from the soil or from manure used as fertilizer.

*In utero* or perinatal transmission can occur.\(^1\)\(^2\)

4.4 Incubation Period
Variable; cases have occurred 3 to 70 days following a single exposure to an implicated product. Estimated median incubation is 3 weeks.\(^2\)

4.5 Period of Communicability
Infected persons can shed the bacteria in stool for several months; mothers of infected newborns may shed the infectious agent in vaginal discharges or urine for 7 to 10 days after delivery.\(^2\)

4.6 Host Susceptibility and Resistance
Those at highest risk for severe disease are fetuses and neonates, the elderly, immunocompromised persons, and pregnant women. Healthy children and young adults are generally resistant; adults less so after age 40. Disease is frequently superimposed on other conditions such as cancer, organ transplantation, diabetes and AIDS. There is little evidence of acquired immunity, even after prolonged severe infection.\(^2\)

5.0 Reporting Requirements

5.1 To local Board of Health
Individuals who have or may have listeriosis shall be reported as soon as possible to the medical officer of health by persons required to do so under the *Health Protection and Promotion Act*, R.S.O. 1990 (HPPA).\(^7\)

5.2 To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry
Cases shall be reported using the integrated Public Health Information System (iPHIS), or any other method specified by the ministry within one (1) business day of receipt of initial notification as per iPHIS Bulletin Number 17: Timely Entry of Cases.\(^8\)

The minimum data elements to be reported for each case are specified in the following sources:
- *Ontario Regulation 569* (Reports) under the HPPA,\(^9\)\(^7\)
- The iPHIS User Guides published by PHO; and
- Bulletins and directives issued by PHO.
6.0 Infection Prevention and Control (IPAC) Measures

6.1 Personal Prevention Measures
Preventive measures:

- 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 drinking raw or unpasteurized milk and dairy products;
- Thoroughly wash raw fruits and vegetables before eating;
- 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.²,¹

6.2 IPAC Strategies

- Apply routine precautions for hospitalized cases;
- Patients with invasive listeriosis do not require isolation; and
- Proper cleaning and disinfection of equipment in neonatal units.

Refer to Public Health Ontario’s website at www.publichealthontario.ca to search for the most up-to-date Provincial Infectious Diseases Advisory Committee (PIDAC) best practices on IPAC. PIDAC best practice documents can be found at: http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/PIDAC_Documents.aspx.

6.3 Management of Cases
Investigate cases of listeriosis to determine the source of infection. Refer to Section 5.0 (Reporting Requirements) above for relevant data to be collected during case investigation. The following disease-specific information should also be obtained during case management:

- Symptoms and date of symptom onset;
- 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

Provide public health management of outbreaks or clusters in order to identify the source of illness, stop the outbreak, and limit secondary spread.

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

As per this Protocol, outbreak management shall be comprised of, but not limited to, the following general steps:
• Confirm diagnosis and verify the outbreak;
• Establish an outbreak team;
• Develop an outbreak case definition. These definitions should be reviewed during the course of the outbreak, and modified if necessary, to ensure that the majority of cases are captured by the definitions;
• Implement prevention and control measures;
• Implement and tailor communication and notification plans depending on the scope of the outbreak;
• Conduct epidemiological analysis on data collected;
• Conduct environmental inspections of implicated premises where applicable;
• Identify the origin of suspect food, along with the transportation, storage and preparation processes;
• Coordinate and collect appropriate clinical specimens where applicable;
• Prepare a written report; and
• Declare the outbreak over in collaboration with the outbreak team.

For more information regarding specimen collection and testing, please see the Public Health Inspector’s Guide to the Principles and Practices of Environmental Microbiology.
Refer to Ontario’s Foodborne Illness Outbreak Response Protocol (ON-FIORP) 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


8.0 Additional Resources


### 9.0 Document History

**Table 1: History of Revisions**

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Document Section</th>
<th>Description of Revisions</th>
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</thead>
<tbody>
<tr>
<td>April 2015</td>
<td>General</td>
<td>New template.</td>
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<tr>
<td></td>
<td></td>
<td>Section 9.0 Document History added.</td>
</tr>
<tr>
<td>April 2015</td>
<td>1.0 Aetiologic Agent</td>
<td>Revised “an aerobic” to “a facultative anaerobic”.</td>
</tr>
<tr>
<td>April 2015</td>
<td>2.1 Surveillance Case Definition</td>
<td>Added: “Sporadic cases of the diarrheal form of listeriosis are not reportable.”</td>
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<tr>
<td>April 2015</td>
<td>2.2 Outbreak Case Definition</td>
<td>First paragraph revised.</td>
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<td></td>
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<td>First bullet: Removed “laboratory”.</td>
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<td></td>
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<td>Second bullet: Added “(i.e., increase in endemic rate)”.</td>
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<td>Fourth bullet: Removed “and/or of the aetiologic agent”.</td>
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<td>Added fifth and sixth bullets.</td>
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<tr>
<td>April 2015</td>
<td>3.2 Diagnosis</td>
<td>Removed: “Diagnosis is confirmed by isolation of</td>
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<tr>
<td>Revision Date</td>
<td>Document Section</td>
<td>Description of Revisions</td>
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<tr>
<td>April 2015</td>
<td>4.1 Occurrence</td>
<td>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.</td>
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<tr>
<td>April 2015</td>
<td>4.2 Reservoir</td>
<td>Replaced “The bacteria” with “Listeria”.</td>
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<tr>
<td>April 2015</td>
<td>4.3 Modes of Transmission</td>
<td>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.”</td>
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<tr>
<td>April 2015</td>
<td>4.6 Host Susceptibility and Resistance</td>
<td>Added: “Host” to title. Second sentence: Added “Healthy” to “children and young adults are generally resistant”.</td>
</tr>
<tr>
<td>April 2015</td>
<td>5.1 To local Board of Health</td>
<td>Removed: “Confirmed and suspected cases” and replaced with “Individuals who have or may have listeriosis…”</td>
</tr>
<tr>
<td>April 2015</td>
<td>5.2 To the Ministry of Health and Long-Term Care (the ministry) or Public</td>
<td>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”</td>
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<td>Health Ontario (PHO), as specified by the ministry</td>
<td>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.</td>
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<tr>
<td>April 2015</td>
<td>6.1 Personal Prevention Measures</td>
<td>Entire section revised.</td>
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<tr>
<td>April 2015</td>
<td>6.2 Infection Prevention and Control Strategies</td>
<td>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.</td>
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<tr>
<td>April 2015</td>
<td>6.3 Management of Cases</td>
<td>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. Refer to the resources listed below for more information.” replaced with “Note: Treatment is under the direction of the individual’s health care provider.” First bullet under Exposure investigation: Added “(obtain product details for trace-back purposes if applicable)” 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.” Revised “No testing is recommended for asymptomatic exposed individuals” to “Testing is not recommended for asymptomatic individuals exposed to the suspected food source.” Third bullet: Replaced 3 weeks with 4 weeks in “Food history for the 4 weeks prior to onset of symptoms”</td>
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<tr>
<td>April 2015</td>
<td>6.4 Management of Contacts</td>
<td>Added: “part of” to “particularly if part of the at risk group such as…”</td>
</tr>
<tr>
<td>April 2015</td>
<td>6.5 Management of Outbreaks</td>
<td>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.”</td>
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<tr>
<td>April 2015</td>
<td>7.0 References</td>
<td>Updated.</td>
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