Appendix A: Disease-Specific Chapters

Chapter: Yersiniosis

Revised January 2014
Yersiniosis

- 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

Yersiniosis is caused by a Gram-negative bacillus of the genus Yersinia. Two species, *Yersinia enterocolitica* (most common in Canada) and *Yersinia pseudotuberculosis* are the causative agents of yersiniosis. *Y. enterocolitica* and *Y. pseudotuberculosis* should not be confused with *Y. pestis*, the causative agent of the plague.

Globally, *Y. enterocolitica* is the species of Yersinia most commonly associated with human infection.1 *Y. enterocolitica* can multiply under refrigeration and low oxygen conditions. Non-pathogenic strains of *Y. enterocolitica* also occur and can be isolated from asymptomatic carriers, food and environmental samples.

2.0 Case Definition

2.1 Surveillance Case Definition

See Appendix B

2.2 Outbreak Case Definition

The outbreak case definition varies with the outbreak under investigation. Consideration should be given to the provincial surveillance case definition and the following criteria when establishing an outbreak case definition:

1. Clinical, laboratory and/or epidemiological criteria;
2. The time frame of occurrence;
3. The geographic location(s) or place(s) where cases live or became ill/exposed;
4. Special attributes of cases (e.g. age, underlying conditions and/or the etiologic agent); and,
5. Further strain typing (e.g., serotype) as appropriate which may be used to support linkage.

Outbreak cases may be classified by levels of probability (i.e., confirmed, probable and/or suspect).
3.0 Identification

3.1 Clinical Presentation

*Yersinia enterocolitica* infections typically manifest as fever and diarrhea in young children. Stool often contains leukocytes, blood and mucus. In older children and adults a pseudo-appendicitis syndrome, with fever, abdominal pain, tenderness in the right lower quadrant of the abdomen and leukocytosis.²

*Yersinia pseudotuberculosis* presents with symptoms that may include fever, scarlatiniform rash, abdominal symptoms, and acute pseudo-appendicitis. Clinical features can mimic those of Kawasaki disease.² Complications include post-infectious arthritis and systemic infections.²

3.2 Diagnosis

See Appendix B for diagnostic criteria relevant to the case definition.

*Y. enterocolitica* and *Y. pseudotuberculosis* can be recovered from stool, throat swabs, mesenteric lymph nodes, peritoneal fluid, and blood. *Y. enterocolitica* also has been isolated from synovial fluid, bile, urine, cerebrospinal fluid, sputum and wounds.² Stool cultures generally are positive during the first two weeks of illness.²

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

*Y. pseudotuberculosis*-associated cases tend to be clustered in the 5-20 year old age group.¹ Between 2007 and 2011, an average of 237 cases of yersiniosis occurred per year in Ontario.

For more information on infectious diseases activity in Ontario, refer to the current versions of the Ontario Annual Infectious Diseases Epidemiology Reports and the Monthly Infectious Diseases Surveillance Report.³, ⁴

4.2 Reservoir

The principal reservoir of *Y. enterocolitica* is swine.² *Y. pseudotuberculosis* is widespread among avian and mammalian hosts, particularly rodents and other small mammals.¹ *Y. enterocolitica* has been isolated from environmental sources, such as soil and water.⁵

Worldwide *Y. pseudotuberculosis* is primarily a zoonotic disease of wild and domesticated birds and mammals, but is the main cause of human cases of yersiniosis in some areas (e.g. Japan, Russia).¹ Both *Y. enterocolitica* and *Y. pseudotuberculosis* have also been isolated from birds, beavers, cats, and dogs, and, in the case of *Y. enterocolitica*, frogs, flies, and fleas.⁵
4.3 Modes of Transmission
Fecal-oral transmission via contaminated food and water or by contact with infected people or animals such as puppies and kittens; raw pork and pork products are known sources of infection.1

Strains of *Y. enterocolitica* can be found in meats (pork, beef, lamb, etc.), oysters, fish, and raw milk. There are many opportunities for *Yersinia* to enter the food supply due the prevalence of this bacterium in soil, water and animals. Poor sanitation, improper storage, or poor sanitizing practices by food handlers may also be a source of contamination.5

*Y. enterocolitica* persists longer in cooked foods than in raw foods, due to increased nutrient availability. *Y. enterocolitica* can grow easily at refrigeration temperatures in vacuum-packed meat, boiled eggs, boiled fish, pasteurized liquid eggs, pasteurized whole milk, cottage cheese, and tofu. Growth of the microorganism also occurs in refrigerated seafood – oysters, raw shrimp, and cooked crab meat.5 Outbreaks, worldwide, have been associated with chocolate milk, tofu and pork chitterlings.1

4.4 Incubation Period
Probably 3-7 days, generally less than 11 days.1, 6

4.5 Period of Communicability
Secondary transmission appears rare; fecal shedding occurs as long as symptoms persist, usually 2-3 weeks; if untreated, persons may shed 2-3 months; prolonged asymptomatic carriage has been reported.1

4.6 Host Susceptibility and Resistance
Diarrhea is more severe in children; complications in adolescents and older adults are more severe and septicemia occurs more often in people with iron overload or immunosuppression.1

5.0 Reporting Requirements

5.1 To local Board of Health
Individuals who have or may have yersiniosis shall be reported to the medical officer of health by persons required to do so under the *Health Protection and Promotion Act*, R.S.O. 1990 (*HPPA*).6

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 and Outbreaks.7

The minimum data elements to be reported for each case is specified in the following sources:
- *Ontario Regulation 569 (Reports)* under the HPPA,8
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:

- Use proper hand hygiene after using sanitary facilities, toileting and diapering, handling pets, and before and after handling food.
- Consume only pasteurized milk and milk products.
- Separate food preparation and child care responsibilities in relevant settings.


6.2 Infection Prevention and Control Strategies
Routine and contact precautions are indicated.

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

6.3 Management of Cases
Investigate cases of yersiniosis to determine source of infection. Refer to Section 5: Reporting Requirements above for relevant data to be collected during case investigation.

Provide education on illness and how to prevent re-infection and secondary spread (as Personal Preventive Measures).

Exclusion Criteria:
Exclude symptomatic food handlers and healthcare providers*, and day care staff and attendees until symptom free for 24 hours, or 48 hours after completion of antibiotic or anti-diarrheal medications.


Note: Treatment is under the direction of the attending health care provider.
6.4 Management of Contacts
Assess household and other contacts for symptoms and if symptomatic advise to seek medical care. Management of symptomatic contacts is the same as for cases.

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 is suggestive of an outbreak.

As per the Infectious Diseases Protocol, 2008 (or as current), outbreak management shall comprise of but not be 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 premise 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 to the Public Health Inspector’s Guide to the Principles and Practices of Environmental Microbiology.12

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


7. Ontario. Ministry of Health and Long-Term Care. Timely entry of cases and outbreaks. iPHIS bulletin. Toronto, ON: Queen’s Printer for Ontario; 2012:17 (or as current).


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>
</tr>
</thead>
<tbody>
<tr>
<td>January 2014</td>
<td>General</td>
<td>New template.</td>
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<tr>
<td></td>
<td></td>
<td><strong>Section 9.0 Document History Added.</strong></td>
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<tr>
<td></td>
<td></td>
<td>Title of Section 4.5 changed from “Susceptibility and Resistance” to “Host Susceptibility and Resistance”</td>
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<td></td>
<td>Title of Section 5.2 changed from “To Public Health Division (PHD)” 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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<tr>
<td>1.0 Aetiologic Agent</td>
<td></td>
<td>First (“Globally, <em>Y. enterocolitica</em> is the species…” and last (“Non-pathogenic strains of…”) sentences added to second paragraph.</td>
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<tr>
<td>2.2 Outbreak Case Definition</td>
<td>Addition of fifth bullet point (“Further strain typing (e.g., serotype)…”)</td>
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<td>3.2 Diagnosis</td>
<td>Addition of direction to contact Public Health Ontario Laboratories or PHO website for additional information on human diagnostic testing.</td>
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<td>4.1 Occurrence</td>
<td>Entire section revised.</td>
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<tr>
<td>4.2 Reservoir</td>
<td>Addition of second sentence of second paragraph (“<em>Y. enterocolitica</em> has been isolated…”) and third paragraph (“Worldwide <em>Y. pseudotuberculosis</em> is primarily a zoonotic disease…”)</td>
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<tr>
<td>4.3 Modes of Transmission</td>
<td>Addition of final two paragraphs (“Strains of <em>Y. enterocolitica</em> can be found in meats…” and “<em>Y. enterocolitica</em> persists longer in cooked foods…”).</td>
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<tr>
<td>4.4 Incubation Period</td>
<td>Changed from “Probably 3-7 days, generally less than 10 days” to “Probably 3-7 days, …”</td>
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<td>generally less than <strong>11 days</strong>.</td>
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<tr>
<td>6.1 Personal Prevention Measures</td>
<td>Addition of the following to the first bullet point: “For proper cooking temperatures, see the Ministry’s publication “Food Safety: Cook”…”</td>
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<td></td>
<td>Addition of the fourth bullet point (“Separate food preparation and child care responsibilities in relevant settings”).</td>
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<td></td>
<td>Addition of the final sentence (“For more food safety prevention measures, please see the Ministry’s food safety frequently asked questions available from…”).</td>
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<tr>
<td>6.2 Infection Prevention and Control Strategies</td>
<td>Changed from “Strategies: Contact precautions are indicated for diapered or incontinent children and hospitalized cases for the duration of diarrheal illness, Cohort food preparation and child care responsibilities in relevant settings” to “Routine and contact precautions are indicated”.</td>
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<td>Addition of reference to PIDAC IPAC best practices documents.</td>
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<tr>
<td>6.3 Management of Cases</td>
<td>Changed from “The following disease specific information should also be obtained during case management: Detailed exposure history (food and animal contact), Educate cases about disease transmission and appropriate personal hygiene, Exclude symptomatic food handlers, healthcare staff and daycare staff and attendees until diarrhea free for 24 hours or 48 hours after completion of antibiotic therapy” to “Provide education on illness and how to prevent re-infection and secondary spread (as Personal Preventive Measures). Exclusion Criteria: Exclude symptomatic food handlers and healthcare providers*, and day care staff and attendees until symptom free for 24 hours, or 48 hours after completion of antibiotic or anti-diarrheal medications. *If the healthcare setting is a hospital, use the “Enteric Diseases Surveillance Protocol for Ontario Hospitals” (OHA and OMA Joint Communicable Diseases Surveillance Protocols Committee, November, 2011) for exclusion criteria”.</td>
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|               | 6.5 Management of Outbreaks | Addition of the following to the third bullet point: “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”.  
Addition of the eighth bullet point: “Identify the origin of suspect food, along with the transportation, storage and preparation processes”.  
Addition of final two paragraphs. |
|               | 7.0 References            | Updated.                                                                                                                                               |
|               | 8.0 Additional Resources  | Updated.                                                                                                                                               |