

Appendix A: Disease-Specific Chapters

Chapter: Yersiniosis

Effective: February 2019

Yersiniosis

Communicable

Virulent

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

1.0 Aetiologic Agent

Yersiniosis is caused by a gram-negative bacillus of the genus *Yersinia*. Two species, *Yersinia enterocolitica* (*Y. enterocolitica*) (most common in Canada) and *Yersinia pseudotuberculosis* are the causative agents of yersiniosis.¹ *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.¹ 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

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

Y. enterocolitica infections typically manifest as fever and diarrhea in young children. Stool often contains leukocytes, blood and mucus. Pseudo-appendicitis syndrome, with

fever, abdominal pain, tenderness in the right lower quadrant of the abdomen and leukocytosis occur especially in older children and adults.²

Yersinia pseudotuberculosis presents with symptoms that may include fever, scarlatiniform rash, acute gastroenteritis, 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

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, pleural fluid and wounds.² Stool cultures generally are positive during the first two weeks of illness.²

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>

4.0 Epidemiology

4.1 Occurrence

Worldwide. The distribution of pathogenic *Y. enterocolitica* varies by geographic region. The highest isolation rates have been reported during the cold season in temperate climates, including northern Europe, North America, and temperate regions of South America. *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

Approximately two-thirds of *Y. enterocolitica* illness occurs among infants and children. *Y. pseudotuberculosis*-associated cases tend to be clustered in the 5-20 year old age group.¹ Between 2013 and 2017, an average of 218 cases of yersiniosis occurred 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

The principal reservoir of *Y. enterocolitica* is swine.² *Y. enterocolitica* has been isolated from environmental sources, such as soil and water.³

Y. pseudotuberculosis is widespread among avian and mammalian hosts, particularly rodents and other small mammals.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.³

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.³

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.³ Outbreaks, worldwide, have been associated with milk, tofu and pork chitterlings.¹

Nosocomial transmission of *Y. enterocolitica* has occurred, as has transmission by transfusion of stored blood from donors who were asymptomatic or had mild gastrointestinal illness.¹

4.4 Incubation Period

Usually between 3-7 days, generally less than 10 days.¹

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 in both children and adults.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

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:

- Ensure thorough cooking and safe handling of meats, especially pork. For proper cooking temperatures, see the Ministry of Health and Long-Term Care’s (ministry) publication “Food Safety: Cook” available at <http://www.health.gov.on.ca/en/public/programs/publichealth/foodsafety/cook.aspx#4>.⁵
- 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.

For more food safety prevention measures, please see the ministry’s food safety frequently asked questions available from:

<http://www.health.gov.on.ca/en/public/programs/publichealth/foodsafety/faq.aspx>.⁶

6.2 Infection Prevention and Control Strategies

Routine and contact precautions are indicated.²

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.

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

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

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 is 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).⁷

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. Heymann DL, editor. *Control of Communicable Diseases Manual*. 20 ed. Washington, D.C: American Public Health Association; 2015.
2. Committee on Infectious Diseases, American Academy of Pediatrics. Section 3: Summaries of Infectious Diseases: *Yersinia enterocolitica* and *Yersinia pseudotuberculosis* 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.
3. Al-Khaldi S. *Yersinia enterocolitica*. In: Lampel KA, Al-Khaldi S, Cahill SM, editors. *Bad Bug Book, Foodborne Pathogenic Microorganisms and Natural Toxins*. 2 ed. Silver Spring, MD: U.S. Food and Drug Administration; 2012.
4. Health Protection and Promotion Act, R.S.O. 1990, Reg. 569, Reports, (2018). Available from: <https://www.ontario.ca/laws/regulation/900569>

[†] 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, 2017 or as current) for exclusion, available at: <https://www.oha.com/labour-relations-and-human-resources/health-and-safety/communicable-diseases-surveillance-protocols>

5. Ontario, Ministry of Health and Long-Term Care. Food Safety: Cook [Internet]. Toronto, ON: Queen's Printer for Ontario; 2008 [updated April 2, 2015; cited May 31, 2018]. Available from: <http://www.health.gov.on.ca/en/public/programs/publichealth/foodsafety/cook.aspx#4>
6. Ontario, Ministry of Health and Long-Term Care. Food Safety: Frequently Asked Questions [Internet]. Toronto, ON: Queen's Printer for Ontario; 2008 [updated December 24, 2015; cited May 31, 2018]. Available from: <http://www.health.gov.on.ca/en/public/programs/publichealth/foodsafety/faq.aspx#11>
7. 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
January 2014	General	New template. Section 9.0 Document History Added. Title of Section 4.5 changed from "Susceptibility and Resistance" to "Host Susceptibility and Resistance" 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"
January 2014	1.0 Aetiologic Agent	First ("Globally, <i>Y. enterocolitica</i> is the species...") and last ("Non-pathogenic strains of...") sentences added to second paragraph.
January 2014	2.2 Outbreak Case Definition	Addition of fifth bullet point ("Further strain typing (e.g., serotype)...")
January 2014	3.2 Diagnosis	Addition of direction to contact Public Health Ontario Laboratories or PHO website for additional information on human diagnostic testing.
January 2014	4.1 Occurrence	Entire section revised.

Revision Date	Document Section	Description of Revisions
January 2014	4.2 Reservoir	Addition of second sentence of second paragraph (“Y. enterocolitica has been isolated...”) and third paragraph (“Worldwide Y. pseudotuberculosis is primarily a zoonotic disease...”)
January 2014	4.3 Modes of Transmission	Addition of final two paragraphs (“Strains of Y. enterocolitica can be found in meats...” and “Y. enterocolitica persists longer in cooked foods...”).
January 2014	4.4 Incubation Period	Changed from “Probably 3-7 days, generally less than 10 days” to “Probably 3-7 days, generally less than 11 days”.
January 2014	6.1 Personal Prevention Measures	Addition of the following to the first bullet point: “For proper cooking temperatures, see the Ministry’s publication “Food Safety: Cook”...” Addition of the fourth bullet point (“Separate food preparation and child care responsibilities in relevant settings”). Addition of the final sentence (“For more food safety prevention measures, please see the Ministry’s food safety frequently asked questions available from...”).
January 2014	6.2 Infection Prevention and Control Strategies	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”. Addition of reference to PIDAC IPAC best practices documents.

Revision Date	Document Section	Description of Revisions
January 2014	6.3 Management of Cases	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”.
January 2014	6.5 Management of Outbreaks	<p>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”.</p> <p>Addition of the eighth bullet point: “Identify the origin of suspect food, along with the transportation, storage and preparation processes”.</p> <p>Addition of final two paragraphs.</p>
January 2014	7.0 References	Updated.
January 2014	8.0 Additional Resources	Updated.

Revision Date	Document Section	Description of Revisions
February 2019	General	Minor revisions were made to support the regulation change to Diseases of Public Health Significance. Common text included in all Disease Specific chapters: Surveillance Case Definition, Outbreak Case Definition, Diagnosis, Reporting Requirements, Management of Cases, and Management of Outbreaks. The epidemiology section and references were updated and Section 8.0 Additional Resources was deleted.
February 2019	4.1 Occurrence	Entire section revised.
February 2019	4.3 Modes of Transmission	Last paragraph added: "Nosocomial transmission of <i>Y. enterocolitica</i> has occurred, as has transmission by transfusion of stored blood from donors who were asymptomatic or had mild gastrointestinal illness."

