Ministry of Health and Long-Term Care

Infectious Diseases Protocol

Appendix A: Disease-Specific Chapters

Chapter: Cyclosporiasis

Effective: February 2019

Ontario

Cyclosporiasis

☒ Communicable

☐ Virulent

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

1.0 Aetiologic Agent

Cyclospora cayetanensis (C. *cayetanensis)* is a sporulating coccidian protozoan; oocysts (rather than cysts) are passed in stools and become infectious days to weeks following excretion.[1]

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

Watery diarrhea is the most common symptom and can be profuse and protracted. Anorexia, nausea, vomiting, substantial weight loss, flatulence, abdominal cramping, myalgia, and prolonged fatigue also can occur. Fever is rare. Infection usually is self-limited, but untreated people may have remitting, relapsing symptoms for weeks to months.[1] Individuals who are not treated may develop chronic complications including Guillain-Barré syndrome or Reiter's syndrome.[2] Biliary tract disease also has been reported.[1]

Asymptomatic infection has been documented most commonly in settings where cyclosporiasis is endemic.[1]

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

4.0 Epidemiology

4.1 Occurrence

C. cayetanensis is not endemic in Canada. Cyclosporiasis is most common in tropical and subtropical countries, where asymptomatic infections are not infrequent. It has also been associated with diarrhea in travelers to Asia, the Caribbean, and Latin America.[2]

Past outbreaks in Ontario have been caused by imported fresh berries, snow and sugar snap peas, herbs, and lettuce.[2,3]

In Ontario, cases of cyclosporiasis typically occur more often in the spring and summer. Previous clusters of cyclosporiasis have been associated with the consumption of imported fresh produce, including berries. Most sporadic cases have been associated with travel.[2]

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.

4.2 Reservoir

Humans are the only known hosts for *C. cayetanensis*.[1]

4.3 Modes of Transmission

Both foodborne and waterborne outbreaks have been reported. Most of the outbreaks in the United States and Canada have been associated with consumption of imported fresh produce.[1] Imported fresh fruits and vegetables, including basil, cilantro, raspberries, blackberries, mesclun lettuce, snow and snap peas, and pre-packaged salad mixes have been linked as sources of *Cyclospora* infection in Canada. *Cyclospora* is not naturally found in or on fresh fruits and vegetables, or any other foods. However, it is suspected that food contamination occurs during cultivation,

harvest, packaging or transportation through contact with contaminated water or infected workers.[3]

Direct person-to-person transmission is unlikely, as excreted oocysts take days to weeks under favorable environmental conditions to sporulate and become infective. The oocysts are resistant to most disinfectants used in food and water processing and can remain viable for prolonged periods in cool, moist environments.[1]

4.4 Incubation Period

Incubation period is approximately 7 days and ranges from 2 to 14 days.[1]

4.5 Period of Communicability

Direct person-to-person transmission is unlikely. Low-level shedding of oocysts is common, even in persons who are symptomatic.[4] Excreted oocysts take days to weeks under favorable environmental conditions to sporulate and become infective.[1]

4.6 Host Susceptibility and Resistance

Immunocompromised individuals appear more susceptible to infection; diarrhea can last for months in some patients.[2] If you have already had cyclosporiasis, you can get it after recovery if you are exposed to the parasite again.[3]

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);[5]
- 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

Prevention measures are similar to those for other enteric diseases.

- Wash hands after using sanitary facilities and before handling food
- Produce should be washed thoroughly before it is eaten, although this practice does not eliminate the risk of cyclosporiasis.[2]
- Thoroughly cooking or baking fruits and vegetables will eliminate the risk of infection.[3]
- Travelers, especially to developing countries, should avoid any fruits and vegetables that cannot be peeled or cooked and should drink water from a safe (treated or boiled) source.[3]

6.2 Infection Prevention and Control Strategies

Disseminate general public health education messages about hand hygiene and safe food handling.

Routine practices are recommended for hospitalized cases.

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 of cyclosporiasis to determine the source of infection. Refer to Section 5: Reporting Requirements above for relevant data to be collected during case investigation.

The disease is not endemic in Canada; therefore, cases should be investigated as most likely associated with imported food or travel.

Treatment is under the direction of the attending health care provider.

Provide education on hand hygiene, proper food handling practices and on preventing the spread of infection.

Exclusion Criteria:

- Exclude symptomatic food handlers, healthcare providers,[*] and day care staff and attendees until symptom free for 24 hours, OR symptom free for 48 hours after discontinuing use of anti-diarrheal medication.

The rationale for exclusion for 48 hours after discontinuing the use of anti-diarrheal medication is to ensure that diarrhea does not return after the anti-diarrheal medication has been discontinued. In the event that antibiotics are used, the person should be excluded until symptom free for 24 hours.

Note: Treatment recommendations are under the direction of the attending health care provider.

6.4 Management of Contacts

Exclude symptomatic persons epidemiologically linked to the same potential source of *Cyclospora* from food handling as per the exclusion specified above for cases.

[*] 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 criteria: https://www.oha.com/labour-relations-and-human-resources/health-and-safety/communicable-diseases-surveillance-protocols

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.

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: Cyclosporiasis. 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. Cyclosporiasis (Cyclospora) [Internet]. Ottawa, ON: Her Majesty the Queen in Right of Canada; 2017 [updated June 29, 2017; cited February 13, 2018]. Available from: https://www.canada.ca/en/public-health/services/diseases/cyclosporiasis-cyclospora.html
4. Centers for Disease Control and Prevention. Parasites - Cyclosporiasis (Cyclospora Infection): Resources for Health Professionals [Internet]. Atlanta, GA: U.S. Department of Health & Human Services 2018 [updated May 22, 2018; cited June 29, 2018]. Available from: https://www.cdc.gov/parasites/cyclosporiasis/health_professionals/index.html
5. Health Protection and Promotion Act, R.S.O. 1990, Reg. 569, Reports, (2018). Available from: https://www.ontario.ca/laws/regulation/900569

8.0 Document History

Table 1: History of Revisions

Revision Date	Document Section	Description of Revisions
December 2014	General	New template. Title of Section 4.6 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". Section 9.0 Document History added.
December 2014	1.0 Aetiologic Agent	Entire section revised.
December 2014	2.2 Outbreak Case Definition	Entire section revised.
December 2014	3.1 Clinical Presentation	Entire section revised.
December 2014	3.2 Diagnosis	Addition of last paragraph: "For further information about human diagnostic testing…"
December 2014	4.1 Occurrence	Entire section revised.
December 2014	4.2 Reservoir	"Confirmed natural infection in animals and humans has not been documented" changed to "Humans are the only known hosts for *C. cayetanensis*."
December 2014	4.3 Modes of Transmission	Entire section revised.
December 2014	4.4 Incubation Period	Changed from "…7 days with a range of 1 – 14 days" to "…7 days and ranges from 2 – 14 days".

Revision Date	Document Section	Description of Revisions
December 2014	4.5 Period of Communicability	Removal of: “The disappearance of symptoms and oocysts usually occurs simultaneously. The mean duration of organism shedding is 23 days.” Addition of: “Direct person-to-person transmission is unlikely. Low-level shedding of oocysts is common, even in persons who are symptomatic. Excreted oocysts take days to weeks under favorable environmental conditions to sporulate and become infective.”
December 2014	4.6 Host Susceptibility and Resistance	Removal of: “Available evidence is limited.” Addition of: “In immunocompromised individuals, diarrhea can last for months.”
December 2014	5.1 To Local Board of Health	At the beginning of the first paragraph, the following was deleted: “Confirmed and suspected cases...” and replaced with: “Individuals who have or may have cyclosporiasis…” Insertion of “…as soon as possible…”
December 2014	5.2 To the Ministry of Health and Long-Term Care (the Ministry) or Public Health Ontario (PHO), as specified by the Ministry	The following removed from the end of the first sentence: “to PHD”. Under the second paragraph the second bullet changed from: “The disease-specific User Guides published by the Ministry” to “The iPHIS User Guides published by PHO”. Under the third paragraph the end of the last bullet changed from: “the Ministry” to “PHO”.
December 2014	6.1 Personal Prevention Measures	Entire section revised.
December 2014	6.2 Infection Prevention and Control Strategies	Addition of new paragraph: “Routine practices are recommended for hospitalized cases.” Addition of reference to PHO’s website for PIDAC best practices.

Revision Date	Document Section	Description of Revisions
December 2014	6.3 Management of Cases	Addition of new paragraph: “The disease is not endemic in Canada therefore, cases should be investigated as most likely associated with imported food or travel.” Removal of paragraph: “Exclude symptomatic cases from food handling until 24 hours after cessation of symptoms.” Addition of all content from “Exclusion Criteria” to end of section.
December 2014	6.4 Management of Contacts	Removal of “Not applicable” and addition of: “Exclude symptomatic persons epidemiologically linked to the same potential source of Cyclospora from food handling as per the exclusion specified above for cases.”
December 2014	6.5 Management of Outbreaks	Deletion of: “As with most enteric diseases, an outbreak is defined as the occurrence of two or more cases of enteric illness linked by time, common exposure or source and most often location.” Insertion of “Two or more cases linked by time, common exposure, and/or place is suggestive of an outbreak.” Addition of reference to Ontario’s Foodborne Illness Outbreak Response Protocol (ON-FIORP).
December 2014	7.0 References	Updated.
December 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, Cyclosporiasis is designated a disease of public health significance and is now classified as communicable. 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	4.6 Host Susceptibility and Resistance	Entire section revised.
February 2019	6.1 Personal Prevention Measures	Deleted last bullet, “Freezing fruits and vegetables may kill parasites.”


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