

Appendix A: Disease-Specific Chapters

Chapter: Trichinosis

Effective: February 2019

Trichinosis

Communicable

Virulent

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

1.0 Aetiologic Agent

Trichinosis is a foodborne parasitic infection caused by the intestinal roundworm (a nematode), *Trichinella* spp., whose larvae migrate to muscles and become encapsulated in muscle tissues.¹⁻³ There are many species of *Trichinella* capable of causing infection in mammals but in Canada, the most common species causing human infection include *Trichinella spiralis*, *Trichinella nativa*, *Trichinella murrelli* and *Trichinella* genotype T6.^{1,3,4}

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

Clinical illness in humans is highly variable and can range from inapparent infection to a fulminating, fatal disease, depending on the number of larvae ingested.^{1,2}

Gastrointestinal symptoms, which appear shortly after infection, include abdominal discomfort, nausea, vomiting, and diarrhea. As larvae migrate into tissues, fever, myalgia, periorbital edema, urticarial rash, eosinophilia, and conjunctival and subungual hemorrhages may develop.^{1,2}

Cardiac and neurological complications may develop and may be fatal if severe.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

Worldwide, but variable in incidence, depending in part on practices of eating and preparing pork or wild animal meat, and the extent to which the disease is recognized and reported.¹ Cases are usually sporadic and outbreaks localized, often resulting from eating sausage and other meat products containing pork or from sharing meat from Arctic mammals.¹

Several outbreaks have been reported in France and Italy due to infected horse meat.¹

In Canada, the primary risk for acquiring trichinosis is through the consumption of undercooked or raw meat from wildlife species such as bears and walrus.⁵ Trichinosis is a rare disease in Ontario. From 2005 to 2016 there were 11 confirmed cases of trichinosis reported in the province, including seven cases reported in 2016.⁶

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

Swine, dogs, cats, horses, rats and many wild animals such as bear, wolves, foxes, wild boar, moose, polar bears, and marine mammals in the Arctic.¹

4.3 Modes of Transmission

Eating raw or undercooked meat of animals containing the *Trichinella* larvae, in particular pork, pork products, and wild animal products.¹

4.4 Incubation Period

Systemic symptoms usually appear about 8 – 15 days after ingestion of infected meat; this varies from 5 – 45 days, depending on the number of parasites involved. Gastrointestinal symptoms may appear within a few days.¹

4.5 Period of Communicability

Not transmitted person-to-person; animal hosts may remain infective for months and meat from these animals remains infective until the larvae are killed by freezing, sufficient cooking, or irradiation.¹

4.6 Host Susceptibility and Resistance

Susceptibility is universal; infection results in partial immunity.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);⁷
- 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:^{1,5}

- Educate food handlers, hunters, and the general public about proper food preparation in general and specifically about cooking pork and wild game thoroughly;
- All wild game meat, pork, pork products and horse meat should be cooked to an internal temperature of at least 71°C. Curing (salting), drying, smoking or microwaving the meat does not consistently kill infective larvae;
- Properly clean and sanitize utensils including meat grinders, chopping boards, and knives after use;
- Do not feed garbage (swill) to swine; and
- Use only certified trichinae-free pork in raw pork products.

6.2 Infection Prevention and Control Strategies

For hospitalized cases, routine precautions are recommended.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 about the illness and how to prevent spread.

Specific treatment is under the direction of the attending health care provider. Treatment mainly involves administration of anthelmintics such as pyrantel, albendazole, or mebendazole which are effective in the intestinal stage and muscle-stage trichinosis.^{1,4}

Albendazole is available through Health Canada’s Special Access Program (SAP): <https://www.canada.ca/en/health-canada/services/drugs-health-products/special-access/drugs/special-access-programme-drugs-1.html>

Additional information is available at: Guidance for Industry and Practitioners - Special Access Programme for Drugs Guidance Document (2013, or as current).⁸

6.4 Management of Contacts

None, unless exposed to the same source; not transmitted person-to-person.²

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 in time to a common exposure is suggestive of an outbreak. Geographical clustering of cases will depend on the distribution of the implicated food product.

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: Trichinellosis. 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. Gottstein B, Pozio E, Nöckler K. Epidemiology, diagnosis, treatment, and control of trichinellosis. *Clinical Microbiology Reviews*. 2009;22(1):127-45.
4. Government of Canada. Pathogen Safety Data Sheets: Infectious Substances – *Trichinella* spp. [Internet]. Ottawa, ON: Her Majesty the Queen in Right of Canada; 2010 [updated April 19, 2011; cited August 2, 2018]. Available from: <https://www.canada.ca/en/public-health/services/laboratory-biosafety-biosecurity/pathogen-safety-data-sheets-risk-assessment/trichinella.html>
5. Canadian Food Inspection Agency. Trichinellosis - Fact Sheet [Internet]. Ottawa, ON: Her Majesty the Queen in Right of Canada; 2013 [updated March 11, 2013; cited August 2, 2018]. Available from: <http://www.inspection.gc.ca/animals/terrestrial-animals/diseases/reportable/trichinellosis/fact-sheet/eng/1330023015817/1330023110684>
6. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Reportable Disease Trends in Ontario: Trichinosis [Internet]. Toronto, ON: Queen's Printer for Ontario; 2018 [updated March 29, 2018; cited August 2, 2018]. Available from: <https://www.publichealthontario.ca/en/DataAndAnalytics/pages/rdto.aspx#/57>
7. Health Protection and Promotion Act, R.S.O. 1990, Reg. 569, Reports, (2018). Available from: <https://www.ontario.ca/laws/regulation/900569>
8. Government of Canada. Guidance Document for Industry and Practitioners - Special Access Programme for Drugs [Internet]. Ottawa, ON: Her Majesty the Queen in Right of Canada; 2013 [updated February 2, 2014; cited August 2, 2018]. Available from: <https://www.canada.ca/en/health-canada/services/drugs-health-products/special-access/drugs/guidance-industry-practitioners-special-access-programme-drugs-health-canada-2008.html>

8.0 Document History

Table 1: History of Revisions

Revision Date	Document Section	Description of Revisions
December 2014	General	<p>New template.</p> <p>Title of Section 4.6 changed from “Susceptibility and Resistance” to “Host Susceptibility and Resistance”.</p> <p>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”.</p> <p>Section 9.0 Document History added.</p>
December 2014	1.0 Aetiologic Agent	<p>Change from “<i>Trichinella spiralis</i> (<i>T. spiralis</i>)” to “<i>Trichinella</i> spp”.</p> <p>Change from “...encapsulated in muscles” to “...encapsulated in muscle tissue.”</p> <p>Change from “...the <i>T. spiralis</i> is the most common cause of human infection” to “...in Canada, the most common species causing human infection include <i>T. nativa</i>, <i>T. murrelli</i> and <i>Trichinella</i> genotype T6.”</p>
December 2014	2.2 Outbreak Case Definition	Entire section revised.
December 2014	3.1 Clinical Presentation	Second paragraph: change from “Two to 8 weeks later...” to “One to several weeks later...”
December 2014	3.2 Diagnosis	<p>Paragraph removed: “Diagnosis is based on clinical presentation and epidemiological evidence and can be confirmed by blood tests and skeletal muscle biopsy. Skeletal muscle biopsy taken more than 10 days after infection (most often positive after the fourth or fifth week of infection) frequently provides conclusive evidence of infection. Serum antibody titres rarely become positive before the second week of illness; testing paired acute and convalescent serum specimens usually is diagnostic.”</p> <p>Paragraph removed: “Refer to the ministry of Health and Long Term Care, Public Health Laboratory. <i>Specimen Collection Guide, Testing Guidelines</i>, June 2008.”</p> <p>Addition of direction to contact Public Health Ontario Laboratories or PHO website for additional information on human diagnostic testing.</p>

Revision Date	Document Section	Description of Revisions
December 2014	4.1 Occurrence	Third paragraph: removal of “Only two cases were reported between the years 2003-2007” and addition of “Between 2007 and 2011 no cases of trichinosis were reported provincially.” Addition of direction to refer to PHO’s Monthly Infectious Diseases Surveillance Reports.
December 2014	4.3 Modes of Transmission	“Trichinella” italicized. End of paragraph: “...beef products” changed to “...wild animal products.”
December 2014	4.4 Incubation Period	“GI” changed to “Gastrointestinal”.
December 2014	4.5 Period of Communicability	Removal of “freezing” from list of methods of killing larvae at end of paragraph.
December 2014	5.1 To Local Board of Health	Entire section revised.
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 second paragraph the end of the last bullet changed from: “the ministry” to “PHO”.
December 2014	6.2 Infection Prevention and Control Strategies	Addition of reference to PHO’s website for PIDAC best practices.
December 2014	6.3 Management of Cases	Entire section revised.
December 2014	6.5 Management of Outbreaks	Second paragraph: addition of “ Geographic clustering of cases will depend on the distribution of the implicated food product ”.
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. 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	3.1 Clinical Presentation	Minor revisions to entire section.
February 2019	4.1 Occurrence	Entire section revised.
February 2019	4.2 Reservoir	Added: polar bears, and marine mammals in the Arctic
February 2019	4.5 Period of Communicability	Added: Freezing to kill larvae.
February 2019	6.1 Personal Prevention Measures	Bullet two revised from "Cook all pork and pork products to an internal temperature of 71° C" to " All wild game meat, pork, pork products and horse meat should be cooked to an internal temperature of at least 71° C. Curing (salting), drying, smoking or microwaving the meat does not consistently kill infective larvae."

