Appendix A: Disease-Specific Chapters

Chapter: *Echinococcus multilocularis* infection

Effective: May 2018
Disease

- Communicable
- Virulent

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

1.0 Aetiologic Agent

_Echinococcus multilocularis_ infection in humans is caused by the ingestion of eggs of the _E. multilocularis_ tapeworm. Once ingested, the eggs develop into the larval form, which grows as multiple, small budding cysts.

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. A time frame of occurrence;
3. A geographic location(s) or place(s) where cases live;
4. Special attributes of cases (e.g. age, underlying conditions); and
5. Occupation (e.g. trapper/hunter, wildlife worker, veterinarian).

Outbreak cases may be classified by levels of probability (i.e. confirmed and probable).

The occurrence of two or more cases linked in time and place to a common exposure is suggestive of an outbreak.

3.0 Identification

3.1 Clinical Presentation

Proliferation of the larval stage of _E. multilocularis_ produces a highly invasive, destructive disease called alveolar echinococcosis. Once clinical signs of alveolar echinococcus develop, lesions are usually found in the liver. As the growth of these lesions is not restricted by a thick laminated cyst wall, they expand at the periphery to produce solid, tumour-like masses. Metastases can result in secondary cysts and larval growth in other organs. Clinical manifestations depend on the size and location of cysts, but are often confused with hepatic carcinoma and cirrhosis.
3.2 Diagnosis

Diagnosis is complex and based on serodiagnosis for early stages of infection, and histopathology for later stages of infection, when lesions have become apparent in the liver or other organs.

Serologic testing for *E. multilocularis* is not performed in Canada. Rather, serum specimens with a requisition for "alveolar hydatid" or "E. multilocularis" are sent for reference laboratory testing in Switzerland, after approval of the request by the PHO Laboratory.

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](http://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/default.aspx).

See Appendix B for diagnostic criteria relevant to Case Definitions.

4.0 Epidemiology

4.1 Occurrence

Historically, *E. multilocularis* was thought to occur in Canada in two zones: northern tundra regions equivalent to the range of arctic fox populations; and a central endemic zone including parts of Alberta, Saskatchewan and Manitoba, and extending southward into 13 contiguous states of the US.¹

Prior to 2009, *E. multilocularis* had never been diagnosed in a dog in Canada. However, in 2009, hepatic alveolar echinococcosis was diagnosed in a 3 year old dog that had never been outside British Columbia. In 2012, a second case was diagnosed in a 2 year old dog that resided in southern Ontario and a third case was diagnosed in a 4 year old dog that lived in Alberta and Manitoba. Between 2013 and 2018, five additional cases were diagnosed in southern Ontario. None of the 8 dogs were related, none had any travel history outside of Canada, and 6 of the dogs had lived their entire lives in provinces where *E. multilocularis* had never been diagnosed prior to the occurrence of these cases. Since then, alveolar echinococcosis has also been identified in two lemurs, who were allowed to roam outdoors in southern Ontario and were coming into contact with wildlife.

A research study conducted by the University of Guelph in 2015-2017 confirmed that *E. multilocularis* has become established in coyote and fox populations across southern Ontario, with potential hotspots of higher rates of infection in some health units.

Passive wildlife surveillance also identified *E. multilocularis* infection in a chipmunk from southern Ontario in 2016, further confirming that all stages of the tapeworm’s lifecycle are now present in the Ontario environment.

While alveolar echinococcosis in humans was not reportable prior to 2018, data from the Canadian Institute for Health Information indicate that there have been at least three human cases of alveolar echinococcosis diagnosed in Ontario since 2014.
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.²
http://www.publichealthontario.ca/en/DataAndAnalytics/Pages/DataReports.aspx

4.2 Reservoir

*E. multilocularis* eggs are shed into the environment primarily by foxes and coyotes with gastrointestinal infections with adult tapeworms. Dogs and cats that become infected from hunting wild rodents (such as mice, rats, voles, chipmunks, etc.) can also be sources of human infection.³

4.3 Modes of Transmission

Ingestion of eggs passed in the feces of foxes, coyotes, dogs or cats that have fed on infected rodents. Fecally soiled dog hair and other environmental fomites also serve as vehicles of infection.³

4.4 Incubation Period

Infection of humans with *E. multilocularis* is characterized by an initial asymptomatic incubation period of 5 to 15 years.¹

4.5 Period of Communicability

*E. multilocularis* eggs are highly resistant, and may remain infective for approximately one year in a suitable, moist environment at lower temperatures.¹ There is no person to person transmission.

4.6 Host Susceptibility and Resistance

Susceptibility is general. Due to the long incubation period, alveolar echinococcosis usually affects adults.³

5.0 Reporting Requirements

As per Requirement #3 of the “Reporting of Infectious Diseases” section of the *Infectious Disease 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 integrated Public Health Information System (iPHIS) User Guides published by PHO; and
- Bulletins and directives issued by PHO.
6.0 Prevention and Control Measures

6.1 Personal Prevention Measures

Education of both pet owners and individuals in high risk occupations (veterinary staff, wildlife workers, hunters and trappers, etc.) about the lifecycle of the parasite and risks of exposure to *E. multilocularis* eggs is an important preventive measure.

Hunters and trappers handling foxes, coyotes or other wild canids should wear plastic gloves when handling these animals or their carcasses.

Wild fruits and vegetables should not be collected from the ground or eaten. All wild-picked foods should be washed carefully or cooked before being eaten.

All dogs and cats having access to wild rodents in areas known to be endemic for *E. multilocularis* should be dewormed monthly with praziquantel to reduce the risk of exposure to parasite eggs in household environments. Pet owners should prevent dogs and cats from eating rodents.

Regular, frequent hand hygiene after handling pets and their feces, and before handling food, can reduce the risk of transmission to humans. Areas inhabited by dogs and cats with known *E. multilocularis* infections should be decontaminated to prevent risk of exposure to parasitic eggs on surfaces such as pet beds, floors, carpets and car interiors.

6.2 Infection Prevention and Control Strategies

Biological samples containing living larval stages of *E. multilocularis* could be infective to humans if accidentally injected into a person. Therefore, precautions should be taken with regard to correct handling and disposal of needles, scalpel blades and glassware.\(^1\)

Routine practices are recommended for hospitalized cases.

Refer to Public Health Ontario’s website at www.publichealthontario.ca to search for the most up-to-date information on Infection Prevention and Control (IPAC).

6.3 Management of Cases

In addition to the requirements set out in the requirements #2 of the “Management of Infectious Diseases – Sporadic Cases” and “Investigation and Management of Infectious Disease Outbreaks” sections of the *Infectious Disease Protocol, 2018*, (or as current), the Board shall inquire about the following disease-specific information during the investigation:

- Date of symptom onset;
- History of travel to endemic areas;
- Occupation; and
- History of exposure to potential definitive hosts, including foxes, coyotes, wolves, dogs and cats, and/or their feces.

Treatment is under the direction of the attending health care provider. All patients require treatment.
Provide cases with information about the infection and how it is transmitted, as listed above.

6.4 Management of Contacts

None, except if exposed to same source. Contacts exposed to the same source should be assessed for serological testing to monitor for antibodies to *E. multilocularis*. For confirmed cases of alveolar echinococcosis, close family members and associates should be examined for suspicious cysts or tumours using ultrasound, X-ray or other imaging modalities.

6.5 Management of Outbreaks

An outbreak is defined as two or more cases linked in time.

Please see the *Infectious Disease Protocol, 2018*, (or current) for steps in managing outbreaks.

7.0 References


8.0 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>March 2018</td>
<td>Entire appendix developed.</td>
<td><em>E</em> multilocularis was designated as a disease of public health significance effective May 1, 2018.</td>
</tr>
</tbody>
</table>