Ministry of Health and Long-Term Care

Infectious Diseases Protocol

Appendix A: Disease-Specific Chapters

Chapter: Blastomycosis

Effective: February 2019

Ontario

Blastomycosis

☒ Communicable

☐ Virulent

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

1.0 Aetiologic Agent

Blastomyces dermatitidis (*B. dermatitidis*) and *Blastomyces gilchristii*, are thermally dimorphic fungi. Both grow as a mould (or mycelial/filamentous) form at 25°C ("room temperature"), and as a yeast form at 37°C ("body temperature"). Upon entering the body from the environment, the mould transforms into the yeast-phase as part of the adaptation process to a new environment with an elevated temperature. Unlike other fungi which are considered opportunistic pathogens, the dimorphic fungi, including *Blastomyces* spp. are considered true pathogens and can cause disease in otherwise healthy individuals.[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).

In areas not known to be endemic for *Blastomyces* spp., the occurrence of two or more cases linked to a common location is suggestive of an outbreak. In areas endemic for blastomycosis, an outbreak would be an increase in case numbers above expected levels.

3.0 Identification

3.1 Clinical Presentation

Blastomycosis is a fungal infection that primarily affects the lungs, but can become a systemic infection with extrapulmonary manifestations.[2] Up to 50% of pulmonary cases remain asymptomatic.[3] Pulmonary blastomycosis may be acute or chronic.[2]

Acute pulmonary infection, which often goes undiagnosed, presents as an influenza-like illness with the sudden onset of fever, cough, and a pulmonary infiltrate on chest radiographs. The acute disease often resolves spontaneously after 1-3 weeks.[2] A subset of those with acute infection will go on to severe disease and acute respiratory distress syndrome (ARDS).[4]

Chronic pulmonary infection has a slow onset where initial symptoms of cough and chest pain may be mild or absent. Clinical manifestations may include 2 to 6 months of weight loss, fever, night sweats, cough with sputum and chest pain, and may be similar to tuberculosis, other fungal infections and cancer. There is a very high mortality rate for patients who develop ARDS with chronic pulmonary infection.[4,5]

Extrapulmonary disease can occur in patients with blastomycosis, but is more common in patients with chronic pulmonary infection. The most common extrapulmonary site for infection is the skin (cutaneous lesions are often located on the face and distal extremities). Other common sites include bone, the genitourinary system, and the central nervous system, but any system can be affected.[2,4] Untreated, chronic and extrapulmonary blastomycosis can eventually progress to death, and a high index of suspicion is required for prompt treatment of all disease to prevent progression.[2,4]

While both immunocompetent and immunocompromised persons can develop illness due to *Blastomyces* spp., persons who are immunocompromised are more likely to develop severe disease and have higher mortality.[4]

Primary cutaneous blastomycosis is rare, but can occur following direct inoculation (*i.e.*, traumatic puncture) of infected material into the skin.[5] Skin lesions in primary cutaneous blastomycosis are similar in appearance to those caused by extrapulmonary disease affecting the skin.[6] Verrucous (rough, warty) and/or ulcerative lesions usually appear on the face, trunk and extremities.[2]

3.2 Diagnosis

See Appendix B for diagnostic criteria relevant to the Case Definition.

For further information about human diagnostic testing including fungal culture, 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

Blastomycosis is relatively uncommon, although cases have been identified in Ontario Manitoba, Quebec and Saskatchewan.[7] A study of blastomycosis hospitalization in northwestern Ontario from 2006–2015 found high rates of blastomycosis in northwestern Ontario with cases identified across Ontario at varying levels by region.[8]

Outside of Canada, endemic areas are found in the southern and southeastern United States (especially those bordering the Mississippi and Ohio river basins), the midwestern states that border the Great Lakes, and an area in New York State along the St. Lawrence River. Cases have also been reported in Africa, Central America, South America, India and the Middle East.[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

Soil is the only known reservoir. *Blastomyces* spp. have been found in moist soil along waterways, and in undisturbed places, such as under porches or sheds.[2]

4.3 Modes of Transmission

Inhalation of airborne spores in dust from the mould or saprophytic growth forms.[2] Cases of blastomycosis from direct inoculation into the skin are rare, but can occur.[6]

No person-to-person transmission or zoonotic transmission. Infection in animals, particularly dogs, has been identified, but animals do not appear to directly transmit the disease to humans.[2]

4.4 Incubation Period

The incubation period ranges between 21-106 days, with a median of 43 days.[9]

4.5 Period of Communicability

No person-to-person transmission, nor zoonotic transmission from infected animals.[2]

It is not known how long spores can retain their infectivity.[10]

4.6 Host Susceptibility and Resistance

People who participate in occupational and recreational outdoor activities in wooded areas (such as forestry work, hunting, and camping) in endemic areas may be at higher risk of exposure to *Blastomyces* spp. Susceptibility is general in areas where *B. dermatitidis* is present in the environment.[3,5] Immunocompromised individuals have higher morbidity and mortality with blastomycosis infection.[2]

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);[11]
- 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

The effectiveness of personal preventive measures to reduce inhalation exposure is unknown.[2]

In areas of Ontario where *Blastomyces* spp. are known to be present, the risk of infection may be reduced by avoiding activities that cause disruption of soil; this is particularly important for individuals with compromised immune systems.

6.2 Infection Prevention and Control Strategies

Decontamination of sites of exposure is not possible, and soil testing is not reliable. Early diagnosis and treatment of disease are therefore important control strategies.

In areas known to be endemic, boards of health may consider periodic education reminders to health care providers ahead of the peak occurrence of blastomycosis in October-December. Raising awareness among health care providers may increase the index of suspicion for blastomycosis and enable earlier diagnosis and treatment for patients.

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 requirements #2 of the "Management of Infectious Diseases – Sporadic Cases" and "Investigation and Management of

Infectious Disease Outbreaks" sections of the *Infectious Diseases Protocol, 2018* (or as current), the board of health shall exercise a high index of suspicion given the non-specific clinical presentation of disease. Early treatment is recommended to prevent morbidity and mortality.[4]

Treatment is under the direction of the attending health care provider. Most patients will require treatment. Treatment is indicated for all patients with progressive pulmonary or extrapulmonary diseases as well as those patients who are immunocompromised. Therapeutic options for blastomycosis have been described in a guideline by the Infectious Disease Society of America.[4]

Consideration of the appropriateness of detailed case follow-up is based on local epidemiology of blastomycosis and knowledge of local endemic areas. Detailed follow-up of cases occurring in areas that are not known to be endemic for *Blastomyces* spp. supports provincial surveillance for new and emerging risk areas for exposure.

Provide cases with information about the infection and how it spreads as listed above.

6.4 Management of Contacts

None, except if exposed to the same source; then manage contacts as indicated above in Management of Cases and monitor contacts for clinical signs and symptoms of blastomycosis. Contacts should seek medical attention if they display signs and symptoms of blastomycosis.

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.

In areas not known to be endemic for *Blastomyces* spp., the occurrence of two or more cases linked to a common location is suggestive of an outbreak. In areas endemic for blastomycosis, an outbreak would be an increase in the number of cases above expected levels.

7.0 References

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8.0 Document History

Table 1: History of Revisions

Revision Date	Document Section	Description of Revisions
March 2018	Entire appendix developed.	Blastomycosis was designated as a disease of public health significance effective May 1, 2018.
February 2019	General	Common text included in all Disease Specific chapters: Surveillance Case Definition, Outbreak Case Definition, Diagnosis, Reporting Requirements, Management of Cases, and Management of Outbreaks.


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