

Ontario Public Health Standards:
Requirements for Programs, Services and Accountability

Infectious Disease Protocol

Appendix 1:

Case Definitions and Disease-Specific Information

Disease: Anthrax

Effective: May 2023

Anthrax

Communicable

Virulent

[Health Protection and Promotion Act \(HPPA\)](#)¹

[Ontario Regulation \(O. Reg.\) 135/18 \(Designation of Diseases\)](#)²

Provincial Reporting Requirements

Confirmed case

Probable case

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:

- [O. Reg. 569](#) (Reports) under the HPPA;
- The iPHIS User Guides published by Public Health Ontario (PHO); and
- Bulletins and directives issued by PHO.^{3,4}

Type of Surveillance

Case-by-case

Case Definition

Confirmed Case

Laboratory confirmation of infection with clinically compatible signs and symptoms:

- Culture of *Bacillus anthracis* (*B. anthracis*) from a clinical specimen (e.g., blood)

OR

- Identification of *B. anthracis* in a clinical specimen (e.g., blood) using the fluorescent antibody technique

Probable Case

Clinically compatible signs and symptoms in a person in whom *B. anthracis* deoxyribonucleic acid (DNA) is detected and with an epidemiologic link to a confirmed case or suspected source.

Outbreak Case Definition

Given the severity of disease and rarity of anthrax in Ontario, in the absence of travel-related or foreign exposure, a single confirmed case constitutes an outbreak.

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.³

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).

Clinical Information

Clinical Evidence

Four clinical forms are recognized: cutaneous, inhalational, gastrointestinal and injection:

- With the cutaneous form, the skin begins to itch and a papule appears at the inoculation site, followed by formation of a vesicle. Within two to six days the vesicle develops into a depressed black eschar accompanied by swelling. If inoculation site involves face or neck, swelling may involve obstruction of airway. Untreated infections can spread to lymph nodes or meninges and result in septicemia.

- The inhalational form begins with fever, malaise, a mild cough or chest pain. Three to four days later the symptoms of respiratory distress appear (including cyanosis, shock and excessive sweating), followed by death.
- Gastrointestinal anthrax is rare and usually occurs in food poisoning outbreaks where patients experience abdominal pain, nausea and vomiting, followed by fever, septicemia and death.
- Injection anthrax has never been reported in Canada but occurs in patients with a history of heroin use, and case presentation has been varied. Most cases present with serious localized soft tissue infections accompanied by soft tissue edema. Fever is not a prominent feature, and pain is less severe than with other serious soft tissue infections. Not all cases have localized injection-related lesions; some have presented with features more typical of systemic anthrax infections.

Clinical Presentation

Depending on the route of transmission, anthrax infection can result in four clinical syndromes: cutaneous, inhalation, gastrointestinal, and injection.⁵

Cutaneous anthrax is characterized by initial itching of the exposed skin surface; an initial vesicle at the site of inoculation develops into a painless black eschar; fever, malaise and headache may be present.⁵

Inhalational anthrax is the most lethal form of disease. Initial presentation includes fever, malaise, mild cough, dyspnea, nausea or vomiting, and this is followed by acute onset of respiratory distress and shock; there is also radiological evidence of mediastinal widening and pleural effusion present.^{5,6}

Gastrointestinal anthrax cases present with acute nausea, vomiting, abdominal distension, pain, fever, gastrointestinal (GI) bleeding and peritonitis.⁵

Injection anthrax cases, associated with heroin use, have emerged in recent years and have been seen in heroin-injecting drug users in northern Europe. This type of infection has never been reported in Canada. Patients with injection anthrax have not presented with typical symptoms associated with the preceding three classical

forms of anthrax. Most patients have serious localized soft tissue infections accompanied by significant soft tissue edema. Fever is not a prominent feature and pain is less severe than with other serious soft tissue infections. Not all cases have localized injection-related lesions; some cases have presented with symptoms more typical of systemic anthrax infections.⁵ Injection anthrax can spread throughout the body faster and be harder to recognize and treat. Many other more common bacteria can cause skin and injection site infections, so a skin or injection site infection in a drug user does not necessarily mean the person has anthrax.⁷

Systemic illness can result from hematogenous and lymphatic dissemination with any form of anthrax. Anthrax meningitis can occur in any patient with systemic illness and in patients without other apparent clinical presentations.⁶ Anthrax meningitis begins with hypotension, quickly followed by delirium or coma; refractory seizures, cranial nerve palsies, and myoclonus have been reported. Case fatality rate for meningitis exceeds 90%.⁶

Laboratory Evidence

Laboratory Confirmation

Any of the following will constitute a confirmed case of Anthrax:

- Positive *B. anthracis* culture with confirmation (See Approved/Validated Tests section)
- Positive *B. anthracis* direct fluorescent antibody (DFA) test

Approved/Validated Tests

- Standard culture for *B. anthracis* with confirmation
- DFA for *B. anthracis*
- Nucleic acid amplification test (NAAT) for *B. anthracis*
- Confirmatory methods include combinations of Gram stain, motility, morphology, haemolysis, spores, demonstration of capsule and lysis by gamma phage

Potential for false negative NAAT exists if virulence gene is lacking.

Laboratory demonstration of *B. anthracis* obtained from blood, cerebrospinal fluid, pleural fluid, ascitic fluid, vesicular fluid or lesion exudate.^{5,6} For further information about human diagnostic testing, contact the [Public Health Ontario Laboratories](#).

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 ensure every case is followed up as soon as possible to determine the source of exposure and eliminate the potential that the case is a result of bioterrorism.³

Suspicious packages should be reported to local police enforcement to coordinate testing at [Public Health Ontario Laboratories](#).

Case Investigation and follow-up will be done in consultation with the Ministry of Health (ministry), PHO and the Public Health Agency of Canada.

Management of cases should also include contacting the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), if exposure to infected livestock is considered the likely source.

Epidemiological investigation:

Information that must be reported to the medical officer of health is specified in [O. Reg. 569](#) under the HPPA.⁴

Investigate cases of anthrax to determine the source of infection, whether other cases may have been exposed to any identified source, and to determine whether bioterrorism is a possibility. Refer to Provincial Reporting Requirements above for relevant data to be collected during case investigation. The following disease-specific information should also be obtained during case management:

- Symptoms and date of symptom onset
- History of out-of-province and international travel
- History of exposure including contact with ruminants that have died acutely

- Earliest and latest exposure dates
- Occupation

Exposure investigation:

In collaboration with the ministry and PHO:

- Determine what samples of suspected sources to collect for laboratory analysis
- Determine appropriate sampling medium and techniques
- Inspect premises associated with illness

Provide information related to anthrax, including information on transmission and on risk factors.

Treatment of the case should be under the direction of an infectious disease specialist. Refer to the resources and references listed below for more information on treatment.^{8,9} Any requests for the use of anthrax antitoxin (anthrax immune globulin) from the National Emergency Strategic Stockpile must be made through the Health Services Emergency Management Branch (HSEMB) of the Ministry of Health.

In collaboration with the ministry and PHO, determine what communication and notification is required about the case.

Note: Given the potential for the appearance of anthrax cases to signal a bioterrorism incident, investigation and follow-up may involve notification of law enforcement. If tampering, sabotage or bioterrorism is suspected, the health unit shall immediately notify their local police service and the HSEMB Health Care Provider Hotline at 1-866-212-2272.. A bioterrorism event would trigger activation of the provincial emergency operations centre, including the Health System Emergency Management Branch of the ministry and relevant health emergency response plans, as well as those additional ministries with responsibilities for security, law enforcement, or other relevant areas of concern, as identified in the [Emergency Management and Civil Protection Act](#) and associated Order in Council. The [Ministry Emergency Response Plan \(MERP\)](#) provides information on how the ministry would respond to a health

emergency.^{10,11} Any requests for federal supplies of medical counter-measures for an anthrax bioterrorism incident must be made through HSEMB. The Provincial Emergency Operations Centre (PEOC) can be contacted by email at EOCOperations.MOH@ontario.ca.

Contact Management

Although there is no person-to-person transmission, there could be a possibility of exposure to a common source; consultation with infectious disease experts may be prudent for decisions with regard to the use of antibiotics for post-exposure prophylaxis.

Outbreak Management

Please see the *Infectious Diseases Protocol, 2018*, (or as current) for steps in managing outbreaks.³ A single case of anthrax should be managed with great urgency. If there is suspicion of a bioterrorism event, notify the Office of the Fire Marshall and Emergency Management.

In the absence of travel-related or foreign exposure, one case should be considered an outbreak.

In addition to the *Infectious Diseases Protocol, 2018* (or as current), the following should be considered:

- Active identification and follow-up of cases and persons exposed to a common source of infection
- Alerts for medical community and hospitals
- Public information and communication plans
- Control of contacts, including field workers involved in the implementation of environmental control measures
- Environmental control measures³

The OMAFRA should also be involved where the source of infection is determined to be livestock.

Prevention and Control Measures

Personal Prevention Measures

Preventive measures include but are not limited to:

- Education about the modes of transmission, care of skin abrasions, and hand washing to members of the public visiting areas where anthrax is known to exist
- Education regarding the importance of hand washing after touching animals in petting zoos, on farms, etc.
- Controlling the disease in animals at risk through maintenance of active immunization and treatment of active animal cases
- Immunizing high risk individuals such as laboratory workers and animal handlers, where indicated. Note: anthrax vaccine (BioThrax®, anthrax vaccine adsorbed) for the prevention of disease caused by *Bacillus anthracis*, is approved by Health Canada under Extraordinary Use New Drug Regulations, for these limited indications.
- Use of proper ventilation in hazardous industries and the use of protective clothing and equipment, where indicated
- Avoiding contact with any suspicious or unknown powdery substances if bioterrorism is suspected^{5,8}

Infection Prevention and Control Strategies

Strategies:

- For hospitalized persons routine practices are recommended
- Persons who may have been exposed to anthrax are not contagious, so quarantine is not appropriate
- Persons with open and/or draining lesions should be cared for using contact precautions. Dressings with drainage from the lesions should be incinerated, autoclaved, or otherwise disposed of as biohazard waste

- Controlling the disease in animals at risk through maintenance of active immunization and treatment of active animal cases^{5,6}

Refer to PIDAC Routine Practices and Additional Practices in All Health Care Settings, 3rd edition (2012, or as current).¹²

Refer to [PHO's website](#) to search for the most up-to-date information on Infection Prevention and Control (IPAC).

Disease Characteristics

Aetiologic Agent - Bacterium *Bacillus anthracis* (*B. anthracis*); an aerobic, gram-positive, encapsulated, spore forming, non-motile rod.⁵ Anthrax can result from natural infection or secondary to a bioterror event.⁶

Modes of Transmission - Transmission occurs by inoculation through open skin via contact with infected animal tissue, other animal products (especially animal skins), and contaminated soil; by ingestion of undercooked, contaminated or raw meat; and following injection of drugs (e.g. heroin) that have been contaminated with anthrax spores.^{5,6} Inhalational anthrax results from the inhalation of anthrax spores, particularly in risky industrial settings such as animal skin processing facilities, or as a result of a bioterrorist incident.⁵

Incubation Period - From 1-7 days, although incubation periods of up to 60 days are possible.⁵

Period of Communicability - Person-to-person transmission is rare. Articles and soil contaminated with spores may remain infective for years.⁵

Reservoir - The main reservoirs of anthrax are animals, both livestock and wildlife, as well as soil where anthrax spores may remain dormant for years and are a potential source of infection for grazing livestock, particularly in the wake of periods of intense precipitation followed by drought.⁵ The skins, hides, hair, and other products from infected animals may pose a risk to those coming into contact with them.⁵

Host Susceptibility and Resistance - There is some evidence of inapparent infection among individuals in frequent contact with the infectious agent. Post-infective immunity may be incomplete, and subsequent reinfections may occur, though reports of such second attacks are rare.⁵

Please refer to [PHO's Reportable Disease Trends in Ontario reporting tool](#) for the most up-to-date information on infectious disease trends in Ontario.

For additional national and international epidemiological information, please refer to the Public Health Agency of Canada and the World Health Organization.

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Document History

Revision Date	Document Section	Description of Revisions
April 2022	Entire Document	New template. Appendix A and B merged. No material content changes.
April 2022	Epidemiology: Occurrence section	Removed.
April 2022	ICD Codes	Removed.
March 2023	Bioterrorism	Addition of bioterrorism guidelines.
May 2023	Exposure Investigation	Addition of contact information.