Anthrax
- Communicable
- Virulent

Health Protection and Promotion Act:
Ontario Regulation 558/91 – Specification of Communicable Diseases
Health Protection and Promotion Act:
Ontario Regulation 559/91 – Specification of Reportable Diseases

1.0 Aetiological Agent

The aetiological agent of anthrax is the bacterium *Bacillus anthracis* (*B. anthracis*), an aerobic, Gram-positive, encapsulated, spore forming, non-motile rod.\(^1\)

*B. anthracis* is a potential bioterrorism agent.

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. The time frame of occurrence;
3. The geographic location(s) or place(s) where cases live or became ill/exposed; and,
4. Special attributes of cases (e.g. age, underlying conditions and/or aetiological agent).

Outbreak cases may be classified by levels of probability (*i.e.* confirmed, probable and/or suspect).

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.

3.0 Identification

3.1 Clinical Presentation

Depending on the route of transmission, anthrax infection can result in three clinical syndromes: cutaneous, inhalation and gastrointestinal.\(^2\)

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.
Inhalational anthrax is the most lethal form of disease. Initial presentation includes sweats, 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. The case fatality rate is extremely high. Anthrax meningitis begins with hypotension, quickly followed by delirium or coma; refractory seizures, cranial nerve palsies, and myoclonus have been reported.

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

Recently, another type of anthrax infection has been identified in heroin-injecting drug users in northern Europe. This type of infection has never been reported in Canada. Symptoms may be similar to those of cutaneous anthrax, but there may be infection deep under the skin or in the muscle where the drug was injected. 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.³

3.2 Diagnosis

Laboratory demonstration of B. anthracis obtained from blood, CSF, pleural fluid, ascitic fluid, vesicular fluid or lesion exudate.¹

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.publichealhtontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/default.aspx

See Appendix B for diagnostic criteria relevant to Case Definitions.

4.0 Epidemiology

4.1 Occurrence

Anthrax is primarily a disease of herbivores; humans and carnivores are incidental hosts. In most industrialized countries, anthrax is an infrequent and sporadic human infection.¹

The occurrence of anthrax outbreaks in Canadian wild bison and livestock appear linked to climatic factors, particularly intense precipitation followed by drought.⁴ Anthrax is infrequently found in Ontario livestock, with the last positive cases diagnosed in cattle herds in northwestern Ontario in 2006, and southern Ontario in 1996.

Human cases of anthrax have not been reported in Ontario since 1990.

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.⁵ ⁶ http://www.publichealhtontario.ca/en/DataAndAnalytics/Pages/DataReports.aspx.

4.2 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.

4.3 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. 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.

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

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

4.6 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.

5.0 Reporting Requirements

5.1 To local Board of Health
Individuals who have or may have anthrax shall be reported as soon as possible to the medical officer of health by persons required to do so under the Health Protection and Promotion Act, R.S.O. 1990 (HPPA).

5.2 To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry
The board of health shall notify PHO immediately by phone upon receiving a report of a confirmed probable or suspect case of anthrax.

Cases shall also be reported using the integrated Public Health Information System (iPHIS), or any other method specified by the ministry within one (1) business day of receipt of initial notification as per iPHIS Bulletin Number 17: Timely Entry of Cases and Outbreaks. The minimum data elements to be reported for each case are specified in the following sources:

- Ontario Regulation 569 (Reports) under the HPPA;
- 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 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
- 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

6.2 Infection Prevention and Control Strategies
Strategies:

- For hospitalized persons routine practices are recommended.2
- 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

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

Refer to Public Health Ontario’s website at www.publichealthontario.ca to search for the most up-to-date Provincial Infectious Diseases Advisory Committee (PIDAC) best practices on Infection Prevention and Control (IPAC). PIDAC best practice documents can be found at: http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/PIDAC_Documents.aspx

6.3 Management of Cases
Every case should be followed up as soon as possible to determine the source of exposure and eliminate the potential that the case is a result of bioterrorism.
Case Investigation and follow-up will be done in consultation with the Public Health Division, MOHLTC, 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).

**Epidemiological investigation:**

Information that must be reported to the medical officer of health is specified in *Ontario Regulation 569* under the HPPA.\(^9\)\(^7\)

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 Section 5: 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 PHD 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 diseases specialist. Refer to the resources and references listed below for more information on treatment.

In collaboration with the PHD 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 the activation of the emergency management system in place in the province, including the Emergency Management Branch of the Ministry of Health and Long-Term Care 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 an emergency. Please see the following link for further information:
6.4 Management of Contacts

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 post-exposure prophylaxis.

6.5 Management of Outbreaks

A single case of anthrax should be managed with great urgency. If there is suspicion of a bioterrorism event, notify Emergency Management Ontario.

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

Consider the following outbreak control measures:

- Coordination with appropriate emergency services (e.g. Emergency Management Ontario and the police force)
- 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 measures

The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) should also be involved.

As per the Infectious Diseases Protocol, 2008 (or as current), outbreak management shall be comprised of, but not limited to, the following general steps:

- Confirm diagnosis and verify the outbreak
- Establish an outbreak team
- Develop an outbreak case definition
- Implement prevention and control measures
- Implement and tailor communication and notification plans, depending on the scope of the outbreak
- Conduct epidemiological analysis on data collected
- Conduct environmental inspections of implicated premise where applicable
- Coordinate and collect appropriate clinical specimens where applicable
- Prepare a written report
• Declare the outbreak over in collaboration with the outbreak team

7.0 References


8.0 Additional Resources


### 9.0 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>December 2014</td>
<td>General</td>
<td>New template.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Title of Section 4.6 changed from “Susceptibility and Resistance” to “Host Susceptibility and Resistance”.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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”.</td>
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<tr>
<td></td>
<td></td>
<td>Section 9.0 Document History added.</td>
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<tr>
<td>December 2014</td>
<td>1.0 Aetiologic Agent</td>
<td>Second paragraph, “bioterrorist” replaced with “bioterrorism”.</td>
</tr>
<tr>
<td>December 2014</td>
<td>2.2 Outbreak Case Definition</td>
<td>Paragraph one, sentence two, changed from “Consideration should be given to the following in establishing an outbreak case definition” to “Consideration should be given to the provincial surveillance case definition and the following criteria when establishing an outbreak case definition”.</td>
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<tr>
<td></td>
<td></td>
<td>Paragraph two changed from “Cases may be classified by levels of probability (e.g. confirmed, probable or suspect) to “Outbreak cases may be classified by levels of probability (i.e. confirmed, probable and/or suspect).”</td>
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<tr>
<td></td>
<td></td>
<td>Addition of a third paragraph, “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.”</td>
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<tr>
<td>December 2014</td>
<td>3.1 Clinical Presentation</td>
<td>Paragraph one changed from “Depending on the route of transmission of infection, anthrax disease can result in four clinical syndromes: cutaneous, inhalation, intestinal and oropharyngeal” to “Depending on the route of transmission, anthrax infection can result in three clinical syndromes: cutaneous, inhalation and gastrointestinal.”</td>
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<tr>
<td>December 2014</td>
<td>3.2 Diagnosis</td>
<td>Paragraph three, sentence three, changed from “Fatality rate is extremely high” to “The case fatality rate is extremely high.” Paragraph four changed from “Intestinal anthrax presents in acute vomiting, abdominal distension, GI bleeding, and peritonitis” to “Gastrointestinal anthrax cases present with acute vomiting, abdominal distension, gastrointestinal (GI) bleeding and peritonitis.” Deletion of “Symptoms of oropharyngeal anthrax include fever, neck swelling due to lymphadenopathy, throat pain, oral ulcers and sepsis.” New paragraph added, “Recently, another type of anthrax infection has been identified in heroin-injecting drug users in northern Europe. This type of infection has never been reported in Canada. Symptoms may be similar to those of cutaneous anthrax, but there may be infection deep under the skin or in the muscle where the drug was injected. 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.”</td>
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<td>December 2014</td>
<td>4.1 Occurrence</td>
<td>Entire section revised.</td>
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<tr>
<td>December 2014</td>
<td>4.2 Reservoir</td>
<td>First sentence, changed from “where the spores” to “where anthrax spores”. First sentence, addition of “particularly in the wake of periods of intense precipitation followed by drought.”</td>
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</table>
| December 2014 | 4.3 Modes of Transmission        | First sentence, changed from “other animal products and contaminated soil and by ingestion of undercooked, contaminated or raw meat” to “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.”  
Second sentence, addition of “such as animal skin processing facilities, or as a result of a bioterrorist incident.” |
| December 2014 | 4.6 Host Susceptibility and Resistance | First sentence, “people” changed to “individuals”.  
First sentence, removed “second attacks can occur, but reports are rare.”  
Second sentence added, “Post-infective immunity may be incomplete, and subsequent reinfections may occur, though reports of such second attacks are rare.” |
| December 2014 | 5.1 To local Board of Health      | First sentence, changed “Confirmed and suspected cases should be reported immediately” to “Individuals who have or may have anthrax shall be reported as soon as possible”.  
First sentence, addition of “(HPPA)”. |
| 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 | First paragraph, replaced “the PHD of the MOHLTC” with “PHO”.  
Second paragraph, changed “Report only case classifications specific in the case definition to PHD” to “Cases shall also be reported”.  
Second paragraph, addition of “and Outbreaks”.  
Bullet two, changed from “The disease-specific User Guides published by the Ministry” to “The iPHIS User Guides published by PHO”.  
Bullet three, replaced “the Ministry” with “PHO”. |
<p>| December 2014 | 6.1 Personal Prevention Measures  | Sixth bullet changed from “Avoid contact with any powder substance if bioterrorism is suspected” to “Avoiding contact with any suspicious or unknown powdery substances if” |</p>
<table>
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| December 2014 | 6.2 Infection Prevention and Control Strategies | “bioterrorism is suspected”.  
Bullet one, removed “and the use of contact precautions for cases with open lesions”.  
Previous second bullet moved down to become the fourth bullet.  
New second bullet added, “Persons who may have been exposed to anthrax are not contagious, so quarantine is not appropriate.”  
Third bullet added, “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.” |
| December 2014 | 6.3 Management of Cases                | First paragraph changed from “One case is deemed a public health emergency” to “Every case should be followed up as soon as possible to determine the source of exposure and eliminate the potential that the case is a result of bioterrorism.”  
Paragraph two, addition of “PHO”.  
Paragraph three, replaced “Canadian Food Inspection Agency (CFIA) with “Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA).”  
Entire fourth paragraph changed.  
Paragraph five, addition of “and PHO”.  
Removed paragraph seven.  
Previous paragraph eight becomes paragraph seven. Previous paragraph nine becomes paragraph eight.  
Paragraph eight, addition of “and PHO”.  
Under Note subsection, first sentence, replaced “these” with “anthrax”.  
Under Note subsection, first sentence, replaced “bioterror” with “bioterrorism”.  
Under Note subsection, first sentence, replaced “Unit” with “Branch”. |
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</table>
| December 2014 | 6.4 Management of Contacts         | Replaced “same” with “common”.
Addition of “for decisions with regard to post-exposure prophylaxis.”                                                                                                                                                                                                                                                                                  |
| December 2014 | 6.5 Management of Outbreaks        | Paragraph one, removed “Consider the following outbreak control measures”.
Addition of a second paragraph, “In the absence of travel-related or foreign exposure, one case should be considered an outbreak.”
Addition of a third paragraph ahead of the bullets, “Consider the following outbreak control measures…”
Bullet two, changed from “Active finding of cases and persons exposed to the same source of infection” to “Active identification and follow-up of cases and persons exposed to a common source of infection”.
Paragraph four, changed from “As well as collaboration with CFIA, the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) should also be involved” to “The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) should also be involved.”
Paragraph five, changed from “As per this Protocol, outbreak management shall comprise of but not be limited to the following general steps” to “As per the Infectious Diseases Protocol, 2008 (or as current), outbreak management shall be comprised of, but not limited to, the following general steps”.
| December 2014 | 7.0 References                    | Updated.                                                                                                                                                                                                                                                                                                                                              |
| December 2014 | 8.0 Additional Resources           | Updated.                                                                                                                                                                                                                                                                                                                                              |