

## 6.6 Plague

<http://www.phac-aspc.gc.ca/ep-mu/plague-eng.php>

### Case Definition

#### Confirmed Case

Laboratory confirmation of infection:

- isolation of *Yersinia pestis* from an appropriate clinical specimen (tier 3 laboratory only)
- OR
- serodiagnosis using *Yersinia pestis* fraction-1 antigen with four-fold titter rise

#### Probable Case

Clinical illness, as identified bellow, in a person as well as:

- visual identification, with bipolar staining, of “safety pin” ovoid gram negative organisms in bubo. Sputum, or CSF
- OR
- presence of *Yersinia pestis* fraction-1 antigen with less than four-fold titter rise in unimmunized individual
- OR
- detection of *Yersinia pestis* nucleic acid
- OR
- detection of *Yersinia pestis* antibody by EIA
- OR
- passive hemagglutinatilon/inhibition titre (>1:10) in a single serum sample in an unimmunized individual

#### Suspected Case

- Clinical illness, as identified bellow, in a person who is not epidemiologically linked to a laboratory-confirmed case or to a probable case of smallpox

### Clinical Presentation

Plague can be one of three forms. Bubonic plague is the most common naturally occurring form of illness. It results from bites of infected fleas. Septicemic plague can occur with the spread of bubonic plague to other areas of the body. Pneumonic plague can result from the secondary involvement of the lungs or inhalation of droplets from individuals with bubonic plague.

Initial symptoms are indescript, fever, chills, malaise, myalgia, nausea, prostration, sore throat and headache. Lymph adenitis occurs in lymph nodes close to the original infection site, these are termed bubos. Nodes are tender, inflamed, and may suppurate. Ulceration can also occur around the site of

infection. In addition to general symptoms pneumonic plague is accompanied with overwhelming pneumonia. Besides bubo's, bubonic plague is characterized by fever, chills, headache, and extreme exhaustion. The disease may progress to septicemia, potentially causing disseminated intravascular coagulation (DIC). The prognosis of the plague has been greatly increased with modern medicine. Untreated secondary bubonic plague has a case-fatality of 50-60% but primary pneumonic plague is decidedly fatal.

Pictures of Plague can be found here, URL:  
<http://www.cdc.gov/plague/symptoms/>

## **Diagnosis**

Case confirmation is based on findings consistent with the above listed case definitions.

## **Epidemiology**

### **Occurrence**

While urban plague has been largely controlled the disease is endemic in many areas of the world including parts of Africa, Southeastern Europe, Asia, South America, and the southern United States.

### **Reservoir**

The reservoir for this virus is wild rodents.

### **Transmission**

Bubonic plague is transmitted through bites from fleas that have bitten infected rodents. Person-to-person transmission can also occur through air droplets. This is rare in the developed world and is unlikely to occur if the appropriate control measures are in place. Overcrowded facilities could create large communicability. Aerosol plague production techniques are believed to exist meaning this could be a means of transmission for bioterrorist purposes (resulting in pneumonic plague).

### **Incubation Period**

The incubation period is usually 1 – 7 days after exposure to secondary plague and 1 – 4 days for primary plague.

### **Period of Communicability**

Fleas may remain infectious for months under the right conditions. For pneumonic plague the contagious period is the length of time the patient is symptomatic. It is generally short because of rapid deterioration.

## Control Measures

### Management of Cases

Because the disease is so rare and, in Canada, is only found in travelers, it can be misdiagnosed. Though bubonic plague is not very communicable unless one comes in contact with bubo's, suppurate, or the infection more to pneumonia, a measure of isolation should still be in place. Drainage and secretion precautions should be in place for 48 hours after beginning effective treatment. Clothes and luggage should be rid of all fleas by using a safe insecticide. Also, search the patient's house for sick or dead rodents. Most antibiotics will effectively treat plague though streptomycin is preferred. Chloramphenicol is required for plague meningitis.

Pneumonic plague, unlike bubonic, requires strict isolation of the patient. Precautions against airborne spread are required until 48 hours after beginning an effective treatment. Disinfection, case investigation, and treatments are the same as secondary plague.

### Management of Contacts

Contacts are identified by household or recent face-to-face contact. They should be given chemoprophylaxis and placed under surveillance for 7 days. Those who refuse chemoprophylaxis should be placed in isolation for 7 days. This applies for cases of both types of plague. Primary pneumonic plague requires more aggressive investigation of contacts, especially face-to-face contacts.

### Management of Outbreaks

Outbreaks of bubonic plague should be addressed by identifying cases and applying the appropriate insecticide treatments to their suspected belonging and/or house. Contacts should be tracked and their suspected articles should be treated with insecticide. Rodent destruction may be necessary in the infected area. Suspected plague deaths should be autopsied. Because of the nature of the disease appropriate communication is vital to preventing potential mass hysteria. It is important to ensure that all ships are free of rodents to prevent international spread. Pneumonic plague will require immediate strict isolation of cases and contacts. The same measures as secondary plague should also be taken. Prophylaxis may be necessary if an epidemic is large. In case of sudden identification of multiple cases of plague, especially pneumonic plague, aerosol release, intentional or otherwise, may be suspected. This may require mass prophylaxis if on a large scale.

Though cases may appear because of recent travel clusters are unusual. The response to an outbreak would involve deployment of an expert team from Health Canada's Centre for Emergency Preparedness and Response Division. Further health direction would come from this team. When deliberate use is suspected than specific measures should be taken and criminal investigation authorities should also be notified and included in planning.

## **Education and Preventive Measures**

As plague is not endemic in Canada, principle prevention methods depend on limiting its entry into the country. The strict control of rodents on ships and harbors is of the utmost importance. The disease should be suspected for individuals who have fallen ill and recently traveled to an area where plague is endemic. Often, due to its relative rarity, plague can go undiagnosed.

## **Reporting Requirements and Procedures**

The PH Lab will provide immediate report of any identified cases

### **Regional MOH will notify**

- Local physicians, nurse practitioners, communicable disease control nurses (CDCNs) and infection control nurses (ICN) in the particular region.
- Provincial office of the CMOH as per list A

### **Provincial Public Health is responsible for**

- Reporting the data related to the disease to PHAC and other regions.
- Analysis of cases and reporting in the Communicable Disease Report (CDR)