

# Plague



## Case Definition

**Confirmed Case:** Clinically compatible illness and one or more of the following:

- the isolation of *Yersinia pestis*;
- a four-fold or greater rise in serum antibody titre to *Y. pestis*;
- single high antibody titre to *Y. pestis* in the absence of history of immunization;
- demonstration of *Y. pestis* antigen in appropriate clinical specimens.

## Reporting Requirements

- All *Y. pestis* positive specimens must be reported by laboratory.
- All cases must be reported by attending health care professional.

## Clinical Presentation/Natural History

Plague can occur in three primary forms or a combination thereof. Bubonic plague is characterized by swollen infected lymph nodes, primarily in the groin area (buboes), which may suppurate. Bloodstream infection, which can occur following Bubonic plague or spontaneously, results in Septicemic plague. Infection of the lungs resulting in pneumonia is termed Pneumonic plague.

Signs and symptoms include fever, chills, prostration, anorexia, nausea, vomiting, myalgia, sore throat and headache. In the case of pneumonic plague, symptoms include cough, bloody sputum, chest pain and shortness of breath. Complications occur most commonly with Septicemic plague and Pneumonic plague, and include meningitis, endotoxic shock, mediastinitis and pleural effusion.

Untreated Bubonic plague has a case fatality of 50-60%, while Septicemic and Pneumonic plague are uniformly fatal if not treated early.

## Etiology

*Yersinia pestis*, a gram negative bacillus

## Epidemiology

**Reservoir and Source:** The reservoir is ground squirrels, wild carnivores, hares and rabbits. The sources are fleas (animal and in some cases human), and other persons with Pneumonic plague.

**Transmission:** Most frequently occurs through bites from rodent fleas carrying the bacteria. Bites or scratches, contact with draining lesions or infected tissues and respiratory droplets of infected animals, often cats, can transmit plague. Person-to-person transmission can occur through close contact with a person with pneumonic plague who coughs out infectious droplets.

### Occurrence:

**General:** Rodent plague occurs in the Western United States, South America, Africa, Asia, and Russia. Human plague has occurred in recent times in Africa, India, China, Indonesia, Mongolia, Myanmar, Vietnam and Brazil, among others. North Dakota is known to have rodent plague.

**Manitoba:** No cases since at least 1993.

**Incubation Period:** One to seven days; possibly longer in immunized persons. Two to four days for plague pneumonia acquired via the respiratory route.

**Susceptibility and Resistance:** Natural infection provides some protection but exposure to large doses of bacteria can result in reinfection. Immunization is believed to provide immunity, however exact efficacy is unknown and likely to be of short benefit (six months), necessitating booster doses.

**Period of Communicability:** Fleas can remain infective for months. Persons with pneumonic plague should be considered infectious until at least 48 hours following appropriate antibiotic therapy and a favourable clinical response.

## Diagnosis

*Alert the laboratory to the suspected diagnosis.*

See **Case Definitions** above. Typical Gram stain with compatible signs and symptoms is suggestive but not diagnostic. Serology is available.

## Key Investigations

- History of exposure to other potential cases.
- History of international travel.
- History of exposure to fleas, rodents, wild carnivores or cats.
- History of hunting or trapping.
- History of veterinary medicine as occupation.

## Control

### Management of Cases:

#### Treatment:

- Streptomycin is the preferred drug, with gentamicin, tetracyclines and chloramphenicol being alternatives.

#### Public Health Measures:

- If no cough and negative chest X-ray, use Routine precautions; for those with pneumonic plague use Droplet precautions (detailed guidelines available from Manitoba Health or Health Canada).
- Use insecticides on patient clothing and luggage.

### Management of Contacts:

- Provide chemoprophylaxis to persons who have had face-to-face exposure with confirmed or suspected pneumonic plague (including medical personnel) cases and observe closely for seven days. Chemoprophylaxis consists of: tetracycline 15-30 mg/kg or chloramphenicol 30mg/kg daily in four divided doses until one week after the last contact.
- Insecticides should be applied to contacts of Bubonic plague; close contacts may also be given chemoprophylaxis.

### Management of Environment:

- In plague affected areas, discourage rodents from developing residence in or close by human dwellings.
- Apply insecticides to reduce population of rodent and domestic dog and cat fleas.
- Apply insect repellents to skin and clothing.
- Reduce affected rodent populations following application of insecticides.
- Handle dead animals with gloves.
- Use appropriate biosafety precautions in laboratories dealing with plague specimens (special guidelines available from Manitoba Health or Health Canada).
- Control rats at ports.

### Management of Outbreaks:

- As per **Control** measures outlined above.
- The role of Manitoba Health is to:
  - develop contingency protocols with Federal Quarantine Travel Medicine to allow for rapid conveyance of incoming affected travellers to appropriate medical care and isolation;

- identify contacts and recommend application of insecticides and/or chemoprophylaxis;
- notify Federal Quarantine Travel Medicine immediately of any new cases (613-957-8739).
- The role of Health Canada (Quarantine Travel Medicine, Medical Services Branch, Department of Foreign Affairs and International Trade, Department of Immigration) is to:
  - inspect and disinfect aircraft/ship;
  - notify Canadian travellers about high-risk destinations;
  - arrange for provision of pre- or post-travel screening and advice regarding plague signs and symptoms, for passengers leaving or arriving from areas affected by plague;
  - obtain contact information on co-passengers of suspected cases of plague to allow follow up by Manitoba Health if necessary.

## **Preventive Measures:**

- Avoid travel to areas experiencing human or zoonotic plague.
- If travel cannot be avoided and exposure to fleas or pneumonic plague is likely, it may be appropriate to provide travellers with chemoprophylaxis (detailed information on appropriate regimens can be sought from Manitoba Health or Health Canada).
- Avoid rodent burrows during recreational activities.
- Immunize persons who have frequent contact with infected rodents (e.g., mammalogists in enzootic areas) or specimens (lab workers).

## **Additional Resources**

### **For Health Care Professionals**

- Recommended Guidelines for Suspected Plague Case at Winnipeg International Airport.
- Emergency Procedures Plague.

Available from Audiovisual and Publications Department, Manitoba Health, telephone (204) 786-7112, fax (204) 772-7213.