

PLAGUE

**Report Immediately
by Phone**

Potential Bioterrorism Agent Category A

Also known as Pestis, Bubonic Plague, Black Plague, Black Death

Responsibilities:

Hospital/Infection Preventionist: Report by phone immediately

Lab: Report by phone immediately

Physician: Report by phone immediately

Local Public Health Agency (LPHA): Follow-up required. Iowa Department of Public Health will lead the follow-up investigation.

Iowa Department of Public Health

Disease Reporting Hotline: (800) 362-2736

Secure Fax: (515) 282-5698

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Plague is caused by the bacterium *Yersinia pestis*. It is a zoonotic disease of rodents and their fleas, which can be spread to humans.

B. Clinical Description

The initial signs and symptoms of plague in humans are usually non-specific, and include fever, chills, malaise, sore muscles (myalgia), nausea, sore throat, headaches, and weakness. Bubonic plague, the most common form, is a syndrome that includes painful swelling of lymph nodes. Pneumonic plague refers to a form affecting the lungs; septicemic plague is a form caused by disseminated infection of the blood stream. Meningeal plague, or plague affecting the membranes lining the brain and spinal cord, is rare. Both pneumonic and septicemic plague can be primary or secondary to another form of plague. Untreated bubonic plague is fatal in 50% – 60% of cases, while untreated primary septicemic and pneumonic plague are fatal in 100% of cases.

C. Reservoirs

Certain wild rodents and their fleas carry *Y. pestis*. In the United States, ground squirrels and prairie dogs in the western U.S. are the primary reservoirs of *Y. pestis*. Lagomorphs (rabbits and hares), wild carnivores (meat-eating mammals) and domestic cats may also be a source of infection to people. There is probably no wild reservoir in Iowa.

D. Modes of Transmission

Plague is acquired primarily through the bite of an infected flea or through inhalation of airborne *Yersinia pestis*, either through proximity to a human or animal case of pneumonic plague or by accidental exposure in a laboratory. Plague can also be acquired by handling tissues of infected animals or by being bitten or scratched by an infected animal.

E. Incubation Period

From 1 - 7 days.

F. Period of Communicability or Infectious Period

Patients with pneumonic plague are considered infectious throughout their symptomatic illness and for 72 hours following initiation of antibiotic treatment. Discharge from lesions in patients with bubonic plague is considered infectious.

G. Epidemiology

Wild rodent plague exists in large areas of South America, Africa, Eastern Europe and Asia. Since the early 1990s, there has been an increase in the annual incidence of human cases of plague, and the disease has reappeared in countries where it has not been reported in decades. In the United States, wild rodent plague occurs primarily in ground squirrels and prairie dogs in the western part of the country. Human cases there occur sporadically, usually following exposure to wild rodents or their fleas. Approximately 5 to 15 people are diagnosed with plague each year in the United States. Five instances of primary plague pneumonia through cat-to-human transmission have been recorded. No person-to-person transmission has been documented in the United States since 1925.

H. Bioterrorism Potential

Category A Agent *Y. pestis* is considered a potential bioterrorism agent. If effectively disseminated, *Y. pestis* could cause a serious public health challenge in limiting casualties and controlling other repercussions. **All cases of plague need to be reported immediately by phone.** (See reporting requirements below).

2) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify potential sources of transmission in the United States (such as wild rodents or other animals).
- To identify sources of transmission and geographical areas of risk outside of the United States.
- To stop transmission from such sources.
- To identify cases and clusters of human illness that may be associated with a bioterrorist event.
- To assess appropriate treatment.

B. Laboratory and Healthcare Provider Reporting Requirement

Iowa Administrative Code 641-1.3(139) stipulates that the laboratory and the healthcare provider immediately report any suspected or confirmed case. Report any suspicion of plague called to your attention by a healthcare provider or any positive laboratory result pertaining to plague. Also, report any potential exposure to plague that may be the result of bioterrorism. The reporting number for IDPH Center for Acute Disease Epidemiology (CADE) is (800) 362-2736. If after business hours, call IDPH at the same number and instructions will be given on how to reach on-call staff.

Laboratory Testing Services Available

The University of Iowa State Hygienic Laboratory (SHL) provides services for testing clinical specimens for *Yersinia pestis* and for confirmation of isolates from sentinel laboratories. Sentinel laboratories can send specimens (blood, tissue biopsies, discharge fluid, vesicle fluid, etc.) to SHL. Isolates submitted from other laboratories will be confirmed and/or identified. Additionally, SHL requests that all laboratories submit all isolates cultured for further identification as rapidly as possible, to aid in the public health surveillance necessary for this illness. SHL needs to be contacted before samples are submitted. For more information on submitting samples, contact SHL at 319-335-4500.

C. Local Public Health Agency (LPHA) Follow-up Responsibilities Case Investigation

- a. **The most important thing an LPHA can do if it learns of a suspect or confirmed case of plague, or a potential exposure that may be a bioterrorism event, is to**

immediately call IDPH, any time of the day or night. The number for the 24-hour disease reporting hotline is (800) 362-2736.

- b. Case investigation of plague in Iowa residents will be directed by IDPH Center for Acute Disease Epidemiology. If a bioterrorism event is suspected, IDPH and other authorities will work closely with the local public health agency and provide instructions and information on how to proceed.
- c. The local public health agency may be asked to assist in investigating cases that live within their communities, including gathering the following:
 - 1) The case's name, age, address, phone number, status (hospitalized, at home, deceased), and parent/guardian information, if applicable.
 - 2) The name and phone number of the hospital where the case is or was hospitalized.
 - 3) The name and phone number of the case's attending physician.
 - 4) The name and phone number of the infection-control official at the hospital.
 - 5) The names and phone numbers of patients seen by a healthcare provider before hospitalization or of other hospitals if seen at more than one hospital.
- d. Disease control is an integral part of case investigation. It is the LPHA responsibility to understand, and, if necessary, institute the control guidelines listed below (in Section 4), in Controlling Further Spread.

3) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements

- **Minimum Period of Isolation of Patient**

Droplet Precautions are indicated when caring for patients with plague until pneumonia is excluded and appropriate antibiotic therapy has been initiated. In patients with pneumonic plague, Droplet Precautions should be maintained for 72 hours after starting treatment. For patients with bubonic plague, Standard Precautions are advised.

- **Minimum Period of Quarantine of Contacts**

See Section 4) B, Protection of Contacts, below.

B. Protection of Contacts of a Case

- Cases with **pneumonic** plague are considered infectious throughout their symptomatic illness and for 72 hours following initiation of antibiotic treatment. People who have been in household or face-to-face contact with a case with pneumonic plague during the infectious period should be educated regarding signs and symptoms and recommended prophylaxis, and referred to their healthcare provider for antibiotic prophylaxis. They should be placed under surveillance for symptoms for 7 days. If contacts of a pneumonic plague case are unable to receive antibiotic prophylaxis, they should be placed under a strict quarantine for a 7-day period.
- **Bubonic** plague is generally not transmitted person-to-person. Quarantine would generally not be required.

C. Managing Special Situations

Reported Incidence Is Higher than Usual/Outbreak Suspected

If multiple cases of plague occur, or if an outbreak is suspected, an investigation to determine the source of infection and mode of transmission (*e.g.*, contact with diseased rodents) is needed. Plague in Iowa would most likely be associated with travel to the western part of the United States or another country with a known outbreak. Contact the Center for Acute Disease Epidemiology as soon as possible. The Center can help determine a course of action to prevent further cases and can perform surveillance for cases across county lines.

Note: If bioterrorism is suspected, IDPH and other authorities will work closely with local public health and public safety and provide instructions and information on how to proceed.

D. Preventive Measures

Personal Preventive Measures/Education

When handling the bubo aspirate and blood, laboratory personnel must use gloves and care to avoid aerosolization of these infected fluids. Laboratory workers who process the cultures should be alerted to take precautions; however, standard bacteriologic techniques that safeguard against skin contact with and aerosolization of cultures should be adequate.

To avoid plague, people should reduce the likelihood of being bitten by infected fleas or being exposed to patients with pneumonic plague by:

- Understanding the modes of transmission and heeding any plague advisories while visiting the southwest U.S.
- Preventing rodent access to food and shelter by ensuring appropriate storage and disposal of food, garbage and refuse.
- Using insect repellents while camping in rural plague-infected areas avoiding and reporting dead or sick animals to park rangers or public health authorities.
- Preventing flea infestations of pet dogs and cats.
- Avoiding unnecessary contact with rodents or rabbits, and using protective gloves if handling is necessary.

Additionally, a *Y. pestis* vaccine is recommended for persons whose occupations put them at high risk for exposure to *Y. pestis* or plague-infected rodents... Also, vaccine may be considered for persons traveling to, or residing in, areas with epizootic or epidemic plague.

National and International Travel

- For more information regarding national/international travel and plague, contact the CDC's Traveler's Health Office at (877) 394-8747 or through the Internet at www.cdc.gov/travel.

4) ADDITIONAL INFORMATION

The Council of State and Territorial Epidemiologists (CSTE) surveillance case definitions for Plague can be found at: www.cdc.gov/osels/ph_surveillance/nndss/phs/infdis.htm#top

CSTE case definitions should not affect the investigation or reporting of a case that fulfills the criteria in this chapter. (CSTE case definitions are used by the state health department and the CDC to maintain uniform standards for national reporting.)

References

American Academy of Pediatrics. *2009 Red Book: Report of the Committee on Infectious Diseases*. 28th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2009

CDC. Plague website. www.cdc.gov/plague/

Heymann, David L., ed., *Control of Communicable Diseases Manual, 20th Edition*. Washington, DC, American Public Health Association, 2015.

Additional Resources

www.who.int/topics/plague/en/