



DIVISION OF HEALTH AND MEDICAL SERVICES

Community Health Services
Disease Prevention
Family Health
Health Promotion
State Epidemiologist

To: Physicians and other health care providers

Date: 23 June 2009

Re: **PLAGUE** detection in South Dakota

Plague is an infectious disease of animals and humans caused by *Yersinia pestis*. People usually get plague from being bitten by a flea that is carrying the plague bacterium or by handling an infected animal. Millions of people died from plague in the Middle Ages, when cities were inhabited by flea-infested rats. Today, plague in the USA is rare. Modern antibiotics are effective against plague, but if an infected person is not treated promptly, the disease is likely to cause severe illness or death.

CLINICAL FEATURES of PLAGUE

- **Bubonic plague:** most common form, abrupt onset of high fever, chills, prostration and unilateral enlarged, extremely tender lymph node(s) usually inguinal, axillary or cervical.
- **Septicemic plague:** septic shock syndrome with disseminated intravascular coagulation (DIC) and small vessel necrosis; *may develop secondary to bubonic form or as primary bacterial sepsis without noticeable bubo.*
- **Pneumonic plague:** fever, cough, dyspnea, chest pain and hemoptysis; *may be primary form or develop secondary to bubonic and/or septicemic forms.*
- **Pharyngeal plague:** Pharyngitis and cervical lymphadenitis resulting from exposure to larger infectious droplets or ingestion of infected tissues.
- Incubation period: 2 to 6 days for bubonic plague; 1 to 4 days for primary pneumonic plague
- Case fatality: 50-60% for untreated bubonic, 100% for untreated septicemic and pneumonic plague.

INFECTIOUS AGENT. Bacteria, *Yersinia pestis*: gram-negative (cocco)bacillus; bipolar-staining; typically slow growing.

MODES of TRANSMISSION to HUMANS

Most common: bite of fleas of infectious rodents, such as prairie dogs, ground squirrels, wood rats, or rabbits. Dogs and cats may carry infectious fleas from active plague area back to the home.

Less common: direct contact with infectious body fluids/tissues of infected animal. Outdoor cats may become infected from hunting infected rodents. Transmission has occurred via bites, scratches, contact with abscess exudates and pneumonic secretions.

Least common: inhalation of infectious respiratory droplets from infected cat or human with pneumonic plague, or exposure to laboratory aerosols.

Unthinkable: Plague is a potential bioterrorism agent. *Yersinia pestis* is a Category A bioterrorism agent.

EPIDEMIOLOGY

- Historically, plague has not been a primary wildlife or human-health concern in South Dakota. There have been NO cases of plague in humans reported in South Dakota. In 2004, this disease was documented in prairie dogs in the wild (sylvatic plague). Since that time prairie dog die-offs have been officially documented in Custer, Shannon, and Dewey Counties; unverified reports of prairie dog die-offs have come from Fall River County. Prairie dog die-offs due to plague have recently (May of 2008) been documented in the Conata Basin area of Pennington County. This area is located along Highway 44 between the towns of Interior and Scenic, SD. Neighboring states Wyoming, Montana and Colorado have reported animal and human cases of plague.
- Human plague is rare. There are 5-15 cases of plague each year in the United States.

- Plague is enzootic and maintained in a complex cycle among wild rodent and rabbit fleas in the western U.S. Patients generally have a history of exposure in rural areas. Most human cases occur in summer and early fall months.
- Free-roaming pets have been increasingly implicated in human cases by bringing infected fleas into the home. Unlike cats, dogs rarely become ill and do not transmit plague directly.

IF YOU SUSPECT A CASE OF PLAGUE

- Place patient in contact and droplet precautions (until pneumonic involvement ruled out).
- Report immediately to the State Department of Health at **1-800-592-1861**.

HUMAN LABORATORY DIAGNOSIS

- Aspirate from bubo for gram stain, PCR, and culture
- Blood cultures (obtained **before** initiation of antibiotic treatment) for PCR and culture
- Chest x-ray to rule out pneumonic involvement
- Sputum for gram stain and culture (for patients with suspected pneumonic involvement)
- Serum for acute and convalescent antibody titers
- Plague testing is available at the South Dakota Public Health Laboratory by PCR method, traditional culture, serology and immunofluorescence stain. The laboratory is to do initial culturing, rule-outs of suspicious cultures or final confirmations. Lab phone: **1-800-592-1861**.

TREATMENT. Drugs of choice: streptomycin, gentamicin. Alternatives: doxycycline, ciprofloxacin, chloramphenicol.

PROPHYLAXIS OF CONTACTS

- Prophylaxis only indicated for close contacts of patients with pneumonic (primary or secondary) plague.
- Close contact is defined as being within 6.5 feet (2 meters) of infectious person.
- Other contacts not meeting criteria for "close" may be put on fever surveillance for 7 days.
- Prophylactic antibiotics are doxycycline and ciprofloxacin. The CDC advises that antibiotics be given for a brief period to people who have been exposed to the bites of potentially infected rodent fleas (during a rodent plague outbreak) or who have handled an animal known to be infected with plague. Such experts also recommend that antibiotics be given if a person has had close exposure to a person or an animal (for example, a house cat) with suspected plague pneumonia. Persons who must be present in an area where a plague outbreak is occurring can protect themselves for 2 to 3 weeks by taking antibiotics.

Vaccines: Plague vaccine is no longer available in the United States.

PLAGUE PREVENTION

Attempts to eliminate fleas and wild rodents from the natural environment in plague-infected areas are impractical. However, controlling rodents and their fleas around places where people live, work, and play is very important in preventing human disease. Therefore, preventive measures are directed toward reducing the risk of human plague infection in those home, work, and recreational settings where the risk of acquiring plague is high.

MORE INFORMATION

SD Dept of Health fact sheet for general public: <http://doh.sd.gov/DiseaseFacts/Plague.aspx>

Centers for Disease Control (CDC): <http://www.cdc.gov/ncidod/dvbid/plague/index.htm>

CDC Plague Training Module for CE credit: www.bt.cdc.gov/agent/plague/trainingmodule/index.asp

References:

American Academy of Pediatrics. Plague. In: *Red Book: 2006 Report of the Committee on Infectious Diseases*. 27th ed. Elk Grove Village, IL: Pickering LK, ed. 2006: 523-525.

Centers for Disease Control and Prevention. Prevention of Plague: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 1996; 45(No. RR-14):1-4. <ftp://ftp.cdc.gov/pub/Publications/mmwr/rr/rr4514.pdf>

Inglesby TV et al. Plague as a biological weapon: medical and public health management. *JAMA* 2000; 283: 2281-2290.

Colorado Department of Health, Plague website: www.cdph.state.co.us/dc/zoosis/plague/