

Plague

Information for New Mexico Physicians and Health Care Workers

May 8, 2007

Dear Colleagues:

Human plague (*Yersinia pestis*) cases in New Mexico have raised concerns among physicians, health care workers and the public. There were 2 deaths from plague in New Mexico in 2006, and the potential for untreated or improperly treated plague to cause mortality remains high. Due to public health concerns about plague, please report **suspected** plague cases **immediately** to the **Epidemiology and Response Division at 505-827-0006 24/7/365** so we can assist in getting diagnostic specimens to the Scientific Laboratory Division (SLD) in Albuquerque and consult on potential prophylaxis of the public and hospital staff.

Modes of Plague Transmission to Humans: Human plague can be acquired in three ways:

- (1) By the bite of a plague-infected rodent flea. Flea bites are the most common mode of transmission, and typically occur during the warmer months of the year. Rodent fleas may be transferred from pets to people.
- (2) By direct contact with blood, saliva, draining abscesses, or tissues from plague-infected animals. Direct contact results from handling and skinning infected rodents, rabbits or carnivores or bites or scratches from infected pets, especially sick cats.
- (3) By the respiratory route. Bacteria in respiratory droplets or secretions of coughing humans or animals with plague pneumonia could spread directly to those caring for the person or animal.

Clinical Recognition of plague:

(1) **Bubonic plague** accounts for 75% of New Mexico cases. Patients typically develop symptoms of bubonic plague 2 to 8 days after being bitten by an infected flea. There is sudden onset of fever, chills, and weakness and the development of an acutely swollen tender lymph node, or bubo, up to one day later. The bubo most typically develops in the groin, axilla, or cervical region depending on where the flea bite occurred, is 1 to 10 cm in diameter and often has marked surrounding erythema and edema. Bacteremia develops frequently and can lead to secondary septicemic plague.

(2) **Septicemic plague** accounts for 20-25% of New Mexico's cases. No detectable bubo is found (although it may be present in a location inaccessible to palpation). Septicemic plague has no specific features by which it can be distinguished from community-acquired sepsis of other etiologies, although abdominal pain, vomiting and diarrhea are common. The case-fatality ratio for primary septicemic plague is significantly higher than for uncomplicated bubonic plague. Unless treated early, endotoxemia quickly develops resulting in a systemic inflammatory response syndrome with bleeding, shock, and organ failure.

(3) **Pneumonic plague** accounts for less than 5% of New Mexico's cases. The incubation period of primary plague pneumonia is 1-3 days. Patients commonly have symptoms of severe bronchopneumonia, chest pain, dyspnea, cough, and hemoptysis. Some patients have also had prominent gastrointestinal symptoms including nausea, vomiting, abdominal pain, and diarrhea.

(4) **Metastatic Complications of Plague:** Patients with bubonic and septicemic plague may develop metastatic foci in the meninges or the lungs. Therefore, plague pneumonia can complicate bubonic or septicemic plague. Plague pneumonia is rapidly progressive and may be difficult to distinguish from pulmonary complications of septicemic disease (ie, adult respiratory distress syndrome). Meningeal plague has the clinical and laboratory features of acute bacterial meningitis.

Diagnosis:

There are no widely available rapid tests for plague. Diagnostic testing should be confirmed at SLD. **All plague specimen testing by SLD must be arranged by first calling the Epidemiology and Response Division at 505-827-0006.**

- (1) **Bacterial culture** of the organism confirms the diagnosis. Culture can only be done before antibiotics are given and can be performed on blood, CSF for meningitis cases, sputum or BAL for pneumonic cases, draining lesions or bubo aspirate. Cultures should be done on both blood agar and chocolate blood agar (to look for tularemia which can have a clinical presentation similar to plague). *Y. pestis* may take 48 hours or longer to grow in culture.

- a. **Procedure for obtaining a bubo aspirate:** We recommend using a 5 or 10cc syringe with a 19 or 20 gauge needle. There is often a large amount of surrounding edema so care must be taken to be sure the bubo is aspirated. Often, a small amount of serous material is obtained; frank pus is less common. If little or no fluid is aspirated, 1 cc of **non-bacteriostatic** saline solution should be injected into the bubo and then aspirated back into the syringe. The syringe and intact needle should then be hand carried to the laboratory where inoculation of media and glass slide preparation should be done under a hood for Gram stain and fluorescent antibody testing.
- (2) **Gram staining** of the bubo aspirate and/or material from a draining lesion should be performed. *Y. pestis* organisms are Gram-negative, coccobacillary organisms which may show bipolar staining.
- (3) **Fluorescent antibody (FA)** staining can be performed at SLD. The FA test is highly specific and sensitive (if plague organisms are present). FA staining should be done on specimen material from bubo aspirate, draining lesions, CSF, sputum and/or throat swabs. The specimen should be carefully expressed onto several different clean glass slides in the laboratory under the hood.
- (4) **Serology** is available, but will not confirm diagnosis until a convalescent specimen is obtained at least 2 (preferably 3-4) weeks after onset. *An acute serology alone is of no benefit and the state lab will not test it without a paired convalescent sample.*

Treatment, Clinical Consultation, and Referral: Selection of an antibiotic regimen depends upon the clinical form of disease and the severity of illness. Since plague is a severe infection (with high case fatality rate if not treated early and appropriately), antibiotics should be started immediately once diagnostic specimens are collected.

- (1) **Streptomycin** continues to be recommended as the drug of choice for treatment of plague though it may be difficult to obtain.
- (2) **Gentamicin** is also used and has been shown to be just as effective.
- (3) **Doxycycline and tetracycline** are also first-line drugs and may be given in conjunction with an aminoglycoside.
- (4) **Chloramphenicol**, because of its high tissue penetration, has been used to treat cases of plague meningitis and pleuritis.

Consultation with an infectious disease physician is recommended. For immediate clinical consultation 24 hours a day and to talk with an infectious disease or critical-care specialist at University Hospital, call **1-888-UNM-PALS (1-888-866-7257)**. This number is for health-care professionals only. Do not call the hospital's general number.

Isolation: Exposures of hospital personnel when plague patients first present in emergency rooms can be prevented if precautions are taken from the start, even before any workup is initiated.

- (1) Standard precautions and droplet isolation should be initiated when there is a suspect plague case, including the use of surgical masks, latex gloves and gowns when within two meters of the patient.
- (2) Any potential exposures to the general public in the waiting room should be noted. *Names and phone numbers should be recorded in case the exposed individuals need to be offered prophylaxis*
- (3) Droplet isolation should be continued until after 48 hours of appropriate antibiotic therapy with clinical improvement, unless there is evidence of plague pneumonia by symptoms, physical examination or chest radiograph. Release of pneumonic plague patients from droplet isolation should be individualized.

Public Health Aspects of Plague: The major public health concern involves plague pneumonia and its potential for person-to-person transmission. There are two areas of concern: the hospital and the community. Isolation concerns for health care settings are described above under **Isolation**. In the community, similar concerns exist whenever plague pneumonia occurs. The Epidemiology and Response Division along with local public health offices investigates and implements control strategies to prevent person-to-person spread of plague. In pneumonic plague cases, the Epidemiology and Response Division works with hospital infection control staff in designing and implementing a prophylactic strategy.

Source of more general information on plague: Clinicians with Internet access can find out more about plague from CDC's comprehensive educational website at <http://www.cdc.gov/ncidod/dvbid/plague/index.htm>. New Mexico specific case maps and information can be found at <http://www.health.state.nm.us/plague.html>.

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