Plague Information for Professionals

Agent: Yersinia pestis, a gram-negative bacillus, may be delivered by aerosol to cause pneumonic plague, or using infected fleas to cause bubonic plague. The organism may remain alive from months to years at freezing temperatures. It may also remain viable in dry sputum, flea feces and buried bodies.

Reporting Requirements for Disease: Immediately report any suspect cases of pneumonic or bubonic plague to your local health authority; or, call the Department of State Health Services at 1-800-252-8239.

Infection Control: Droplet Precautions in addition to Standard Precautions should be strictly enforced for at least 72 hours after the initiation of effective therapy. Surface decontamination may be accomplished by using soap and water and a hospital grade disinfectant.

Incubation Period: 2-3 days (pneumonic) and 2-10 days (bubonic)

Signs/Symptoms: with pneumonic plague, the onset of symptoms is acute and the course is fulminant with high fever, chills, headache, malaise, myalgias, and cough. The patients may have lymphadenopathy and blood-tinged sputum. The pneumonia progresses rapidly, resulting in dyspnea, stridor, and cyanosis. The terminal events are respiratory failure, circulatory collapse, and bleeding diathesis with mortality of 100% in untreated patients. In the bubonic form, initial symptoms include malaise, high fever, and one or more painful lymph nodes. The vast majority of buboes occur in the groin, as the legs are the most commonly "flea-bitten" part of the body. However, cervical and axillary lymph nodes may also be involved. Up to 80% of patients with bubonic plague also become septic; 5-15% develop pneumonia, and a smaller proportion develop meningitis. Patients may also present with primary sepsis (10-15%) or gastrointestinal symptoms. Circulatory collapse, hemorrhage and peripheral thrombosis are the terminal events. About half of untreated bubonic cases die. The disease is readily treated with antibiotics so an early clinical diagnosis is key to a successful patient outcome.

Diagnosis:
Differential Diagnosis: For the bubonic form, tularemia adenitis, staphylococcal or streptococcal adenitis, meningococcemia, enteric gram-negative sepsis, cat scratch disease, and rickettsiosis should be considered. In tularemia or cat scratch disease, the inoculation site is usually more evident than in bubonic plague, and the patient will not usually be septic. The differential for pneumonic plague includes tularemia, anthrax and staphylococcal enterotoxin B (SEB) inhalation. Continued deterioration without stabilization effectively rules out SEB. The presence of a widened mediastinum on chest x-ray should alert the physician to the probability of anthrax. Patients with plague have a cough productive of bloody sputum, while those with tularemia generally have a nonproductive cough. For all of the infections above, early clinical suspicion, even without definitive

diagnosis, is key to prompt treatment and optimal patient outcome.

Diagnostic tests: Presumptive diagnosis can be made microscopically by identification of the organism in smears from lymph node needle aspirate, sputum, blood, or cerebrospinal fluid by standard stains (Wright, Giemsa, or Wayson) or immunofluorescence. The organism is easily cultured or identified by PCR in blood, sputum, CSF, or bubo aspirates. Blood for PCR should be collected into 3-ml tubes with citrate, EDTA, or heparin. Vaccinated personnel should perform cultures in a BSL3 biocontainment facility.

Specimens of possible epidemiological interest include early postexposure (0-24 hours) nasal swabs, sputum, and induced respiratory secretions collected into plastic screw-cap containers for culture, and for fluorescent antibody (FA) assay. A four-fold rise in antibody titer in paired sera may also be epidemiologically useful.

Specimen Submission: All specimens must be triple contained, cold not frozen, in an approved shipping container and have biohazard labels. Before transport is arranged via a secure carrier, the receiving laboratory must be alerted prior to transport by calling (800) 252-8239 ("press 1"). Newly available diagnostic tests may be discussed at that time. Specimens must be accompanied by a Specimen Submission Form (G-1A) and submitted to the Texas Department of State Health Services Laboratory, 1100 West 49th Street, Austin, TX 78756. Plague must be mentioned on the G-1A so that appropriate biosafety precautions will be taken in the laboratory.

Additional Tests: Chest x-ray reveals a patchy or confluent bronchopneumonia. Thrombocytopenia, leukocytosis, and elevated liver function tests (LFT) are common; fibrinogen-fibrin degradation products (DIC) may be noted.

Treatment: Adults: Streptomycin 1 g IM q 12 hours for 10 days or gentamicin 2.0 mg/kg IM or IV loading dose, then 1.7 mg/kg q8h IM or IV. Alternate treatments are doxycycline 100 mg q12h IV for 10 days; ciprofloxacin 400 mg IV q 12 hours for 10 days or chloramphenicol 1000 mg qid IV for 10 days (preferred for plague meningitis). Children: Streptomycin 15 mg/kg IM q 12 hours (maximum daily dose 2 g) for 10 days, gentamicin 2.5 mg/kg IM or IV q 8 hours for 10 days, doxycycline, if ≥ 45 kg, give adult dose, if < 45 kg, give 2.2 mg/kg IV q 12 hours (maximum 200 mg/d) for 10 days, ciprofloxacin 15 mg/kg IV q 12 hours for 10 days or chloramphenicol 25 mg/kg IV q 6 hours for 10 days (preferred for plague meningitis). Children younger than 3 months should not receive chloramphenicol. Supportive therapy should be provided as required.

Prophylaxis: Adults: Doxycycline 100 mg bid po for 7 days or ciprofloxacin 500 mg bid po for 7 days may also be used. Children: Doxycycline, if ≥ 45 kg, give adult dosage, if < 45 kg, then give 2.2 mg/kg po q 12 hours for 7 days or ciprofloxacin 20 mg/kg po q 12 hours for 7 days (ciprofloxacin dose should not exceed 1 gm/d).