


BUBONIC PLAGUE

Background:

Plague is caused by *Yersinia pestis*, a naturally occurring pathogen with a long history of profound impact on human life. When the disease occurs from natural infections, it is usually associated with poor sanitary conditions, overcrowding and rodents affected by fleas which bite both humans and rodents. As a biological weapon, plague can potentially be distributed by aerosol of *Y. pestis* or by airborne dispersion of fleas infected with plague. It is assumed that a modern biological attack would involve such a scenario. The ensuing outbreak would be almost entirely pneumonic plague.  *Approximately 60 percent of reported cases occur in individuals younger than 20 years.*

Clinical syndromes of plague include:

- 1) **Bubonic Plague** - characteristic buboes in the femoral area, groin, axillary or cervical lymph nodes
- 2) **Septicemic Plague** - occurs as a primary disease or secondary to bubonic plague with purpura, DIC and necrosis (perhaps the "Black Plague" of medieval times)
- 3) **Pneumonic Plague** - primarily from inhalation of aerosols
- 4) **Plague Meningitis** - found mainly in children
- 5) **Pharyngeal Plague** - asymptomatic carriers occur in contacts of plague patients
- 6) **Cutaneous Plague** - ulcer or pustule at inoculation site from flea bite

Incubation Period:

Adults: Usually 1 to 8 days after exposure to pathogen

 *Pediatrics: Usually 3 to 4 days, with a range of several hours to 10 days*

Signs/Symptoms:

- 1) Initial presenting symptoms are non-specific and may include sudden high fever, chills, headache, malaise, nausea, vomiting, mental status changes, abdominal pain, cough or chest pain.
- 2) Bubo formation will occur several hours after onset of initial symptoms. Buboes are large, erythematous, tender lymph nodes and most commonly present in the femoral region, followed by inguinal, axillary and then cervical lesions in descending order of frequency. A bubo may be aspirated for diagnostic purposes and to relieve pain and swelling. A bubo should not undergo incision and drainage because of the infectious potential of the contained material and resultant draining wound.
- 3) Later findings of septicemic plague may be seen with purpura, DIC and acral necrosis of digits and nose.
- 4) Respiratory symptoms from secondary or primary pneumonic involvement may be seen.

Laboratory and Diagnostic Testing:

Call the local department of public health and IDPH to inform the state of a possible plague-infected patient and to obtain additional instructions for testing, treatment and isolation. Specimen collection should occur before the administration of antibiotics.

- 1) CXR may show non-specific bilateral infiltrates or consolidation if respiratory symptoms are present.
- 2) CSF specimens are needed if meningeal symptoms are present.
- 3) Obtain multiple blood cultures from different sites 10 to 30 minutes apart.
- 4) Aspirated material from affected bubo should be sent for culture and microscopic examination (for adults only).
- 5) Sputum and throat specimens for microscopy for specialized stains (gram negative bacilli on Wright, Giemsa or Wayson stains) and fluorescent antibody tests.

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If you suspect a poisoning exposure from any bioterrorism agent, immediately contact your local county health department, and the Illinois Poison Center at 1-800-222-1222.

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- 6) Skin scraping of cutaneous lesions (for adults only).
- 7) Tracheal/bronchial washings may be necessary as an inpatient.
- 8) Serum for serologic testing to include *Yersinia pestis* F1 antigen and antibody to F1 antigen.
Acute and recovery phase will be needed.

Treatment:

Infected patients with respiratory signs and symptoms should be kept in isolation. Health care workers should wear masks because of the potential of transmission of concomitant pneumonic plague by aerosolized droplets.

Recommended Therapy for a Contained Casualty Setting — One antimicrobial agent should be selected. Therapy should be continued for 10 days.

<p>Adults: Preferred Choices Streptomycin: 1 g IM twice daily <i>or</i> Gentamicin: 5 mg/kg IM or IV once daily or 2 mg/kg loading dose followed by 1.7 mg/kg IM or IV 3 times daily</p>	<p><i>Alternative Choices</i> Doxycycline: 100 mg IV twice daily or 200 mg IV once daily <i>or</i> Ciprofloxacin: 400 mg IV twice daily <i>or</i> Chloramphenicol: 25 mg/kg IV 4 times daily</p>
<p>Children: Preferred Choices Streptomycin: 15 mg/kg IM twice daily (maximum daily dose, 2 g) <i>or</i> Gentamicin: 2.5 mg/kg IM or IV 3 times daily</p>	<p><i>Alternative Choices</i> Doxycycline: If ≥45 kg, use adult dosage If <45 kg, 2.2 mg/kg IV twice daily (maximum, 200 mg/d) <i>or</i> Chloramphenicol: 25 mg/kg IV 4 times daily <i>or</i> Ciprofloxacin: 15 mg/kg IV twice daily (max dose 1 gm/day)</p>
<p>Pregnant women and adolescents: <i>Preferred Choices</i> Gentamicin: 5 mg/kg IM or IV once daily or 2 mg/kg loading dose followed by 1.7 mg/kg IM or IV 3 times daily</p>	<p><i>Alternative Choices</i> Doxycycline: 100 mg IV twice daily (for adults and adolescents) <i>or</i> 200 mg IV once daily (for adults only) Ciprofloxacin: 400 mg IV twice daily</p>
<p>Immunocompromised individuals: <i>Preferred Choices</i> Same as non-immunocompromised individuals</p>	<p><i>Alternative Choices</i> Same as non-immunocompromised individuals</p>

Mass Casualty Setting and Post-Exposure Prophylaxis — Duration of treatment of plague in mass casualty setting is 10 days. Duration of post-exposure prophylaxis to prevent plague infection is 7 days.

<p>Adults: Preferred Choices Doxycycline: 100 mg orally twice daily Ciprofloxacin: 500 mg orally twice daily</p>	<p><i>Alternative Choices</i> Chloramphenicol: 25 mg/kg orally 4 times daily</p>
<p>Children: Preferred Choices Doxycycline: If ≥45 kg, use adult dosage If <45 kg, 2.2 mg/kg orally twice daily Ciprofloxacin: 20 mg/kg orally twice daily (max dose 1 gm/day)</p>	<p><i>Alternative Choices</i> Chloramphenicol: 25 mg/kg orally 4 times daily</p>
<p>Pregnant women and adolescents: <i>Preferred Choices</i> Doxycycline: 100 mg orally twice daily Ciprofloxacin: 500 mg orally twice daily (max dose for adolescents 1 gm/day)</p>	<p><i>Alternative Choices</i> Chloramphenicol: 25 mg/kg orally 4 times daily</p>

Precautions: Droplet isolation is necessary. Standard respiratory droplet precautions (gown, gloves and eye protection). Large number of affected patients may be cohorted. Patients being transported should wear a mask.

Consensus recommendations of the Working Group on Civilian Biodefense, JAMA, June 6, 2001

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