PLAGUE

1. **Agent**: *Yersinia pestis*, a Gram-negative bacillus.

2. **Identification**:

   a. **Symptoms**:

   Bubonic plague: Presents as acute onset of fever, chills, headache and lymphad-enitis in lymph nodes that drain the site of a fleabite. Occur more often in inguinal nodes, less commonly in axillary and cervical nodes. Involved nodes become swollen and tender, and may suppurate. .

   Septicemic plague: All forms of plague, including those without lymphadenopathy, may progress to septicemic plague with dissemination by the bloodstream to diverse parts of the body.

   Pneumonic plague: Often occurs secondarily to hematogenous dissemination of bubonic plague, resulting in pneumonia with mediastinitis or pleural effusion. Inhalation of respiratory droplets or artificially generated aerosols (bioterrorism) can cause primary plague pneumonia, a highly communicable disease that may lead to localized outbreaks. Pneumonia Plague is thought to be the most likely presentation in the event of a biological attack.

   Untreated bubonic plague has a fatality rate of 50%. Pneumonic and septicemic plagues are invariably fatal if not treated.

   b. **Differential Diagnosis**:

   Bubonic: Tularemia, granuloma inguinale, staphylococcal or streptococcal lymphadenitis, cat-scratch fever, incarcerated hernia, acute appendicitis, tuberculosis adenitis.

   Septicemic: enteric fever, meningococcemia.

   Pneumonic and meningitis: other bacterial causes of pneumonia and meningitis.

   c. **Diagnosis:** Confirmed by culture of *Y. pestis* from bubo aspirate, blood, CSF or sputum, or a fourfold or greater change in serum antibody between acute and convalescent specimens. Presumptive diagnosis made by positive EIA (enzyme linked immunosorbent assay), fluorescent antibody test or visualization of bipolar staining dumbbell-shaped organisms or “safety- pin” appearance on smear of bubo aspirate, blood, spinal fluid or sputum.

3. **Incubation**: 2-8 days for bubonic plague; primary plague pneumonia in 1-3 days. The incubation period of septicemic plague is poorly understood and is likely within a few days of exposure.

4. **Reservoir**: Wild rodents, e.g., ground squirrels. Lagomorphs (rabbits and hares) and domestic cats can serve as a source of infection to people.

   Most human cases in the US occur in two regions:
   - Northern New Mexico, northern Arizona, and southern Colorado
   - California, southern Oregon, and far western Nevada

   Plague epidemics have occurred in Africa, Asia, and South America but most human cases since the 1990s have occurred in Africa.

5. **Source**: Infected fleas and blood or tissue from an animal infected with *Y. pestis*; respiratory droplets and sputum from patients or animals with pneumonic plague. Intentional release as an agent of bioterrorism.

6. **Transmission**:

   Bubonic or Septicemic: Bite from an infected flea, or by handling tissues of an infected animal.

   Pneumonic: Contact with droplets or sputum from an infected patient or animal, Intentional release by terrorist(s).

7. **Communicability**: Human to human only in pneumonic form. Fleas may remain infective for months. Cats are particularly susceptible to plague and can be infected by eating infected rodents. Sick cats pose a risk of transmitting infectious plague droplets to humans.

8. **Specific Treatment**: Fluoroquinolones and gentamicin are first line treatments in the United States. Patients can be treated with IV or oral antibiotics depending on severity of illness and other clinical factors. See CDC Clinical Testing and Diagnosis for Plague for additional treatment details.

9. Pre- and post-exposure prophylaxis is indicated for persons with known exposure to plague such as close (<6ft), sustained contact with patient or animal with pneumonic plague or direct contact with infected body fluids or tissues. Pre-exposure prophylaxis for first responders and HCP who will care for infected patients is not considered necessary as long as precautions in place however can be considered in specific situations. See CDC Clinical Care of Plague for additional information.

10. **Immunity**: Temporary.

REPORTING PROCEDURES

1. **Reportable**. *California Code of Regulations*, Title 17, Sections 2500, 2696. All suspect cases should be reported **immediately by phone** to the Los Angeles County Department of Public Health (LAC DPH) Acute Communicable Disease Control (ACDC) Program at: During business hours (M-F 8:00 AM-5:00 PM) (213) 240-7941. After hours report to County operator (213) 974-1234 and ask to speak with the Public Health Physician on Call.

   Laboratory work with clinical specimens must be done under Bio-safety level (BSL)-2-condition. Call ACDC to arrange for submission of specimen for confirmations testing.

   ACDC must notify the State Division of Communicable Disease Control immediately upon receiving notice of a case of suspected plague.

   ACDC will supervise investigation and control measures.

2. **Report Form**: **PLAGUE (HUMAN) CASE INVESTIGATION REPORT (CDPH 8549).**

3. **Epidemiologic Data**:

   a. History of travel to or residing in endemic areas within the incubation period.

   b. Detailed information regarding method of travel (i.e., hiking, mule ride, camping, etc.) and itinerary.

   c. History of flea bites.

   d. Contact with sick or dead animals, (e.g., domestic cats, ground squirrels, rabbits). Location of hunting or trapping.

   e. Occupation and exact address of workplace.

4. **Bioterrorism**: *Yersinia pestis* has been listed by the CDC as one of the agents most likely to be used in a bioterrorist attack because of its devastating physical and psychological effects and its ability to be weaponized and effectively delivered to a target area. Pneumonic plague is the most likely manifestation following an intentional release. See CDC Guidance for Responding to a Plague Bioterrorism Event for more information.

CONTROL OF CASE, CONTACTS & CARRIERS

Immediate investigation required. ACDC will supervise investigation and control measures.

CASE OF BUBONIC PLAGUE:

1. Contact and standard precautions.

2. Use an effective insecticide to eliminate all fleas from the patient, clothing, and living quarters.

CASE OF PNEUMONIC PLAGUE:

1. Droplet precautions and standard precautions.

2. **Isolation**: Patients should be place in a private room; persons entering should wear gown gloves and mask. Negative air pressure isolation rooms are not indicated.

3. Immediate hospitalization required; arrangements to be made by the ACDC duty officer.

4. Eliminate all fleas with an effective insecticide from the patient, clothing, and living quarters.

5. If case dies, refer to **Part III, MORTICIANS & CEMETERIES**. See also http://www.publichealth.lacounty.gov/acd/Bioterrorism/TerrorismAgentInformation.pdf .

CONTACTS: Persons exposed to the aerosolized *Yersina pestis* or have been in close physical contact with a case or animal that has or is suspected of having plague.

1. Institute immediate, complete quarantine of household and contacts (including domestic animals) until disinfestations and 6 days of surveillance completed. Consult with the ACDC duty officer.

2. Close contacts should receive chemoprophylaxis. All prophylactic antibiotic therapy should continue for 7 days from last exposure to the case. See CDC Clinical Testing and Diagnosis for Plague for additional details.

CARRIERS: None applicable.

PREVENTION-EDUCATION

1. Control and monitor rodent and flea populations for evidence of infection.

2. When camping in or near endemic areas, use insect repellents, sleep off the ground, and protect pets from fleas. Consult with forest ranger for identification of endemic areas. Do not handle sick or dead animals but report them to park officials.

3. Seek immediate medical evaluation for suspected cases that have a history of visits into wilderness areas of California within 6 days of the onset of symptoms.

4. Disinfect articles contaminated with blood, sputum or purulent discharges from suspected case.

5. Review bioterrorism and response plan on the LAC Public Health web site (http://publichealth.lacounty.gov/eprp/) including the *Zebra Packet for Hospitals and Clinicians (http://www.publichealth.lacounty.gov/acd/Bioterrorism/TerrorismAgentInformation.pdf).*

DIAGNOSTIC PROCEDURES

Do not send specimens using regular courier or without prior consultation, approval, and notification to the Los Angeles County Public Health Laboratory. Contact the Bioterrorism Response Unit at (562) 658-1360 during business hours for specimen notification, sample pick up, and assistance with packing specimens. After hours, weekends, or holidays contact the County Operator and ask for the public health laboratory director at 213-974-1234.

1. **Culture:** Diagnosis is confirmed by isolating *Y. pestis* by culture in fluid from buboes, blood, sputum, or biopsy/autopsy tissues. Specimens should be obtained from appropriate sites based on the clinical presentation.

   Laboratory Form: **Test Requisition and Report Form H-3021**

   Examination Requested: Plague

   Material: Buboes aspirate, blood, sputum, or biopsy/autopsy tissues

   Amount: At least 300 µL of blood, aspirates, or fluid; at least 2 g of tissues

   Storage: Refrigerated

2. **Serology:** Serologic confirmation is based on a fourfold rise in titer between acute and convalescent sera taken at least 1 month apart. Consult with Public Health Laboratory.

   Laboratory Form: **Test Requisition and Report Form H-3021**

   Examinations Requested: Plague antibody

Material: Serum, plasma

Amount: 1 mL

Storage: Serum may be refrigerated for up to 14 days. If testing is delayed for a longer period, serum may be frozen.