

# PLAGUE

## Epidemiology

### Source:

Rodents, carnivores, & their fleas

### Transmission

- Bites of infected rodent fleas
- Direct contact with tissues/fluid of infected animals (bubonic, septicemic)
- Droplets from infected animal or human (pneumonic)
- Exposure to laboratory aerosols (pneumonic)

### Infectious dose

10-500 organisms

### Incubation

Bubonic: 2-8 d  
Septicemic: 1-6 d  
Pneumonic: 1-3 d

**Contagious** 48 hrs after Tx (pneumonic)

### Not in LA

- Imported from Western US or foreign
- Lab infection
- If not suspect BT

### Clinical case definition

Abrupt onset of fever, chills, headache, malaise  
**-Bubonic:** Swollen lymph nodes (buboes) esp. in inguinal, axillary, cervical regions.  
**-Septicemic:** hypotension, acute respiratory distress, intravascular coagulopathy  
**-Pneumonic:** cough, fever, dyspnea, hemoptysis

### Communicability

- Bubonic:** by fleas, infectious for weeks by contact with pus while symptomatic
- Septicemic:** blood & body fluid exposure
- Pneumonic:** droplet while symptomatic

### Epidemics

- Epizootics in domestic rodents
- Exposure to pneumonic plague (bioterrorism possible)

**Complications:** sepsis with renal failure, acute respiratory distress syndrome, hemodynamic instability, diffuse intravascular coagulation, necrosis of distal extremities  
**Morbidity:** 50% bubonic and septicemic, 90% pneumonic if treatment is not started within 18 hrs.

## Diagnosis

*Yersinia pestis* is a nonmotile, gram-negative bacillus that belongs to the Enterobacteriaceae family.

### Lab Diagnosis

- **Culture-** Culture of *Y. pestis* confirmed from blood, bubo aspirate (bubonic), sputum or tracheal wash (pneumonic), and CSF.
  - Gram stain shows organism with bipolar (safety-pin) morphology.
  - Direct fluorescent assay (FA) shows bacilli
- **Immunofluorescence** - positive for *Y. pestis* F1 antigen.
- **Serologic test-** 4-fold difference in antibody titer between 2 serum specimens (4 wk apart)
- **Polymerase chain reaction** -for rapid diagnosis.
- Microbiology lab should be informed of suspected cases to minimize risks of transmission.

**Suspect:** Clinically compatible case

**Probable:** Clinically compatible  
-Elevated serum antibody titers to *Y. pestis* F1 antigen,  
-F1 antigen by fluorescent assay

### Confirmed:

-Isolation of *Y. pestis*  
-Detection by PCR,  
-Fourfold change in serum antibody titer to *Y. pestis* F1 antigen

## Treatment, Prophylaxis

### Treatment

- For children: streptomycin (30 mg/kg per day in 2 or 3 divided doses given intramuscularly) or gentamicin in standard doses given intramuscularly.
- Alternative drugs: Tetracycline, doxycycline, chloramphenicol, trimethoprim-sulfamethoxazole, ciprofloxacin Alternative drugs.
- Duration 7-10 days or until several days after lysis of fever.
- Drainage of abscessed buboes may be necessary.

### Indications for prophylaxis

- Indicated for people with close exposure (<2m) to a patient with pneumonic plague
- Anyone exposed to pneumonic plague with a >38.5°C fever or any other symptoms

### Prophylaxis

- Children: trimethoprim-sulfamethoxazole
- Adults: doxycycline or ciprofloxacin
- Given for 7 days in usual therapeutic doses

## Standard & droplet precautions (until 24hrs after treatment)

Household contacts or anyone with face-to-face exposure to a plague patient should report fever >38.5°C or other signs of illness to their physician.

## Control

- Public should be educated about
- Risk factors
  - Preventive measures
  - Signs & symptoms of infection
  - Flea control
  - Avoiding contact with sick/dead animals

Rodent & insect control by health authorities in incidents of plague epizootics