



PLAGUE: INFORMATION FOR VETERINARIANS

General Information

Plague is caused by *Yersinia pestis*, a gram-negative bacterium, and is endemic to most of the western United States. In Arizona, plague is endemic in much of the high country above 4,500 feet. Plague often occurs in epizootics in rodents (rock squirrels, prairie dogs, ground squirrels, chipmunks, packrats, and others), but also occurs in domestic animals. Cats are particularly susceptible and can play a role in transmission to humans by transporting infected fleas or rodent/rabbit carcasses into the residential environment, direct contact with exudates or respiratory droplets, and by bites or scratches. Seven of 22 reported human plague cases associated with cats have been in veterinarians or their assistants, five of which presented as primary pneumonic plague. Dogs are frequently infected with *Y. pestis* and develop antibodies to the organism, but only occasionally exhibit clinical signs. Dogs also can transport infected fleas or rodent/rabbit carcasses into the residential environment.

Plague in Cats

Clinical Features

In endemic areas, plague should be considered in the differential diagnosis of fever of unknown origin in severely ill cats. Bubonic plague is the most common form seen in cats and usually presents as fever, anorexia, lethargy, lymphadenopathy, and/or buboes (abscessed lymph nodes). Submandibular lymph nodes are frequently affected. Abscessed lymph nodes may be difficult to clinically distinguish from abscesses caused by other causes. In the less common pneumonic presentation, clinical signs include sneezing, coughing, nasal discharge, oral lesions, and/or lower respiratory tract symptoms. **Cats with pneumonic plague are highly infectious to others, and may or may not have buboes. Exudates from buboes, respiratory secretions, and saliva are contagious to humans.** Cats may also develop the septicemic form of plague. Tularemia, caused by the zoonotic bacteria *Francisella tularensis*, has also been reported in cats in Arizona. Clinical features are very similar to plague.

Diagnosis

Rapid presumptive diagnosis can be made from oral lesion or pharyngeal region swab, bubo aspirate, tissue sample or culture (isolate) by fluorescent antibody (FA) testing and/or polymerase chain reaction (PCR). Confirmation is achieved by culture of *Y. pestis* or a four-fold rise in titer between acute and convalescent sera. If plague is ruled out, specimens will be tested for tularemia.

1. Serology: acute and convalescent serum (0.5ml), collected at least 14 days apart.
2. Culture, FA, and PCR test: swab of lesion or throat, lymph node aspirate, and/or whole blood, as indicated by clinical presentation.
 - a. Swab of lesions (oral cavity, draining lymph nodes): Submit one swab without transport media (dry) and one swab in transport media (culturette). Dry swab will be used for PCR.
 - b. Lymph node aspirate: Due to the large amount of surrounding edema, care must be taken to be sure the bubo itself is aspirated. When performing lymph node aspirate, if little or no fluid can be aspirated, 1cc of non-bacteriostatic saline solution can be injected into the bubo and then aspirated back. Aspirates may be left in the syringe for shipment or transferred to culturette. Slides from aspirates can also be tested with DFA and PCR.
 - c. Pharyngeal swabs if pneumonic plague is suspected. Submit one dry swab and one swab in culturette.
 - d. Whole blood if suspect septicemic plague for culture. Collection preferred in blood culture bottles. If not available, collect in citrate or heparin tubes.

3. Postmortem Samples: Tissues from lymph node, liver, spleen, lung, bone marrow or whole blood can be sent to the Arizona State Health Laboratory or Arizona Veterinary Diagnostic Laboratory (AzVDL). If diagnostics for other than rule out of plague and tularemia are desired, submit tissue specimens to the AzVDL. Tissue samples should be placed in a clean container, (do NOT use formalin or alcohol) and shipped on cold packs. As an alternative, the entire carcass may be submitted to AzVDL.

NOTE: It is preferable to collect specimens for culture prior to administering antibiotics, but samples should still be collected if antibiotics have been given. PCR & DFA may still be positive on such specimens. All samples should be shipped overnight. Keep specimens chilled, not frozen (except blood for culture, keep at room temperature or place in incubator).

Management & Treatment

If respiratory signs are present, thoracic radiographs should be performed to identify pneumonic plague, due the highly zoonotic nature of this presentation.

Antimicrobials effective against plague in cats include doxycycline, tetracycline, and gentamicin. Per the Centers for Disease Control & Prevention (CDC), streptomycin is the treatment of choice, but is difficult obtain. The following regimens are recommended by the CDC:

Gentamicin	2-3mg/kg TID, IM or SQ
Doxycycline	5mg/kg BID, PO
Tetracycline	22mg/kg TID, PO
Chloramphenicol	50mg/kg BID PO

A flea control product that kills fleas on contact (e.g. fipronil, pyrethrin) should be applied to the cat and premises. Also instruct the owner on how to treat the cat's environment and other contact animals.

The local or state health department should be notified immediately of any suspect cases of plague in cats.

Precautions for Handling a plague suspect or confirmed cat:

1. **Hospitalize the cat in isolation until fever and respiratory signs are resolved.** The duration of infectivity in treated cats has not been studied, but cats are thought to be noninfectious after 48 hours of appropriate antibiotic therapy with evidence of clinical improvement.
2. **Mask and gloves should be worn when examining and treating cats suspected of having plague.** In pneumonic plague, spread occurs by respiratory droplet, requiring close patient contact for transmission to occur. Although, surgical masks may provide protection from respiratory droplet exposure via inhalation, a well-fitted N95 rated mask is recommended.
3. **Any exudates and the oral cavity should be considered infectious** and any material used for treating suspect cats should be disinfected, autoclaved, or incinerated.
4. Owners of cats with suspected plague or tularemia and the treating veterinarian and staff should **consult with their physician immediately if they develop fever, lymphadenopathy, and/or nausea.** The usual incubation period for bubonic plague in humans is 2 to 7 days, for pneumonic plague only 1 to 4 days.

If you suspect plague or tularemia in your feline patient, please call the Arizona Department of Health Services, Vector-Borne & Zoonotic Diseases Section, at **(602) 364-4562**. Shipping instructions for specimens to the Arizona State Health Laboratory will be provided as needed.