



## PLAGUE MANAGEMENT INFORMATION FOR VETERINARIANS

### **BACKGROUND:**

Plague, caused by *Yersinia pestis*, is a rare bacterial zoonotic infection typically transmitted by the bite of an infected rodent flea. The infection can be life-threatening for certain animals and people. Plague periodically causes epizootics, particularly in lagomorph and wild rodent populations, including those of the Piute ground squirrel (*Eurocitellus mollis*). Plague epizootics in wild rodents increase the infection risk to humans and animals that contact ill or dead animals or their burrows and fleas. In Idaho, plague is most often detected in Ada and Elmore counties, but may be found elsewhere. Plague-infected domestic pets in Idaho typically have a history of hunting in or roaming through ground squirrel habitat. Plague is most often detected from May through July. Visit the following Idaho Department of Fish and Game website to see a map of areas in Idaho considered high-risk for plague: <https://idfg.idaho.gov/plague>.

### **Plague in Cats and Dogs**

**Note: Suspected or confirmed plague is reportable to the local (public health district) or state health department immediately.**

### **CLINICAL FEATURES<sup>1</sup>**

Consider plague in the differential diagnosis of fever of unknown origin in cats and dogs who have likely consumed or otherwise been exposed to wild rodents, their burrows or fleas. Cats are typically more severely affected than dogs. Feline plague can present as bubonic, septicemic, or pneumonic. Approximately 75% of cat cases present with submandibular lymphadenitis. Regional lymphadenopathy may also be seen. Fever (>39.2°C, >102.6°F), lethargy, and anorexia are common and oral lesions are often present. Feline septicemic plague will have no obviously enlarged lymph nodes, but will present with fever, lethargy, and anorexia, progressing to overt signs of gram-negative bacterial sepsis, including vomiting, diarrhea, tachycardia, prolonged capillary refill time, cold extremities, pale mucous membranes, disseminated intravascular coagulopathy, multi-organ failure and acute respiratory distress syndrome. Pneumonic plague may be secondary to bubonic or septicemic plague and is characterized by fever, dyspnea, oral/nasal discharge, and coughing or sneezing. Approximately 10% of cats with plague develop the pneumonic form, a significant risk to persons who come in close contact with these cats (e.g. owners, veterinarians and veterinary staff) because of potential direct respiratory droplet spread to humans. The case-fatality rate in untreated feline cases is approximately 60%<sup>2</sup>. Infection in dogs is either asymptomatic or presents as a self-limiting, mild febrile illness; anorexia and lymphadenopathy may be noted. Severe disease including respiratory involvement and death is possible, but rare.

### **INFECTION CONTROL PRACTICES**

Plague is very serious in humans and animals. Instituting infection control practices when plague is suspected is important to protect hospital staff and pets. A cat or dog suspected of having plague is considered a risk to human and animal health and should be placed in isolation and the number of persons who have contact with the animal minimized. With plague, any abscess exudate, respiratory secretion, and the oral cavity should be considered infectious. Wear personal protective equipment (PPE), including masks, gowns, gloves, and eye protection, and face shield when examining and treating animals suspected of having plague or handling their tissues. A flea control product that kills fleas on contact should be applied to the animal in accordance with the label. Flea control products should be applied to animals in adjacent cages. Hospital-wide flea control measures should be considered. Promptly dispose of potentially contaminated materials as biohazardous waste. According to the Centers for Disease Control and Prevention, if anyone is exposed to infectious material, they should watch their health closely for 2 weeks following the exposure and discuss post-exposure prophylaxis or fever watch with a health care provider and public health official right away. To learn more about plague in people and risks to veterinarians, visit the [Centers for Disease Control and Prevention Plague page](#).

## **VETERINARY CASE MANAGEMENT<sup>1</sup>**

In all suspected feline plague cases, auscultation of the chest and thoracic radiographs should be done to assess pulmonary involvement. Typical radiographic findings include changes suggestive of diffuse interstitial pneumonia or coalescing areas of necrosis forming an abscess. Respiratory isolation should continue until thoracic radiographs have ruled out pneumonia or until the completion of at least 72 hours of antibiotic therapy.

Plague progresses rapidly, particularly in cats. Gentamicin is the drug of choice for severely ill animals. Doxycycline is an appropriate choice for the bubonic form of plague, and can be used to complete treatment of seriously ill patients after clinical improvement and where potential toxic side effects of gentamicin are a consideration. No veterinary clinical trials have been performed on fluoroquinolones; however, there is growing evidence from their use by veterinarians in enzootic areas (NM, CO) that they are effective in the treatment of plague in dogs and cats. Clinical improvement (including defervescence) is expected within 3 days of initiation of treatment. Penicillin analogs and cephalosporins are not efficacious against plague.

**Table 1. Recommended Antibiotic Protocols for Dogs and Cats<sup>1,3</sup>**

<b>Antibiotic</b>	<b>Dosage</b>
Gentamicin*	2-3 mg/kg tid, IM or SQ, 10 days
Doxycycline	5 mg/kg, PO, daily, 14 days
Tetracycline	22 mg/kg tid, PO, 14 days
Chloramphenicol	50 mg/kg bid, PO, 14 days

\*Injectable antibiotics might be preferred during the acute stage of infection to avoid contact with oral cavity secretions and reduce the risk of bites.

## **LABORATORY DIAGNOSIS**

Veterinary samples are tested for *Yersinia pestis* by the Idaho Bureau of Laboratories (IBL), Idaho's State Public Health laboratory. Samples are screened using an RT-PCR method (positives are noted as presumptive positive) and confirmed using culture and a specific phage lysis test.

The IBL Sampling and Submission Guide is found here:

([https://healthandwelfare.idaho.gov/Portals/0/Health/Labs/SSG/Micro\\_Yersinia\\_pestis.pdf](https://healthandwelfare.idaho.gov/Portals/0/Health/Labs/SSG/Micro_Yersinia_pestis.pdf))

Veterinarians should not attempt to culture specimens in the clinic from animals with suspected plague.

- Always use appropriate PPE while collecting specimens.
- Always alert your local public health district (PHD) epidemiologist or state public health veterinarian prior to sample submission for consultation and to gain testing approval. The following link provides a list of PHDs in Idaho: <http://healthandwelfare.idaho.gov/Health/HealthDistricts/tabid/97/Default.aspx> ).

Acceptable samples include one or more of the following (\*preferred samples). NOTE: No fixatives or preservatives should be used:

- Lymph node aspirates: submitted in a red top tube with no additives (no syringes), 1- 5 ml\*
- Whole blood for smears and bacterial culture: 3-4 ml, with anticoagulant such as EDTA\*
- If there is evidence of plague pneumonia, collect a pharyngeal swab using a culturette
- Tissues. Call IBL if tissues are being considered as a sample for submission.

It is preferable to collect specimens for culture prior to administration of antibiotics, but samples should still be collected even if antibiotics have been given. *Y. pestis* can be identified by examination of stained smears of peripheral blood, sputum, or lymph node specimens and by RT-PCR at IBL.

## **LABORATORY SUBMISSION**

All samples must be accompanied by the “Clinical Test Request Form”:

[https://healthandwelfare.idaho.gov/Portals/0/Health/Labs/Clinical\\_Test\\_Request\\_Form.pdf](https://healthandwelfare.idaho.gov/Portals/0/Health/Labs/Clinical_Test_Request_Form.pdf)

Please note “SUSPECTED PLAGUE” under “Biological Threat Rule-out” and include a brief exposure history and clinical description.

Ship clinical specimens with chill packs, not frozen, following category B biological substance packaging procedures. If you have questions about proper sampling or shipping, contact the bacteriology laboratory at: 208-334-2235

### **Proper shipping to IBL includes the following:**

- 1) Samples must be shipped as a category B package.
- 2) Leak-proof Primary Receptacles: Specimens must be placed in a leak-proof container known as a primary receptacle. All primary receptacles must have positive closures, such as a screw-on cap.
- 3) Leak-proof Secondary Packaging: To prevent contact between multiple primary receptacles, each sample must be individually wrapped or separated and placed inside a leak-proof secondary container. An example of the secondary container is a leak-proof biohazard bag.
- 4) Outer Packaging: The primary receptacle(s) and the secondary container(s) are then placed inside a sturdy outer container.
- 5) After approval, ship samples to:

Idaho Bureau of Laboratories  
**ATTN: LRN-B Laboratory**  
2220 Old Penitentiary Rd  
Boise, ID 83712

## **CONTACTING PUBLIC HEALTH**

It is *extremely important* that public health officials be notified immediately when plague is suspected in a person or animal. Public health officials can assist in follow-up of potentially exposed persons, consult with the veterinarian, veterinary staff, and the owner’s physician about the need for antibiotic prophylaxis, advise on environmental risk mitigation, and provide community education. If you have any questions or are making a notification, contact your local public health district.

(<http://healthandwelfare.idaho.gov/Health/HealthDistricts/tabid/97/Default.aspx>).

## **RESOURCES**

1. Recommendations for the Management, Diagnosis, and Treatment of Suspected Veterinary Plague Cases. Colorado Dept. of Public Health and Environment  
<https://drive.google.com/file/d/0B0tmPQ67k3NVc0xBcE53Y2h5b0U/view>
2. AVMA Plague FAQs: <https://www.avma.org/KB/Resources/FAQs/Pages/Plague-FAQs.aspx>
3. Plague Information for Veterinarians, Centers for Disease Control and Prevention:  
<https://www.cdc.gov/plague/healthcare/veterinarians.html>

Comments/questions about this guidance can be directed to:

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