



## 2017 SEASONAL PLAGUE ADVISORY FOR VETERINARIANS

Plague (*Yersinia pestis*) is a very serious illness with a high case-fatality rate in untreated humans. In domestic animals plague is also a health threat, particularly for cats, and poses a serious zoonotic disease risk to those exposed to fleas or ill animals. Veterinarians need to be aware of the risks to themselves, their staff, their clients, and their client's pets.

Plague was confirmed in Piute ground squirrels (*Urocitellus mollis*), aka whistle pigs, in 2015 and 2016 primarily in rural areas of south/southwestern Idaho and it is anticipated that the bacteria likely circulate annually in low levels in certain ecosystems. Sporadic detections of plague in domestic animals (6 cats and 1 dog) have also been reported in 2015 and 2016; in total, 6 from southwestern Idaho, and 1 from eastern Idaho. To date, the positive findings in wild and domestic animals have been from Ada, Canyon, Clark, and Elmore counties, but suspicion should be high for plague activity in any area of Idaho that supports a ground squirrel population. To learn more about ground squirrel populations in Idaho, visit the Idaho Department of Fish and Game website here: <https://idfg.idaho.gov/hunt/ground-squirrel>. Detection of plague in Idaho has typically been associated with seasonal ground squirrel activity prior to their estivation, typically March through July. It is anticipated that each spring the risk for plague exposure to pets and people with proximity to ground squirrels or their fleas is increased until ground squirrel activity diminishes in the summer.

Although most ground squirrel populations in Idaho are generally healthy, plague epizootics can occur in wild rodents, evidenced by mortality events. The risk for plague exposure to humans and pets increases when they are exposed to fleas from ground squirrel dens (particularly dens that appear abandoned), sick or dying animals, their carcasses, or fleas. Most people acquire plague by the bite of an infectious rodent flea, while approximately 20% of human cases result from direct contact with infected animals. Cats are particularly susceptible to plague and can transmit plague to humans through direct contact with exudates or respiratory droplets and by bites or scratches. One report from Colorado (MMWR May 1, 2015 / 64(16);429-434) also suggested that dogs might transmit plague to humans, but direct dog-to-human transmission is not well documented as a risk factor. Both cats and dogs can transport infected fleas or animal carcasses into the home, leading to plague transmission to people. Plague-infected ungulates have rarely been identified.

### VETERINARY MANAGEMENT OF PLAGUE IN CATS AND DOGS

Consider plague in the differential diagnosis of fever of unknown origin (FUO) in cats and dogs who have visited or live on the periphery of an epizootic area or area that supports a ground squirrel population. Animals can present with three clinical manifestations of plague: bubonic, septicemic, and pneumonic. Most cases of plague are the bubonic form; approximately 75% present with submandibular lymphadenitis indistinguishable from abscesses caused by other organisms. Regional lymphadenopathy may be seen. Fever (>39.2°C, >102.6°F), lethargy, and anorexia are common and oral lesions are often present.

#### **CATS:**

Cats with primary 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. About 10% of cats with plague have pneumonic plague, a significant risk to people who come in close contact with these cats such as owners, veterinarians, and veterinary technicians because of potential direct respiratory droplet spread to humans. Pneumonic plague may be secondary to bubonic or septicemic plague and is characterized by fever, dyspnea, oral/nasal discharge, and coughing or sneezing. Approximately 38% of untreated cat cases are fatal.

**DOGS:**

Infection in dogs is either asymptomatic or usually a self-limiting, mild febrile illness; anorexia and lymphadenopathy may be noted. Severe disease in dogs including respiratory involvement and death is possible, but rare. (JAVMA 2014, 244:1176–80)

<http://avmajournals.avma.org/doi/abs/10.2460/javma.244.10.1176>

**Case Management**

Wear personal protective equipment (PPE), including masks, gowns, gloves, and eye guards when examining and treating animals suspected of having plague or handling their tissues. An animal suspected of having plague is a risk to human health and should be placed in isolation. The number of persons who have contact with the animal should be minimized. In *all* suspected 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 effective antibiotic therapy.

**Antibiotic Therapy**

Plague progresses rapidly, particularly in cats. Treatment for suspected plague and infection control practices should be started before a definitive diagnosis is obtained. 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 animals 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. The recommended duration of treatment is 10 days for bactericidal and at least 14 days for bacteriostatic antimicrobial agents. Clinical improvement (including defervescence) is expected within 3 days of initiation of treatment. Penicillin analogs and cephalosporins are not efficacious against plague.

**Recommended Antibiotic Protocols for Feline Plague Cases**

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

\*Injectable antibiotics might be preferred during the acute stage of infection to avoid contact with oral cavity secretions and reduce the risk of bites. Patients receiving parenteral antibiotics may be switched to oral therapy upon clinical improvement

Source: Colorado Dept. of Public Health and Environment

[https://www.colorado.gov/pacific/sites/default/files/DC\\_CD\\_Zoo-Plague-Recs-for-Management-Diagnosis-and-Treatment-of-Vet-Plague-Cases.pdf](https://www.colorado.gov/pacific/sites/default/files/DC_CD_Zoo-Plague-Recs-for-Management-Diagnosis-and-Treatment-of-Vet-Plague-Cases.pdf)

Visit the CDC/Plague “Information for Veterinarians” site for treatment options for dogs

<http://www.cdc.gov/plague/healthcare/veterinarians.html>

### **Post-Exposure Prophylaxis**

Prophylactic therapy with a tetracycline is indicated in asymptomatic animals exposed to plague and should be continued for 7 days.

### **Flea Control**

A flea control product that kills fleas on contact should be applied to the pet in accordance with the label. Flea control products should also be applied to animals in adjacent cages that might have been exposed to fleas from suspected infected cats. Hospital-wide flea control measures should be implemented as a general precaution. Potentially contaminated materials should be treated as biohazardous waste.

## **VETERINARY LABORATORY DIAGNOSIS**

Because pet owners and clinic staff could be exposed to plague from an infected pet, animal specimens should be submitted for diagnostic testing if plague is suspected. Veterinary samples are tested for *Yersinia pestis* by the Idaho Bureau of Laboratories (IBL), Idaho’s State Public Health Laboratory. : IBL can conduct culture, smears using direct fluorescent antibody (DFA) specific for *Y. pestis*, and real-time PCR.

**Veterinarians should not attempt to culture specimens from animals with possible plague within their clinic’s laboratory; samples should be sent to IBL after contacting your local public health district and IBL (shipping advice) as outlined below.**

- Always use appropriate PPE while collecting specimens.
- Always alert your local public health district epidemiologist prior to sample submission to gain testing approval (link to local public health district contact information: <http://healthandwelfare.idaho.gov/Health/HealthDistricts/tabid/97/Default.aspx>).

**Acceptable samples include one or more of the following (\*preferred samples):** Ideally collect specimens for culture prior to administering antibiotics, but samples should still be collected if antibiotics have been given.

- 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
- Slants with appropriate media
- Tissues. Call IBL if tissues are being considered as a sample for submission.

**No fixatives or preservatives should be used.**

### **Laboratory Submission Form:**

All samples must be accompanied by the “Clinical Test Request Form” for samples being submitted to IBL: <http://healthandwelfare.idaho.gov/Health/Labs/ClinicalMicrobiology/tabid/190/Default.aspx>

Sample submission forms must be clearly labelled SUSPECTED PLAGUE and include a brief exposure history and clinical description.

Ship clinical specimens with chill packs, but not frozen, to the following address, following category B biological substance packaging procedures (described below).

**Proper shipping to IBL via courier includes (category B):**

- 1) Leak-proof Primary Receptacles. Specimen 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.
- 2) Leak-proof Secondary Packaging. To prevent contact between multiple primary receptacles, each 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.
- 3) Outer Packaging. The primary receptacle(s) and the secondary container(s) are then placed inside a sturdy outer container.

**CONTACT IBL PRIOR TO SHIPPING TO BE SURE YOU ARE DOING IT CORRECTLY.**

Mailing Address:

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

Questions? 208-334-2235 (ASK FOR THE BACTERIOLOGY LABORATORY)

Testing recommendation adapted from the IBL Sampling and Submission Guide

[http://healthandwelfare.idaho.gov/Portals/0/Health/Labs/SSG/Micro\\_Yersinia\\_pestis.pdf](http://healthandwelfare.idaho.gov/Portals/0/Health/Labs/SSG/Micro_Yersinia_pestis.pdf) and the CDC plague diagnostic testing instructions website <http://www.cdc.gov/ncezid/dvbd/specimensub/bacterial-zoonotic-shipping.html>

**HUMAN HEALTH RISKS TO VETERINARIANS, VETERINARY STAFF, AND PET OWNERS**

Every case of plague in cats is a potential risk to humans; risk of human illness from dogs is thought to be low. Any exudates, respiratory secretions, and the oral cavity should be considered infectious. Acquiring primary pneumonic plague from animals is a risk for veterinarians, veterinary staff, and pet owners. Bubonic plague or primary plague septicemia can result from contact with infectious tissues, exudates, or flea bites. In pneumonic plague, spread occurs by respiratory droplet to close contacts.

**Veterinary Clinic Personnel**

Wear personal protective equipment (PPE), including masks, gowns, gloves, and eye guards when examining and treating or handling tissues from any animal suspected of having plague. Veterinary clinic personnel should be advised of risks and to consult their physician and local public health district in the event of possible exposure to an infected animal, their fleas, or their fluids/tissues. According to the Centers for Disease Control and Prevention, if any veterinary staff is exposed to infectious material, they should and discuss fever watch and the necessity for post-exposure

prophylaxis with a health care provider and public health district epidemiologist right away, and then watch their health closely for 2 weeks following the exposure. If fever develops, staff should be instructed to seek medical attention immediately. The usual incubation period for bubonic plague in humans is 2 to 8 days. The incubation period for primary pneumonic plague is considerably shorter, only 1 to 3 days. Most fatalities in people are a result of a delay in appropriate antimicrobial therapy.

### **Flea Control**

Keeping fleas off dogs and cats protects the animals and protects people by keeping fleas out of the home. Home and clinic flea control is an important plague prevention practice.

### **Advising Clients**

Owners of cats and dogs with suspected plague should be advised to consult their physician and local public health district if they develop a febrile illness, treat their other companion animals for fleas, and be instructed on environmental flea control. Animal owners should be advised to avoid taking pets to epizootic areas (areas where plague is known or suspected, and other ecosystems that support ground squirrel populations). Risk can be reduced by applying flea control to all pets, which protects pets and reduces flea introduction into the home, preventing pets from approaching burrows, and deterring rodent (dead or alive) contact or consumption. All potentially exposed ill animals should be seen by a veterinarian. Note: public health officials will be contacting owners if animals are presumptive or confirmed plague-positive to discuss risk factors.

## **CONTACTING PUBLIC HEALTH OFFICIALS**

It is *extremely important* that public health officials be notified immediately when plague is suspected in a person or animal. Public health officials, including the State Public Health Veterinarian, 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 right away.

(<http://healthandwelfare.idaho.gov/Health/HealthDistricts/tabid/97/Default.aspx>). If it is after normal business hours, contact public health via the State Communications hot line at 1-800-632-8000. This is a 24 hour service and an epidemiologist will be paged.

### **The Idaho Health Alert Network (HAN)**

To receive health alerts pertaining to zoonotic disease, please consider registering to receive messages from the Idaho Health Alert Network <https://health.dhw.idaho.gov/idhan/>

Comments/questions about this advisory or anything else of a zoonotic nature can be directed to:  
Leslie Tengelsen, PhD, DVM, State Public Health Veterinarian  
208-334-5941, [Leslie.Tengelsen@dhw.idaho.gov](mailto:Leslie.Tengelsen@dhw.idaho.gov)

## **REFERENCES**

Centers for Disease Control and Prevention:

1. General plague information  
<https://www.cdc.gov/plague/index.htm>
2. Plague Information for Veterinarians  
<https://www.cdc.gov/plague/healthcare/veterinarians.html>

Idaho Department of Fish and Game:

1. General plague page: <https://idfg.idaho.gov/plague>
2. Ground squirrel website here: <https://idfg.idaho.gov/hunt/ground-squirrel>

ADDITIONAL INFORMATION:

AVMA Plague FAQs: <https://www.avma.org/KB/Resources/FAQs/Pages/Plague-FAQs.aspx>

Central District Health Department Plague press release, 2016:

<http://www.cdhd.idaho.gov/pdfs/News/2016/Plague%20Joint%20News%20Release%202016.pdf>

To learn more about the 2016 surveillance and response effort, visit the following MMWR article here:

<https://www.cdc.gov/mmwr/volumes/65/wr/mm6548a5.htm>