



PLAGUE ADVISORY FOR VETERINARIANS

Plague (*Yersinia pestis*) Confirmed in Southwestern Idaho Ground Squirrels Veterinarians be on the Alert for Cases through June

Plague was confirmed on May 22nd in Piute ground squirrels (*Eurocitellus mollis*) (aka whistle pigs) from a colony south of Boise. Ground squirrel die-offs have been detected this spring in multiple areas from Boise south to the Snake River, including areas around Kuna. No human or veterinary cases have been detected at this time but veterinarians need to be aware of the risks. Visit the following website to see a map of affected areas: <https://fishandgame.idaho.gov/content/article/treasure-valley-ground-squirrel-tests-positive-plague>

Plague antibodies have previously been detected in wild carnivores in Idaho. Plague epizootics in wild rodents increase the risk to humans and pets. Most people acquire plague by the bite of an infectious rodent flea; about one-fifth 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.

Plague is a very serious illness with a high case fatality in untreated humans. To learn more about plague in people, visit <http://www.cdc.gov/plague/symptoms/index.html>

Plague in Cats and Dogs

Clinical Features

Consider plague in the differential diagnosis of fever of unknown origin in cats and dogs who have visited or live on the periphery of the epizootic area. Cats can present with three clinical manifestations of plague: bubonic, septicemic, and pneumonic. Most cases of plague in cats are the bubonic form and 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 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 persons who come in close contact with these cats such as owners, veterinarians, and veterinary technicians because of potential 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.

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

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. **A cat suspected of having plague is considered a risk to human health and should be placed in isolation and the number of persons who have contact with the animal minimized. A flea control product that kills fleas on contact should be applied to the cat in accordance with the label.** Flea control products should 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. Promptly dispose of potentially contaminated materials as biohazardous waste.

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 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 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. 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

Antibiotic	Dosage	Action
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

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.

Laboratory Diagnosis

Because pet owners and clinic staff could be exposed to plague from an infected pet, if plague is suspected, animal specimens should be submitted for diagnostic testing. Veterinary samples are tested for *Yersinia pestis* by the Idaho Bureau of Laboratories (IBL), Idaho's State Public Health laboratory. The Washington Animal Disease Diagnostic Laboratory (WADDL) offers postmortem testing only.

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

Sample Testing at IBL

- 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>).

No fixatives or preservatives should be used.

IBL can conduct culture, smears using direct fluorescent antibody (DFA) specific for *Y. pestis* and real-time PCR.

Acceptable samples include one or more of the following (*preferred samples):

- 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.

It is preferable to collect specimens for culture prior to administering antibiotics, but samples should still be collected if antibiotics have been given. *Y. pestis* can be identified microscopically by examination of stained smears of peripheral blood, sputum, or lymph node specimens.

Ship clinical specimens with chill packs, but not frozen, to the following address, following category B biological substance packaging procedures. All samples must be accompanied by the "Bacteriology 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.

Idaho Bureau of Laboratories
ATTN: LRN-B Laboratory
2220 Old Penitentiary Rd
Boise, ID 83712
Questions? 208-334-2235 x 0555 or x 0515

Testing recommendation adapted from the IBL Sampling and Submission Guide

http://healthandwelfare.idaho.gov/Portals/0/Health/Labs/SSG/EP-BT_Yersinia_pestis%20.pdf and the CDC plague diagnostic testing instructions website. <http://www.cdc.gov/ncezid/dvbd/specimensub/bacterial-zoonotic-shipping.html>

Postmortem Sample Testing at WADDL

Tularemia can be clinically indistinguishable from plague and is easily aerosolized; therefore necropsies on suspected plague patients should only be performed inside of a biosafety level 2 (BSL-2) hood and with appropriate personal protective equipment. Submission of the entire carcass to WADDL for necropsy is safer. If doing your own necropsy, appropriate samples include lymph node aspirate and tissues from lymph node, liver, spleen, lung, and whole blood. Tissue samples should be placed in a clean container (do NOT use formalin or alcohol). Contact WADDL to make arrangements for postmortem testing for plague at (509) 335-9696 and alert Idaho public health district epidemiologists if you suspect plague. Use the "Accession Form for General Diagnostics", select the "PCR" box and write *Y. pestis* next to it. Also explain clinical history in "additional history" space and fill in "condition suspected" box as appropriate. Link to form:

<http://waddl.vetmed.wsu.edu/docs/librariesprovider10/forms/acessiongeneraldiagnosticswaddl.pdf?sfvrsn=4>

Risks to Veterinarians, Veterinary Staff, and Pet Owners

Every case of plague in cats is a potential risk to humans; risk of 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 cats is a particular risk for veterinarians, veterinary staff, and pet owners. Bubonic plague or primary plague septicemia can result from contact with infectious tissues, exudates, or fleas. In pneumonic plague, spread occurs by respiratory droplet to close contacts.

Veterinary Clinic Personnel

Veterinary clinic personnel should be advised of these risks and to consult their physician and local public health district in the event of possible exposure to an infected animal. **If you suspect that you have been exposed to *Yersinia pestis* and develop febrile illness, 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.

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 instructed on environmental flea control. Animal owners should be advised to avoid taking pets to epizootic areas. Risk can be reduced by applying flea control and preventing pets from approaching burrows and dead rodents or ingesting rodents. All potentially exposed ill animals should be seen by a veterinarian.

Contacting Public Health Officials

It is *extremely important* that public health officials be notified immediately when plague is suspected in an 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>).

The Idaho Health Alert Network (HAN)

To receive other 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 can be directed to:
Leslie Tengelsen, PhD, DVM, State Public Health Veterinarian
208-334-5939, tengelse@dhw.idaho.gov