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Wildlife and Disease--Public Health Concerns

This NebGuide describes human health risks and symptoms associated with prominent diseases of Nebraska's wildlife. Listed are precautions for minimizing exposure and preventing infection.

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Zoonoses (zoe-uh'-no-sez') are diseases that can be transmitted from animals to humans (*Table I*). Wild animals and domestic animals share some disease-causing organisms and either group can transmit diseases to people. Transmission can occur directly through contact with tissues or body fluids of animals. Indirect transmission can occur through insects, ticks and mites that feed on infected animals.

Analyzing Your Risk

Everyone should be aware of zoonoses and take appropriate precautions. Often, the perceived risks of the most notorious zoonoses are much greater than the actual risks. For example, rabies is a widely known and feared deadly disease but it causes only about two deaths in the U.S. each year.

Generally, risks of human exposure from zoonoses depend on the time of year and frequency of exposure to animal habitats. Risks are greater among hunters, campers, biologists and veterinarians than among other groups. Risks can increase within any group when precautions are not taken.

Current and accurate information about risk, symptoms, and incidences of disease is available from physicians, veterinarians and medical entomologists. State departments of health or agriculture and the national Centers for Disease Control and Prevention also provide information on understanding risks and can identify current rates of infection and geographic "hot spots." (Additional sources are listed at the end of this NebGuide.)

General Precautions

Diseased wild animals often show changes in behavior. They sometimes appear docile or react unusually to humans. Rabid wild and domestic dogs can react aggressively. Avoid contact with animals that appear sick, are dying or exhibiting unusual behavior. Avoid animals found outside their normal habitat or conditions. Report to officials when normally nocturnal animals are seen during the day or when domestic free-ranging pets behave unusually. Conservation officers and local, state and federal

animal control agents are good contacts. General contacts are listed at the end of this NebGuide.

Below are two lists. The first gives general precautions for those who handle or have direct contact with wild animals. The second list gives general precautions for those entering areas where fungal and vector-borne diseases have been identified.

General Precautions for Diseased Animal Contact

1. **Wear protective clothing.** Items like rubber or plastic gloves, boots or aprons can lessen the risk of exposure for diseases transmitted by blood, feces or saliva.
2. **Clean animal holding and handling areas.** Scrub tools, tables, reusable gloves and equipment with water and soap or detergent. Rinse the area with a disinfectant that contains bleach.
3. **Don't eat or drink when handling high risk animals or materials.** Wash hands thoroughly after handling.
4. **Dispose of animals properly.** Eliminate sources of disease by incineration or deep burial.
5. **Cook meat thoroughly before eating and dispose of tainted meat with questionable colors, odors, or observable parasites.**
6. **Notify your physician if you are in a high risk profession for wildlife disease.** As a precaution, your doctor may recommend that a blood sample be drawn and frozen to provide baseline information. Information you provide will enable your doctor to be more alert to signs and symptoms of rarely occurring diseases.
7. **Educate yourself.** Know the symptoms and distributions of wildlife-transmitted diseases. Not all diseases of wildlife are transmissible to humans.

General Precautions for High Risk Areas

1. **Apply mosquito or tick repellents.** Be aware that some repellents are harmful to the skin.
2. **Avoid tick-infested areas or high activity periods of mosquitoes.** Ticks are generally most numerous late spring to early summer. Mosquitoes are most active during summer, early evening hours.
3. **Wear protective clothing and equipment.** For the tick-borne Lyme disease, wear light-colored clothing and tape pants cuffs inside of socks or high boot tops when in high risk areas. Equipment guards against air-borne transfer of microorganisms that can cause hantavirus and histoplasmosis. (Occupational Safety and Health Administration regulates job-related activities regarding risk to wildlife-transmitted diseases and may require certain clothes or equipment.)
4. **Recognize early symptoms.** Alert your attending physician of your possible exposure. Many zoonoses are rare enough that medical professionals sometimes overlook them.
5. **Reduce host populations.** Become involved in community or area-wide efforts to control mosquitos, fleas, ticks, rats or mice. Implement control methods on your property.
6. **Vaccinations.** Vaccinate domestic animals against wildlife-transmitted diseases like rabies and Lyme disease. Contact your physician for human vaccination recommendations.

Table I. Wildlife diseases that affect humans.*

Disease (Parasite)	Method of Transmission	Wildlife Hosts**	Symptoms in Humans
Rabies (Virus)	Animal bite, aerosol	Striped skunk, raccoon, foxes, bats, and other mammals	Paralysis, convulsions, coma, death
Hantavirus (HPS) (Virus)	Aerosol, animal bite	Deer mice, other wild and commensal rodents	Fever, headache, muscle aches, nausea, vomiting, back pain, respiratory syndrome
Plague (Bacteria)	Contamination from skinning animals, fleas	Wild rodents (prairie dogs, ground and tree squirrels, chipmunks), rabbits, carnivores	Fever, headache, severe discomfort, shaking, chills, pain in groin or arm pits (swollen lymph nodes), death
Leptospirosis (Bacteria)	Urine contamination, ingestion	Commensal and wild rodents, rabbits, fox, skunk, raccoon, opossum, deer	Fever, jaundice; pain in abdomen, joints or muscles; nausea; may be fatal
Brucellosis (Bacteria)	Contamination, ingestion (milk, etc.)	Hoofed animals, coyotes	Intermittent fever, chills, headache, body aches, weakness, weight loss
Salmonellosis (Bacteria)	Ingestion of bacteria in food contaminated with feces	Rodents, swine, cattle, wild birds, poultry, pet turtles	Sudden onset of headache, fever, abdominal pain, nausea, diarrhea, vomiting
Histoplasmosis (Fungus)	Inhalation of spores	None, grows in soil enriched by feces under pigeon and bat roosts	Mild fever and flu-like illness, pneumonia, hepatitis, death
Trichinosis (Nematode worm)	Ingestion of uncooked meat containing larval cysts	Swine, bear, wild and domestic carnivores, wild and domestic rodents	Loss of appetite, nausea, diarrhea, swollen eyelids, fever, chills, muscle aches
Tularemia (Bacteria)	Contamination from skinning animals, ticks, biting insects	Wild rodents, rabbits, hares, carnivores, birds, hoofed animals	Mild to severe. Pneumonia, ulcer at inoculation site, swollen lymph nodes, death
Tick-borne			
Colorado tick fever (Virus)	Tick, <i>Dermacentor andersoni</i> , <i>D. occidentals</i>	Wild rodents (squirrels, porcupine), hares, rabbits, marmots, carnivores	High fever, headache, muscle ache, lethargy
Rocky Mountain spotted fever (Rickettsia)	Tick, <i>D.andersoni</i> , <i>D. variabilis</i> , <i>Amblyomma americanum</i> , <i>Haemaphysalis leporispalustris</i>	Wild rodents, rabbits, hares, carnivores, birds	Rapid onset, fever, headache, muscle aches, nausea, vomiting, abdominal pain, rash, loss of muscle control, possibly fatal
Ehrlichiosis (Rickettsia)	Tick, species unknown	Unknown, possibly dogs and other carnivores	Fever, headache, nausea, vomiting, muscle aches, fleeting rash
Lyme disease (Bacteria)	Tick, <i>Ixodes scapularis</i> , <i>I. pacificus</i> , <i>A. americanum</i>	Wild rodents (some mice, chipmunks), raccoon, deer, rabbits, birds	Skin lesion, fever, headache, fatigue, muscle ache, arthritis, affects heart and nervous system
Mosquito-borne			
Encephalitis (Virus)	Mosquitos, <i>Culex</i> , <i>Culiseta</i> , and <i>Aedes</i> spp.	Birds (mostly songbirds and water birds), some rodents, bats, jackrabbits	Fever, headache, nausea, musculo-skeletal aches, malaise, confusion and coma. High fatality rates occur in Eastern Equine Encephalitis

* Adopted from "Wildlife Diseases and Humans" in Prevention and Control of Wildlife Damage - 1994. University of Nebraska Cooperative Extension.

** Commensal rodents are Norway rats, house mice and others that commonly invade homes.

Hantavirus

The Sin Nombre is a hantavirus that causes Hantavirus Pulmonary Syndrome (HPS). In the U.S., people exposed to the virus develop respiratory problems that may lead to death. Flu-like symptoms of fever, chills, muscle aches, cough, headache, nausea, vomiting, diarrhea and lower back pain occur within 2 to 3 weeks after exposure.

HPS cases were first diagnosed in New Mexico during 1992. By January 1995, 52.6 percent of the first 95 victims in the United States had died of HPS.

Incidence of hantavirus has been confirmed across a broad area of the western U.S., including Nebraska. In Nebraska there is recent evidence that 4 percent to 5 percent of mice have been exposed to the Sin Nombre virus.

Mice are the most important reservoirs for hantaviruses but other small rodents may be involved. Animals are thought to be unaffected by the virus although it is found in their urine, feces and saliva. The virus is most likely transmitted to humans when it is dispersed into the air by sweeping or dusting. Dispersed aerosols of HPS viruses are more infectious in enclosed areas where mice have been living. Animal bites may also be infectious. There is no known case of person-to-person transmission of HPS.

To minimize exposure to hantaviruses, remove rodent harborage around unused buildings, cabins, hunting blinds and other structures. Exclude rodents where possible by closing holes larger than one-quarter inch.

If rodents, nests, droppings, carcasses and other evidence of long-term rodent use is seen in buildings, open the windows and doors for 30 minutes and leave the premises before disinfecting the area. This will cross ventilate and reduce the aerosol dispersal of the virus.

To prevent aerosol dispersal, use a wet mop, rather than a broom or vacuum, when cleaning an area. To remove rodents, droppings, or nests, soak them for 10 to 15 minutes in a household disinfectant solution of 3 tablespoons of bleach in one gallon of water. You can disinfect sprung traps that have captured rodents the same way. Use rubber gloves or a long-handled shovel when handling rodents or nests. Double-wrap mice in plastic bags and dispose of them with the household garbage. Use disinfectant or soap and water to clean gloves before removing, then wash hands with soap and water.

Plague

Outbreaks of plague or "Black Death" have devastated human populations across the globe, most notably in the 6th, 14th and 19th Centuries. Plague in humans creates sudden chills, high fever, swollen lymph nodes and blackened skin. It can invade spinal and brain fluids, blood and lungs. Entrance into the lungs causes coughing which can spread the disease to others.

Historic worldwide epidemics of plague were caused by high concentrations of urban rats and people living in confined and unsanitary areas. Today's risks to world populations are much reduced due to improved urban environments. For Nebraskans and other Americans, slight risk still occurs in urban settings but an additional risk occurs from wild animal transmission. Three western regions outside of Nebraska have experienced reoccurring plague outbreaks among wild rodents. These endemic regions include California and Oregon, Colorado and Wyoming, and the Four Corners Area, where Arizona,

New Mexico, Colorado and Utah meet.

Less than 25 reported human plague cases occur annually across the U.S. Almost all occur in people who live in or have visited endemic plague areas. No human cases of plague have been reported in Nebraska.

Plague has been confirmed through surveys of predators in western Nebraska. These surveys showed exposure among coyotes and badgers in Nebraska's Panhandle and southwestern counties.

Bubonic plague, known as sylvatic plague among wild animals, is caused by a bacterium transmitted by fleas. It affects more than 80 wildlife species but is most common among rodents. Ground squirrels and prairie dogs are typically affected.

Plague is a serious and fatal disease if left untreated. Between 10 percent and 15 percent of infected people die, mostly because of misdiagnosis and/or delayed treatment. Most effective treatments with antibiotics require quick diagnosis, often within days, or even hours, after contact.

Recreationists, hunters, and others who might contact rodents in these endemic areas can contact the State of Nebraska Department of Health for details.

Lyme Disease

Lyme disease is caused by a spiral-shaped bacterium found in infected ticks. The lone star tick is the suspected vector in Nebraska. It is found primarily in southeastern Nebraska counties where most cases of Lyme disease have occurred. Ticks transmit the disease when they feed on raccoon, dogs, opossums, deer, horses and humans.

Human symptoms of Lyme disease are fatigue, chills, fever, headache, muscle and joint pain and swollen lymph nodes. In 60 percent to 80 percent of human Lyme disease cases, a growing circular or "bull's eye" skin rash develops within three to 30 days around the site where the tick bite occurred.

Chronic, delayed effects of Lyme disease in humans include arthritis and other complications of the nervous or cardiac system. Persistent symptoms may occur in a few patients, even with antibiotic treatment. Antibiotics are effective in treating patients during early stages of the disease and may alleviate some symptoms.

Lyme disease in dogs may include fever, lameness, poor appetite and prolonged illness.

High risk seasons are summer months, especially June and July when nymph ticks are active. High risk regions of the U.S. are the Upper Midwest, East Coast, and North Central West Coast.

Reduce tick bites by avoiding tall grass cover and other tick habitat. When visiting such areas, wear light-colored clothing to help make ticks more apparent. Dress in long sleeves and pants and tuck pant legs into high top boots or socks. Remove and wash clothing immediately upon returning home. Shower and examine yourself thoroughly. Check pets for ticks before they enter your home. Remove ticks by gently squeezing the mouth parts with a forceps and gently pulling upward. See NebGuide *G94-1220, Controlling Ticks* for more information.

Rabies

Rabies is a virus that is often carried by skunks, raccoons, fox, dogs, cats, and bats. Prior to 1990, skunks presented the greatest number of rabies cases, but recent outbreaks of rabies among raccoons in the northeastern and Middle Atlantic states has made this species the most prominent.

Humans acquire the rabies virus when an infected animal transmits virus-laden saliva through a bite wound or other opening in human skin. The virus can also be inhaled. Enclosed areas where persistent bat populations occur should be avoided.

Rabies symptoms are variable. An animal may be aggressive or tame or show no unusual behavior.

Rabies usually results in death among domestic animals and wildlife, except in bats. Dogs may become restless, aggressive or inactive. Paralysis, convulsions and heavy salivation often occurs before death. Other indications in dogs are voice changes or howling.

Dogs tend to bite after the virus reaches their salivary glands. They almost always die within 10 days after salivary glands are infected. Skunks can carry the virus for months in their saliva without showing symptoms.

Wildlife handlers like biologists and veterinarians may choose to be immunized as a precaution. Recently developed rabies vaccines for humans are simpler and have fewer side effects than previous types. The process requires three injections plus a booster two years later. Upon exposure to rabies virus, a prevaccinated person will typically receive five post-exposure injections.

All cats and dogs should be vaccinated against rabies. Oral vaccines for wild animals are being used as a means to contain rabies within local animal populations.

Report suspect bites to your physician and public health authorities. Their advice will depend on many factors, including species, exposure level, and known presence of rabies in the area.

If bitten by a suspect animal, immediately scrub the wound with soap and water for 20 minutes. For wild animals, weigh the risk of killing the animal against the likelihood of disease. You may elect to kill docile animals by a sharp blow to the back of the skull or neck. Double-wrap the animal in plastic and immediately submit it to the Nebraska Public Health Department. Domestic animals should be quarantined and observed.

Sources of Additional Information

Local health departments--see telephone directory

Unusual Animal Behavior Contacts:

Local sheriff department or animal control office.

*National Center for Infectious Diseases
Centers for Disease Control and Prevention
Fort Collins, CO 80522
970/221-6400*

*USDA-APHIS-Animal Damage Control
5940 South 58th St.*

Lincoln, NE 68516
402/437-5097

Nebraska Game and Parks Commission
Wildlife Division
2200 North 33rd. St
Lincoln, NE 68503
402/464-0641

References:

"Wildlife Diseases and Humans," by Robert G. McClean, *Prevention and Control of Wildlife Damage*--1994, Cooperative Extension, IANR, University of Nebraska. (Available through University of Nebraska Cooperative Extension 402/472-2188)

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