

Human Diseases and Wildlife: Implications for Nebraska

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Serious diseases having a wildlife connection, Lyme disease, hantavirus, and West Nile virus are more and more frequently in the news. What is the current status of these diseases in Nebraska? Wayne Kramer is Nebraska's lead investigator of these vector-borne diseases. He is a medical entomologist with the Nebraska Department of Health and Human Services, Regulation and Licensure. This article discusses how these diseases may potentially impact Nebraskans.

Lyme Disease:

Lyme disease is the most reported vector-borne disease in the U.S. It is caused by a bacteria, *Borrelia burgdorferi*, and was first identified in Lyme, Connecticut in 1982, although it likely has been present in the U.S. since the 1800's. It is a chronic debilitating disease, but rarely fatal. More than 16,000 cases of Lyme disease were reported in the U.S. in both 1998 and 1999, and the greatest number of cases continues to occur in northeastern, mid-Atlantic, and northcentral states (Minnesota and Wisconsin). A distinctive, expanding circular rash is the best early symptom of the disease and occurs in 60 to 80 percent of all cases. Lyme disease is maintained in nature in a cycle involving *Ixodes scapularis*, the deer tick, and associated reservoir hosts (white-footed mice and white-tailed deer).

In 1996, a related bacteria, *Borrelia lonestari*, was isolated from the lone star tick, *Amblyomma americanum*, which has

a distribution in the southern U.S. including Nebraska. This fact may help us better understand the current status of Lyme disease in Nebraska. A relatively small number of cases of Lyme disease have been reported in Nebraska (84 for the period of 1990 to 1999) despite the fact that the only known competent vector of *Borrelia burgdorferi*, the deer tick (*I. scapularis*), has not been found here. The majority of the Lyme disease-like illnesses that are being reported and counted as classic Lyme disease in Nebraska may, in fact, be caused by *B. lonestari*. Also, most cases of the Lyme-like disease were contracted in the southeastern part of the state which overlaps the lone star tick geographical distribution—good epidemiological evidence this tick may be the vector.

There is a human vaccine currently being marketed for Lyme disease but it is not recommended for Nebraska residents. Because the risk of Lyme disease is very low in Nebraska and because vaccines have a high degree of specificity, it is thought the vaccine would not protect persons against *B. lonestari*.

Ehrlichiosis:

The lone star tick is also known to transmit another bacterial agent, *Ehrlichia chaffeensis*, which causes human monocytic ehrlichiosis (HME). This bacteria was first described in 1986, and one case has been reported in Nebraska. The spectrum of human disease ranges from an illness that is very mild to a severe, life threatening, or fatal disease.

The disease may be confused clinically with Rocky Mountain spotted fever. The wildlife reservoir for this disease is also the white-tailed deer.

Personnel at the Lancaster County Extension Office, have the expertise to identify tick species. During the summer of 2000, we were surprised to identify several deer ticks. However, each of these ticks were brought back to Nebraska by folks traveling in the eastern part of the U.S. So, if you are vacationing in areas where deer ticks occur, check yourselves carefully for the presence of ticks. If the populations are very high, consider using the repellent DEET or the insecticide permethrin on your clothing.

Hantavirus Pulmonary Syndrome (HPS):

HPS is a deadly respiratory condition caused by a virus named the Sin Nombre virus. It is carried by a rodent, primarily the deer mouse (genus *Peromyscus*). HPS was first identified in 1993 in the Four Corners region of the southwest after several individuals died, but the disease has been documented as far back as 1959. It is a rare disease—as of February 2001, 279 cases were confirmed in 31 states. Cases are concentrated in western states, although cases have been documented as far east as Rhode Island and New York. Only one case of HPS has been documented in Nebraska (1999), even though surveys of rodent populations show that the Sin Nombre virus is endemic in deer mice populations

throughout Nebraska. In a number of surveys, between four and 20 percent of collected rodents carried the Sin Nombre virus.

There is no insect vector for hantavirus. The risk associated with this disease is solely dependent on factors that promote rodent populations and the frequency of human activities in infested areas. Rodents are completely unaffected by the disease and do not get sick or die, but serve as a reservoir and can infect other rodents. The virus is shed by rodents in the urine and feces and may remain viable in the environment for some period of time.

The risk to humans occurs when individuals inhale infectious virus particles. Many human exposures have come from contaminated buildings, occupying previously vacant cabins, cleaning barns and other outbuildings, but other sources of exposure have been associated with agricultural activities, such as planting and harvesting field crops. Hikers and campers may also encounter the virus.

Because there is always a risk, even though it is small, precautions should be taken to prevent exposure to the virus. Wearing a properly fitted respirator with a HEPA filter will provide protection by effectively filtering out the tiny virus particles which may be airborne. Paper dust masks do not provide effective protection. When dealing with rodent-infested areas, one must first reduce rodent populations, ventilate the area before cleaning, and then use wet cleaning techniques (see *Safely Clean up After Rodents*, below). These steps will reduce the risk from inhaling infectious virus particles.

West Nile Virus:

West Nile encephalitis, thought to be first introduced into New York City in 1999, was found in four states by the end of 1999. In 2000, it expanded further outward from the New York City metro area to 12 states. The virus circulates in nature in a mosquito-bird cycle and clinical disease is known in humans and horses. Although, most bird species are not affected by the virus, a small number of bird species are debilitated by this disease; the most susceptible birds belong to the family Corvidae (crows, ravens, jays). The observation of dead crows (Corvids) which later tested positive for West Nile virus has been a useful surveillance tool to monitor the expanding range of this virus in both 1999 and 2000 on the east coast. The dead crows are more likely to be single crows, rather than a large flock, which is more likely to indicate mortality from a toxic substance, like a pesticide.

Most people who are infected with the West Nile virus have no symptoms or experience a mild illness (fever, headache, body aches) and fully recover. Some individuals, particularly the elderly, West Nile virus can cause encephalitis and cause permanent neurological damage to the brain and can be fatal. Symptoms include a severe headache, muscle weakness, high fever, stiff neck, confusion, and loss of consciousness (coma).

What is the likelihood that the West Nile virus will get to Nebraska? Based on the expansion of the disease from 1999 to 2000, a good guess is that the disease could reach Nebraska in two to five years. Predictions are complicated because each geographical area has its

own complement of mosquito species that may or may not be good vectors.

If you find dead crows, you are urged to call Wayne Kramer (402) 471-0506. To be useful for analysis, the crows must be recently dead and in reasonably good condition. The West Nile virus cannot spread directly from birds to people. However, dead birds should not be handled with bare hands. *Use gloves to place the dead bird in a double plastic bag.*

Will the state be ready for all the testing and monitoring if the West Nile encephalitis gets to Nebraska? The CDC has granted \$90,000 to the Nebraska Department of Health and Human Services to develop the laboratory testing procedures that will be needed.

Diseases that have a wildlife connection are not new, but increased human activities where wildlife are abundant have increased the risk of contracting Lyme disease and HPS. As we continue to spend time outdoors, exposure to these diseases will continue.

On the other hand, West Nile encephalitis is a new disease to North America being introduced into the United States via infected wildlife or mosquitoes from Africa, Eastern Europe, or West Asia. This may be an unfortunate consequence from increased international activities and trade. These diseases and recent livestock diseases in the news (foot and mouth disease and mad cow disease) remind us how small the world really is.

Safely Clean up After Rodents

Eliminating rodents from your home/cabin or other dwelling will decrease your risk for Hantavirus Pulmonary Syndrome. Follow these standard rodent removal and cleanup guidelines:

- Set spring traps that will kill mice.
- Use rubber gloves and spray the nest or dead rodent until soaked with a household disinfectant solution or three tablespoons of bleach in one gallon of water. Other disinfectants can also be used as directed. Let the area soak thoroughly 10 to 15 minutes.
- Remove the nest or rodent

using a long-handled shovel or rubber gloves.

- Double bag the rodent or nest securely with plastic bags and dispose of them in the trash.

Persons in rural areas may bury the waste two to three feet deep.

- Clean up the rodent area and traps by spraying with disinfectant solution. Let the area soak for 10 to 15 minutes. While still wearing gloves, wipe up the area with paper towels or rags.

- Double bag all paper towels, rags, and gloves used in the cleanup. Dispose of them in a tightly covered trash container.

- Wash your hands with soap and water after completing the cleanup.

After the rodents are removed, floors, countertops, cabinets and other surfaces should be cleaned with a solution of three tablespoons of household bleach in one gallon of water, or by a commercial disinfectant. Do not sweep floors with a broom, or vacuum, until area has been disinfected.

Rugs can be steam cleaned; dirt floors should be sprayed with a disinfectant solution.

Source: Nebraska Department of Health and Human Services.