ENVIRONMENTAL HEALTH

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HOW TO PREVENT HANTAVIRUS PULMONARY SYNDROME

Hantavirus (sin nombre virus) is a rodent-borne viral disease often characterized by severe pulmonary illness. The disease in humans is rare and the chance of being infected is low. The recent cases in Inyo and Mono Counties are considered isolated events and there is no evidence that the disease is infectious.

Two variations of the disease have been identified. The more common and sometimes deadly form is called acute sin nombre virus with pulmonary syndrome or hantavirus pulmonary syndrome (HPS). The second form is called acute sin nombre virus without pulmonary syndrome. With this form there is no respiratory compromise. Only two cases of the latter have been confirmed in California, both of which were in the Inyo/Mono region.

Since 1933, the Centers for Disease Control (CDC) confirmed 239 cases in 30 states. 39 cases were identified retrospectively with onset of illness prior to May 1933. Including the retrospective cases, California has had a total of 26 HPS cases through March 16, 2000. Of those, 7 have been confirmed in Mono County and 4 in Inyo County. These 11 cases account for 42% of the California cases and 5% of the cases nationwide. The mean age for all cases is 37 years, with a range of 10 to 75 years. Including the retrospective cases, the mortality rate has been 42% nationwide, 50% in California and 45% in Inyo and Mono Counties. Since 1993 the mortality rate has been 34% nationwide, 41% in California and 40% in Inyo and Mono Counties.

The best defense against hantavirus is education. Persons involved in peridomestic, occupational and/or recreational activities that bring them into contact with rodents and/or their bodily wastes may be at risk. It is important that these people become knowledgeable about how to avoid exposure, how to recognize the early stages of the disease symptoms and the importance of getting immediate medical care.

WHO IS AT RISK?

The risk of hantavirus infection in humans is proportional to the frequency with which persons come into contact with infectious rodents, rodent population density and the prevalence of rodent infection.

People involved in activities that bring them in close contact with infectious rodents, their droppings, urine, saliva and nesting material may be at increased risk of exposure to the disease. Human infection is often associated with the cleaning of rodent infested houses, cabins, trailers, barns, outbuildings, storage facilities and automobiles that have been closed off or abandoned for extended periods of time. Hikers and campers can be exposed when staying in infested trail shelters. Construction and utility workers may be at risk when working in closed spaces inhabited by infectious animals.

To reduce the risk of exposure, anyone involved in these or similar activities should be prepared to take sensible disease prevention measures when working or recreating in areas where rodent signs are evident.

ANIMALS THAT CARRY HANTAVIRUS

The predominant animal that carries and transmits hantavirus is the common deer mouse. Other rodent species like the meadow vole and the California harvest mouse have demonstrated evidence of infection with hantavirus-like viruses that are not pathogenic to humans. Certain species of wood rats, pocket mice and ground squirrels also show incidental hantavirus infections but are not considered competent carriers or transmitters of the disease.

Deer mice population densities and disease prevalence vary from site to site and can change markedly from season to season and year to year. Infrequently, environmental conditions result in the simultaneous occurrence of high populations and densities and a correspondingly high prevalence of hantavirus infection. These conditions occurred following the recent El Nino/La Nina weather phenomenon. During this period the infection rate in out of state study populations increased dramatically. It is during these climatic cycles that humans may be at increased risk of exposure and infection.

Research has shown that the virus is spread through the saliva of infectious animals during biting incidents. It is through this behavior that the disease is maintained within the deer mouse population. Infected animals quickly develop antibodies to the disease and do not appear to be affected by the virus.

Deer mice occur throughout Inyo and Mono Counties and can be difficult to distinguish from other closely related species. Most of the time we only catch a fleeting glimpse of them and all we can say is, we saw or, we think we saw a mouse. Efforts to positively identify suspect rodent species can result in an increased risk of exposure and, as such, are not recommended or warranted. All wild rodents should be treated as potentially infectious and contact should be avoided whenever and wherever possible.

HOW IS HANTAVIRUS TRANSMITTED?

Infectious rodents shed the virus in their droppings, urine and saliva. Viral particles contained within the shed materials can become air-borne during dusting, sweeping and vacuuming, a process known as aerosolization. Aerosolization may also occur directly during animal defecation and urination. Persons working in contaminated environments can become infected if these airborne particles are inhaled. Infection via this transmission route can be prevented through the use of approved filter and respiratory devices.

Disease transmission can also occur through rodent bites, by touching ones mouth, nose or eyes with hands that become contaminated after handling infectious rodents or their discharges, by eating or drinking rodent contaminated foods and by using contaminated utensils or tools.

Research scientists don't believe the virus lives long once shed from the body. Outdoors, where the virus is exposed to ultraviolet radiation, heat, low humidity and other naturally occurring conditions, the virus may survive for a day or two. In indoor environments, where conditions are less extreme, the virus may survive for up to one week or more. No one is absolutely certain about these time frames however.

Hantavirus cannot be transmitted from one person to another, or by blood transfusion. The hantavirus that causes HPS in the United States stops at the infected person.

Dogs and cats are not known to transmit the disease. They may, however, bring infected rodents into contact with people after catching them and bringing them into the home. There is no known transmission from any other animals or insects.

WHAT ARE THE DISEASE SYMPTOMS?

The majority of HPS cases involve people who were unaware that they had been exposed to the virus. In cases like these, it's crucial that the victim recognizes the early stage symptoms and seek immediate medical attention.

The initial symptoms of HPS appear between one to five weeks after a person is exposed to the virus. This is known as the incubation period. The early symptoms are flu-like and mimic many other bacterial, viral and environmental illnesses. The initial symptoms most frequently seen in hantavirus patients are elevated fever, muscle aches in the major muscle groups and chills. Other frequently experienced symptoms are coughing, nausea, vomiting, headache, diarrhea and malaise. Less frequently experienced symptoms include shortness of breath, dizziness, arthralgia, back and chest pain, abdominal pain and sweats. Symptoms not typically associated with HPS are earache, sore throat and rashes. Coughing, which heralds the onset of pulmonary edema, does not normally begin until two or more days after the first day of symptoms.

People showing these symptoms within one to five weeks after a known or suspected exposure should notify their medical provider immediately. Because there is no specific treatment for hantavirus, it is critical that victims be seen in the earliest stage of the disease. Early recognition and provision of supportive care can make the difference between survival and death. There is no vaccine for hantavirus.

HOW TO PREVENT HPS

The most effective way to decrease the risk for HPS is to limit exposure to rodents and their discharges. To minimize the risk of hantavirus infection, the following preventative and precautionary measures should be taken where there is minor evidence of rodent activity.

A. Buildings that have been closed for extended periods and that show signs of rodent activity should be aired out for a minimum of one hour before proceeding with any cleaning, maintenance or repair activities. When rodent droppings that look like black grains of rice, urine, nests or dead animals are found, the following safety precautions and cleaning procedures should be followed:

1. Never touch a rodent, its discharges or contaminated traps with bare hands.

2. Always wear rubber gloves, goggles and an approved respirator (if needed) during cleanup activities.

3. Thoroughly wet dead rodents, traps, droppings, nests, or other potentially contaminated items with a chlorine bleach and water solution (3 tablespoons of bleach per gallon of water) and let soak for a minimum of 30 minutes before proceeding with handling or cleanup. Contact with disinfectants, detergents and alcohol will kill the virus. NEVER sweep or vacuum mouse droppings or other potentially contaminated items prior to disinfecting as this can cause the virus to become air-borne.

4. Carefully place the disinfected material into a plastic bag. Seal the bag being careful not to exhaust the air towards the face when closing. Place this bag in a second bag and seal it. Discard by burying or disposing in an outside garbage container.

5. Disinfect all tools or other objects used in the cleanup.

6. Disinfect floors, countertops and other surfaces that may have been contaminated.

7. Wash gloved hands with a disinfectant, then in soap and water. Thoroughly wash hands with soap and water after removing gloves and before beginning other activities.

8. It is recommended that the trap and animal be disposed together. If snap traps are being used more than once, thoroughly disinfect and air dry under the sun before reusing.

B. To control mice inside the house, snap traps should always be used. In addition to traps, EPA-registered rodenticides can be placed in areas close to walls, in dark corners and behind appliances. Remember to keep all poisons out of the reach of children and animals.

C. To control mice outside, snap traps and approved and carefully handled baits should be used in barns, sheds and outbuildings where animals and children cannot reach them. Remember that cats, hawks, snakes and coyotes will help keep down rodent populations. Trapping of larger rodents (i.e., squirrels and chipmunks) should be avoided. Removing these animals without first controlling their fleas can result in an increased risk of plague transmission.

D. To keep rodents away from residences, woodpiles, vegetable gardens, trashcans and animal feed should be kept 100 feet away from the house. Hay bales, woodpiles, and trashcans should be elevated at least 12 inches off the ground. When possible, animal food and water should not be left out overnight.

    1. To eliminate rodent nesting sites, junk cars, old tires and trash piles should be removed. Grass, brush and shrubbery should be cut within 100 feet of the house.

    2. To eliminate food sources, all food, water and garbage should be kept in metal or thick plastic containers with tight-fitting lids. Clean up spilled food, dirty dishes and cooking utensils immediately and dispose of trash and clutter before it piles up.

    3. To prevent rodents from entering buildings, openings of ¼ inch or larger should be sealed with steel wool or concrete. Three (3) inches of gravel around the base of homes will discourage burrowing. Metal roof flashing placed around the base of wooden, earthen or adobe dwellings will help keep rodents out of the house.

    4. Cleanup and control in areas where there is evidence of heavy rodent activity requires additional safety precautions including, but not limited to, the proper use of an approved and properly fitted and tested respiratory device. Under these conditions, property owners should consult with their local environmental health department, the State Department of Health Services Vector-borne Disease Section or a qualified, licensed pest control company.

Anyone having questions or wishing additional information about HPS should contact the Amador County Environmental Health Department at (209) 223-6439 or Dr. Robert Hartmann, Amador County Health Officer at (209) 223-6407. Additional information is available on the internet at www.cdc.gov/ncidod/diseases/hanta/hps/.