NATIONAL PARK SERVICE
DEPARTMENT OF THE INTERIOR

Conserve O Gram

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Hantavirus Disease Health And Safety Update

In 1993, several cases of Hantavirus, an acute respiratory disease, were reported in the Four Corners area of Arizona, New Mexico, Colorado, and Utah. The virus was named Hantaan for a location in Korea. There are many different strains of the disease in the United States, Asia, and Europe. In 1993, the Center for Disease Control (Atlanta, GA) conducted a survey in various national parks. Results of the survey confirmed the presence of the virus in many different rodent species nationwide.

The responsibilities of park museum staff place them in direct contact with situations that might pose the risk of Hantavirus infection should rodents be present. Such situations include:

- Performing housekeeping in exhibit and storage spaces
- Opening museum collections storage and exhibit spaces only on a periodic or seasonal schedule
- Processing and rehousing recently received archeological collections
- Conducting inventories/assessments of collections in newly acquired or remotely located structures

Transmission and Symptoms of the Disease

The respiratory disease is carried primarily by the deer mouse in the western United States. However, evidence of infection also has been discovered in other rodent species (e.g., pinion mice, brush mice, house mice, white-footed mice, western chipmunks, Norway rat and brown rat). Hantaviruses produce a lifelong infection in rodents without apparent disease. Infected rodents transmit the virus via saliva, urine, and feces. Humans are most at risk if they inhale infective saliva or excreta as dried airborne particles. Besides inhalation, other possible routes of transmission of the disease include direct inoculation into broken skin or the eye, rodent bites, and ingestion of contaminated food or water. Fleas and ticks are not known to have a role in the transmission of Hantaviruses. There is no evidence that cats or dogs transmit the disease to humans, and humans cannot transmit it to each other.

The incubation period is 1 to 5 weeks. The disease causes flu-like symptoms, including a fever, muscle aches, headaches, coughing, nausea, vomiting, diarrhea, and abdominal pain. It rapidly progresses to severe respiratory distress because of fluid buildup in the lungs. Staff should *immediately* seek care if they develop these symptoms and have had contact with rodents, rodent nests, and/or rodent burrows. Since 1980 there have been 111 confirmed cases of this disease. The fatality rate has been about 55%.

Actions to be Taken

1. Establish an Integrated Pest Management (IPM) program for the monitoring and trapping of rodents in spaces that house museum collections. See NPS *Museum Handbook*, Part I (Rev 9/90), Chapter 5.

2. Work with the park safety officer to inform staff about the disease and the precautions for reducing the risk of becoming infected.

3. Assign a staff person the responsibility for documenting rodent occurrences.

4. Conduct an inspection of facilities and spaces housing museum collections to obtain evidence of rodents and rodent droppings. Work with IPM and maintenance staff to implement mechanical rodent-proofing measures in facilities and spaces by eliminating all possible sources of access by rodents (such as foundation wall holes and holes around pipes, utility lines, and vents).

5. Implement a housekeeping program in spaces housing museum collections and in exterior adjacent areas to eliminate harborage situations conducive to the nesting of rodents. Look for carcasses and droppings on a regular basis.

6. Practice precautions (see below) when removing dead rodents, rodent excreta, rodent nests, and traps to reduce the risk of Hantavirus infection.

Precautions to Reduce Risk[1]

Staff removing carcasses in traps and cleaning spaces that have rodent infestations need to exercise the following precautions:

1. Wear rubber or plastic gloves when handling rodent carcasses or traps containing rodents, nests and/or nesting materials, or when cleaning up infested areas. Wash and disinfect gloves before removing them from your hands. Wash your hands thoroughly upon removing your gloves.

2. Wear a half-face air-purifying respirator equipped with a high-efficiency particulate air (HEPA) filter when removing rodent nests and rodents from traps, and when cleaning up infested area(s). For Hantavirus, order NIOSH Filter Type TC-21C-228, high efficiency dust, particulate, fume and mist. The filter does not offer 100% protection. The virus itself can penetrate the HEPA filter. However, the filter traps dust particles with the virus attached.

   NOTE: Respirators are not considered protective if facial hair interferes, since a proper fit cannot be assured. Respirator must be fitted to each employee. See NPS-50, *Guideline for Loss Control Management*, Release No. 2, Chapter 32, Respiratory Protection Program, for detailed guidance.

3. Spray dead rodents, rodent nests, excreta and traps with Lysol® disinfectant, a 10% solution of bleach, or 70% isopropyl alcohol. (See ***Caution*** in number 5 below.) Soak the material thoroughly. Wait 10-20 minutes. Place the material in a plastic bag and seal. Place used paper towels and disposable gloves in the same bag. Place the bag in a second plastic bag and seal. Dispose of the bag in the trash or by burying it in a 2- to 3-foot-deep hole. Do not reuse traps.

4. Do not vacuum or sweep dry surfaces before mopping or shampooing to avoid infectious airborne excreta. ***NOTE***: You can use a wet vacuum with filter to clean dry surfaces.

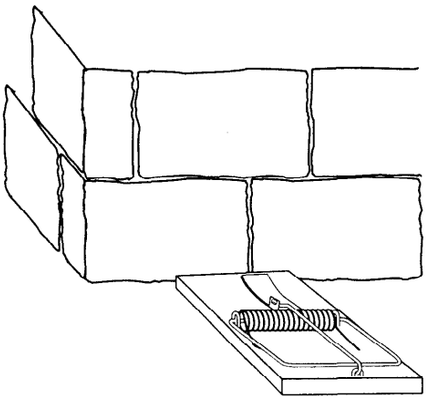
5. Mop area of floor/other surface with a solution of water, detergent, and disinfectant. A second mopping is optional. Spray dirt floors with a disinfectant solution. Disinfect carpets/rugs with a household disinfectant or commercial-grade steam cleaning or shampooing. ***Caution***: Some disinfectants including household bleach will damage carpets and other fabrics and will discolor wood floors. Use 70% isopropyl alcohol on carpets, other fabrics, and wood floors.

6. Disinfect work surfaces by washing them with a solution of detergent, water, and disinfectant. Optionally, wipe down surfaces with a general-purpose household disinfectant.

Monitoring/Trapping Program for Rodents

1. In each space, set out the appropriate quantity of spring-loaded mouse traps. Date each trap. Record the location of each trap. Use

gum drops or chunky peanut butter as bait. Keep bait supply fresh by storing it in a refrigerator. Place each trap perpendicular to the wall with the trap against the wall and the trigger coil nearest the wall.



2. When implementing the monitoring program, inspect each trap daily. Once the structure is mechanically sealed to exclude rodents, reduce inspection of traps to once a month. If rodent activity is evident, begin to inspect traps on a daily basis.

3. If a mouse is discovered in a trap, exercise the above-described precautions in collecting and disposing of the mouse. The staff at Fort Davis National Historic Site have developed the *Hanta Kit* to aid in removal of trapped rodents. The *Hanta Kit* contains the following items:

   - Respirator with the approved high-efficiency particulate air (HEPA) filters
   - Plastic trash bags with ties
   - Disposable plastic gloves
   - Pint of 70% isopropyl alcohol with spray attachment
   - Paper towels
   - New spring-loaded mouse traps
   - Trash gripper rod
   - Clipboard with forms to document trap catches
   - Large bucket (labeled *Hanta Kit*) for above contents

   Use the trash gripper rod to pick up the entire trap with rodent and place in a plastic bag. (See above ***Precautions to Reduce Risk,*** number 3, for procedures.)

4. Maintain a record of all trapped mice and their location. Also keep records of all staff involved in the cleanup and of rodent-proofing repairs.

Note

1. Precautions are based on information provided in the document *Hantavirus Infection Interim Recommendations for Risk Reduction,* (November 1993) that was issued by NPS memorandum dated October 28, 1993, from the Associate Director, Operations to Regional Directors and Park Superintendents, Subject: Hantavirus Disease.

Sources

Latex rubber surgical style gloves; respirators, cartridges and filters are available from a variety of sources, including Lab Safety Supply Company, P.O. Box 1368, Janesville, WI 53547; (800) 356-0783.

Spring-loaded mouse traps are available from General Services Administration (GSA) in packages of 100 (Item No. 3740-00-2523854) and from local hardware stores.

Trash gripper rods are available from Grab-It Enterprises, P.O. Box 703, Jackson, AL 36545; (800) 247-2286.

References

Fink, T. Michael. "Hantavirus Pulmonary Syndrome and Southwestern Archeologists: A Protocol for Risk Reduction." *Kiva* (Journal of Southwestern Anthropology and History) Vol. 59, No. 3 (Spring 1994): pp. 363-365.

Pinto, Lawrence J. *Commensal Rodents, IPM Training Manual* (prepared by Pinto & Associates, Inc., Mechanicsville, MD). Washington, DC: U.S. Department of the Interior, National Park Service, Wildlife and Vegetation Division, 1993.

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