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# Technical Data Bulletin

OH&ESD

## #110 Hantavirus Infection

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In 1993, a previously unknown disease, Hantavirus Pulmonary Syndrome (HPS), was identified among residents of the Southwestern United States. Since then, the virus has been recognized throughout the continental U.S. The Sin Nombre version of the virus is known to cause the majority of cases in the U.S. with the deer mouse as its predominant reservoir.

As of December 15, 2010, according to the Centers for Disease Control and Prevention, a total of 560 cases of HPS have been identified in 32 states, with a case fatality rate of 36%. More recently, as of September 6, 2012, 8 cases of HPS have been linked to visitors in Yosemite National Park who stayed in a series of cabins. 3 of those cases have resulted in fatalities. These findings emphasize the need for renewed attention to reducing the risk for Hantavirus exposure.

**Mode of Transmission**

Infected rodents shed virus in saliva, urine and feces. Human infection may occur when infected saliva or excreta are aerosolized and then inhaled. Persons visiting laboratories where infected rodents were housed have been infected after only a few minutes exposure to animal holding areas. Transmission may also occur when excreta contaminated materials are introduced into broken skin, the membranes of the eyelid or eyeball, and possibly by ingestion of contaminated food or water. Persons may become infected after being bitten by rodents but this is considered very rare. To date, no known cases of person-to-person transmission have occurred, including the recent Yosemite outbreak.

**Risk Factors**

Hantavirus infections are associated with domestic, occupational and recreational activities that bring humans into contact with infected rodents. This occurs more often in rural settings. Adults are primarily infected by the virus. HPS cases in the United States occur throughout the year, but greater numbers are reported in spring and summer. Hantavirus infection resulting in HPS has been epidemiologically associated with the following situations:

- Increasing numbers of host rodents in human dwellings.
- Occupying or cleaning previously vacant cabins, buildings or other structures that are actively infested with rodents.
- Disturbing excreta or rodent nests around the home or workplace (e.g. during renovation, demolition or construction).
- Residing in or visiting areas where substantial increases have occurred in numbers of hantavirus infected host rodents.
- Handling equipment or machinery that has been in rodent infested storage locations.
- Disturbing excreta in rodent-infested areas while hiking or camping.
- Hand plowing or planting in contaminated soil.

Persons who frequently handle or are exposed to wild rodents or excreta contaminated materials are at higher risk for hantavirus infection than the general public. Such persons include, but are not limited to: mammalogists, pest-control workers, some farm and domestic workers, building and fire inspectors, construction and utility workers.

Laboratory workers practicing universal precautions while processing routine clinical materials

are not considered to be at increased risk for hantavirus infection. Laboratory acquired infections have occurred among persons who handled infected wild or laboratory rodents. Therefore, laboratory work that may result in propagation of hantaviruses should be conducted in a biosafety level 3 facility. Biosafety level 3 is described in Biosafety in Microbiological and Biomedical Laboratories.

**Clean up and Disinfection**

It is uncertain how long the virus survives after being shed into the environment. Therefore it is critical to minimize aerosolizing of dust during clean up and disinfection. The CDC first recommends opening windows and doors to enclosed areas and allowing the space to ventilate for at least 30 minutes. Droppings and other contaminated material should not be dry swept or vacuumed with a household vacuum. Thoroughly soak materials as noted below before sweeping or wiping. Use only a vacuum equipped with a true high efficiency particulate air filter (HEPA). Hantaviruses are susceptible to most disinfectants. Suggested disinfectants include:

- Sodium hypochorite. The CDC recommends a 1:10 solution (1 part commercial bleach to 10 parts water). The materials should be soaked and let stand for at least 5 minutes.
- Most commercial disinfectants. Follow manufacturer's recommendations for dilution and disinfection time.

Refer to the CDC Hantavirus website for further details on clean up and disinfection.

**Engineering Controls**

As with any occupational hazard, engineering controls (e.g. eliminating the hazard) are the best. In this case utilizing environmental hygiene practices that deter rodents from colonizing the home and work environment are recommended. The CDC Hantavirus web site (www.cdc.gov/hantavirus) and the July 26, 2002 issue of *Morbidity and Mortality Weekly Report* have recommendations for eliminating rodents from structures (e.g. sealing building entry points, removing food sources, use of traps to eliminate the rodent population).

**Personal Protective Equipment (PPE)**

In some cases such as construction or utilities work, engineering controls as described above may not be practical or sufficiently reduce the hazard. PPE may also be necessary during clean up and decontamination. Proper PPE for workers should include respiratory protection, eye protection, gloves and coveralls as described below. When use of respirators is required, the Occupational Safety and Health Administration (OSHA) requires the employer to implement a respiratory protection program per 29 CFR 1910.134. (www.osha.gov). All PPE must be used in accordance with the manufacturer's user instructions. Refer to the user instructions for proper use procedures, limitations, warnings and cautions.

- Respirators used should be tested and certified by the National Institute for Occupational Safety and Health (NIOSH). Suggested respirators include:
    - Half face piece, negative pressure respirator with N100 or P100 filters. Dust proof goggles should also be worn to protect the eyes from contaminated dust
    - Full face piece, negative pressure respirator with N100 or P100 filters.
    - Powered Air Purifying Respirator (PAPR) with high efficiency (HE) filters.

- Rubber, vinyl or nitrile gloves when handling rodents, traps containing rodents, or excreta contaminated materials. Carefully remove gloves when done and thoroughly wash hands with soap and water. A water-less, alcohol based hand sanitizer can be used if wash water is not available.
- Disposable coveralls, rubber boots or disposable shoe covers. Coveralls should meet the requirements of EN ISO Standard 13982-1 for dust protection.

Protective equipment should either be decontaminated after use or disposed of.

**Waste Disposal**

All potentially infective waste material (including respirator filters and protective clothing) from clean-up operations should be double bagged in plastic bags. County or state health departments can assist in determining appropriate disposal methods.

**Conclusion**

OSHA does not currently have any specific regulations regarding Hantavirus. For the latest information on Hantavirus and the CDC's recommendations for diagnosis, treatment and prevention, see the CDC's Hantavirus web site (www.cdc.gov/hantavirus). This Technical Data Bulletin does not contain the CDC's recommendations in their entirety, nor does it constitute an endorsement by OH&ESD to use 3M respirators for this purpose. The impact and utility of these recommendations will be assessed as they are implemented and will be continually reviewed by the CDC and the involved state and local health agencies as additional data related to the disease is gathered. The reader is advised to be alert to supplements or modifications to these recommendations in the future.

For further information on respirators, eye protection and disposable coveralls for use against Hantavirus call 3M Tech Service at 1-800-243-4630 or visit our website at www.3M.com/PPESafety. For possible disinfectants visit our website at http://solutions.3m.com/wps/portal/3M/en_US/Commercial/Care/Solutions-for/Infection-Control/

**Warning**

Respirators are designed to reduce the wearer's exposure to airborne hazards. Biological agents, such as viruses, are particles and can be filtered by particulate filters with the same efficiency as non-biological particles having the same physical characteristics (e.g. size, shape). Unlike many industrial particles, there are no exposure limits established for biological agents. Therefore, while respirators will help reduce exposure to hantaviruses, there is no guarantee that the user will not contract HPS. Respirators may help reduce exposures to airborne contaminants, but they don't eliminate the risk of exposure, infection, illness or death.

**References**


- Centers for Disease Control and Prevention – Hantavirus website www.cdc.gov/hantavirus
- Centers for Disease Control and Prevention: Hantavirus Pulmonary Syndrome—US:Updated Recommendations for Risk Reduction. Morbidity and Mortality Weekly Report 2002:51 (RR-09):1–12.
- Centers for Disease Control and Prevention/National Institutes of Health: Biosafety in Microbiological and Biomedical Laboratories. 5th edition. 2009 Washington DC http://www.cdc.gov/biosafety/publications/bmbl5/.


## For more information:

### In the U.S., contact:

**Technical Assistance**
1-800-243-4630

**World Wide Web**
www.3M.com/PPESafety

**For other 3M products**
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### In Canada, contact:

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