Child Care Facilities Regulations

Appendix E:

Hantavirus Prevention Information

CDC Special Pathogens Branch "All About Hantavirus"

Serving Boulder City, Clark County, Henderson, Las Vegas, Mesquite and North Las Vegas

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National Center for Infectious Diseases
Special Pathogens Branch

"All About Hantavirus": Prevention: Cleaning Up

Website address:
http://www.cdc.gov/ncidod/diseases/hanta/hps/noframes/generalinfoindex.htm

Tips for Preventing Hantavirus Pulmonary Syndrome (HPS):

How Is Hantavirus Transmitted?

In the United States, deer mice (along with cotton rats and rice rats in the southeastern states and the white-footed mouse in the Northeast) carry hantaviruses that cause hantavirus pulmonary syndrome. Learn more about the rodent carriers of HPS at http://www.cdc.gov/ncidod/diseases/hanta/hps/noframes/rodents.htm

Rodents shed the virus in their urine, droppings, and saliva. The virus is mainly transmitted to people when they breathe in air contaminated with the virus.

When fresh rodent urine, droppings or nesting materials are stirred up, tiny droplets containing the virus get into the air. This process is known as **"aerosolization."**

Transmission Details: So How Does "Aerosolization" Really Work?

For a hantavirus to cause HPS, the virus must travel from the rodents that carry it to a person. A common way this happens is when a person breathes in the hantavirus from the air.

Let's create an imaginary scenario and go through the process step by step. Say you have a storage room in your home that you hardly ever enter. You keep old furniture there, old newspapers and magazines, and so on.

At some point, a group of deer mice find their way into the room, looking for places to build nests. They found their way into the room through a crack—deer mice can squeeze through holes as small as a shirt button! Some mice chew through the fabric of an old armchair and build a nest inside it. Other mice shred bits of magazines and build nests under the shredded pieces.

A few of these mice are infected with the hantavirus. The infected mice don't show any signs of being sick. In fact, the virus does not seem to make them ill at all; it simply lives in their bodies. However, the virus is shed continuously from them: into the droppings and urine they leave around the room, and into their saliva, which dries on anything they have chewed, such as nesting material. Out in the environment like this, the virus can live for several days.

Meanwhile, you decide to clean up your storage room. You go inside, spend a few minutes moving boxes and furniture. The mice hear you coming and scurry away, leaving a trail of fresh urine!

Because you find mouse droppings and some of the furniture stuffing the mice have used as nesting material, you get a broom and sweep up the mess. As you move around and sweep, tiny particles of fresh urine, droppings and saliva, with

the virus in them, get kicked up into the air. This is the **aerosolization**. It is these tiny particles that you breathe in—and this is the beginning of becoming sick with HPS.

Because the virus is spread when virus-containing particles are stirred up into the air, an essential HPS prevention tactic in areas showing signs of rodents is to avoid actions that raise dust and to carefully wet the area down with disinfectant. The less chance the virus has to get into the air, the less chance it will be breathed in!

There are several other ways rodents may spread hantavirus to people:


If a rodent with the virus bites someone, the virus may be spread to that person-but this type of transmission is rare.


Researchers believe that people may be able to get the virus if they touch something that has been contaminated with rodent urine, droppings, or saliva, and then touch their nose or mouth.


Researchers also suspect people can become sick if they eat food contaminated by urine, droppings, or saliva from an infected rodent.

These possibilities demonstrate why disinfecting rodent-infested areas is so important in preventing transmission of the virus. Transmission can happen any place that infected rodents have infested. This could include barns, sheds, or other outbuildings, warehouses, and summer cottages that have been closed up for the season. Carrier rodents can infest homes as well. Therefore, the most sensible way to avoid contact with infected rodents is to prevent rodents from infesting the places where you live and work and to follow safety precautions if you do stumble into a rodent-infested area. The **prevention section** of this document details this information.

Can You Get Hantavirus from Another Person?

The types of hantavirus that cause HPS in the United States cannot be transmitted from one person to another. For example, you cannot get the virus from touching or kissing a person who has HPS or from a health care worker who has treated someone with the disease. You also cannot get the virus from a blood transfusion in which the blood came from a person who became ill with HPS and survived.

Can You Get Hantavirus from Animals Other Than Rodents, or from Insects? What About Pets?

No-the hantaviruses that cause HPS in the United States are not known to be transmitted by any types of animals other than certain species of rodents. You cannot get hantavirus from farm animals, such as cows, chickens, or sheep, or from insects, such as mosquitoes. Dogs and cats are not known to carry hantavirus; however, they may bring infected rodents into contact with people if they catch such animals and carry them home. Guinea pigs, hamsters, gerbils, and rodents from pet stores are not known to carry hantavirus.

Who Is at Risk of Getting HPS and Why?

Anyone who comes into contact with rodents that carry hantavirus is at risk of HPS. Rodent infestation in and around the home remains the primary risk for hantavirus exposure. Even healthy individuals are at risk for HPS infection if exposed to the virus.

Common Signs of Rodent Infestation

Remember that not all types of rodents carry hantavirus. Neither common house mice nor common rats have been associated with HPS in humans, for example. Yet because it can be tough to tell just what kind of rodents you have, play it safe–clean up the infestation and rodent-proof your home or workplace.

Here are some common signs that you may have a rodent problem.

Rodent Droppings

This is one of the most reliable signs that you have a rodent problem. You may find droppings in places where you store your food or your pet/animal food, such as in cupboards and drawers or in bins. Because mice like to run in places that offer them some protection from predators, you may find droppings in cupboards or under the sink, along walls, or on top of wall studs or beams. Mice will leave droppings near their nests as well. Storage rooms, sheds, barns, or cabins loaded with boxes, bags, old furniture, and other objects make an ideal home for rodents, so you may find droppings there, even inside boxes and other containers.

Workplaces make good rodent homes! Warehouses, restaurants, and the like are obvious places to look because food may be plentiful there. However, rodents can infest office buildings, too. Once again, look for droppings in protected places, such as closets, storage rooms, or inside boxes.

Signs of Rodent Nests

Rodents tend to build their nests from materials that are soft, fuzzy, or warm. Among common rodent nest materials are shredded paper, bunches of dry grass or small twigs, fabric, and furniture stuffing. Rodents will nest wherever safety from enemies can be found close enough to food and water, and they prefer places that are relatively quiet. Inside buildings, here are some places to look:

- Inside cabinets
- Under or inside dressers
- In and among boxes
- Behind and inside machinery and appliances (kitchen appliances such as stoves or refrigerator drip pans; water coolers; and electric motor cases or computer cases)
- Inside upholstered furniture
- Inside double walls or the space between floors and ceilings.

Food Boxes, Containers, or Food Itself That Appears To Be Nibbled

Look for droppings nearby. Rodents can chew through plastic, so plastic bags do not make safe food storage containers.

Signs of Rodent "Feeding Stations"

These are semi-hidden spots where rodents eat food they have collected. At these stations, rodents may leave larger-than-normal amounts of droppings/urine, plus remnants of a variety of foods (such as nut shells), bits of plastic or paper, and cockroach carcasses.

You Find Evidence of Gnawing

To get to food, rodents will gnaw on almost anything softer than the enamel of their teeth. This includes such things as wood, paper board, cloth sacks, and materials even harder than these. Because rodents' teeth grow continuously, they must gnaw to keep them short. That may help to explain why chair legs or similar surfaces show gnawed spots or tooth marks in rodent-infested places.

You Notice an Odd, Stale Smell

In closed-up rooms infested by rodents, you will commonly smell an unusual, musky odor.

You See a Mouse

Rodents are normally active at night, and generally avoid humans. If you have rodents, unless the infestation is large, you may never see one.

What Kind of Activities Are Risky?

Any activity that puts you in contact with rodent droppings, urine, saliva, or nesting materials can place you at risk for infection. Hantavirus is spread when virus-containing particles from rodent urine, droppings, or saliva are stirred into the air. It is important to avoid actions that raise dust, such as sweeping or vacuuming. Infection occurs when you breathe in virus particles.

Opening and Cleaning Previously Unused Buildings

Opening or cleaning cabins, sheds, and outbuildings, including barns, garages and storage facilities that have been closed during the winter is a potential risk for hantavirus infections, especially in rural settings.

Housecleaning Activities

Cleaning in and around your own home can put you at risk if rodents have made it their home too. Many homes can expect to shelter rodents, especially as the weather turns cold. Please see our prevention information on how to properly clean rodent-infested areas.

Work-related Exposure

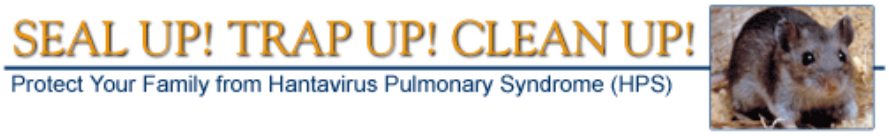
Construction, utility and pest control workers can be exposed when they work in crawl spaces, under houses, or in vacant buildings that may have a rodent population.

Campers and Hikers

Campers and hikers can also be exposed when they use infested trail shelters or camp in other rodent habitats.

The chance of being exposed to hantavirus is greatest when people work, play, or live in closed spaces where rodents are actively living. However, recent research results show that many people who have become ill with HPS were infected with the disease after continued contact with rodents and/or their droppings. In addition, many people who have contracted HPS reported that they had not seen rodents or their droppings before becoming ill. Therefore, if you live in an area where the carrier rodents, such as the deer mouse, are known to live, take sensible precautions-even if you do not see rodents or their droppings.

How Do I prevent HPS?



Eliminate or minimize contact with rodents in your home, workplace, or campsite. If rodents don't find that where you are is a good place for them to be, then you're less likely to come into contact with them. Seal up holes and gaps in your home or garage. Place traps in and around your home to decrease rodent infestation. Clean up any easy-to-get food.

Recent research results show that many people who became ill with HPS developed the disease after having been in frequent contact with rodents and/or their droppings around a home or a workplace. On the other hand, many people who became ill reported that they had not seen rodents or rodent droppings at all. Therefore, if you live in an area where the carrier rodents are known to live, try to keep your home, vacation place, workplace, or campsite clean.

Seal Up!

Seal up holes inside and outside the home or workplace to prevent entry by rodents!

Prevent rodents from entering the building by checking inside for gaps or holes any larger than a pencil could fit into. Potential rodent entry holes can be found inside, under, and behind kitchen cabinets, inside closets, around doors, and under sinks. Seal the holes, using steel wool, lath metal, or caulk. If you do not remember to seal up entry holes, mice will continue to enter.

Prevent rodents from entering the home or workplace outside. Clear brush and grass from

around the foundation. Check the landscaping for debris and holes that might encourage rodent infestations. Potential rodent entry holes can be found around windows and doors, between the foundation and the ground, and around electrical, plumbing and gas lines. Seal possible entry holes with cement, lath metal, hardware cloth, or sheet metal. Fix gaps in portable building skirtings and use flashing around the base of the structure.

Trap Up!

Trap rodents to help reduce the population!

Choose an appropriate snap trap. Traps for catching mice are different from those for catching rats. Always read the instructions on the box before setting the trap. A small amount of peanut butter (approximately the size of a pea) should be placed on the bait pan of the snap trap. Position the bait end of the trap next to the wall so it forms a "T" with the wall.

Glue traps and live traps are not recommended. These traps can scare mice that are caught live and cause them to urinate. This may increase your risk of being exposed to hantavirus. Place traps in outbuildings and in areas that might likely serve as rodent shelters. Natural rodent predators, such as non-poisonous snakes, owls, and hawks, may also be beneficial in the control and reduction of rodents outside the home.

Clean Up!

Clean up urine and droppings

Take precautions before and while cleaning rodent-infested areas. Before cleaning a space, ventilate the area by opening the doors and windows for at least 30 minutes to diffuse potentially infectious aerosolized material. Use cross-ventilation and leave the area during the airing-out period.

- **When you begin cleaning, it is important that you do not stir up dust by sweeping or vacuuming up droppings, urine, or nesting materials.**

1. Wear rubber, latex, vinyl, or nitrile gloves when cleaning urine and droppings.

2. Spray ***(soak thoroughly)*** the urine and droppings with a disinfectant or a mixture of bleach and water and let soak 5 minutes. The recommended concentration of bleach solution is 1 part bleach to 10 parts water (see below).

These viruses are surrounded by a lipid (fatty) envelope, so they are somewhat fragile. The lipid envelope can be destroyed and the virus killed by fat solvents, such as alcohol, ordinary disinfectants and household bleach. That is why one of the most important ways to prevent transmitting the disease is to carefully wet down dead rodents and areas where rodents have been with disinfectant and/or bleach. When you do this, you are killing the virus itself and reducing the chance that the virus will get into the air.

Strength of Hypochlorite Solution

Special Pathogens Branch recommends a 10% bleach solution be used to inactivate hantaviruses. A 10% solution corresponds to 1 and a half cups of household bleach per gallon of water, or 1 part bleach to nine parts water.

Why a 10% solution? Household bleach is made of 5.25% Sodium Hypochlorite (52,500 ppm); therefore, a 1% bleach solution is 525 ppm. Some experiments have shown that 200 ppm (or even less in some experiments) will inactivate most viruses. Therefore it would seem that a 1% solution of household bleach might be adequate. However, hypochlorite is substantially and quickly inactivated in the presence of organic matter. So, although 1% may be adequate for surface decontamination, a 10% dilution may be a better choice for inactivation of virus when one is cleaning out areas which have been infested by rodents. This 10% concentration is currently supported in CDC Infection Control recommendations.

Amount of Hypochlorite Solution

No matter what concentration of solution is used, only the outside layer of the material to be disinfected is bound with the chlorine molecules in the bleach solution, unless the object is entirely soaked through. Complete soaking is more easily achieved when greater quantities of water are used. Therefore, it is recommended that the material being sprayed or poured over be thoroughly drenched, in order to maximize penetration of the material.

3. Use a paper towel to pick up the urine and droppings, and dispose of the waste in the garbage. After the rodent droppings and urine have been removed, disinfect items that might have been contaminated by rodents or their urine and droppings.

4. Mop floors and clean countertops with disinfectant or bleach solution. Steam clean or shampoo upholstered furniture and carpets with evidence of rodent exposure. Wash any bedding and clothing with laundry detergent in hot water if exposed to rodent urine or droppings. Lastly, before removing gloves used while cleaning, wash gloved hands with soap and water or spray a disinfectant or bleach solution on gloves before taking them off. Wash hands with soap and warm water after removing gloves.

Clean up dead rodents or nests

5. Wear rubber, latex, vinyl, or nitrile gloves when cleaning up dead rodents or nests. Spray the dead rodent or nest and the surrounding area with a disinfectant or a mixture of bleach and water. Soak rodent, nesting materials or droppings in solution for 5 minutes before wiping up with a paper towel or rag. Place the dead rodent or nesting materials in a plastic bag and seal tightly. Place the full bag in a second plastic bag and seal. Throw the bag into a covered trash can that is regularly emptied.

6. Wash gloved hands with soap and water or spray a disinfectant or bleach solution on gloves before taking them off. Wash hands with soap and warm water after taking off your gloves.

Clean up heavy rodent infestation

Special precautions should be used for cleaning homes or buildings with heavy rodent infestations. Hiring a professional pest control operator is a good idea! Also, workers who are either hired specifically to perform a clean-up or asked to do so as part of their work activities should receive specific training about hantavirus. The special precautions may also apply to vacant dwellings that have attracted large numbers of rodents and to dwellings and other structures that have been occupied by persons with confirmed hantavirus infection.

Persons involved in the clean-up should wear:

- ✓ Coveralls (disposable, if possible);
- ✓ Rubber boots or disposable shoe covers;
- ✓ Rubber, latex, vinyl, or nitrile gloves;
- ✓ Protective goggles; and
- ✓ An appropriate respiratory protection device, such as
- ❖ A half-mask air-purifying (or negative-pressure) respirator with a high-efficiency particulate air (HEPA) filter or
- ❖ A powered air-purifying respirator (PAPR) with HEPA filters.

Please note the HEPA classification recently has been discontinued. Please read "Update On the Nomenclature and Use of Respirators as a Precaution for Hantavirus Infection, February, 1999"for details at website www.cdc.gov/ncidod/diseases/hanta/hps/noframes/prevent7.htm or at the end of this document.

Personal protective gear should be decontaminated upon removal at the end of the day. If the coveralls are not disposable, they should be laundered on site using Biohazard Event protocols. If no laundry facilities are available, the coveralls should be immersed in liquid disinfectant until they can be washed.

All potentially infective waste material (including respirator filters) from clean-up should be double bagged in appropriate plastic bags. The bagged material should then be labeled as infectious (if it is to be transported) and disposed of in accordance with local requirements for infectious waste.

Workers who develop symptoms suggestive of HPS within 45 days of the last potential exposure should immediately seek medical attention. The physician should contact local health authorities promptly if hantavirus-associated illness is suspected. A blood sample should be obtained and forwarded through the state health department to CDC for hantavirus antibody testing.

Clean up rodent food sources and nesting sites

Prevent contact with rodents by cleaning up your home, workplace, or campsite.

Eliminate possible rodent food sources. Keep food in thick plastic or metal containers with tight lids. Clean up spilled food right away and wash dishes and cooking utensils soon after use. Always put pet food away after use and do not leave pet-food or water bowls out overnight. Use a thick plastic or metal garbage can with a tight lid. Keep compost bins 100 feet or more from the house. Keep grains and animal feed in thick plastic or metal containers with tight lids. In the evening, uneaten animal feed should be returned to containers with lids.

If storing trash and food waste inside the home, do so in rodent-proof containers, and frequently clean the containers with soap and water. Dispose of trash and garbage on a frequent and regular basis, and pick up or eliminate clutter.

Eliminate possible nesting sites outside the home. Elevate hay, woodpiles, and garbage cans at least 1 foot off the ground. Move woodpiles 100 feet or more from the house. Get rid of old trucks, cars, and old tires that mice and rats could use as homes. Keep grass and shrubbery within 100 feet of the home well trimmed.

Summing Up: How to Prevent HPS

- ❖ Make your home, workplace, vacation home unattractive to rodents
- ❖ Clean up infested areas by using safety precautions
- ❖ Wet down infested areas with bleach/disinfectant to kill the virus before it aerosolizes

AIR OUT SEAL UP TRAP UP CLEAN UP!

Update on the Nomenclature and Use of Respirators as a Precaution for Hantavirus Infection: February, 1999

The CDC "Hantavirus Pulmonary Syndrome--Updated Recommendations for Risk Reduction"[1] describes precautions for persons who are involved in the cleanup of homes of confirmed cases of hantavirus infection or of areas with heavy rodent infestation and for workers in affected areas who are regularly exposed to rodents. Among these precautions is the wearing of one of the following types of respirators[2] equipped with a high-efficiency particulate air (HEPA) filter: a half-mask air-purifying (or negative-pressure) respirator or a powered air-purifying respirator (PAPR).

Recent changes in the nomenclature and certification of the type of filters used in these respirators include the discontinuation of the HEPA designation and the designation of new classes of filters. As shown on the chart below, the N-100 (99.97) is equivalent to the previous HEPA filter.

Use of an N-100 filter should provide the same protection as the HEPA filter. Due to the nature of the virus, no studies have been able to test the efficacy of either the HEPA or N-100 filters in protecting against HPS transmission. Available evidence suggests that HPS is transmitted by inspiring small (less than 5 micron) viral particles in aerosols which the N-100 is the most effective in removing.

Cautions: As described in CDC "Hantavirus Pulmonary Syndrome—Updated Recommendations for Risk Reduction", all negative-pressure respirators are fit-dependent. Anything that interferes with the respirator's face seal, such as facial hair, will allow ambient air to bypass the filter medium in the respirator[3]. Ideally, users should be fit-tested with the same make, model, style, and size of respirator that will be actually used. Respirator practices should follow a comprehensive user program and be supervised by a knowledgeable person.

New Classes of Filters for Respiratory Protection Devices[4]

New classes of filters ††			Characteristics
		Equivalent to HEPA	
N-95	N-99	N-100 (99.97)	Not resistant to oil
R-95	R-99	R-100 (99.97)	Resistant to oil
P-95	P-99	P-100 (99.97)	Oil Proof

†† number indicates % efficiency in removing monodispersed particles 0.3 micrometers in diameter.
Authority for testing and certifying these respirators has been given exclusively to NIOSH. For additional information:
contact the Industrial Hygiene Section, Office of Health & Safety, CDC at 404 639-3112.
Read the NIOSH directive online, at "OSHA Directives: CPL 2-0.120 - Inspection procedures for the Respiratory Protection Standard"
(1) MMWR Recommendations and Reports, July 26, 2002; 51[RR-9]
(2) All of these respirators can be purchased from commercial suppliers of laboratory safety equipment. The items displayed here are intended to show the general design of the respirator and do not constitute endorsement of any particular brand of respirator.
(3) MMWR 47(40): 1045-1049, demonstrates importance of fit testing for all negative-pressure respirators.
(4) As described in NIOSH 42, CFR 84.