

## ANNEX 9. PREVENTION MATERIALS FOR REPRODUCTION AND DISTRIBUTION

---

*This annex contains reference materials on personal risk reduction that can be produced and distributed easily and quickly.*

### HANTAVIRUS PULMONARY SYNDROME

#### Rationale for Surveillance

Hantavirus pulmonary syndrome (HPS) in the Americas is a rare but usually severe disease transmitted through close contact with the urine, feces, or saliva of infected rodents. Although HPS cases have only been reported from Argentina, Brazil, Canada, Chile, Paraguay, United States of America, and Uruguay, the potential for disease exists throughout the Americas due to the widespread distribution of existing rodent reservoirs. Surveillance is therefore essential for all countries.

#### Recommended HPS Case Definition

##### *Clinical Case Definition:*

- A febrile illness (i.e., temperature greater than 38.3 °C [101 °F]) occurring in a previously healthy person characterized by bilateral diffuse intersti-

tial edema that may radiographically resemble adult respiratory distress syndrome (ARDS) with respiratory compromise requiring supplemental oxygen developing within 72 hours of hospitalization; **OR**

- An unexplained illness resulting in death in conjunction with an autopsy examination demonstrating noncardiogenic pulmonary edema without an identifiable specific cause of death.

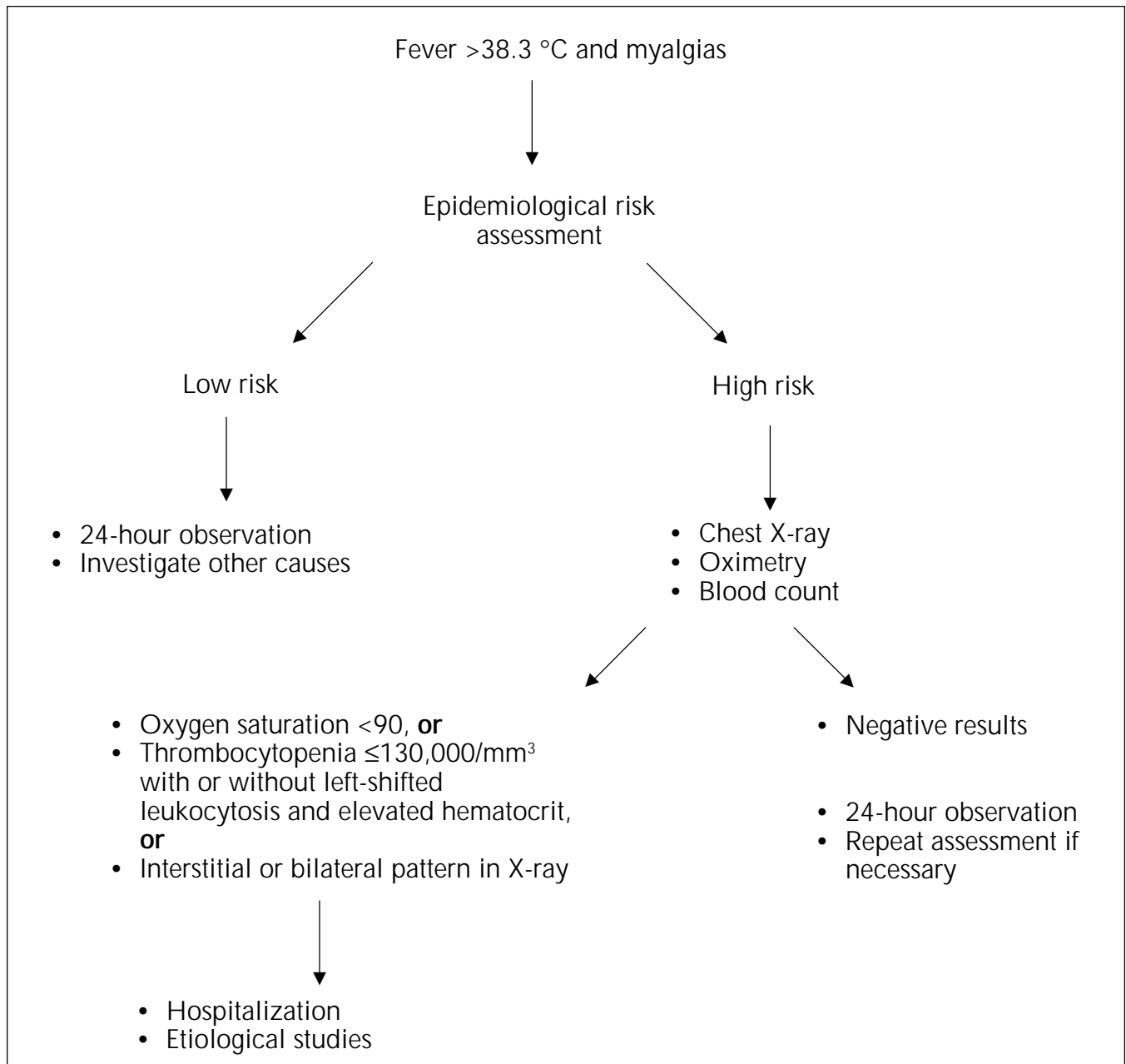
##### *Laboratory Criteria for Diagnosis:*

- Presence of hantavirus-specific IgM antibodies or a 4-fold or greater increase in IgG antibody titers; **OR**
- Positive reverse transcriptase-polymerase chain reaction (RT-PCR) results for hantavirus RNA; **OR**
- Positive immunohistochemical results for hantavirus antigens.

##### *Case Classification:*

- Suspected: A case compatible with the clinical description.
- Confirmed: A suspected case that is laboratory confirmed.

FIGURE A9.1. Hantavirus pulmonary syndrome algorithm.



### Recommendations for Surveillance

- Establish HPS as a reportable (compulsory reporting) disease in all PAHO Member Countries.
- Develop a case report form that identifies standard minimum data elements to be collected by all countries of the Region.
- If HPS is suspected, a blood count, chest X-ray, oxygen saturation, and hantavirus serology should be performed. Rodent exposure should be evaluated.
- Postmortem blood, fresh frozen tissue, and formal fixed tissue should be collected from deceased HPS patients and properly transported to the nearest laboratory capable of HPS confirmation.
- If hantavirus infection not meeting the case definition of HPS is suspected, specimens may also be submitted for testing along with a description of clinical manifestations.

### General Precautions for Residents of Affected Areas

- Reduce the availability of food sources and nesting sites used by rodents inside the home.
- Eliminate rodents inside the home.
- Discourage children from playing with rodents or their nests, and advise them to tell their parents if they see rodents or their nests.
- Keep food (including pet food) and water covered and stored in rodent-proof metal or thick plastic containers with tight-fitting lids.
- Store garbage inside homes in rodent-proof metal or thick plastic containers with tight-fitting lids.
- Wash dishes and cooking utensils immediately after use and remove all spilled food.
- Dispose of trash and clutter.
- Use spring-loaded rodent traps in the home continuously.
- As an adjunct to traps, use rodenticide with bait under a plywood or plastic shelter (a covered bait station) on an ongoing basis inside the house.

## General Practices for the Prevention of Rodent-infested Homes

- Use steel wool or cement to seal, screen, or otherwise cover all openings into the home that have a diameter of 0.5 cm or more.
- Place metal roof flashing as a rodent barrier around the base of wooden, earthen, or adobe dwellings up to a height of 30 cm and buried in the soil to a depth of 15 cm.
- Place 10 cm of gravel under the base of homes or under mobile homes to discourage rodent burrowing.
- Reduce rodent shelter and food sources within 30 m of the home.
- Cut grass, brush, and dense shrubbery within 30 m of the home.
- Use raised cement foundations in new construction of sheds, barns, outbuildings, or woodpiles.
- When possible, place woodpiles 30 m or more from the house and elevate wood at least 30 cm off the ground.
- Store grains and animal feed in rodent-proof containers.
- Near buildings, remove food sources that might attract rodents, or store food and water in rodent-proof containers.
- Store hay on pallets, and use traps or rodenticide continuously to keep hay free of rodents.
- Do not leave pet food in feeding dishes.
- Dispose of garbage and trash in rodent-proof containers that are elevated at least 30 cm off the ground.
- Haul away trash, abandoned vehicles, discarded tires, and other items that may serve as rodent nesting sites.
- Place spring-loaded rodent traps at likely spots for rodent shelter within 30 m around the home, and use continuously.
- Use a nationally approved rodenticide certified for outside use in covered bait stations at places likely to shelter rodents within 30 m of the home.

## Eliminating Rodent Infestation: Guidance for Residents of Affected Areas

- Before rodent elimination work is begun, ventilate closed buildings or areas inside buildings by opening doors and windows for at least 30 min. Use an exhaust fan or cross ventilation if possible. Leave the area until the airing-out period is finished. This airing may help remove any aerosolized virus inside the closed-in structure.
- Seal, screen, or otherwise cover all openings into the home that have a diameter of 0.5 cm or more. Then set rodent traps inside the house, using peanut butter, fruit, sugarcane, or other substitutes as bait. Use only spring-loaded traps that kill rodents.
- Next, treat the interior of the structure with an insecticide labeled for flea control, following label instructions. Insecticide sprays or powders can be used in place of aerosols if they are appropriately labeled for flea control.
- Rodenticides may also be used while the interior is being treated, as outlined below:
  - Remove dead rodents from the traps. Wear rubber or plastic gloves while handling rodents. Place the carcasses in a plastic bag containing a sufficient amount of a general-purpose household disinfectant to thoroughly wet the carcasses. Seal and double-bag the carcasses, then dispose of them by burying them in a hole 0.5–1 m deep or by burning. If burying or burning is not feasible, contact your local or state health department about other appropriate disposal methods. Rebait and reset all sprung traps.
- Before removing the gloves, wash gloved hands in a general household disinfectant and then in soap and water. A hypochlorite solution prepared by mixing 3 tbs of household bleach in 4.5 L of water may be used in place of a commercial disinfectant. When using the solution, avoid spilling the mixture on clothing or other items that could be damaged.
- Thoroughly wash hands with soap and water after removing the gloves.
- Leave several baited spring-loaded traps inside the house at all times as further precaution against rodent reinfestation. Examine the traps regularly.
- Disinfect traps no longer in use by washing in a general household disinfectant or the hypochlorite solution and *rinsing* clean. Disinfect and wash gloves as described above, and wash hands thoroughly with soap and water before beginning other activities.

## Cleanup of Rodent-contaminated Areas: Guidance for Residents of Affected Areas

- Persons involved in the cleanup should wear rubber or plastic gloves.
- Spray dead rodents, rodent nests, droppings, and foods or other items that have been tainted by rodents with a general-purpose household disinfectant.
- Soak the material thoroughly and place in a plastic bag.
- When cleanup is complete (or when the bag is full), seal the bag, then place it into a second plastic bag and seal.
- Dispose of the bagged material by burying in a hole 0.5–1 m deep or by burning. If these alternatives are not feasible, contact the local or state health department concerning other appropriate disposal methods.
- After the above items have been removed, **mop** floors with a solution of water, detergent, and disinfectant. To avoid generating potentially infectious aerosols, do not vacuum or sweep dry surfaces before mopping.
- Spray dirt floors with a disinfectant solution. A second mopping or spraying of floors with a general-purpose household disinfectant is optional.
- Carpets can be effectively disinfected with household disinfectants or by commercial-grade steam cleaning or shampooing.
- Disinfect countertops, cabinets, drawers, and other durable surfaces by washing them with a solution of detergent, water, and disinfectant, followed by an optional wiping-down with a general-purpose household disinfectant.
- Rugs and upholstered furniture should be steam cleaned or shampooed. If rodents have nested inside furniture and the nests are not accessible for decontamination, the furniture should be removed and burned.
- Launder potentially contaminated bedding and clothing with hot water and detergent. (Use rubber or plastic gloves when handling the dirty laundry, then wash and disinfect gloves.) Machine-dry laundry on a high setting or hang it to air-dry in the sun.

## Special Precautions for Cleanup in Homes of Persons with Hantavirus Infection or Buildings with Heavy Rodent Infestation

- A baseline serum sample, preferably drawn at the time these activities are initiated, should be available for all persons conducting the cleanup of homes or buildings with heavy rodent infestation. The serum sample should be stored at  $-20^{\circ}\text{C}$ .
- Persons involved in the cleanup should wear coveralls (disposable if possible), rubber boots or disposable shoe covers, rubber or plastic 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. Respirators (including positive-pressure types) are not considered protective if facial hair interferes with the face seal, since proper fit cannot be assured. Respirator practices should follow a comprehensive user program and be supervised by a knowledgeable person. 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. 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 cleanup operations that cannot be burned or deep-buried on site 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 with the baseline serum through the state health department to the appropriate reference laboratory for hantavirus antibody testing.

## Precautions for Workers in Affected Areas Who Are Exposed to Rodents

- A baseline serum sample, preferably drawn at the time of employment, should be available for all persons whose occupation involves frequent rodent contact. The serum sample should be stored at  $-20^{\circ}\text{C}$ .
- Workers in potentially high-risk settings should be informed about the symptoms of HPS and be given detailed guidance on prevention measures.
- Workers who develop a febrile or respiratory illness within 45 days of the last potential exposure should immediately seek medical attention and inform the attending physician of the potential occupational risk of hantavirus infection. The physician should contact local health authorities promptly if hantavirus-associated illness is suspected. A blood sample should be obtained and forwarded with the baseline serum to the appropriate reference laboratory for hantavirus antibody testing.
- Workers should wear a half-face air-purifying (or negative-pressure) respirator with eye protection or a power air-purifying respirator equipped with high-efficiency particulate air filters when removing rodents from traps or handling rodents in the affected area. Respirators (including positive-pressure types) are not considered protective if facial hair interferes with the face seal, since proper fit cannot be assured. Respirator use practices should be in accord with a comprehensive user program and should be supervised by a knowledgeable person. Workers should wear rubber or plastic gloves when handling rodents or handling traps containing rodents. Gloves should be washed and disinfected before removal.
- Traps contaminated by rodent urine or feces or in which a rodent was captured should be disinfected with a commercial disinfectant or bleach solution. Dispose of dead rodents.
- Persons removing organs or obtaining blood from rodent-affected areas should follow published safety guidelines.

## Reducing Risk of Hantavirus Infection: Guidance for Hikers and Campers

- Avoid coming into contact with rodents and rodent burrows or disturbing dens, such as pack rat nests.
- Do not use cabins or other enclosed shelters that are rodent infested until they have been appropriately cleaned and disinfected.
- Do not pitch tents or place sleeping bags in areas in proximity to rodent feces or burrows or near possible rodent shelters (e.g., garbage dumps or woodpiles).
- If possible, do not sleep on the bare ground. Use a cot with the sleeping surface at least 30 cm above the ground. Use tents with floors.
- Keep food in rodent-proof containers.
- Promptly bury (or—preferably—burn, followed by burying, when in accordance with local requirements) all garbage and trash, or discard in covered trash containers.
- Use only bottled water or water that has been disinfected by filtration, boiling, chlorination, or iodination for drinking, cooking, washing dishes, and brushing teeth.