



# HANTAVIRUS PULMONARY SYNDROME

1. **Agent:** Several strains of hantaviruses have been associated with causing hantavirus pulmonary syndrome (HPS). The most common cause of HPS in North America is Sin Nombre virus, the agent responsible for the 1993 epidemic in the Southwestern United States (US). Other hantaviruses cause a distinct syndrome called hemorrhagic fever with renal syndrome (HFRS); the only such agent in North America is Seoul virus.
2. **Identification:**
  - a. **Symptoms:** Fever, myalgia and gastrointestinal complaints followed by the abrupt onset of respiratory distress and hypotension with rapid progression to severe respiratory failure and cardiogenic shock. The illness can progress rapidly to become clinically compatible with adult respiratory distress syndrome (ARDS).

Elevated hematocrit, thrombocytopenia, and hypoalbumenia are common laboratory findings. The Mortality rate is approximately 38%. Rare instances of renal or hemorrhagic disease may occur.

An increasing number of acutely infected patients develop either no cardiopulmonary disease or extremely mild pulmonary disease.
  - b. **Differential Diagnosis:** Other types of viral infections, leptospirosis, Legionnaire's disease, mycoplasma, Q fever, chlamydia septicemic plague, tularemia, coccidioidomycosis, and histoplasmosis. In the immunocompromised, pneumocystis pneumonia, cytomegalovirus, cryptococcus, and aspergillus.
  - c. **Diagnosis:** Serologic tests for specific IgM antibodies using ELISA (enzyme linked immunosorbent assay) or Western blot techniques. PCR analysis of tissue samples or immunohistochemistry can be performed on biopsy specimens or at autopsy.
3. **Incubation period:** Not well known. Limited case information suggests 1 to 8 weeks.
4. **Reservoir:** Each hantavirus is associated primarily with a single rodent host species. The reservoir of Sin Nombre virus is the deer mouse, *Peromyscus maniculatus*, which can be found throughout the western and central US and Canada. Cotton rats and rice rats in the southeastern states and the white-footed mouse in the Northeast are other reservoirs of the hantaviruses.
5. **Source:** Saliva, urine, and droppings of infected rodents.
6. **Transmission:** Aerosol transmission from rodent excreta. Rare forms of transmission include bites of infected rodents, direct contact of broken skin or mucous membranes with rodent excreta, and by eating food contaminated by infected rodent excreta.
7. **Communicability:** No evidence of spread from person-to-person of viruses found in the US. Rare cases of person-to-person transmission have occurred in South America among close contacts of persons infected with Andes virus.
8. **Specific Treatment:** Supportive measures only.
9. **Immunity:** All persons without prior infection are presumed to be susceptible. There are no known re-infections with the same hantavirus.

## REPORTING PROCEDURES

1. **Reportable:** All cases and suspected cases of Hantavirus pulmonary syndrome require immediate notification by telephone to ACDC, *California Code of Regulations*, Section 2500.

**Report forms:**

[HANTAVIRUS INFECTIONS CASE REPORT \(CDPH 9077\)](#)



## 2. Epidemiologic Data:

- a. Exposure to rodents, rodent droppings, or other signs of rodent infestation in the 8 weeks prior to onset.
- b. Exposure to rural areas where forests, fields, and farms offer suitable habitat for rodents.
- c. Exposure to confined, poorly ventilated spaces, including rarely opened or seasonally closed buildings, such as vacation cabins or storage facilities.
- d. Occupation, job duties.
- e. Travel in previous 8 weeks.
- f. Case finding: Similar illness among co-workers or household members.

### CONTROL OF CASE, CONTACTS & CARRIERS

#### CASES:

**Isolation:** None

**CONTACTS:** No restrictions.

**CARRIERS:** Not applicable.

#### PREVENTION-EDUCATION

1. Control rodents.
2. Workers in high-risk occupations should wear protective clothing and respirators.
3. Using a disinfectant solution, wet-clean cabins or buildings which are rarely opened, and which have past or present rodent problems.
4. Dispose of potentially infectious waste (rodent feces or carcasses) in double plastic bags.
5. Give disease-specific pamphlet.

#### DIAGNOSTIC PROCEDURES

Save all specimens (including hematology differential slides) from the patient until HPS serology has been completed. Additional

samples may be tested if the patient is deceased.

[CDPH Screening Criteria for HPS in Persons with Unexplained Respiratory Illness and Guidelines for Specimen Submission](#)

#### Laboratory Forms:

[HANTAVIRUS PULMONARY SYNDROME SCREENING FORM \(acd-hantaviruscreen\)](#)

[VRDL General Purpose Specimen Submittal Form](#)

1. **Serology:** Confirm serological testing at the California Department of Public Health (CDPH) Viral and Rickettsial Disease Laboratory, after approval by ACDC.

**Container:** Purple top for serum EDTA and red top for whole clotted blood

**Examination Requested:** Hantavirus IgM

**Material:** Serum EDTA and whole clotted blood

**Amount:** 5 mL serum, 10mL whole blood

**Storage:** Send on cold packs and use an overnight delivery service because the EDTA samples will begin to degrade within three days.

2. **PCR/Viral Isolation:** CDPH recommends submitting a respiratory specimen for viral isolation and/or respiratory PCR assays to test for other agents.

**Examination Requested:** PCR or viral isolation

**Container:** Swabs composed of synthetic fibers (e.g., rayon, nylon, dacron) should be used to collect samples. The swabs should be placed in a standard container with 2-3 ml of VTM or similar media approved for viruses.

**Material:** Nasopharyngeal swabs or washes, tracheal aspirates, bronchoalveolar lavage, and/or pleural fluid

**Storage:** Refrigerated at 4 °C after inoculation. If there will be prolonged



specimen storage (>5 days), then the specimen should ideally be frozen at -70 °C or below.

3. **Tissue Examination:**

**Material:** Lung, kidney, and spleen tissues are preferred.

**Storage:** Paraffin embedded lung and kidney tissues. Ship and store at ambient temperature.

Fresh or frozen lung and kidney. Ship and store at -70°.