Hantavirus Pulmonary Syndrome

Organism: In the US and Canada, the Sin Nombre hantavirus is responsible for the majority of cases of Hantavirus Pulmonary Syndrome (HPS). The host of the Sin Nombre virus is the deer mouse (*Peromyscus maniculatus*), present throughout the western and central US and Canada. Indigenous HPS has not been reported in Alaska.

Incubation period: The incubation period of HPS is one to six weeks (7–45 days).

Infectious period: Person-to-person spread of hantaviruses in the U.S. has not occurred. However, it has been documented in Argentina during an outbreak due to a related Andes virus.

Transmission: Transmission is via inhalation of virus that is excreted in mouse urine, feces or saliva and aerosolized during cleaning of buildings with rodent nests or other rodent contamination. Exposures have occurred in rodent-infested cabins, homes, barns, vehicles, outbuildings or less commonly when handling wild rodents without protective equipment. Nationally, rare transmission has been documented from a bite of a deer mouse.

Treatment: There is no antiviral treatment. Supportive care including intubation and ventilation and fluid and pharmacologic support of blood pressure is typically required.

Information Needed for the Investigation

Verify the Diagnosis

- Because the clinical illness is nonspecific and ARDS is common, a screening case definition should be used to determine which patients to test. In general, a predisposing medical condition (e.g., malignancy, chronic pulmonary disease, trauma, burn, or surgery) is a more likely cause of ARDS than hantavirus pulmonary syndrome. Patients with these underlying conditions and ARDS need not be tested for hantavirus.

Laboratory Testing

- CDC will not accept specimens without prior consultation with the Viral Special Pathogens Branch (VSPB) at 470-312-0094. Alaska State Public Health Laboratory (ASPHL) should also be advised of the testing request and will facilitate shipping specimens to CDC. Guidelines for submitting specimens to CDC's VSPB are available here: https://www.cdc.gov/ncezid/dhcpp/vspb/pdf/specimen-submission-508.pdf
- CDC Webpage Protocol for Specimen Submission: http://www.cdc.gov/hantavirus/health-care-workers/specimen-submission/protocol.html

2015 Case Definition
http://wwwn.cdc.gov/NNDSS/script/casedef.aspx?CondYrID=958&DatePub=2015-01-01

Clinical Description
Hantavirus Pulmonary Syndrome (HPS) is an acute febrile illness (i.e., temperature greater than 101.0 °F [greater than 38.3° C]) with a prodrome consisting of fever, chills, myalgia, headache, and gastrointestinal symptoms, and one or more of the following clinical features: Bilateral diffuse interstitial edema, or

- Clinical diagnosis of acute respiratory distress syndrome (ARDS), or
- Radiographic evidence of noncardiogenic pulmonary edema, or
- An unexplained respiratory illness resulting in death, and includes an autopsy examination demonstrating noncardiogenic pulmonary edema without an identifiable cause, or
- Healthcare record with a diagnosis of hantavirus pulmonary syndrome, or
- Death certificate lists hantavirus pulmonary syndrome as a cause of death or a significant condition contributing to death

Laboratory Criteria for Diagnosis

- Detection of hantavirus-specific immunoglobulin M or rising titers of hantavirus-specific immunoglobulin G, or
- Detection of hantavirus-specific ribonucleic acid in clinical specimens, or
- Detection of hantavirus antigen by immunohistochemistry in lung biopsy or autopsy tissues

Case Classification
Confirmed: A clinically compatible case of HPS with laboratory evidence.

Comment(s)
Laboratory testing should be performed or confirmed at a reference laboratory. Because the clinical illness is nonspecific and ARDS is common, a screening case definition can be used to determine which patients to test. In general, a predisposing medical condition (e.g., chronic pulmonary disease, malignancy, trauma, burn, and surgery) is a more likely cause of ARDS than HPS, and patients who have these underlying conditions and ARDS need not be tested for hantavirus.

Hospital Considerations:

- Standard precautions are recommended. HPS has not been associated with health care-associated or person-to-person transmission in the United States.

Control Measures:

- Care of Exposed People. Serial clinical examinations should be used to monitor people assessed to be at high risk of infection after a high-risk exposure.
- Environmental Control. Hantavirus infections of humans occur primarily in adults and are associated with domestic, occupational, or leisure activities bringing humans into

contact with infected rodents, usually in a rural setting. Eradicating the host reservoir is not feasible. The best available approach for disease control and prevention is risk reduction through environmental hygiene practices that discourage rodents from colonizing the home and work environment and that minimize aerosolization and contact with virus in saliva and excreta. Measures to decrease exposure in the home and workplace include eliminating food sources available to rodents in structures used by humans, limiting possible nesting sites, sealing holes and other possible entrances for rodents, and using "snap traps" and rodenticides. Before entering areas with potential rodent infestations, doors and windows should be opened to ventilate the enclosure.

- Hantaviruses, because of their lipid envelope, are susceptible to most disinfectants, including diluted bleach solutions, detergents, and most general household disinfectants. Dusty or dirty areas or articles should be moistened with 10% bleach or other disinfectant solution before being cleaned. Brooms and vacuum cleaners should not be used to clean rodent-infested areas. Use of a 10% bleach solution to disinfect and wearing rubber gloves before handling trapped or dead rodents are recommended. Gloves and traps should be disinfected after use. The cleanup of areas potentially infested with hantavirus-infected rodents should be carried out by knowledgeable professionals using appropriate personal protective equipment. Potentially infected material removed should be handled according to local regulations as infectious waste.
- Chemoprophylaxis measures or vaccines are not available.

Case Reporting

- CDC HPS Case Report Form: https://www.cdc.gov/hantavirus/pdf/hps_case-report-form-508.pdf
- Enter into AK-STARS

Resources:

1. American Academy of Pediatrics (Hantavirus Pulmonary Syndrome). In Red Book: 2018-2021 Report of the Committee on Infectious Diseases, (pages 375-78).
2. CDC Hantavirus website: http://www.cdc.gov/hantavirus/index.html
3. CDC Hantavirus website brochure 'Facts About Hantavirus': http://www.cdc.gov/hantavirus/pdf/hps_brochure.pdf and Hantavirus Pulmonary Syndrome Fact Sheet https://www.cdc.gov/hantavirus/pdf/hps-fact-sheet.pdf
4. Washington State Department of Health website: http://www.doh.wa.gov/Portals/1/Documents/5100/420-056-Guideline-Hantavirus.pdf#nameddest=casedef