



## PREVENTION OPPORTUNITIES UNDER THE BIG SKY

### Hantavirus pulmonary syndrome in Montana: risk factors, recognition, and treatment

Hantavirus pulmonary syndrome (HPS) was first recognized in May 1993, in the Four-Corners region of the United States. It is a rare but potentially deadly disease caused by a group of viruses called hantaviruses.<sup>1</sup> At least five different hantaviruses causing HPS have been characterized in the United States, each with its own distinct rodent reservoir. Sin Nombre virus, carried by the deer mouse (*Peromyscus maniculatus*), is the predominant cause of HPS in the United States and the only cause of HPS currently identified in Montana.

Although HPS rates in the U.S. and Montana are relatively low, overall mortality rates in reported cases are around 36% and 29%, respectively. While early treatment is imperative, patients typically present with a nonspecific illness making it difficult to diagnose HPS in its early stages. This issue of *Montana Public Health* describes the epidemiology of HPS in the U.S. and Montana, risk factors, clinical manifestations, diagnostic testing, and treatment recommendations.

**Hantavirus transmission.** The virus is transmitted to humans from aerosolized rodent excreta, particularly urine, and can also occur from inhalation of secondary aerosols (atmospheric gas interacting with particulate matter), and from rodent bites or other direct contact of infectious material with mucous membranes or broken skin.

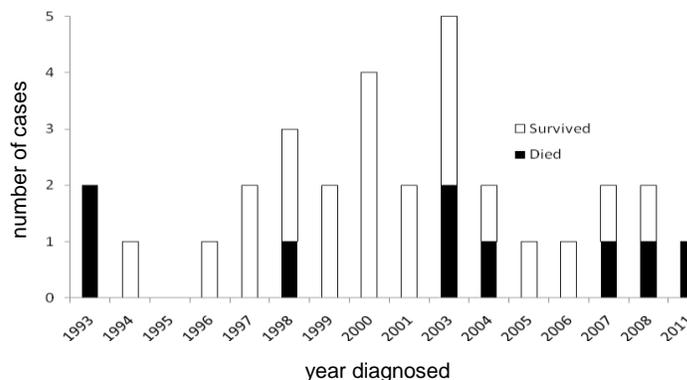
**HPS in the United States.** Through December 15, 2010, 560 cases of HPS were reported in the United States. Around 36% of all reported cases resulted in death. Cases have been reported from 31 states with half occurring in the southwestern U. S. around the Four-Corners region. Approximately 75% of reported HPS cases occurred among residents of rural areas, and 63% were male.

**HPS in Montana.** From 1993 through May 2011, 31 cases of HPS were reported from 19 counties in Montana (Figure). Counties with the most cases included Beaverhead (5), Cascade (4), and Glacier (3). Of the total cases reported in Montana, 9 (29%) died and 20 (65%) were male.

**Risk Factors.** Case-control studies have suggested that increased rodent infestations in and around the home is the highest risk factor for hantavirus transmission to humans,<sup>2</sup> followed by entering rarely or seasonally opened buildings where rodents may reside. Clusters of cases have also been documented where exposure occurred within an enclosed structure. Investigation of these clusters indicated that disturbing or inhabiting closed structures with active rodent

infestations are important risk factors for hantavirus transmission.

**Figure. Hantavirus pulmonary syndrome cases, Montana, 1993-2011 (May)**



**Clinical Disease.** The prodromal phase of HPS is clinically indistinguishable from numerous other viral infections. Patients typically present with a 3-5 day history of fever, headache, and muscle aches. Early symptoms also might include chills, dizziness, non-productive cough, and gastrointestinal symptoms and patients might report shortness of breath (respiratory rate usually 26 - 30 times per minute). The physical examination often reveals tachypnea and tachycardia but is usually otherwise normal. Within 24 hours of initial evaluation, most patients develop some degree of hypotension and evidence of progressive pulmonary edema and hypoxia, usually requiring mechanical ventilation.

**Differential diagnosis.** Because the prodromal phase of HPS is indistinguishable from numerous other viral infections, often the only indication that the clinical illness is HPS are hematological findings. Hematological studies often show circulating immunoblasts, which appear as large atypical lymphocytes, and thrombocytopenia. A concurrent left-shifted neutrophilia with circulating myelocytes might distinguish HPS from other viral infections. In the cardiopulmonary stage of HPS, patients have a diffuse pulmonary edema most frequently caused by silent myocardial infarction.

Diseases in immunocompetent patients with non-specific prodrome leading to acute cardiopulmonary deterioration might also include leptospirosis, Legionnaire's disease, Q fever, a mycoplasma infection, or Chlamydia infection. HPS is relatively uncommon and in immunocompromised persons infections with *Pneumocystis carinii*, CMV, cryptococcus, or aspergillus, or graft vs. host disease are far more likely to be the cause of diffuse pulmonary infiltrates compared with a hantaviral infection.

#### **Recommendations for health care providers<sup>4, 5</sup>**

- Health care providers should consider HPS as a diagnosis in patients with fever, headache, myalgia, nausea/vomiting, and shortness of breath, especially if rodent exposure is reported.
- If a hantavirus infection is suspected, a CBC and blood chemistry should be repeated every 8 to 12 hours to monitor serum albumin, hematocrit, platelet count, atypical lymphocytes, and white blood cell count.
- A serum sample should be sent to the Montana Public Health Laboratory for IgG and IgM testing.
- Patients should receive appropriate, broad-spectrum antibiotic therapy while awaiting confirmation of a diagnosis of HPS.
- Care during the initial stages of the disease should include antipyretics and analgesia as needed.
- If there is a high degree of suspicion of HPS, patients should be transferred immediately to an emergency department or intensive care unit (ICU) for close monitoring and care.
- ICU management should include, monitoring and adjustment of volume status and cardiac function, including inotropic and vasopressor support if needed.
- Immediately report any suspected case of HPS to your local public health department.

For more information, contact the state communicable disease epidemiology program, 406-444-0273; or see <http://www.dphhs.mt.gov/PHSD/epidemiology/epi-diseases-a-z.shtml>.

#### **References:**

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