

Hantavirus Pulmonary Syndrome in Montana

Background. Montana has one of the highest incidence rates of hantavirus pulmonary syndrome (HPS) in the United States.

Etiology, Transmission, and Pathogenesis. HPS is a life-threatening illness caused by hantavirus infection (Sin Nombre virus [SNV] is the most common hantavirus in the U.S.). The deer mouse (*Peromyscus maniculatus*) is the predominant animal reservoir for SNV. Rodents infected with SNV do not show signs of illness and persistently shed the virus. Humans become infected through exposure to the urine, droppings, or saliva of an infected rodent. The illness is characterized by a non-specific febrile, flu-like illness followed by development of bilateral diffuse interstitial edema of the lungs within 72 hours in a previously healthy person. Patients often require mechanical ventilation and the mortality rate is nearly 40%. The incubation period of HPS is estimated at 1–5 weeks. SNV characteristically becomes airborne and infects the lung parenchyma following inhalation. The virus disseminates and primary targets include vascular endothelial cells in the heart, lung, and lymphoid tissues. The immune response then results in vascular dysfunction and plasma leakage, ultimately resulting in fulminant cardiogenic pulmonary edema followed by rapid progression to cardiogenic shock. The diagnosis of HPS should be suspected in persons presenting with fever and fatigue following a rodent exposure. Most patients will have an elevated hematocrit, thrombocytopenia, leukocytosis, and hypoalbuminuria. Diagnosis is confirmed by detection of immunoglobulin (Ig)M or rising titers of hantavirus-specific IgG, hantavirus-specific RNA by polymerase chain reaction (PCR) in clinical specimens, or hantavirus antigen by immunohistochemistry. No curative treatment exists for HPS but early recognition and symptomatic treatment of HPS can lessen mortality. Recommended care includes aggressive fluid resuscitation and rapid transfer to a tertiary care center with intensive care unit capabilities.

Trends. Since 1993 when HPS was first described in the U.S. through 2011, 32 cases (range: 0–5 per year) of HPS have been reported in Montana. Nine (28%) of the 32 HPS cases died. Among the cases, the median age was 35 years (range: 8–69) and 20 (63%) were male. The majority of cases were reported in spring through summer, but cases were reported in all seasons (Figure). Twelve cases were suspected of having occupational exposure to rodents; among those, six cases had ranching as their primary occupation. While Beaverhead (n=5), Cascade (n=4), and Glacier (n=3) counties reported the most HPS cases, cases have been reported in every region of Montana.

Prevention. The best way to prevent HPS is to eliminate or minimize contact with rodents and rodent droppings. Persons engaging in the following activities might be at increased risk for developing HPS: a) opening and cleaning previously unused buildings, especially in rural areas; b) housecleaning activities; c) work-related activities, including construction, ranch, utility, and pest control workers; and d) campers and hikers that use rodent-infested trail shelters or camp in rodent habitats. Those persons living in or traveling through areas known to have SNV-infected rodents should take precautions to avoid exposure to rodents and rodent droppings. The Centers for Disease Control and Prevention’s (CDC) campaign “Seal Up! Trap Up! Clean Up!” offers safe and practical advice for reducing rodent populations. Details can be found at <http://www.cdc.gov/hantavirus/>.

Figure. Number of hantavirus pulmonary syndrome cases reported in Montana (n=32) by month of report, 1993–2011

