

# STATE OF COLORADO

Bill Owens, Governor  
Douglas H. Benevento, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.  
Denver, Colorado 80246-1530  
Phone (303) 692-2000  
TDD Line (303) 691-7700  
Located in Glendale, Colorado

Laboratory Services Division  
8100 Lowry Blvd.  
Denver, Colorado 80230-6928  
(303) 692-3090

<http://www.cdphe.state.co.us>



Colorado Department  
of Public Health  
and Environment

## Hantavirus Pulmonary Syndrome (HPS)

### Guidelines for Emergency Departments and Health Care Providers

May 10, 2007

Given the rapidity of onset of shock and respiratory failure, early recognition of Hantavirus Pulmonary Syndrome is critical in reducing mortality. This document provides information on the early signs and symptoms of HPS and what resources are available for diagnosis and treatment of the disease. Infected deer mice and human cases have been reported from all rural areas of Colorado.

#### **Clinical Recognition of the Hantavirus Prodrome**

HPS begins one to six weeks (average 2 weeks) after exposure to infected rodents or their excreta. Although not all patients will give a history of rodent exposure, reports of rapid, large increases in mouse populations around their residence or exposure to mice infested buildings are common among HPS patients. Patients experience a prodromal phase with fever, chills and myalgias, persisting for 1 to 7 days before progression to the cardiopulmonary phase. **Pain in the legs and back can be very severe in hantavirus prodrome.** Approximately 50% of patients also experience nausea, vomiting and diarrhea. The presence of a productive cough or other upper respiratory symptoms (rhinorrhea, sinusitis, sneezing) at the onset of illness is NOT consistent with a HPS diagnosis.

#### **Presumptive Laboratory Recognition of the Hantavirus Prodrome**

Because there is no way to **clinically** distinguish between the prodrome of HPS and that of many other viral and bacterial infections, the **liberal use of the complete blood count (CBC)** with differential and platelet count is recommended. A low platelet count (<150,000 in 98% of cases; <130,000 in 92%) is the only CBC abnormality consistently seen during the prodromal phase. All HPS cases eventually have platelets <100,000. Other nonspecific lab results suggestive of prodromal HPS include elevated LDH, elevated AST, and reduced serum bicarbonate. Patients with symptoms consistent with early HPS but with platelet counts of >150,000 should be advised to return to your clinic in 24 hours for re-evaluation.

#### **Presumptive Clinical and Laboratory Recognition of the Hantavirus Cardiopulmonary Syndrome**

The transition from hantavirus prodrome to HPS/respiratory failure progresses rapidly; 4 to 12 hours after the onset of dry cough and shortness of breath. With the onset of pulmonary edema, the CBC now shows thrombocytopenia, elevated hematocrit, leukocytosis with circulating myelocytes and promyelocytes, and immunoblasts, recognized as large atypical lymphocytes with deep blue cytoplasm. Acidosis (lactic), mild coagulopathy, elevated LDH and hepatic enzymes, and reduced serum albumin are usually seen. Serum creatinine is usually not elevated unless dehydration due to vomiting and diarrhea is severe. Hypotension in HPS is due to cardiogenic shock with low cardiac output and normal or elevated peripheral vascular resistance. Patients presenting with bilateral alveolar-interstitial infiltrates and hypotension and plasma lactate greater than 4 meq/L (note: your laboratory may use different units) have a high risk of mortality.

### **Management and Referral**

Patients with suspected HPS (thrombocytopenia and compatible clinical picture) should be transported to a critical-care unit as early as possible, because the fluid management should be guided by Swan-Ganz catheter data, hypotension must be treated with inotropes (initiate treatment with dobutamine), and oxygenation may be difficult even with mechanical ventilation. All patients with suspected HPS should be under respiratory isolation until the diagnosis of HPS is confirmed by serology. No approved antiviral treatment is available for HPS.

### **Diagnostic Testing**

The IgM antibody ELISA test specific for Sin Nombre virus is the preferred diagnostic test and is available at the state health department laboratory. Blood for serologic testing should be drawn into a red top tube, serum separated and held at refrigerator temperature. Specimens should be sent on cold pack via same-day or next-day delivery. Results are available within 48 hours after receipt by the laboratory. A completed submission form, available from the state lab, or paperwork documenting the patient's name, requested test, and name, address, and telephone/fax number of the submitting physician or hospital (where the results should be sent) must accompany the sample. Some private referral laboratories also offer hantavirus testing; ensure that the result is for Sin Nombre specific IgM antibody and not a screening test using a non-specific hantavirus antigen (i.e. Seoul or Hantaan virus) which have been associated with false positive results.

### **Consultation**

For consultation on suspected cases of HPS, the Colorado Department of Public Health and Environment (CDPHE) can be contacted at **303-692-2700** (regular business hours) or **303-370-9395** (after hours, weekends and holidays). The Virology Laboratory at can be reached at **303-692-3485**

### **Additional Clinical Information on HPS**

Clinicians with Internet access can find out more about the clinical and laboratory recognition of HPS at the University of New Mexico Department of Pathology's website at the following URL:

<<http://hsc.unm.edu/pathology/research/HjelleLab/clinical%20recognition1.htm>>. The Centers for Disease Control and Prevention (CDC) also maintains a comprehensive educational website at <[www.cdc.gov/ncidod/diseases/hanta/hps/](http://www.cdc.gov/ncidod/diseases/hanta/hps/)>.

### **General Information About HPS**

General patient information about HPS and prevention is available at CDPHE's Division of Disease Control and Environmental Epidemiology at 303-692-2700 (regular business hours) or on the internet at:

<<http://www.cdphe.state.co.us/dc/Zoonosis/hanta/index.html>> (CDPHE web site) or

<<http://www.cdc.gov/ncidod/diseases/hanta/hps/index.htm>> (CDC web site).