

Hantavirus Student Guide

History of Hantavirus

An outbreak of unexplained illness occurred in May 1993 in the Four Corners area of the Southwest. The name Four Corners comes from the high plateau region where the corners of Arizona, Colorado, New Mexico, and Utah meet. A number of previously healthy young adults suddenly developed fever, chills, and muscle pain — followed by a hard time breathing; about half of them died.

Hantavirus was first identified during the Korean War in the early 1950s when 3,000 U.S. soldiers were infected. After that, there was not another outbreak amongst the U.S. population until May of 1993. Upon investigating, researchers realized that they were dealing with a form of hantavirus, which is transmitted by rodents.

They began to trap rodents in the affected area, doing tissue studies both of rodents and hantavirus victims. The virus and its principal carrier — the deer mouse — were positively identified. This disease causes "hantavirus pulmonary syndrome" (HPS).

The deer mouse often lives in and near human dwellings to obtain food. Early on, researchers also established that person-to-person spread was unlikely. Rodents, especially deer mice, were the keys.



Why the Four Corners Area?

There was a "bumper crop" of rodents in the Four Corners, due to heavy rains during the spring of 1993. The wet weather produced an extra-plentiful supply of the foods that rodents eat. More food helped rodent populations grow.

Deer mice and other infected rodents occur in every habitat type, from desert to alpine tundra. Infection is more common in middle-altitude habitats that occur in the Four Corners area. Deer mice in the Four Corners area commonly carry the hantavirus. In 1993, 30% of the rodents trapped in the Four Corners area had the hantavirus antibody.

Herman Shortly, Director of the Office of Environmental Health of the Navajo Nation, notes that traditional Navajos observed the problem in the past. When there was an increase in rain in 1918, 1933, and 1934, the increase in food supply led to more rodents and deaths among young healthy Navajos living in the Four Corners region.

Although the highest caseload of HPS still occurs in the Four Corners states, it appears that other places where rodents live can host HPS as well.

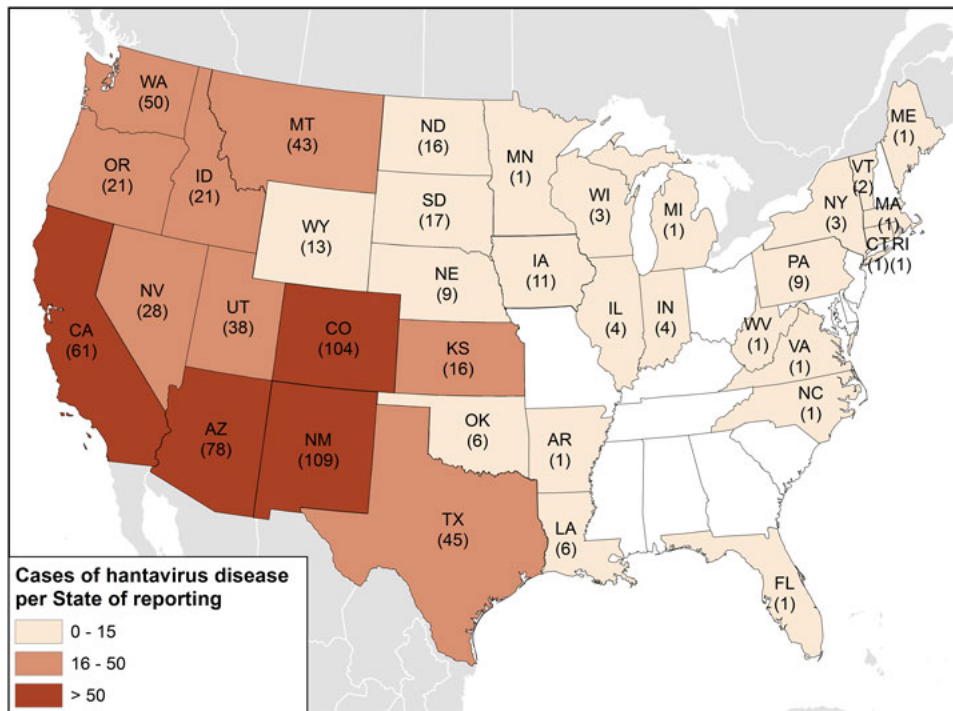
Take a look at this choropleth map, courtesy of the Center for Disease Control (CDC). Choropleth maps show abundance in an area through shading. In this case, specific numbers have also been placed in each state.



Deer Mouse habitat in North America



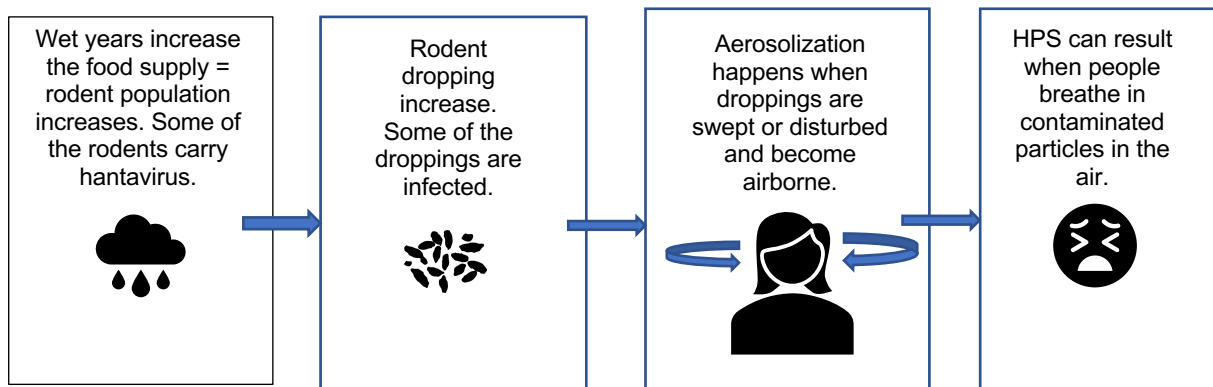
Cumulative Case Count through January 2017 per State Based on Data Collected by the Nationally Notifiable Disease Surveillance System



There are other places in the world that also have rodents that carry hantavirus. Some of these locations are China, Russia, Canada, and much of Europe and South America. It is actually referred to by the terms Old World Hantavirus and New World Hantavirus.

How is Hantavirus Transmitted?

Rodents shed the virus in their urine, droppings, and saliva. Hantavirus pulmonary syndrome (HPS) is mainly transmitted to people when they breathe in air contaminated with the virus. An aerosol is a suspension of fine particles (dust) in air. Aerosolization is the name given to the process of how dust gets into the air. Aerosolization happens when fresh rodent urine, droppings, or nesting materials are stirred up. Aerosolization is important, because dust containing the virus can be easily breathed into lungs.



There are several other ways rodents may spread Hantavirus to people. If a rodent with the virus bites someone, the virus may be spread. Researchers believe that people may be able to get the virus if they

touch something that has been contaminated with rodent urine, droppings, or saliva, and then touch their nose or mouth. People can also become sick, if virus-infected rodent urine, droppings, or saliva contaminates food that people eat. Hantavirus does not spread from human to human.

Who is at Risk of Getting HPS, and Why?

People are at risk when they open up cabins and sheds or clean outbuildings that have been closed during the winter. Examples of these buildings include barns, garages, or storage facilities for farm and construction equipment. Construction and utility workers can be exposed when they work in crawl spaces under houses or in vacant buildings. Hikers and campers can also be exposed when they use infested trail shelters.

What are the Symptoms of HPS?

HPS symptoms include fatigue, fever, and muscle aches, especially the large muscle groups—thighs, hips, back, sometimes shoulders. These symptoms are universal. There may also be headaches, dizziness, chills and/or abdominal problems, such as nausea, vomiting, diarrhea, and abdominal pain. About half of all Hantavirus patients experience these symptoms:

- early stage (universal): fever, fatigue, muscle aches.
- early stage (about half): headaches, dizziness, chills, abdominal problems.
- late stage (universal): coughing, shortness of breath.

Sources:

Photo: <https://www.fs.fed.us/database/feis/animals/mammal/pema/all.html>

Maps: <https://www.cdc.gov/hantavirus/surveillance/reporting-state.html>

<https://www.cdc.gov/hantavirus/rodents/index.html>

Information: <https://www.cdc.gov>

<https://cmr.asm.org/content/23/2/412>

Hantavirus Worksheet Answer Key

Answer the following questions in complete sentences or circle the correct choice.

1. Name the states that make up the region called the “Four Corners.” (4 pts)
The Four Corners consists of Arizona, Utah, Colorado, and New Mexico.

2. Which state has the most cases of Hantavirus? (2 pts)

a. New Mexico
b. Arizona
c. California
d. Colorado

3. What is “aerosolization”? (3 pts)

Aerosolization is a process of dust/contamination getting into the air. This makes the contamination/particles of dust airborne and breathable.

4. Name three ways to prevent getting hantavirus mentioned in the Hantavirus Student Guide. (6 pts) (Accept any reasonable responses)

Use animal proof food containers, keep brush away from homes, use rodent traps, allow wild animals to prey on rodents, keep garbage away from rodents, don't breathe in dust (wear a mask), be careful when opening homes or going into spaces not used by humans for a long time and might have rodents living there, wash hands before touching your face or eating, etc.

5. Name at least two ways that hantavirus is similar to Covid 19 in a short paragraph. (10 pts) (Accept any reasonable responses)

Covid 19 and hantavirus are similar in the following ways. Both originated through contact of humans and animals. Both involve the aerosolization of contaminated particles that can be spread to others. Prevention of both diseases can be helped by wearing masks that help reduce the effects of aerosolization. Both diseases produce similar symptoms. At this time, there is no known cure for both diseases. Both diseases can be fatal. Etc.

6. Name two consequences of health catastrophes such as hantavirus, Covid 19, other pandemics? (10 pts) (Accept any reasonable responses)

Movement of people is curtailed for fear of spreading the disease
Panic among populations when there is no cure
Rush to get a cure/vaccine
Economic downturn due to loss of retail opportunities on local, national, and global level
Loss of human life
Lack of medical equipment and personnel to handle the pandemic
Because of stress of pandemic issues, perhaps social unrest occurs
Etc.