

Key Findings and Public Health Messages

- The California Department of Public Health (CDPH) received reports of 15 cases of hantavirus pulmonary syndrome (HPS) with onset dates from 2009 through 2012. The number of cases was highest in 2012 (8 cases).
- During summer 2012, 10 hantavirus infections were identified among overnight visitors to Yosemite National Park, including 8 California residents--6 with HPS and 2 with milder illnesses.
- During the surveillance period, 3 (20.0 percent) case-patients were reported to have died with HPS.
- The median age among HPS case-patients was 42 years (range: 13 to 61 years) and the highest number of cases occurred among persons 35 to 44 years of age (6 cases).
- HPS case-patients reported White non-Hispanic (53.3 percent), Hispanic (20.0 percent), Asian (20.0 percent) and non-Hispanic unknown (6.7 percent) race/ethnicities. The ratio of male to female case-patients was 2:1.
- The primary strategy for reducing the risk of hantavirus exposure is to avoid contact with rodents and their excreta.

Background

Hantavirus pulmonary syndrome (HPS) is a rodent-borne viral disease that was first recognized in 1993 when an outbreak of severe respiratory illnesses occurred among

residents of the southwestern United States (US)¹. HPS is an acute respiratory illness characterized by a flu-like prodrome consisting of fever, chills, myalgias, headaches, and gastrointestinal symptoms, followed by often severe cardiopulmonary dysfunction resembling adult respiratory distress syndrome (ARDS). Nationwide, the case-fatality ratio for HPS during 2009-2012 was 37.2 percent².

Hantaviruses are maintained in rodents which shed the virus in their urine and feces; humans become infected when rodent excreta are stirred into the air and inhaled. Sin Nombre virus is the hantavirus that causes the majority of HPS cases in the U.S. Its reservoir, the deer mouse, is prevalent in undeveloped areas throughout the western U.S. and will readily enter homes and buildings in search of food or nesting material.

We describe here the epidemiology of HPS in California from 2009 through 2012. Two cases of hantavirus infection with onset in 2012 that did not meet the HPS surveillance case definition were not included in the analysis and summary. The epidemiological description of HPS for the 2001-2008 surveillance period can be found in the Epidemiologic Summary of HPS in California, 2001- 2008³. For a complete discussion of the definitions, methods, and limitations associated with this report, please refer to Technical Notes⁴. Because of the small numbers of reported cases, incidence rates were not calculated.

California reporting requirements and surveillance case definition

California Code of Regulations (CCR), Title 17, requires health care providers to report

suspected cases of hantavirus infection to their local health department immediately by telephone. Since 2011, CCR, Title 17, Section 2505 has required laboratories to notify local health officials of test results suggestive of HPS.

California regulations also require local health officers to report to CDPH cases of hantavirus infections. CDPH officially counted cases of HPS that satisfied the U.S. Centers for Disease Control and Prevention (CDC) surveillance case definition for HPS⁵. CDC defines a confirmed case as one with clinically compatible illness and laboratory confirmation. Clinically compatible illness includes one or more of these clinical features: (i) a febrile illness (i.e., temperature greater than 101.0 °F [greater than 38.3 °C]) corroborated by bilateral diffuse interstitial edema or a clinical diagnosis of ARDS or radiographic evidence of noncardiogenic pulmonary edema, or unexplained respiratory illness resulting in death, and occurring in a previously healthy person, or (ii) an unexplained respiratory illness resulting in death, with an autopsy examination demonstrating noncardiogenic pulmonary edema without an identifiable cause. Laboratory confirmation includes detection of hantavirus-specific immunoglobulin (Ig) M or rising titers of hantavirus-specific IgG, or detection of hantavirus-specific ribonucleic acid sequence by polymerase chain reaction in clinical specimens, or detection of hantavirus antigen by immunohistochemistry.

Epidemiology of HPS in California

CDPH received reports of 15 cases of HPS in California residents with illness onset dates from 2009 through 2012. The highest number of cases was in 2012 (8) and the lowest number was in 2011 (0) [Figure 1]. During the surveillance period, 3 (20.0

percent) case-patients were reported to have died with HPS.

The number of HPS cases during the surveillance period was highest among persons 35 to 44 years of age [Figure 2]. The median age among case-patients was 42 years (range: 13 to 61 years). HPS patients reported White non-Hispanic (53.3 percent), Hispanic (20.0 percent), Asian (20.0 percent) and non-Hispanic unknown (6.7 percent) race/ ethnicities. The ratio of male to female case-patients was 2:1.

Eleven case-patients were residents of Northern California and 4 were residents of Southern California. The counties of Alameda (2), Mono (3) and Nevada (2) were the only counties to report more than 1 case.

Public health investigations of HPS cases that occurred during 2009 through 2012 revealed that the likely sites of exposure for 7 case-patients were lodgings within Yosemite National Park in the central Sierra Nevada (Mariposa and Tuolumne counties). One of these patients had illness onset during 2010, and the other 6 had illness onsets during 2012. The likely exposure sites for the other 8 case-patients with illness onsets during 2009 through 2012 were the eastern Sierra Nevada (Mono and Inyo counties) for 4 patients, the northern Sierra Nevada (Nevada County) for 2 patients, the southern California high desert for 1 patient, and undetermined for 1 patient.

Figure 1. California HPS case counts by onset year

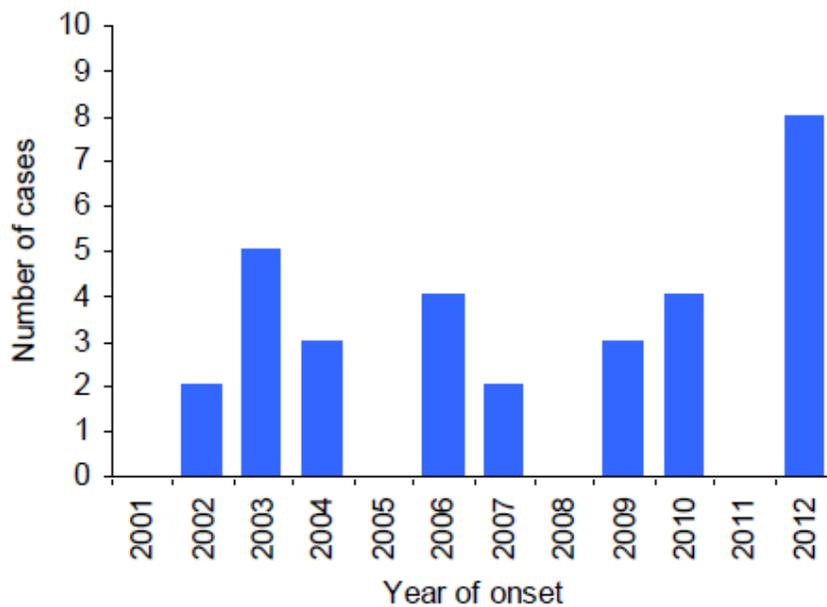
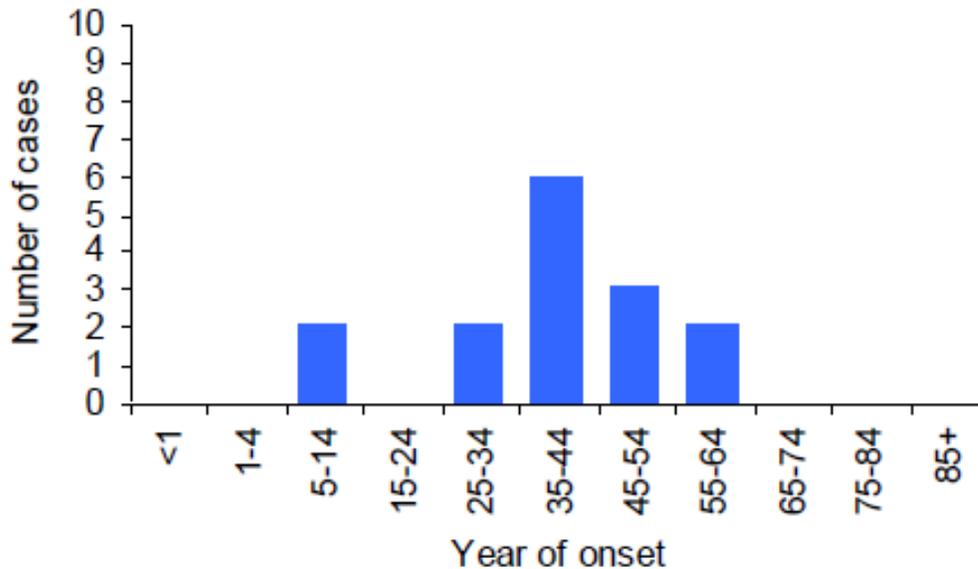


Figure 2. California HPS case counts by age-group, 2009-2012



Comment

Before 2012, the number of California HPS cases remained relatively steady, with an annual average 2.3 cases during 2009-2011, and an annual average 2.0 cases during

2001-2008. The increased number of cases in 2012 was chiefly attributable to several hantavirus infections with onset during July or August 2012 identified among visitors to Yosemite National Park. In addition to 6 HPS cases in California residents, other hantavirus

infections in 2012 among visitors to Yosemite National Park included 1 Pennsylvania resident with HPS, 1 West Virginia resident with HPS, and 2 California residents with hantavirus illnesses that did not meet the HPS case definition⁶.

Hantavirus infections are associated with domestic, occupational, or recreational activities that bring humans into contact with rodents and their excreta, usually in rural settings⁷. Eight California residents developed hantavirus illnesses (6 with HPS) after visiting Yosemite National Park in 2012: 7 patients lodged in insulated, double-walled tent cabins in the Yosemite Valley, and 1 patient lodged in standard tent cabins elsewhere in the Park^{8,9}. Other HPS case-patients in California reported working in or cleaning confined, poorly ventilated areas around their home or work place--such as storage buildings, sheds, or basements--prior to onset. Follow-up investigations indicated that at least 7 case-patients in California may have been exposed at either their residence or their worksite, underscoring the propensity for deer mice to enter areas of human activity.

The primary strategy for reducing the risk of hantavirus exposure is to avoid contact with rodents and their excreta. Useful measures include preventing rodents from entering buildings, eliminating current rodent infestations, and proper respiratory protection when working in poorly ventilated areas contaminated with rodent excreta.

References and resources

¹[Hantavirus Cardiopulmonary Syndrome. California Department of Public Health.](http://www.cdph.ca.gov/healthinfo/discond/Pages/HantavirusCardiopulmonarySyndrome.aspx)
<http://www.cdph.ca.gov/healthinfo/discond/P>

[ages/HantavirusPulmonarySyndrome.aspx](http://www.cdc.gov/hantavirus/surveillance/annual-cases.html)
²[Annual U.S. HPS Cases and Case-fatality, 1993-2012. Centers for Disease Control and Prevention.](http://www.cdc.gov/hantavirus/surveillance/annual-cases.html)
(<http://www.cdc.gov/hantavirus/surveillance/annual-cases.html>)

³[Epidemiological Summaries of Selected General Communicable Diseases in California, 2001-2008: Hantavirus Pulmonary Syndrome.](http://www.cdph.ca.gov/data/statistics/Pages/EpiSummariesCDsCA-01-08.aspx)
(<http://www.cdph.ca.gov/data/statistics/Pages/EpiSummariesCDsCA-01-08.aspx>)

⁴ Epidemiologic Summaries of Selected General Communicable Diseases in California, 2009-2012: Technical Notes.

⁵[National Notifiable Diseases Surveillance System, Case Definitions, Hantavirus. Centers for Disease Control and Prevention.](http://www.nndss.cdc.gov/NNDSS/script/conditionsummary.aspx?CondID=76)
(<http://www.nndss.cdc.gov/NNDSS/script/conditionsummary.aspx?CondID=76>)

⁶[Outbreak of Hantavirus Infection in Yosemite National Park. Centers for Disease Control and Prevention.](http://www.cdc.gov/hantavirus/outbreaks/yosemite-national-park-2012.html)
(<http://www.cdc.gov/hantavirus/outbreaks/yosemite-national-park-2012.html>)

⁷ Hantavirus Pulmonary Syndrome—United States: Updated Recommendations for Risk Reduction. MMWR July 2002, 51 (RR09); 1-12.

⁸[Notice to Health Care Providers: Hantavirus Pulmonary Syndrome Cases Associated with Staying in Yosemite National Park, California.](http://emergency.cdc.gov/HAN/han00326.aspx)

(<http://emergency.cdc.gov/HAN/han00326.aspx>)

⁹[Update: Yosemite National Park Continues Response to Hantavirus Cases. National Park Service.](http://www.nps.gov/yose/parknews/hanta0812c.htm)
(<http://www.nps.gov/yose/parknews/hanta0812c.htm>)

Last updated 2/19/2014

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