Objectives

- Brief overview of HPS
- Colorado Surveillance Data
- Geographic challenges
Hantavirus

- Belongs to the family Bunyaviridae
- Documented in North and South America
- Rodent hosts - Genus and possibly species specific
- No arthropod vector established - Unique among genera of Bunyaviridae
Transmission of Hantaviruses

Chromically infected rodent

Horizontal transmission of infection by aggressive behavior

Virus is present in aerosolized excreta, particularly urine

Virus also present in throat swab and feces

Secondary aerosols, mucous membrane contact, and skin breaches are also sources of infection
## Rodent Exposure

70 confirmed HPS cases

<table>
<thead>
<tr>
<th>Exposure Type</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peridomestic exposure</td>
<td>69% (48/70)</td>
<td></td>
</tr>
<tr>
<td>Peridomestic &amp; occupational exposure</td>
<td>19% (13/70)</td>
<td></td>
</tr>
<tr>
<td>Peridomestic &amp; recreational exposure</td>
<td>9% (6/70)</td>
<td></td>
</tr>
<tr>
<td>Occupational exposure</td>
<td>4% (3/70)</td>
<td></td>
</tr>
<tr>
<td>Entering/cleaning rodent-infested structures</td>
<td>9% (6/70)</td>
<td></td>
</tr>
</tbody>
</table>

Armstrong, L.R. et al., JID 1995; 172 (October)
Hantavirus Pulmonary Syndrome Case definition

- Febrile illness with bilateral diffuse interstitial edema or ARDS or noncardiogenic pulmonary edema in a previously healthy person with laboratory detection of Hanta specific IgM, PCR, or immunohistochemistry.
Hantavirus Pulmonary Syndrome
Laboratory-confirmed Diagnosis

Serology
IgM specific for Sin Nombre

Immunohistochemistry

Reverse transcription and polymerase chain reaction (RT-PCR)
## Hantavirus Pulmonary Syndrome

### Clinical Presentation

<table>
<thead>
<tr>
<th>Most Frequent</th>
<th>Frequent</th>
<th>Rare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>Dizziness</td>
<td>Rhinorrhea</td>
</tr>
<tr>
<td>Myalgia</td>
<td>Arthralgia</td>
<td>Sore Throat</td>
</tr>
<tr>
<td>Nausea/Vomiting</td>
<td>Shortness of Breath (late in the course of disease)</td>
<td></td>
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Hantavirus Pulmonary Syndrome
Radiographic Findings

- Bilateral interstitial infiltrates
  - moderate to rapid progression

- Bilateral alveolar infiltrates

- Pleural effusion
Hantavirus Pulmonary Syndrome
Common Laboratory Findings

**Hematology**
- Thrombocytopenia
- Atypical lymphocytes (immunoblasts)
- Left shift on WBC differential
- Elevated hematocrit
- Elevated WBC

**Chemistry**
- Low albumin
- Elevated LDH
- Elevated AST (SGOT)
- Elevated ALT (SGPT)
Hantavirus Pulmonary Syndrome
Physical Examination

- Tachypnea
- Tachycardia
- Hypotension
- Crackles or rales on lung examination
HPS Management

- Early aggressive intensive care
- Transfer suspect case as early as possible to a specialty hospital
- Early ventilation
- Careful monitoring
  - Oxygenation
  - Fluid balance
  - Blood pressure
Monitoring and Therapy

- Serial CBCs, note hematocrit and platelet count
- Early use of inotropic agents
- Mechanical ventilation
- Judicious volume resuscitation
Reported HPS Cases by Year, Colorado, 1985-2009
### Top 5 Colorado Counties with Reported HPS Cases, 1993 – July 2012

<table>
<thead>
<tr>
<th>County</th>
<th>Number of Cases</th>
<th>*Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weld</td>
<td>8</td>
<td>252,825</td>
</tr>
<tr>
<td>La Plata</td>
<td>6</td>
<td>51,334</td>
</tr>
<tr>
<td>Alamosa</td>
<td>5</td>
<td>15,445</td>
</tr>
<tr>
<td>Saguache</td>
<td>5</td>
<td>6,228</td>
</tr>
<tr>
<td>Delta</td>
<td>4</td>
<td>30,451</td>
</tr>
</tbody>
</table>

*Population from 2010 Department of Local Affairs*
Reported HPS Cases by Year, Colorado, 1993 – July 2012
HPS Cases by Onset Month, Colorado, 1993 – July 2012
Colorado Case Descriptions

• Age Range 6 years - 77 years
  Mean ≈ 36 years

• Gender 35 (42%) Female
  48 (58%) Male

N = 83 including cases under investigation
Colorado HPS Fatalities 2010-present

- 2010: 3 fatalities out of 5 cases
- 2011: 1 fatality out of 4 cases
- 2012: 1 fatality out of 4 cases to date
*Peromyscus maniculatus*

Deer mouse
2012 HPS Case Study

• 28 yr old female
• Sudden onset of fever, cough in March
• Seen in ED diagnosed with viral illness
• Negative for influenza
• Increased SOB upon return home
• Husband insisted on testing and treating for Hanta
2012 HPS Case Study 2

- 77 year old male presented to ED with neurological symptoms
- Fever developed with cough and renal insufficiency
- Wife reported mouse bite and insisted testing for Hanta
Thank you!

- Janell Bezdek, CDPHE
- Nicole Comstock, CDPHE
- Aaron Doussett, CDPHE
- Elisabeth Lawaczeck, CDPHE
- John Pape, CDPHE (retired)
- Dale Tanda, CDPHE (retired)
- Bill Ray, CDPHE
Questions ?
Questions asked after presentation

• Resources and instructions for clean up and prevention of mice infestations can be found at including technical and clinical information at:
www.cdc.gov/hantavirus.gov