Surveillance for Hepatitis A in Alaska; the impact of childhood vaccination program

Liver Disease and Hepatitis Program
Alaska Native Tribal Health Consortium

Proportion of US homes with complete plumbing

Graph showing the proportion of US homes with complete plumbing from 1940 to 2000. The graph includes data for the US, Alaska, District of Columbia, Mississippi, and Rural Alaska Native.
Hepatitis A: Background

- Alaska 1950-1990s HAV epidemics occurred every 10-15 years
- Alaska Native (AN) people (especially in rural villages) disproportionately affected
- Mid 1970 statewide outbreak AN people accounted for >60% of cases (16% Alaska population)
- 1993 retrospective serosurvey: 85% AN people born before 1945 had HAV antibodies
Geographic Distribution of HAV Infection - 1990

Anti-HAV Prevalence
- High
- Intermediate
- Low
- Very Low
Hepatitis A: Vaccines

• Havrix (GSK) and Vaqta (Merk) developed in 1980s
• Immunogenicity trial in AK late 1980s
• 1992-93 large outbreak with peak incidence in affected region:
  – > 2000 cases/100,000 persons per year
• Pre-licensure approval for demonstration project
• One dose Havrix given to >5000 susceptibles in 25 communities
Hepatitis A: Vaccines

• Outcome:
  – Communities with >80% vaccination, outbreak ceased in 4-8 weeks
  – In a large community with <50% vaccination outbreak continued for 50 weeks

• Hep A vaccine licensed 1995

• ACIP recommendation for routine vaccination of US children in populations with high rates of HAV
  – such as American Indian/Alaska Native (AI/AN) communities
Hepatitis A: Vaccines

• Jan 1996 Alaska Section of Epidemiology (SOE) implemented universal Hep A vaccination for all Alaska children age 2-14 years
  – Expanded to 2-18 years in 1997
  – Expanded to 1-18 years in 2006
• 2001 Hep A vaccine required in AK for daycare and school attendance
Hepatitis A: Surveillance

• Mandatory reporting of HAV infection to Alaska SOE since 1974

• Confirmed case defined as:
  – Acute illness with discrete onset of symptoms with presence of jaundice or elevated aminotransferase AND
  – Serologically confirmed IgM antibody to HAV OR epidemiological link to person with lab-confirmed HAV

• HAV cases reported by health care providers and laboratories
Hepatitis A: Vaccine coverage

- National Immunization Surveys
Hepatitis A: Impact

- 1996-97 Immunization of children in high incidence areas
  - 20x decrease in HAV incidence from 1997-2001 among all AI/AN (similar to overall US rate)
- 2001-2007
  - HAV incidence among AI/AN lower than rates of other racial/ethnic groups in US
  - vaccination coverage 24-35 month old AI/AN children, highest among all racial/ethnic groups in US
Table 1: Number (rate per 100,000) reported HAV cases by ethnic group, Alaska, 1972-2007

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Overall</td>
<td>6572 (60.0)</td>
<td>148 (4.0)</td>
<td>34 (0.9)</td>
<td>98.6</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AK Native</td>
<td>4267 (243.8)</td>
<td>13 (2.1)</td>
<td>2 (0.3)</td>
<td>99.9%</td>
</tr>
<tr>
<td>AK Non-native</td>
<td>1766 (19.2)</td>
<td>91 (3.0)</td>
<td>23 (0.7)</td>
<td>96.3%</td>
</tr>
<tr>
<td>Unknown race</td>
<td>539</td>
<td>44</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>RR (95% CI)</td>
<td>12.7 (12.0,13.4)</td>
<td>0.70 (0.36, 1.25)</td>
<td>0.54 (0.05,1.61)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Number (rate per 100,000) reported HAV cases by age, Alaska, 1972-2007

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Pre-vaccine 1972-1995</th>
<th>Implementation 1996-2001</th>
<th>Routine vaccination 2002-2007</th>
<th>% reduction, pre to post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>6572 (60.0)</td>
<td>148 (4.0)</td>
<td>34 (0.9)</td>
<td>98.6</td>
</tr>
<tr>
<td>0-14</td>
<td>3402 (112.4)</td>
<td>21 (2.2)</td>
<td>2 (0.2)</td>
<td>99.8%</td>
</tr>
<tr>
<td>15-24</td>
<td>1239 (65.9)</td>
<td>16 (3.0)</td>
<td>4 (0.7)</td>
<td>98.9%</td>
</tr>
<tr>
<td>25-44</td>
<td>1332 (33.3)</td>
<td>76 (6.2)</td>
<td>14 (1.2)</td>
<td>96.5%</td>
</tr>
<tr>
<td>45+</td>
<td>274 (13.4)</td>
<td>35 (3.5)</td>
<td>14 (1.1)</td>
<td>91.6%</td>
</tr>
</tbody>
</table>

Table 3: Number (rate per 100,000) reported HAV cases by region, Alaska, 1972-2007

<table>
<thead>
<tr>
<th>Region</th>
<th>Pre-vaccine 1972-1995</th>
<th>Implement 1996-2001</th>
<th>Routine vaccination 2002-2007</th>
<th>% reduction, pre to post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anchorage</td>
<td>1402 (27.2)</td>
<td>69 (3.7)</td>
<td>21 (1.0)</td>
<td>96.3%</td>
</tr>
<tr>
<td>Gulf coast</td>
<td>320 (27.2)</td>
<td>23 (5.4)</td>
<td>3 (0.7)</td>
<td>97.5%</td>
</tr>
<tr>
<td>Interior</td>
<td>430 (24.5)</td>
<td>12 (2.1)</td>
<td>6 (1.0)</td>
<td>96.0%</td>
</tr>
<tr>
<td>Northern</td>
<td>1622 (396.7)</td>
<td>4 (2.9)</td>
<td>0 (0)</td>
<td>100%</td>
</tr>
<tr>
<td>Southeast</td>
<td>323 (23.5)</td>
<td>32 (7.5)</td>
<td>3 (0.7)</td>
<td>97.0%</td>
</tr>
<tr>
<td>Southwest</td>
<td>2464 (330.3)</td>
<td>7 (3.0)</td>
<td>1 (0.4)</td>
<td>99.9%</td>
</tr>
</tbody>
</table>

Hepatitis A in Alaska Natives and Non-Natives in Alaska, by Year

State of Alaska vaccination programs
Geographic Distribution of HAV Infection - 2010

Anti-HAV Prevalence
- High
- Intermediate
- Low
- Very Low
Hepatitis A: Summary

• Prior to the availability of hepatitis A vaccine, Alaska experienced large recurrent outbreaks of acute hepatitis A with the highest impact in rural areas.

• Introduction of universal childhood vaccination has dramatically reduced the incidence of acute hepatitis A infection in Alaska from the highest in the US to the lowest in the world.
Arctic Viral Hepatitis Working Group Meeting

August 3, 2012
Anchorage, Alaska
Alaska Native Tribal Health Consortium

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