Progress Controlling Vaccine Preventable Disease in Alaska Native People

Alaska Immunization Conference

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ANTHC Immunization Program
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When enough children are vaccinated in a community, then a disease doesn’t spread. This is known as “community” or “herd immunity”
60% live outside of cities, in small, remote villages
Access to most villages only by air
Per capita income and in-home running water are lower in these areas, and household crowding indices are higher
These factors have been associated with increased risk for vaccine-preventable disease
In 1960-62, the post-neonatal death rate (1-11 month olds) in YK Delta infants was 5.6 per 100, or 5.6%.

Nearly half of these infant deaths were caused by measles or pertussis.

The postneonatal death rate (1-11 months) decreased 10-fold between 1960-62 and 1980-81 – partly due to measles and pertussis vaccines.

Since instituting the 2 dose measles requirement in Alaska, we have not had any outbreaks of measles in Alaska.

Lum et al, Public Health Rep 1986;101:309-14
Vaccine Coverage Rates:
US, Alaska, Alaska Native children*

4-3-1-3-3-1 = 4DTaP 3polio 1MMR 3Hib 3HepB1Var in children 19-35 months old
4-3-1-0-3-1-4 = 4DTaP 3 polio 1 MMR 3 Hep B 1 Var 4 PCV

In 1925 a diphtheria epidemic threatened icebound Nome. The nearest serum was in Anchorage.

A Pony Express-type relay of dog teams rushed the vaccine from Nenana to Nome...

Gunnar Kaasen drove the final two legs behind lead dog Balto, through hurling 80 mph winds...

The serum arrived in time to prevent the epidemic and save hundreds of lives.
**Haemophilus influenzae** (Hib)

- **Unique Aspects in Alaska Natives before Hib vaccine**
  - 5-10 times higher rate of disease
  - Younger peak age (4-6 months)

- **Unique Recommendations in Alaska**
  - We use PRP-OMP (PedvaxHIB®) because of its unique ability to produce protective antibodies after 1 dose.
Decline in Hib Disease:
US, Navajo/Apache, AK Native, 1988-2003

Invasive Hib Disease, Children Aged <5 yrs, Alaska, 1980-2010

Singleton, Pediatrics 2006 & CDC unpublished data
Invasive Pneumococcal Disease Cases, YK Delta children <5 yrs, 1998-2008

* 6 additional serotypes in PCV13
Recent consequences of delayed vaccination

- Hib meningitis death – 14 month old
  - had delayed booster dose because ill

- Hib meningitis, Severe brain damage – 2 mo old
  - 2 month old - delayed first vaccine because of mild illness

- Hib pneumonia – 14 month old
  - parents had refused all vaccines

- Pneumococcal meningitis - 9 month old
  - foster parents delayed vaccines – worried about autism

- Hepatitis A in a mother
  - unvaccinated 15 month old child had traveled to Africa
Main cause of serious infections:
- Bacterial meningitis
- Blood infections
- Pneumonia

One of main cause of Ear Infections
Rates of Invasive Pneumococcal Disease

Cases/100,000/year

Age (years)

US white population
Alaska Native (1996-2000)
Invasive Pneumococcal Disease (IPD): YK children aged <2 yrs, before PCV7, 1995-2000

- 10 times higher than in non-Native Alaskans
- 73% caused by serotypes in 7 valent pneumococcal conjugate vaccine (PCV7)

AIP-CDC surveillance, Wenger et al, PIDJ, 2010
PCV7 vaccine Impact in US children < 5 years old

All Serotypes: -76% (-79,-73)
PCV7 Types: -100% (-100,-99)

22-25 cases per 100,000

Pilishvili T. et al. JID 2010; 201:32-41
Invasive Pneumococcal Disease
YK Delta Children less than 2 yrs old, by year

Unpublished Pneumococcal surveillance data, Arctic Investigations Program-CDC
¾ of pneumococcal infections in Alaska Native children are covered by new PCV13 (Prevnar 13) vaccine licensed in Feb 2010
Hepatitis B in Alaska Native persons

- **Before Vaccine:**
  - 6% had been infected
  - 1500 hepatitis B carriers
  - Incidence 50 times the general U.S.

- **Vaccination strategies**
  - universal infant & catch-up vaccination starting in 1983

- **Post-Vaccine Rate:**
  - declined from 250 to <0.4/100,000
  - lowest hepatitis B rate any US ethnicity.

Symptomatic Hepatitis B Incidence
AK Native Persons 1981-2003

- Vaccine Demo Program begins in Yukon Kuskokwim Delta
- Statewide Program - newborn immunization
Meningococcal disease - rare but serious, rapidly progressive infection (meningococcemia, meningitis)

Rate 0.5-2 per 100,000 persons/year

Rates are highest among:
- infants (not eligible for vaccine)
- college freshmen living in dormitories
- Military recruits in camps

Case Fatality rate 9%-12%; up to 40% in meningococcemia

Rates in Alaska Native people appear to be similar to other populations

Purpura fulminans
Courtesy of www.immunize.gov
Neisseria meningitidis Cases/Rates – Alaska, 2000-2010

AIP-CDC, State of Alaska
Neisseria meningitidis Rates – AK Native/Non-Native, 2000-2010

International Circumpolar Surveillance, AIP-CDC, State of Alaska
Hepatitis A in Alaska Native People

- Pre-Vaccine Incidence –
  - Large outbreaks
  - Lifetime risk in villages ~90%
  - 1992-3 : 4 deaths from fulminant Hep A

- Hepatitis A Vaccine (1996)
  - Universal vaccine for children
  - School requirement

- Rates have declined >99%
  - Rate now lower than US rate
  - No epidemics! – no transmission in villages

CDC MMWR 1992;41:6
Hepatitis A Incidence, American Indian/Alaska Natives & US, 1990-2006

Incidence of Hepatitis A infections in Alaskans, Native and Non-Native, 1972-2007

Rate per 100,000

Year
Native
Non-Native

Hep A Vaccine

Singleton, McMahon, Castrodale et al. VACCINE 2010;28:6298-304
Cervical Cancer rate in Alaska Native women
- 3.4 times higher than US white women during 1974-78.

HPV = Necessary cause of 95% of Cervical Cancer
HPV Vaccine Uptake
HPV coverage rates, Alaska Native 13-17 year olds, 2007-2011

National Immunization Survey – 44.4% US teen girls ≥1HPV, 2009
Alaska Native teens have higher HPV vaccine coverage than US
Goals

- Help improve use of vaccine
- Evaluate vaccine impact

Participants

- Alaska Native Tribal Health Consortium
- Southcentral Foundation
- CDC AIP - Anchorage; Division of STD Prevention - Atlanta
- Alaska Division of Health ~ Immunization Program
Adult Vaccine Schedule
2010

- Vaccines currently supplied by the State for all:
  - 19-64 yrs. Influenza – yearly, Tdap/Td q10 yrs, PneumoVax -once in High Risk (50-65 yrs PneumoVax once Alaska Natives if none prior)
  - 65+ yrs. Influenza – yearly, Td q 10 yrs, PneumoVax once

- Additional vaccines for adults
  - Hep B non-immune unvaccinated adults in high risk groups, diabetics
  - Hep A non-immune adults with specific risk for hep A
  - HPV licensed up to 26 years
  - MMR health care workers – 2 doses or proof of immunity in born>1957
  - Varicella non-immune healthcare workers without contraindications
  - Zoster adults 60 years+ without contraindications
“...during April 15--November 13, AI/ANs in the 12 participating states had an **H1N1 mortality rate four times higher** than persons in all other racial/ethnic populations combined.
H1N1 complications high in Alaska Native people

- hospitalization rate was 4 times higher than white Anchorage residents,
- H1N1 death rate 4 times higher in AI/AN people,
- relatively healthy young adults and children affected

http://www.epi.hss.state.ak.us/bulletins/docs/b2009_30.pdf
# Hospitalization Rates by Region

<table>
<thead>
<tr>
<th>Race</th>
<th>Anchorage</th>
<th>Fairbanks</th>
<th>Southwest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of cases (rate per 100,000)</td>
<td>Underlying Disease (%)</td>
<td>No. of cases (rate per 100,000)</td>
</tr>
<tr>
<td>White</td>
<td>24 (11)</td>
<td>15 (63)</td>
<td>18 (21)*</td>
</tr>
<tr>
<td>AI/AN</td>
<td>15 (50)*</td>
<td>11 (73)</td>
<td>8 (57)#</td>
</tr>
<tr>
<td>A/PI</td>
<td>9 (41)*</td>
<td>8 (89)</td>
<td>-</td>
</tr>
<tr>
<td>Black</td>
<td>2 (21)</td>
<td>4 (100)</td>
<td>2 (33)</td>
</tr>
<tr>
<td>Unknown</td>
<td>7</td>
<td>4 (57)</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>59 (21)</td>
<td>42 (71)</td>
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*P*<0.01 vs rate in Anchorage whites; # *P*<0.05 vs rate in Anchorage whites

Wenger et al, Clin Infect Dis 2010; 52:S189-197
Prevention and Control of Influenza with Vaccines
Recommendations of the Advisory Committee on Immunization Practices (ACIP), 2010

• Universal vaccination of all ages...

• When vaccine supply is limited, vaccination efforts should focus on delivering vaccination to persons who:
  
  • Are infants….
  • Have chronic medical conditions…..
  • Pregnant women…
  • Are American Indians/Alaska Natives

Summary: Vaccine-Preventable Disease, Alaska

- BEFORE VACCINES:
  - Hib disease – 80 cases/yr children <5 yr
  - Pneumo disease – 50 cases/yr, <2 yr
  - Hep A – epidemics with 4,000 symptomatic cases
  - Hep B – 10% Alaska Natives carriers in some areas

- BECAUSE OF VACCINES:
  - ~ 1 case of Hib per year!
  - Vaccine-type pneumo down 98%
  - No Hep A epidemics since vaccine!
  - No Hep B carriers in children!