Acknowledgements

- Navajo and White Mountain Apache tribal members
- CAIH Faculty and Staff
- IHS Clinical and Lab partners
- Navajo Nation IRB
- White Mountain Apache Health Board and Tribal Council
- Phoenix Area IHS IRB
Learning Objectives

1. Characterizing pneumococcal carriage helps explain trends in pneumococcal disease
2. Coverage with pneumococcal conjugate vaccine (PCV) is high among children <5 years of age
3. Some PCV-type pneumococcal carriage persists in children and adults
What is *Streptococcus pneumoniae*?

- A “germ” or bacteria
- More than 90 types
- Types differ by the type of sugar coating on the surface of the bacteria
- Can cause serious disease (pneumonia, meningitis, blood infection)
How does someone get pneumococcus?
Why do we study pneumococcal carriage?

- ear infection
- pneumonia
- meningitis
- blood infection
High burden of pneumococcal disease for Navajo children <5 years old

![Graph showing disease rate (Cases per 100,000) from 1997 to 2016. The graph compares Navajo and General US data. Two key events are highlighted: 2001: PCV7 introduced, and 2010: PCV13 introduced. There is a note indicating US data available only through 2015.]
PCV7: a vaccine for pneumococcus

- PCV7 (Prevnar), available in 2000
- Given to children <5 years old
- Prevents carriage of PCV7 types
PCV13: a new vaccine for pneumococcus

- Contains PCV7 types plus 6 additional types
- PCV13 use began 2010 for children
- Given to children <5 and adults ≥65 years of age (starting in August 2014)
PCV13 Study – Part 1: Objectives

1. Track uptake of PCV13 into the community

2. Measure impact of PCV13 on carriage of PCV13-types before and after vaccine introduction
PCV13 Study – Part 1: Study design and activities

• Enrollment period: January 2010 – March 2012
• Enrollment population: Convenience sample of all ages
• Study sites:
  – Chinle, Fort Defiance, Gallup, Shiprock (Navajo)
  – Whiteriver (White Mountain Apache)
• Study activities:
  – Administer questionnaire (demographics, risk factors)
  – Collect nasopharyngeal (NP) swab
  – Review medical chart (chronic medical conditions, PCV history)
  – Culture and type pneumococcus from NP swab
Part 1 Results: PCV13 uptake after introduction in 2010, children <5 years old

Mar 2010: PCV13 introduction

Percent Vaccinated

2010

2011

2012
Part 1 Results: PCV13-type carriage in children and adults after PCV13 introduction

Percent of Navajo and Apaches who are PCV13-type positive before and after PCV13 use began

Residual PCV13-type carriage

- <5 years: 11% (3% positive, 8% positive after)
- 5-17 years: 5% (1% positive, 4% positive after)
- 18+ years: 2% (1% positive, 1% positive after)
Question:

After five years of PCV13 use, does PCV13-type carriage continue to persist in the population?

“PCV13-types”
- types only in PCV13 -
PCV13 Study – Part 2: Study design and activities

• Enrollment period: October 2015 – September 2016
• Enrollment population: convenience sample of children <5 years and adults ≥18 years
• Study sites:
  – Chinle, Fort Defiance, Gallup, Shiprock (Navajo)
  – Whiteriver (White Mountain Apache)
• Activities:
  – Consent participant
  – Administer questionnaire (demographics, risk factors)
  – Collect nasopharyngeal (NP) swab
  – Review medical chart (underlying conditions, PCV history)
  – Culture and type pneumococcus from NP swab
## Pneumococcal carriage: PCV13 Study - Part 2

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Total swabs</th>
<th>Pneumococcal positive, n (%)</th>
<th>PCV13-type positive, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2 years</td>
<td>170</td>
<td>64 (38)</td>
<td>8 (5)</td>
</tr>
<tr>
<td>2-&lt;5 years</td>
<td>165</td>
<td>95 (58)</td>
<td>4 (2)</td>
</tr>
<tr>
<td>&lt;5 years</td>
<td>335</td>
<td>159 (47)</td>
<td>12 (4)</td>
</tr>
<tr>
<td>18-39 years</td>
<td>176</td>
<td>18 (10)</td>
<td>1 (0.6)</td>
</tr>
<tr>
<td>40-64 years</td>
<td>172</td>
<td>13 (7)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>≥65 years</td>
<td>165</td>
<td>9 (5)</td>
<td>1 (0.6)</td>
</tr>
<tr>
<td>≥18 years</td>
<td>513</td>
<td>40 (8)</td>
<td>2 (0.4)</td>
</tr>
</tbody>
</table>
Comparison of pneumococcal carriage: PCV13 Study - Part 1 vs. Part 2

![Bar chart showing comparison of pneumococcal carriage between Part 1 and Part 2 for different age groups.](chart.png)
Comparison of **PCV13-type** carriage: PCV13 Study - Part 1 vs. Part 2

![Graph showing percent positive for different age groups for Part 1 and Part 2 of the PCV13 Study.](Image)
Comparison of individual PCV13-type carriage: PCV13 Study - Part 1 vs. Part 2
PCV13 use among PCV13 Part 2 participants <5 and ≥65 years
Conclusions

- Since PCV use began in 2000, PCV-type carriage has declined.
- Residual PCV13-type carriage exists after five years of vaccine use at high coverage.
- If PCV13-type disease persists, alternative strategies may be needed to eliminate carriage of residual PCV13-types.
Thank you!