Development of an Index for Measurement of Parents' Vaccine Confidence and Linkage to Pediatric Immunization Acceptance

Paula M. Frew, PhD, MA, MPH
Raphiel Murden, MA
Christina Mehta, PhD
Allison Chamberlain, PhD
Alan Hinman, MD
Glen Nowak, PhD

Judith Mendel, MPH
Ann Aikin, MA
Laura A. Randall, MPH
Allison L. Hargreaves, MPH
Lillian Flannigan, MPH
Robert A. Bednarczyk, PhD
Introduction

Project Component Goals:

1. To develop an index that can be used to gauge changes in U.S. parents' confidence over time

2. To develop an index that could be used in clinical settings, either to gauge an individual's vaccine confidence and/or to assess vaccine confidence over time among individuals in a provider practice
Methods

• Developed a survey with project team, vaccine experts, biostatisticians, and National Vaccine Program Office (NVPO) guidance

• National survey (N= 893)
  – Eligibility:
    • Adults over 18 years of age (parents, guardians, caregivers) in the US
    • Youngest child < 7 years
    • Able to read and understand English

• Qualtrics panel survey

• Survey administration: October-November 2016
Survey Content

• Survey included:

  – Child’s vaccination history
    - DTaP
    - Hepatitis B
    - MMR
    - Polio
    - Haemophilus influenzae type B
    - Pneumococcus
    - Hepatitis A
    - Rotavirus
    - Varicella

  – Sociodemographics:
    - Parental age
    - Education
    - Race
    - Number of children in the household
    - Ethnicity
    - Rural/suburban/urban residence location
    - Income

  – 5 key NVAC components assessed from 2015 report (n=30 items)
<table>
<thead>
<tr>
<th>Sample Characteristic</th>
<th>(N=893)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Mean: 31.3 years</td>
</tr>
<tr>
<td>Gender</td>
<td>Female 82%</td>
</tr>
<tr>
<td></td>
<td>Male 18%</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Hispanic 12%</td>
</tr>
<tr>
<td></td>
<td>Non-Hispanic 88%</td>
</tr>
<tr>
<td>Race (may be Hispanic/Non-Hispanic ethnicity)</td>
<td>White 81%</td>
</tr>
<tr>
<td></td>
<td>Black/African American 12%</td>
</tr>
<tr>
<td></td>
<td>All Others 7%</td>
</tr>
<tr>
<td>Educational Attainment</td>
<td>High School 23%</td>
</tr>
<tr>
<td></td>
<td>≥College 67%</td>
</tr>
<tr>
<td>Region</td>
<td>Northeast 20%</td>
</tr>
<tr>
<td></td>
<td>Midwest 22%</td>
</tr>
<tr>
<td></td>
<td>South 41%</td>
</tr>
<tr>
<td></td>
<td>West 16%</td>
</tr>
<tr>
<td></td>
<td>US Territory 1%</td>
</tr>
<tr>
<td>Children in Household</td>
<td>1 child 43%</td>
</tr>
<tr>
<td></td>
<td>2 children 35%</td>
</tr>
<tr>
<td></td>
<td>≥3 children: 22%</td>
</tr>
</tbody>
</table>
## Pediatric Immunization

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Yes (%)</th>
<th>No/Unsure (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTaP</td>
<td>93.3</td>
<td>6.7</td>
</tr>
<tr>
<td>Polio</td>
<td>91.5</td>
<td>8.5</td>
</tr>
<tr>
<td>MMR</td>
<td>89.8</td>
<td>10.2</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>89.8</td>
<td>10.2</td>
</tr>
<tr>
<td>Rotavirus</td>
<td>88.7</td>
<td>11.3</td>
</tr>
<tr>
<td>Hib</td>
<td>86.4</td>
<td>13.6</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>85.5</td>
<td>14.5</td>
</tr>
<tr>
<td>Varicella</td>
<td>81.9</td>
<td>18.1</td>
</tr>
<tr>
<td>Pneumococcal</td>
<td>76.9</td>
<td>23.1</td>
</tr>
</tbody>
</table>
Analytic Approach

• Factor analysis was used to group survey items into broader categories for VCI:
  - Vaccine attitudes and beliefs
  - Vaccine information
  - Trust in government and experts
  - Social norms

• Created a summary scoring rubric for VCI
• Assessed relationship between VCI and immunization
  - Logistic regression models for each vaccine
Final VCI
(N=8 items)

Rate your level of trust in the following (7-point “complete-no trust” response):

1. Food & Drug Administration (FDA), the federal government agency that licenses vaccines
2. Centers for Disease Control and Prevention (CDC), the federal government agency that makes recommendations about who should get licensed vaccines
3. Federal government agencies responsible for monitoring the safety of recommended childhood vaccines
4. Scientists involved in developing and testing new vaccines

Indicate how strongly you agree with the following (5-point Likert response):

5. It is important for everyone to get the recommended vaccines for their child(ren)

Indicate your level of confidence in each item below about childhood vaccines (6-point “complete-no confidence” response):

6. Vaccines recommended for young children are safe
7. My doctor or nurse is a trustworthy source for vaccine information
8. My doctor or nurse has my child(ren)’s best interest in mind when making vaccine recommendations
VCI Vaccine-Specific Results

- Correlated 4-category confidence levels to specific immunization
  - All significant values for comparisons and trend tests

- Calculated ORs to assess likelihood of 1 point (or 10%) increase in vaccination based on VCI score
  - All significant values for 9 pediatric immunizations
  - Little difference between ORs/aORs = highly consistent, robust
  - aOR adjusting for sociodemographics reflects VCI robustness
Results

• Strong correlation between reported vaccine receipt and VCI score
• Increasing VCI score corresponds to increased odds of vaccine receipt
  – Unadjusted and adjusted odds are similar:
    • Confidence (as measured by the VCI) seems to be acting independently of sociodemographics
    • Indicates the robustness of the scale
• We created a relatively short VCI that had strong internal reliability
• The final 8-item scale encompassed the four initially identified domains and appears to work as well as the 30-item scale
Limitations

• Self-reported vaccination of children

• Sample population is not representative of general population of U.S. parents of children < 7

• Requires validation
Next Steps

• Ready for application in clinical, research, and surveillance settings

• Validity testing underway with discrete, similar sample of parents of children 0 – 7 years old

• Ready to be tested with third party immunization receipt verification

• Ready to be tested with other populations
Acknowledgements

• Qualtrics Staff
  – Brandon Powell
  – Rachel Olvera
• Avnika Amin
• Dr. Walt Orenstein
• Dr. Saad Omer

Project Support: DHHS/NVPO 1VSRNV000003-01-00