Vaccine Exemptions: Should we be concerned?

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Vaccination history

• Variolation was the first variety of immunization; used against smallpox
• Widespread use began in early 1700s
• Scrapings taken from infected person
• Recipient had an incision made and the material was essentially rubbed into the wound
• An anti-vaccination movement was also born
“In 1736 I lost one of my sons, a fine boy of four years old, by the small-pox, taken in the common way. I long regretted bitterly, and still regret that I had not given it to him by inoculation. This I mention for the sake of parents who omit that operation, on the supposition that they should never forgive themselves if a child died under it; my example showing that the regret may be the same either way, and that, therefore, the safer should be chosen.”
September 19\textsuperscript{th}, 1891

Punch Magazine

- “My little boy, sir, died when he was only two months old, just after he had been vaccinated”.
- “How very sad! Had he been baptized?”.
- “Yes sir, but it was the \textit{vaccination} as carried him off, sir!”.
Parallels to today

• The assignment of causality to a temporal relationship
  – We like to find patterns

• As humans, we may be more likely to be guided by emotion than by cold, hard facts
Anti-vaccination strategy from 1800’s

The Medical Times and Gazette (J. & A. Churchill; London, England, Volume 1, 1876, page 41)

• Leafleting

  – The birth of a child was announced in the newspaper, and the father shortly thereafter received some mail (post-card persecution)

  “Anti-vaccinators had “been discouraged by the result of their legitimate endeavors to oppose the (mandatory vaccination) law, and are now having recourse to circulars, which depend for their influence on vague threats and unwholesome insinuations“.
Anti-vaccination strategy of today

• Same thing, only this:
What are vaccine exemptions?

• Parents opt out of vaccinations for enrollment into school or daycare
• All 50 states provide for at least one type of exemption (special cases: WV, MS)
• Three main categories
  – Medical
  – Religious
  – Personal beliefs
How do you get an exemption?

• Protocols are set by the state
• Ease of obtaining exemptions varies widely
  – Ranges from parental signature on a pre-printed form to going to the health department in person, signing and notarizing form, and obtaining approval from the health department.
## Exemption protocols and immunization rates

Ernst and Jacobs, Human Vaccines and Immunotherapy, 2012

<table>
<thead>
<tr>
<th>Obtaining PBE</th>
<th>Vaccine coverage (% ± sd)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MMR</td>
<td>DTP/DTAP/DT</td>
</tr>
<tr>
<td>Easy (n=7)</td>
<td>92.7 ± 3.2</td>
<td>92.3 ± 3.3</td>
</tr>
<tr>
<td>Medium (n=7)</td>
<td>93.6 ± 4.2</td>
<td>94.8 ± 3.9</td>
</tr>
<tr>
<td>Difficult (n=4)</td>
<td>97.2 ± 4.1</td>
<td>97.1 ± 2.0</td>
</tr>
<tr>
<td>p-trend³</td>
<td>0.06</td>
<td>0.03</td>
</tr>
</tbody>
</table>
Impact of Exemptions

<table>
<thead>
<tr>
<th>Age group</th>
<th>Measles Annual incidence/100,000</th>
<th>Pertussis Annual incidence/100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exemptors</td>
<td>Vaccinated</td>
</tr>
<tr>
<td>3-5</td>
<td>39.8</td>
<td>0.6</td>
</tr>
<tr>
<td>6-10</td>
<td>54.0</td>
<td>0.9</td>
</tr>
<tr>
<td>11-14</td>
<td>27.9</td>
<td>1.7</td>
</tr>
<tr>
<td>15-18</td>
<td>5.6</td>
<td>2.5</td>
</tr>
<tr>
<td>Total</td>
<td>32.2</td>
<td>1.4</td>
</tr>
</tbody>
</table>

On average, exemptors were 22 times more likely to contract measles and 5.9 times more likely to contract pertussis than vaccinated children.
Current Arizona Exemption Protocol

• One of the easiest U.S. protocols
• Form completed by parent at time of enrollment of child in K, 5th and 9th grade
  – Available online or at school
  – Signature of parent only
  – Can exempt all or select vaccines
Arizona and Vaccine Exemption

• Non-Medical exemption on the rise
  – In the 2011 year Arizona experienced a 14% increase in non-medical exemption over 2010
  – Since 2005-2006: 78% increase
  – Since 2000-2001: 129% increase
Research Goals

• Determine characteristics of schools with high exemption rates
• Identify factors associated with exempting parents
• Assess physician attitude towards exemptions in Arizona
Statewide Hotspots of High and Low Vaccine Exemptions

Birnbaum et al., Vaccine, December 2012
Regional Hotspots of High and Low Vaccine Exemptions

Birnbaum et al., Vaccine, December 2012

[Map depicting regional hotspots with color-coded zones for high and low vaccine exemptions]
Key Findings

Birnbaum et al., Vaccine, December 2012

Higher exemption rates found in:

– Schools with fewer minorities
– Charter schools
– Lower proportion of free/reduced lunch
– Sedona, Colorado City, East Maricopa
Pima County Vaccine Exemptions

(Garcia, Silviano; Garcia, Francisco)

Mean MMR Coverage and Exemption Percentages in Kindergarten Schools, 2008-2012 Pima County

School Year

2008 2009 2010 2011 2012

Mean MMR Coverage PCT

Herd Immunity Estimate

Mean MMR Exemption PCT

Mean MMRcovPCT

MeanMMRexPCT

Mean MMR Coverage PCT

97
96
95
94
93
92

0
0.5
1
1.5
2
2.5
3
3.5
4

2008 2009 2010 2011 2012

Mean MMR Exemption PCT
Vaccine exemptions Pima County

(Garcia, Silviano; Garcia, Francisco)

16 School Districts
1 TUSD
6 Marana
8 Flowing Wells
10 Amphitheater
12 Sunnyside
13 Tanque Verde
15 Ajo
16 Catalina
20 Vail
30 Sahuarita
35 San Fernando
37 Empire
39 Continental
40 Indian Oasis
44 Redington
51 Altar Valley
Physician survey
Haenchen et al., Vaccine, 2014

• 152 physicians participated (Response rate = 13.5%)

• Represented all counties in Arizona except Apache
After requesting a vaccination exemption, do you provide care differently to the children?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Yes</th>
<th>% indicating change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refuse to provide regular care</td>
<td>10</td>
<td>8.9%</td>
</tr>
<tr>
<td>Monitor child’s health differently</td>
<td>43</td>
<td>38.7%</td>
</tr>
<tr>
<td>No change in care provided</td>
<td>56</td>
<td>51.9%</td>
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Some states have protocols in which clinicians approve and sign off on philosophical/personal belief exemptions for childhood vaccines required for entrance into public school. Do you feel as though such a protocol should be implemented?

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<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td></td>
<td>36.6%</td>
<td>63.4%</td>
</tr>
<tr>
<td></td>
<td>41</td>
<td>71</td>
</tr>
</tbody>
</table>

Would you educate parents about childhood vaccines before signing a personal/philosophical belief exemption form?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>95.7%</td>
<td>4.3%</td>
</tr>
<tr>
<td></td>
<td>110</td>
<td>5</td>
</tr>
</tbody>
</table>

Do you feel as though such a practice would reduce philosophical belief exemptions?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td></td>
<td>49.1%</td>
<td>50.9%</td>
</tr>
<tr>
<td></td>
<td>55</td>
<td>57</td>
</tr>
</tbody>
</table>

Do you feel this protocol would be a burden to your practice?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>55.3%</td>
<td>44.7%</td>
</tr>
<tr>
<td></td>
<td>63</td>
<td>51</td>
</tr>
</tbody>
</table>
Qualitative Responses – Vaccine exemption

• Lenient: “I strongly believe in vaccinating my patients; however, ultimately the decision is up to the parents......”

• Hard-line: “I will not accept unvaccinated children in my practice”.
Qualitative: physician sign-off

• “Asking me to approve a parents’ philosophical/personal belief would be asking me to violate my own philosophical/personal beliefs and makes it appear that medical providers approve of these decisions. If a parent wants to make these decisions, they have to also assume the consequences of these decisions.”
Washington’s vaccine exemption law resulted in a drop of 1.5% in vaccine exemptions since 2011
School Nurses and Vaccine Exemptions
Salmon et al. Pediatrics, 2004

- Survey sent to 1000 schools, randomly selected, in Colorado, Massachusetts, Missouri, and Washington
- Personnel reported training, perceptions and beliefs re. disease severity, immunization safety, etc.
- Examined the factors associated with the likelihood of a child having an exemption
School Nurses and Vaccine Exemptions
Salmon et al. Pediatrics, 2004

- If a school nurse responded to the survey, a child was significantly less likely to have had an exemption
- Nurses were more likely than non-nurses to understand the safety and efficacy of vaccinations
- If a respondent or family had used alternative medical treatments, a child was more likely to have an exemption
School Nurses and Vaccine Exemptions
Salmon et al. Pediatrics, 2004

• Training, knowledge, and attitudes of school personnel are critical to maintaining vaccination rates

• Many non-nurse school personnel were unaware of severity of VPDs
Discussion

• Vaccination exemptions continue to rise
• School nurses are, without question, one of the most important links to vaccination
• Our culture is changing and we need to address ways to be responsive
• This includes being able to clearly state the benefits of vaccination
Questions?

• ADHS
  – Will Humble
  – Patty Gast
  – Karen Lewis
  – Jennifer Ralston-King
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