Fear and Loathing: Vaccination The Pariah of Public Health Interventions

Dr. Jared Rutledge
Epidemiologist - Communicable Disease
Fresno County Department of Public Health
Objectives

- Understand what vaccination is and benefits associated with vaccine uptake
- Explain how perceived risk can predict vaccine uptake via the Health Belief Model
- Describe the three factors that are likely to act as barriers to vaccine uptake
- Explain the true risks associated with vaccination
- Describe how message framing can be used with patients to increase likelihood of vaccine uptake
Full Disclosure

- Vaccination is at the forefront of control of several communicable diseases
- Vaccination is one of few methods of eradicating communicable diseases
- As a communicable disease epidemiologist, I am pro-vaccine
Vaccination

• An individual’s choice that can have monumental impact on the population’s health

This is Ben.
He is immunocompromised and cannot be vaccinated.
But thanks to community immunity, he is protected from major diseases.

By vaccinating, you are not only protecting yourself and your children, but also people unable to be vaccinated.
The Anti-Vaccination Movement

- One of the biggest threats to eradicating diseases
- Based on bad science
- No amount of message framing or education will dissuade them
- Just have to hope their effect size does not reach a critical mass of greater than 10-20% of the general population

(Grant et al., 2010; Nyhan et al., 2014; van der Weerd et al., 2011)
Theoretical Framework

• Vaccination is a Health Behavior

• Several models exist that will explain why a person selects to engage in a behavior or does not
  – Health Belief
  – Stages of Change
  – Social Learning
  – Theory of Planned Behavior

• Health Belief Model
  – An individual based model
    • Perceived Susceptibility
      – Am I at risk?
    • Perceived Severity
      – How serious are the consequences?
    • Perceived Benefits
      – What are the positive effects of taking the action?
    • Perceived Barriers
      – How easily can I engage in the action?
        » Cost, availability, time etc.
    • Cues to Action
      – When should this happen?
        » CDC & ACIP
    • Self-Efficacy
      – Likelihood of my action resulting in positive stimulus
      – Think reward system

(Conner & Norman, 1996; Glanz et al., 2002; Glanz et al., 1997; Rosenstock, 1966)
Perceptions of Vaccination and Barriers of Uptake

- **Fear (perceived risk)**
  - Of the virus equals vaccine uptake
  - Lack of fear equals vaccine barrier
  - Fear of the vaccine equals vaccine barrier

- **Lack of Knowledge**
  - Perceived benefits
    - Two for One in pregnant populations – protect mother and baby
    - Herd immunity for the general population
  - Lack of provider recommendation

- Lack of information of the disease
- Lack of information regarding the limitations and benefits of vaccination
  - This can lead to reduced self efficacy
    - Example: A person gets sick right after the vaccine

- **Inconvenience**

(Adhiambo et al., 2013; Lee et al., 2012; Bardenheier et al., 2003; Meharry et al., 2013; Rose et al., 2011)
Legitimate concerns: VAERS

- VAERS observed approximately 5,000 events that were characterized by:
  - Death
  - Hospitalization
  - Disability
  - Life threatening-illness
  - Birth Defects

- Total adverse events reported to VAERS was 37,000

- In 2010, over 163 million doses of flu vaccine alone were administered

- Approximately 2 million people will have adverse events associated with peanuts
  - Vaccination safer than a PB & J

- Limitations due to correlation and causal events
- Provides researchers with a target with which to focus
- 42 cases of febrile seizure were reported in 2010 among infants
  - Prevnar & Fluzone were associated with these most frequently
  - Concomitant administration appeared to increase risk in a data mining project
  - Active surveillance is being conducted at the CDC to investigate and address the gaps in knowledge
  - Molecular Mimicry

(Centers for Disease Control and Prevention, 2010; Martin et al., 2013; Williams et al., 2011)
Legitimate concerns: Any pharmaceutical is going to come with risk

- Public Health focuses on population based outcomes
  - Historically vaccines have had side effects
    - Modern vaccine concerns predominantly fall under two categories
      - Immune
      - Neurologic
    - Issues with causation
    - Issues with surveillance and attribution of adverse events and vaccine exposure
- Issues vaccination during pregnancy
  - Hep B, Pneumococcal, Meningococcal
  - Appears to be safe; Missing large cohort or double blind studies to be absolutely sure for the above vaccines only
- Flu vaccine
  - Even with autoimmune diseases flu vaccine rarely causes autoimmune events
  - Does not cause cellulitis or abscesses at the vaccination site in the elderly
  - H1N1 vaccine not capable of producing the immunologic agents necessary for a Guillain Barre reaction (Wang et al., 2012)
- DTwP
  - Significant neurological concerns/complications in infants
  - Acellular has proven safer
- Yellow Fever
  - 0.43 per 100,000 vaccines
  - Serious event including neurological and immune system reactions requiring medical attention
- Pneumococcal Vaccine in Elderly
  - Risk of cellulitis or abscesses requiring hospitalization
    - History of hospitalization was a confounder
- Rota
  - Contraindicated if the patient has an immunosuppressive condition such as Severe combined immunodeficiency disorder

(Aikawa et al., 2013; Bakare et al., 2010; Breugelmans et al., 2013; Koenig et al., 2011; Kulak, 2012; Makris et al., 2012; Monteiro et al., 2010)
(Ranaldi et al., 2014)
Legitimate Concerns: Final Thoughts

• Smallpox Vaccine
  – One of the most riddled with adverse events vaccines ever created
  – Yet, CDC and WHO still eradicated disease

• Autoimmune responses have been characterized as largely host dependent. Until genetic sequencing is a standard part of patient care predictive models on causal relationships will be limited.

• All the large scale epidemiological studies that have evaluated population based risk associated with allergic reactions have yielded no real clinically significant results
  – Odds Ratios or Relative Risk Ratios ranged from 0.9-1.07
  – A result of 1 indicates no relationship

• Some studies have credence biologically for MS and certain other autoimmune diseases, but these are almost entirely dependent on the host
  – These reactions are based on molecular mimicry. The patient being infected with wild type disease would be at the same risk for developing disease as they would with vaccination. The relative risk for developing the autoimmune disease would remain the same.
  – With most of these vaccine preventable diseases it is not if you are going to catch them but when.
  – Unless contraindicated by ACIP guidelines the weight of evidence suggested there is greater risk in non-vaccinated population than in the vaccinated population.

(Gluck et al., 2008; Offit et al., 2003; Ouandaogo et al., 2012; Pronker et al., 2013; Stanley et al., 2007; Thompson et al., 2013; Wang et al., 2014; Williams et al., 2011)
Assuaging Fears and Promoting Uptake

• Assuage the Fear of the Vaccine

• Make the patient aware of the fear that should be present in the absence of the vaccine
  – With a flu vaccine the US experiences 30,000 influenza related deaths each year
    • 162 million doses given each year out of 313 million
      (only 51% coverage)
    – This is a surprising statistic to most in the general population

• Promoting fear of the disease is not enough

• Patients must be provided a narrative and not just hit with traditional education
  – Tell them a story of loss

(McCaul et al., 2002; Mehany et al., 2013; Prati et al., 2012)
Message Framing & Content

Materials

• Racial Diversity must be present
  – When targeting parents both parents must be present on promotional materials

• Multiple languages must be available

Content

• Information of the disease and vaccine should be delivered in a narrative

• Loss framed message must be emphasized
  – In most cases

• Efficacy (what the patient should expect) of the vaccination action should be clearly defined

(Gainforth et al., 2012; Gerend et al., 2007; Gerend et al., 2008; Gerend & Sias, 2009; Lechuga et al., 2011; McCaul et al., 2002; Mehaney et al., 2013; Prati et al., 2012)
What does loss framing mean?

TABLE 1. Examples of Framed Messages

<table>
<thead>
<tr>
<th>Desirable (Benefits)</th>
<th>Undesirable (Costs)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attain</strong></td>
<td><strong>Loss-framed</strong></td>
</tr>
<tr>
<td>Daughter</td>
<td>Son</td>
</tr>
<tr>
<td>If you vaccinate your daughter you will have peace of mind about her health.</td>
<td>If you vaccinate your son you will have peace of mind about his health.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Avoid</strong></td>
<td><strong>Gain-framed</strong></td>
</tr>
<tr>
<td>Daughter</td>
<td>Son</td>
</tr>
<tr>
<td>If you fail to vaccinate your daughter, you will not have peace of mind about her health.</td>
<td>If you vaccinate your son against HPV you can prevent infections that cause cervical cancer.</td>
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</tbody>
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Note. Messages were based on the current message that the Ontario government provides to parents. HPV, human papillomavirus.

- Loss Frame seems to work best with patients about themselves.
- Gain Frame seems to work best with parents regarding their children.

(Gainforth et al., 2012; O’Keefe et al., 2012)
Limitations & Conclusions

• The usefulness of message framing for vaccination has been critiqued

• The variation that exists could be due in part to the variation of disease severity and perceived efficacy of each vaccine

• Key Concepts
  
  – Tell patients a story (narrative)
  
  – Use the narrative to provide all pertinent information about the vaccine and consequences associated with inaction (loss-framing)
  
  – Make a recommendation to get vaccinated at the office visit instead of asking

(Gainforth et al., 2012; O’Keefe et al., 2012)
References


References Continued


