Vaccine Hesitancy and the Reemergence of Vaccine Preventable Diseases

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Learning Objectives

• Review the emergence of vaccine preventable diseases including measles and pertussis
• Recognize a vaccine hesitant family and assess the source of their concerns
• Develop strategies for approaching vaccine hesitant parents
• Discuss complexities surrounding vaccine messaging and explain that more information and pro-vaccine messaging doesn’t always sway opinion in vaccine hesitant parents

Vaccines and VPDs

• Vaccines: the successes
• Vaccines: the doubters and why they doubt
• Vaccine preventable diseases: what we don’t remember
  • Measles
  • Pertussis
• How to better communicate with families

Vaccines Do Work...How Far We’ve Come

<table>
<thead>
<tr>
<th>Disease</th>
<th>20th Century Annual Morbidity</th>
<th>2012 Reported Cases</th>
<th>Percent Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smallpox</td>
<td>29,005</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>21,053</td>
<td>1</td>
<td>&gt; 99%</td>
</tr>
<tr>
<td>Measles</td>
<td>130,217</td>
<td>55</td>
<td>&gt; 99%</td>
</tr>
<tr>
<td>Mumps</td>
<td>162,344</td>
<td>199</td>
<td>&gt; 99%</td>
</tr>
<tr>
<td>Pertussis</td>
<td>200,752</td>
<td>41,880</td>
<td>79%</td>
</tr>
<tr>
<td>Polio (paralytic)</td>
<td>16,316</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Rubella</td>
<td>47,745</td>
<td>8</td>
<td>&gt; 99%</td>
</tr>
<tr>
<td>Congenital Rubella Syndrome</td>
<td>152</td>
<td>2</td>
<td>99%</td>
</tr>
<tr>
<td>Tetanus</td>
<td>580</td>
<td>36</td>
<td>&gt; 99%</td>
</tr>
<tr>
<td>Haemophilus influenzae</td>
<td>20,000</td>
<td>21*</td>
<td>&gt; 99%</td>
</tr>
</tbody>
</table>

* Haemophilus influenzae type b (Hib) < 5 years of age. Additional 14 cases of Hib are estimated to have occurred among the 217 reports of Hib (< 5 years of age) with unknown serotype.

[Source: JAMA. 2007;298(18):2155-2163]
† † Source: CSHE, MMWR, January 4, 2013:62(52);ND-719-ND-731.
† Source: CDC, MMWR, January 4, 2013:62(52);ND-719-ND-731.
Outside the US

Cases/deaths per year worldwide:

- Hib: 8 million/199,000
- Pertussis: 30-50 million/300,000
- Measles: 20 million/145,000
- Tetanus: 1 million/70,000
- Pneumococcal disease: 14.5 million/476,000
- Rotavirus: 138 million/450,000

17% of all pediatric deaths in the developing world are VP
29% of all deaths in children 1-59 months are VP

WHO 2014

What Parents are Thinking

- Don't see themselves as "anti-vaccine" rather "vaccine educated"
- Not as concerned about MMR-autism link anymore.
- Not concerned about other people's children.
- Natural immunity is stronger than vaccine immunity
- May not trust physicians who “make money” for administering vaccines
  - Would rather trust those without medical degrees such as doulas, chiropractors, midwives
- Overwhelming feeling that vaccines just aren't necessary anymore
  - Successful eradication of disease has reinforced this

Risk Misperception

Are Physicians Part of the Problem?

- Offering alternative schedules (more about this later…)
- Catering to parental misconceptions and concerns
- Practicing anecdotal medicine
  - “I’ve never seen a case of measles…”
  - “Chicken pox itches but doesn’t kill children…”
- Messaging
  - Society benefit vs. individual child benefit (Pediatrics 2014)
  - Mixed messaging
What do Parents do?

- Refuse all vaccinations
- Design their own vaccine schedules
- Follow "Dr. Bob’s"1 vaccine schedules
  - Alternative
  - Selective


Dr. Bob’s Schedule

Delay of Vaccines
- VZV vaccine from age 1 to age 2
- Polio vaccine from 2 months-9 months
- Hepatitis A vaccine from 1 year to 7 years
- MMR until age 4 or 5: “if parents are concerned about autism”
- Let’s parents plan their vaccination schedule
  - Based on…..?

The Problem with “Dr. Bob’s Schedule”

- Misrepresents risks of vaccine
  - VAERS (passive reporting)
  - Package inserts
- Based on anecdotal experience
  - “I’ve only seen one case of _____ in my 10 years”
- Utilizes scare tactics rather than facts
  - Human Bovine Serum
  - Thimerosal
  - Aluminum (ignores other sources in environment)

Pediatrics 2009:123:e164-9

The Problem with “Dr. Bob’s Schedule”

- Proposes two schedules
  - Decline or delay vaccines
  - Space vaccines out
- Multiple visits: (2, 3, 4, 5, 6, 7, 9, 12, 15, 18, 21, 24 months) during the first two years
- Offers the worst of both worlds by catering to parental fears
  - Offers a schedule that has no chance of making vaccines safer
  - Leaves children susceptible to vaccine preventable illnesses while waiting to get vaccinated

Pediatrics 2009:123:e164-9

The Problem with “Dr. Bob’s Schedule”

- Does not recommend meningococcal vaccine for teenagers due to the risk of GBS
  - Risk of GBS: 1/1,000,000
  - Risk of Meningococcal disease: 1/100,000
- Does not recommend polio vaccine since polio has been eradicated from the US since 1979
  - Polio persists in India, Africa, SE Asia, Middle East and people travel
  - 1/200 infected people are asymptomatic but shedding
  - Current outbreaks in the Middle East and parts of Africa

Pediatrics 2009:123:e164-9

The Problem with “Dr. Bob’s Schedule”

- Disingenuous (benefits of herd immunity)
  - Tells parents to avoid MMR but “not to tell their neighbors”
  - Insists that the risk of polio in the US is “zero”
- Ignores the high price of "natural immunity"
  - Advocates for "Chicken Pox parties"
- Misinformation and misrepresentation of data regarding side effects and disease risk
"I do think the disease danger is low enough where I think you can safely raise an unvaccinated child in today's society."

- Dr. Bob Sears

Dr. Sears Hasn't Been to Disneyland

Downsides of Delay

• More injections—may lead to more fearful children
• Vaccines administered in a non tested schedule (interference)
• Increases chance for incomplete vaccines as children grow up and have fewer visits to the physician.
• Leaves child unprotected for longer periods of time—especially in the most vulnerable months.

California Measles Cases

• 123 cases reported in California (80% of cases)
  • 35 from Orange County
  • 24 from LA County
  • 39 visited Disneyland; 28 close contacts; 8 community
• 56 Unvaccinated; 16 ≥ 1 dose MMR
  • 15% < 1 year
  • 56% ≥ 20 years
• 18% hospitalized

As of 2/23/15

Measles: Historical Aspects

• First account was in Boston in 1657 (John Hull)
• Epidemics every 3-4 years
• Virus isolated in 1954 by Enders and Peebles
  • 13 year old boy (David Edmonston)
• RNA virus: (Paramyxoviridae group)
Measles

- Humans are the only natural host
  - Propagated in monkeys, suckling mice and hamsters
  - Transmitted through direct contact with infectious droplets and by airborne spread
  - VERY contagious (one of the most communicable diseases)
  - Distinctive and recognizable exanthematous disease

Measles: Clinical Manifestations

- Three “C’s”: Cough, Coryza and Conjunctivitis
- Cough is a common reason for presentation
- Pearl: “If it doesn’t cough, it’s not measles”
- Koplick Spots: pathognomonic enanthema
- Complications:
  - Otitis media
  - Laryngotraceobronchitis (croup)
  - Bronchopneumonia
  - Encephalitis (1/1,000 cases)
  - Hearing loss
  - SSPE (late manifestation = 11 years incubation)

It’s Unlikely to be Measles if…

- No rash present on face, head, neck or torso
- If the rash started on the torso or lower extremities
- No fever with rash OR if rash preceded fever
- Child is well appearing
  - Children with measles are sick
- Consider in every case of rule out Kawasaki Disease

Measles: Before Vaccination

- Early 1900s: 26 deaths per 1,000 cases
- 1954 virus isolated from an 11 year old boy
- 1960s: mortality drops to 1 death per 1,000 cases
  - 48,000 hospitalizations per year
  - 400-500 deaths per year
- 1963: Vaccine introduced
- 1971: MMR introduced

Measles: Vaccination

- Live attenuated viral vaccine licensed in 1963
- Currently available: MMR and MMR-V
- Prepared in chicken embryo cell culture
- Vaccination programs have successfully reduced the incidence of measles in the US by >99%
- Two doses required due to a 5% primary failure rate
  - First dose at 12 months
  - Second dose 4-5 years of age (or 4 weeks after first dose) to cover non-responders
- Adverse effects: fever, measles-like rash (3%), seizures (higher with MMRV), thrombocytopenia (1/25,000-2 million)

Measles: Live Viral Vaccine

- Contraindications and precautions for a live vaccine:
  - Immunocompromised patients
  - Corticosteroids (high dose: >2mg/kg for 14 days)
  - Except HIV (depends on immune status and CD4 count)
  - Receipt of immune globulin preparations (IG or IVIG)
  - Range of intervals
  - Longest for IVIG treatment of KD and ITP (11 months)
  - Egg allergy is NOT an absolute contraindication for MMR or MMRV
  - Produced in chicken embryo cell culture
  - ...but does NOT contain significant amounts of egg white protein
Measles: Exposure and Treatment

- Active immunization following exposure may have some efficacy due to long incubation period (8-12 days)
- Give within 72 hours of measles exposure
- Useful in measles outbreaks
- Passive immunoprophylaxis (IG) for susceptible exposed individuals who cannot be immunized
- Patients <12 months
- Give within 6 days of exposure (0.25mL/kg IM)
- Vitamin A administration associated with decreased morbidity and mortality in children with measles

Measles: Diagnosis

- History: “When did the rash start and how did it spread?”
- Clinical symptoms
  - Cough, coryza, conjunctivitis
  - Fever
  - Then rash that starts around the hairline and moves down
- Vaccination history
  - Modified measles may occur with secondary vaccine failure
- Laboratory confirmation important but need to report suspect cases

Measles: Diagnosis

- Call County Health Department
- Viral isolation: PCR
  - Throat or NP swab (best if ≤ 7 days into illness)
  - Urine (within 10 days)
- Serology
  - IgM
  - Rise in IgG

Pertussis: Recent epidemiology

- Prior to vaccine > 200,000 cases/year
- Increasing numbers in the US-epidemics every 3-4 years

Stages of Pertussis

- Incubation
  - 3 weeks
  - Symptom onset
  - Paroxysmal
  - Convalescent

Infantile Paroxysmal: 1-3 weeks duration, cough with cyanosis, “whoop”, emesis
Convalescent: gradual improvement but ‘reactivation’ of symptoms with respiratory illness
Pertussis: Classic Whooping Cough

- Severe cough illness—starts as a “cold”
  - Coryza; but no pharyngitis
  - Paroxysmal cough, post tussive vomiting & “whoop”
  - No systemic illness, no fever, no pharyngitis
- Complications:
  - Subconjunctival hemorrhages
  - Broken ribs
  - Hemorrhoids
- Adults with pertussis often report sweating episodes and feeling as if they’re choking on something
- Misdiagnosed as: GERD, bronchiitis, asthma, sinusitis, foreign body aspiration, psychogenic cough

Fatal Pertussis: Infants

- Infants appear deceptively well in early stages:
  - No fever (no systemic symptoms)
  - No pulmonary findings
- As disease progresses:
  - Gagging, gasping
  - Bradycardia or apnea
  - Cyanosis (parents may report red or purple face)
  - Post-tussive emesis
- Viral (RSV, adenovirus) may complicate illness (and diagnosis)

Pockets of Unimmunized People

Nonmedical Vaccine Exemptions and Pertussis in California, 2010

- Geographic areas with high rates of non-medical exemptions (NMEs) were associated with high rates of pertussis.
- Both NME and pertussis clusters were associated with factors characteristic of high SES
  - Lower population density, lower average family size
  - Higher percentage of high school, college, or graduate school graduates
  - Higher median household income
  - Lower percentage of families in poverty

Pertussis Management

- Erythromycin, azithromycin or clarithromycin
  - Risk of IHPS (infantile hypertrophic pyloric stenosis)
  - Azithromycin for infants < 6 months: 10mg/kg/day for 5 days
  - ≥ 6 months: 10mg/kg/day X 1 day then 5mg/kg/day X 4 days
  - TMP-SMX alternative for infants > 2 months of age
    - Little data on efficacy
    - TMP 8 mg/kg/day; SMX 40 mg/kg/day in 2 doses for 14 days
- Antibiotics
  - Ameliorate disease if given early
  - Limit spread if given after paroxysmal phase begins

What Can We Do?

- Listen
- Use “presumptive” language*:
  - “We are going to give Billy his shots now”
  - “Crystal is due for 3 vaccinations today”
- Instead of “participatory” language*:
  - “What do you want to do about shots today?”
  - “Are you still declining vaccinations for Emily?”

Presumptive vs. Participatory Language

- Use of participatory initiation formats when making vaccine recommendations was associated with increased odds of parental resistance.
- Shared decision making not typically indicated when there is only one medically acceptable choice (i.e., immunizations).
- Nearly ½ of initially resistant parents accepted the provider’s original vaccine recommendation if the provider continued to pursue it.


What More Can We Do?

- Clear and consistent messaging: parents do trust our opinions.
- Share personal stories and anecdotes with families.
- Remind them frequently that their child’s health is your primary concern.
  - “don’t allow me to practice substandard medicine”
  - “don’t let me send your child out into an increasingly dangerous world”
  - “let me care for your child to the best of my ability”

Good Web Resources for Providers

- CDC’s vaccine web section http://www.cdc.gov/vaccines
- Vaccine Education Center http://www.vaccine.chop.edu
- AAP’s immunization website http://www.aap.org/immunization
- National Network for Immunization Information http://www.immunizationinfo.org

Immunization Declination Forms

Available on the AAP website:
http://www2.aap.org/immunization/pediatricians/refusaltovaccinate.html

Vaccine Preventable Diseases

*It’s better not to fall ill than to be cured*  
Lancissio 1654-1720

Source: CDC