Childhood Immunizations Updates and Controversies
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Objectives

• Review vaccine hesitancy and how to counter it
• Review new recommendations for
  • Flu Vaccine
  • HPV
  • Meningococcal
• Review poor compliance rate with HPV
  • Particularly with male population
Vaccine Hesitancy

• Vaccination is one of the single greatest public health achievements of the last century

• Yet, over the past decade, acceptance of vaccines has been challenged by individuals who question their advantage

• 2014 Measles outbreak
  • Majority of cases occurred in children who had not received the vaccine (45%) or had unknown vaccination status (38%). Of those unvaccinated, 43% of parents cite philosophical or religious reasons for refusal

Vaccine Hesitancy

• Herd immunity fundamental concept of vaccination success

• Control of such vaccine preventable diseases contingent on a significant proportion of the population being immune

• Depending on the disease, the percentage of individuals required to achieve herd immunity ranges from 30%-95%
Vaccine Hesitancy

- Recent years have seen marked increase in availability and use of “philosophical” or “personal belief” exemption

- In Arkansas rates of overall exemptions increased an average of 23% per year once philosophical exemptions were allowed

- Study Omer et al
  - 2005-2011 unadjusted rates for nonmedical exemptions in states allowing philosophical were 2.5 times high in states that allowed only religious exemptions
Vaccine Hesitancy

• Vaccine Hesitancy: Terminology to eradicate polarizing “pro” vs “anti” vaccination

• Characterized by WHO

  • “a behavior influenced by a number of factors including issues of confidence (do not trust a vaccine or provider), complacency (do not perceive a need for a vaccine or do not value the vaccine), and a convenience (access.)

<table>
<thead>
<tr>
<th>Immunization Advocate</th>
<th>Agree vaccines necessary and safe. Strong relationship with provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Go Along to Get Along</td>
<td>Do not question vaccines, would like to vaccinate but may lack detailed knowledge of vaccines</td>
</tr>
<tr>
<td>Cautious Acceptor</td>
<td>Minor concerns but ultimately vaccinate</td>
</tr>
<tr>
<td>Fence-Sitter</td>
<td>Significant concern, knowledgeable about vaccines. May vaccinate, delay or refuse. Have neutral relationship with provider</td>
</tr>
<tr>
<td>Refuser</td>
<td>Refuse all vaccines. Reasons for refusal may include distrust, safety concerns religious beliefs</td>
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Vaccine Hesitancy

• The Periodic Survey of Fellows study by American Academy of Pediatrics (AAP)
  • In 2006, 75% of pediatricians surveyed had encounters with parents who refuse a vaccine, in 2013 raised to 87%
  • Over this 7 year period, pediatricians stated that the proportion of parents who refused 1 or more vaccines increased from 9.1% to 16.7%

Vaccine Hesitancy

• Reasons cited for refusal
  • Most common reason: parents didn’t believe vaccine necessary (this reason also showed increase over 7 year period)
  • Also, had concerns about autism (which, thankfully, was a reasons that declined over the 7 years)

• National telephone survey 2010
  • 1500 parents children 6-23 months, response rate 46%
  • About 3% of respondents had refused all vaccines
  • 19.4% had refused or delayed at least 1 recommended childhood vaccines
Vaccine Hesitancy

• Additional reasons for hesitancy
  • a study showed 44% reported concern over pain during multiple injections, 34% unease with multiple vaccines at once, 26% concerned about autism, 13.5% concern vaccines lead to chronic illness, 13.2% vaccines not tested enough for safety

• Concerns about vaccine safety and necessity often cited as reasons for refusal
  • Survey showed those who refuse have greater distrust of health care professionals and more likely to use complementary and alternative medicine

Vaccine Hesitancy

• Vaccine Safety
  • Too many
  • Autism
  • Additives
  • Overload immune system
  • Serious adverse reactions
  • Inadequate research
  • Pain
  • Cause illness
Vaccine Hesitancy

Number of Immunogenic Proteins and Polysaccharides Contained in Vaccines Past 100 Years

Vaccine Hesitancy

- Necessity of Vaccines
  - Disease is more natural
  - Parents don’t believe diseases being prevented are serious
  - Diseases have disappeared
  - Not all vaccines are needed
  - Vaccines don’t work
Vaccine Hesitancy

• Freedom of Choice
  • I have the right to choose
  • I know what is best for my child
  • Risks outweigh benefits
  • I don’t trust organized medicine
  • I don’t trust government authorities
  • I don’t trust pharmaceutical companies
  • Ethical, moral, religious reasons
Vaccine Hesitancy

• How can we counter this attitude?
  • Fortunately, studies have shown that physicians can and have influenced vaccine hesitant parents to vaccinate

• Target their specific concerns
  • Safety and thimerosal, aluminum
  • Too many vaccines and immune system
  • Pain
  • Religious reasons

Vaccine Hesitancy

• Role of Pediatrician
  • SINGLE MOST IMPORTANT FACTOR GETTING PARENTS TO ACCEPT VACCINE: One-on-one contact with informed, caring and concerned physician

• 2005 study
  • Parents of more than 7000 children 19-35 months surveyed regarding physician influence on vaccine choice
  • 80% stated decision to vaccinate was positively influenced by primary care provider

• Well informed physicians effectively addresses parental concerns and strongly supports benefits of vaccination enormous influence on parental acceptance
Vaccine Hesitancy

• Communication Highlights
  • Vaccines are safe and effective, serious disease can occur without vaccination
  • Respect each vaccine-hesitant family’s concerns
  • Vaccines are thoroughly tested before licensure and there is monitoring
  • Nonmedical vaccine exemptions increase rates of unvaccinated children
  • Unvaccinated children put vaccinated children and medically exempt children at risk

Vaccine Hesitancy

• Communication Highlights
  • Strong provider commitment to vaccination can influence
  • Personalize vaccine acceptance
  • Often accepted vaccine when presented with immunization needed to maintain optimal disease prevention
  • Current vaccine schedule is the only on recommended by CDC and AAP
Vaccine Hesitancy

• But......providing vaccine information is time consuming
• Kempe et al found 53% of physicians spend 10-19 minutes discussing vaccines with concerned parents
• 8% of physicians spend 20 minutes or more
• Pediatricians experience decreased job satisfaction because of time spent with parents and vaccine concern

Vaccine Hesitancy

• Options to address this: schedule longer visits, acceding to parent, delay or skip vaccine, dismissal(??)

• No option is ideal, illustrates the impact vaccine hesitant families have on health care access and services

• Vaccine refusal form
Vaccine Hesitancy

• Delay schedule of vaccines?
  • No delay or alternative schedule has been found to provide better efficacy
  • Vaccine schedule is designed to protect children when they are most susceptible

• Robison et al showed that children who spaced vaccines out had more total visits for vaccines, and by 9 and 19 months of age were less likely to be caught up

Vaccine Hesitancy

• Medical contraindications to vaccines:
  • No pertussis containing vaccine with development of encephalopathy within 7 days of receiving vaccine
  • No Haemophilus Influenza type b <6weeks old
  • No rotavirus to children with SCID or history of intussusception
  • No live viral vaccine during pregnancy or to chemotherapy patients, antibody deficiencies, DiGeorge, HIV ok but check CD4 T-Lymphocytes
  • Anaphylaxis.....
Vaccine Hesitancy

• Anaphylaxis from vaccines is very rare, 2000-2009, 9 cases of anaphylaxis filed with National Vaccine Injury Compensation Program

• Allergic components:
  • Gelatin: Flumist, MMR, Rabies, Typhoid
  • Yeast: Hep B and quadrivalent HPV
  • Latex
  • Egg: Yellow fever, influenza, MMR and Rabies

Vaccine Updates – Influenza Vaccine

• Egg allergy no longer contraindication for influenza vaccine

• Since 2011 ACIP has relaxed recommendations for Influenza Vaccination among those with egg allergies
  • Tolerate lightly cooked eggs (scrambled)? Vaccinate without precaution
  • Develop only hives? Vaccinate with inactivated flu vaccine and observe for 30 minutes
  • Hypotension, wheezing, nausea, vomiting, require epipen? Refer to allergist before vaccine
Vaccine Update – Influenza Vaccine

• Since 2010, routine flu immunization for all children 6 months and older vs previous recommendations 6-24 months plus those with chronic illness

• Recommendations vary year to year, check with health department
  • 2017-2018 updates:
    • NO INTRANASAL FLU VACCINE, not effective

Vaccine Updates - Meningococcal

• Meningococcal disease affects all age groups with increased infection rates among infants, adolescents and the elderly

• Case:fatality ratio 10%-40%

• Annual incidence meningococcal disease in United state varies from 0.3-1.5 cases per 100,000 persons

• Currently experiencing historic low
Vaccine Updates - Meningococcal

• In 2014, there were 426 total cases with incidence rate of 0.14 cases per 100,000 persons

• Decrease preceded introduction of meningococcal quadrivalent conjugate vaccines into vaccine schedule
  • May be due to natural immunity, changes in risk (decrease smoking), decreased virulence of strains

Vaccine Updates – Meningococcal

• Peak incidence of disease occurs first year of life

• 35%-40% cases occur in children younger than 5, second peak in adolescence

• These findings correlate with observed nasopharyngeal colonization rates
  • Colonization may be transient or persistent which may provide protection against invasive disease
Vaccine Updates - Meningococcal

• Infections occur throughout the year but particularly in winter

• Occur globally but there is geographic variation in serogroup distribution
  • B, C most disease in Europe
  • B,C,Y most disease in North America
  • A serogroup epidemics in Asia and Africa (Senegal “meningitis belt”)
  • Serogroup W sub-Saharan Africa

Vaccine Updates – Meningococcal

• 2 polysaccharide-protein conjugate vaccines recommended for meningococcal disease in adolescence
  • MenACWY-D (Menactra) and MenACWY-CRM (Menveo)

• In 2005 Advisory Committee on Immunization Practices (ACIP) recommended immunization age 11-12

• 2011 CDC recommended booster dose after 5 years of primary vaccine due to waning immunity
Vaccine Updates - Meningococcal

• With use of MenACWY vaccines in adolescence, serogroup B now causes 40% of all meningococcal disease cases in this age group

• Recent year, 50 cases of serogroup B meningococcal disease have occurred annually among 11-23 year olds and one third of serogroup B age 18-23 occurs in college students
  • 10 University outbreaks since 2008

Vaccine Updates – Meningococcal

• 2013-2014, outbreaks of serogroup B occurred at 2 Universities
  • 13 cases and 1 death

• In response, vaccine campaign at both campuses using a MenB vaccine (Bexsero)
  • At the time approved in Europe, Canada and Australia
Vaccine Updates - Meningococcal

- Both serogroup B meningitis vaccines, Bexsero and Trumenba, underwent accelerated approval and licensure in 2014 and 2015

- Both approved for ages 10-25

Vaccine Updates - Meningococcal

- Bexsero
  - 2-dose series, one month apart

- Trumenba
  - 3 versus 2 dose series
  - Clinical trial conducted in Europe 1,450 persons 11-18 years old
  - Divided into 5 groups to evaluate 2 versus 3 dose regime
  - Those who received 2 doses didn’t have statistically significant response to vaccination than 3 dose series
Vaccine Updates – Meningococcal

• Trumenba ACIP Recommendations:
  • 3-dose series (0,1-2,6 months) to: Persons ages >/ 10 years at increased risk for serogroup B meningococcal disease, including anatomic or functional asplenia, microbiologists who work with Neisseria meningitidis, eculizumab administration, complement deficiency, those at risk due to outbreak
  • 2-dose series to (0,6 months): age 16-23, healthy, 2 doses. If second given less than 6 months after first, give a third at least 4 months after the second

Vaccine Updates - Meningococcal

• Bexsero ACIP Recommendations:
  • 2-dose series (0,30 days) to: Persons ages >/ 10 years at increased risk for serogroup B meningococcal disease, including anatomic or functional asplenia, microbiologists who work with Neisseria meningitidis, eculizumab administration, complement deficiency, those at risk due to outbreak
  • 2-dose series to (0,30 days): age 16-23, healthy, 2 doses
**Vaccine Updates - Meningococcal**

- Same vaccine type needs to be used, cannot interchange brands, still no recommendations on booster dosing as of yet

- Meningococcal B vaccines are not expected to provide protection against disease caused by all serogroup B strains
  - Recent study, 34% of vaccinated teens in a college outbreak did not mount immune response to the outbreak strain after 2 doses of Bexsero. Outbreak strain wasn’t in vaccine but 2 vaccine antigenic components were in outbreak strain

**Vaccine Updates - HPV**

- Lifetime risk of acquiring HPV infection is >80%

- Estimated 79 million people in the United States are infected with HPV and half of the 14 million new infections each year are in 15-24 year olds

- Why give HPV vaccine routinely in 11-12 year old visit?
  - Greatest protection when given before teen becomes sexually active
  - Cumulative incidence of HPV nearly 40% (college women) and 60% (college men) within first 2 years of sexual activity
Vaccine Updates - HPV

• Approximately 24% of adolescent boys and girls report having sexual intercourse by grade 9 and 58.1% report having sex by grade 12

• Highlights importance of talking to children about sexual activity early and its risk early on and why HPV vaccine given when it is

Vaccine Updates - HPV

• The less you talk about sex, the more likely children will get an STI, become pregnant and engage in high risk sexual behavior, vaccinating

• Vaccinating children against HPV provides and opportunity to talk to children about sexual activity and doesn’t encourage them to have sex
Vaccine Updates - HPV

• The effect of HPV
  • Nearly all cervical cancers caused by HPV
  • 90% anal cancer (87% by types 16 or 18)
  • 69% vaginal cancer (55% by types 16 or 18)
  • 60% oropharyngeal cancer (60% by types 16 or 18)
  • 51% vulvar cancer (44% by types 16 or 18)
  • 40% penile cancer (29% by types 16 or 18)

Vaccines Updates - HPV

• Of the 35,000 cancers reported in 2009 in the United States, 39% occurred in males
  • No screening unlike PAP smear

• Perceived as only affecting females
  • Leading cancer associated with HPV is cervical cancer
  • When first launched, HPV vaccine only approved for females
  • Condom use will protect
Vaccine Updates - HPV

• This perception of HPV not affecting males seen in immunization rates
  • 2013 initiation rates for HPV vaccine series 34.6% BOYS and series completion rates 15% BOYS
  • 2013 initiation rates for HPV vaccine series 57.3% GIRLS and series completion rates <40% GIRLS
• Why are rates so low? National Vaccine Advisory Committee reviewed root cause
  • Weak and inconsistent provider recommendations
  • Low parental demand for HPV

Vaccine Updates - HPV

• Providers site financial concerns and parental attitudes as barriers and contribute to weak recommendations
  • Also in pediatrics, HPV cancers not perceived as imminent threat

• Additional barriers to providers was discomfort with addressing questions about sexually transmitted infections and safety concerns

• Studies show (this is a persistent notion for all vaccines) that despite parental hesitancy, physician HPV strong recommendation would convince vaccine compliance
Vaccine Updates - HPV

• Parental hesitancy with HPV vaccination echo some reasons for other vaccine hesitancy, but some reasons are unique to HPV
  • Concerns about safety
  • Too young to have this type of vaccine
  • May encourage sexual activity
  • Belief that HPV infectivity is low risk

• It works: Pre-vaccine era (2003-2006) and post-vaccine era (2009-2012) HPV prevalence showed 64% decrease in type 6,11,16,18, ages 14-19

Vaccine Updates - HPV

• Such poor compliance with HPV, would simplifying the 3-dose schedule help?

• October 7, 2016 (revised October 19, 2016) ACIP recommended:
  • ages 9-14, vaccination with 2 doses of 9vHPV at 0, and 6-12 months
    • Gardasil 9 = 6,11,18,31,33,45,52,58

• Immunogenicity evidence showed a 2-dose schedule equivalent efficacy to 3-dose schedule if series initiated before 15th birthday
Vaccine Updates - HPV

• If you start Gardasil 9 on or after 15th birthday (up to age 26)
  • 3-dose series (0,1,6months)

• If you started with 4vHPV series, you can finish with Gardasil 9

THANK YOU