Childhood Immunizations Updates and Controversies

Nicole Greenwood, M.D.
Assistant Professor of Pediatrics
Lake Erie College of Osteopathic Medicine
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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

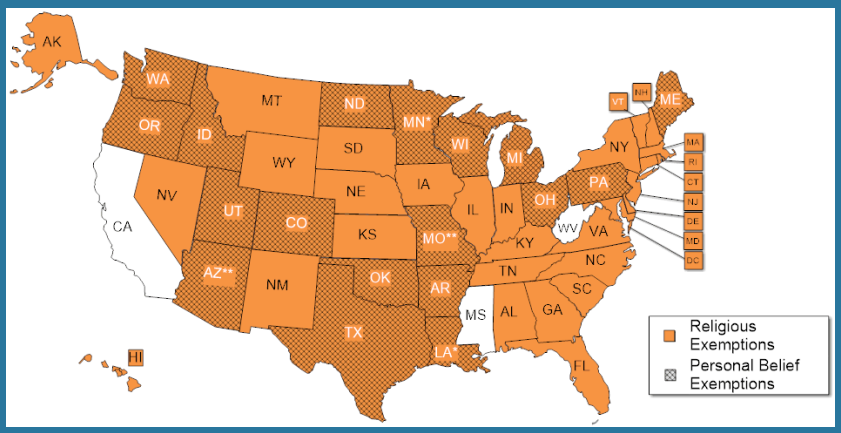
Vaccine Hesitancy

- 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

- 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.)

Vaccine Hesitancy

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

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 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

1900		1960		1980		2000	
Vaccine	Proteins	Vaccine	Proteins	Vaccine	Proteins	Vaccine	Proteins/ Polysaccharides
Smallpox*	~200	Smallpox	~200	Diphtheria	1	Diphtheria	1
Total	~200	Diphtheria†	1	Tetanus	1	Tetanus	1
		Tetanus‡	1	WC-Pertussis	~3000	AC-Pertussis¶¶	2–5
		WC-Pertussis§	~3000	Polio	15	Polio	15
		Polio‖	15	Measles¶	10	Measles	10
		Total	~3217	Mumps#	9	Mumps	9
				Rubella**	5	Rubella	5
				Total	~3041	Hib††	2
						Varicella‡‡	69
						Pneumococcus§§	8
						Hepatitis B‖‖	1
						Total	123–126

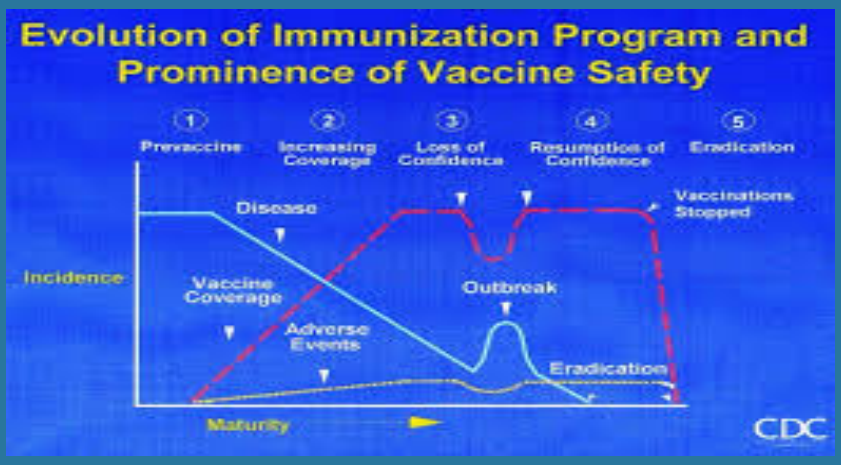
Vaccine Hesitancy

- 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



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 VACCTINE: 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 (0,6months): 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 (0,30days) 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