Vaccines Demystified

Erika Krumbeck, ND

WEBINAR WORKBOOK

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CONSIDERATIONS

How will YOU decide to vaccinate your child?

What is the overall health of your child?

- Any immune compromise? Allergies? Abnormal reactions to vaccines in the past? History of seizures? Taking immunosuppressive medications?

Who is the baby/child around? What are possible exposure sources?

- Daycare? Caregivers work in healthcare field? Siblings? Neighbors? Traveling?

Who could the baby/child affect?

- What is the health of other family members? Any immunocompromised siblings or caregivers? Planning on traveling?

What are the school requirements?

- Daycare requirements? School requirements?

Time

- If considering an alternate vaccine schedule: do you have time for extra trips to the health department or care provider?
- If considering skipping certain vaccines - can you take time off of work if there is an outbreak or if the child becomes ill?

Ethical dilemmas

- What is important to you? Is it important for you to protect persons who cannot be vaccinated? What are other ethical considerations for your family? What is **most** important to you?

HEPATITIS B VACCINE

Hepatitis B is a virus that causes an infection of the liver, leading to inflammation and swelling.

The disease

- 1-2% develop fulminant hepatitis, often causing death (93%). Many develop chronic hepatitis, which leads to liver cirrhosis and hepatocellular (liver cancer) later in life. 90+% of infected infants will become chronic carriers.
- Is spread through blood and bodily fluids.
- ~800,000 - 1.4 million people in the United States are chronic carriers. Worldwide more than 2 billion people have been infected and 350 million have chronic infections.
- High risk groups include IV drug users, those who engage in risky sexual behaviors, healthcare workers who are exposed to bodily fluids.

The vaccine

- CDC recommended schedule: birth, 1-2 months, 6-18 months.
- Who should not get the vaccine?
- Ingredients: 250 mcg aluminum, yeast protein, sodium chloride, phosphate buffers.

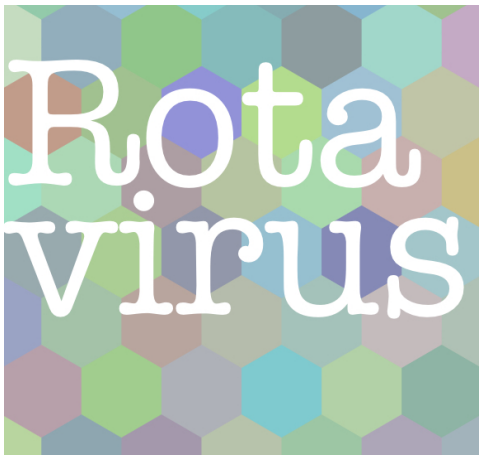
Special topics

- What is the association between the Hepatitis B vaccine and Multiple Sclerosis?
- What is the association between the Hepatitis B vaccine and the risk of developing autism?
- Is there any thimerosal in the currently used Hepatitis B vaccine?

ROTAVIRUS VACCINE

Rotavirus is a gastrointestinal viral infection leading to watery diarrhea. It can cause severe dehydration and electrolyte imbalance in infants and young children. Children 3-15 months are most at risk.

The disease



- Spread through fecal-oral route. Can also be spread from hands, toys or other surfaces contaminated with stool. Spreads quickly and easily.
- Before introduction of the vaccine rotavirus caused 2.7 million infections per year, with around 20-60 deaths per year, and was a leading cause of hospitalization in children.

The vaccine

- Is an ORAL, live-virus vaccine.
- CDC recommended schedule: 2 months, 4 months, 6 months (depending upon brand). Must be started and finished by certain ages. (Cannot delay, or the child is no longer eligible to receive the vaccine.)
- Who should not get the vaccine?
- Ingredients: amino acids, dextran, Dulbecco's Modified Eagle Medium (contains mostly electrolytes, amino acids and nutrients), sorbitol, sucrose.

Special topics

- What is the association between the Rotavirus vaccine and intussusception?
- What is the porcine circovirus? What type is found in the Rotavirus vaccine, and in which brand?
- What is the association between the Rotavirus vaccine and celiac disease?

HIB VACCINE

Haemophilus influenzae type B is a bacterial infection which can cause meningitis, skin infections, joint infections, bone infections or epiglottitis.

The disease

- Invasive *Haemophilus influenzae* infection can cause meningitis. 15-30% of patients with invasive Hib infection can have lasting neurological damage (like permanent deafness) and 2-5% die. It can also cause skin infections, epiglottiitis, joint infections and bone infections.
- It is spread through respiratory droplets or direct contact.
- Risk factors: household crowding, daycare, school-age siblings, low socioeconomic status, chronic disease, Alaskan eskimos or native Alaskans.
- Estimated 20,000+ cases/year in the United States (in all age groups), with over 1,000 deaths per year. Now: *Haemophilus influenzae* type B appears to be very rare, though there is an increase in other types

The vaccine

- ACIP recommended schedule: 2 months, 4 months, 6 months, 12-15 months.
- Who should not get the vaccine?
- Ingredients: varies by brand. ActHib has no aluminum, is preservative free with trace residual formaldehyde (<0.5 mcg/dose), Hib polysaccharide is bound to a tetanus toxoid. PedvaxHib has 225 mcg aluminum, is bound to a Neisseria meningitidis OMPC, and contains 0.9% sodium chloride. The vial stopper does contain rubber latex.

Special topics

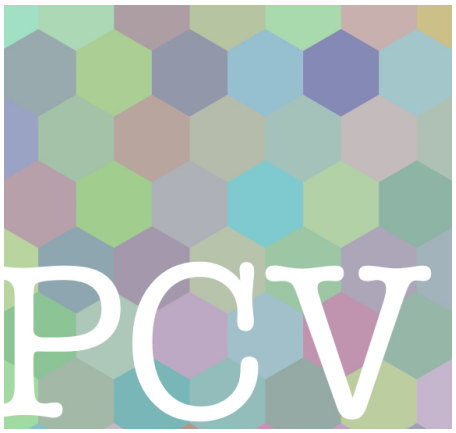
- How long is breastfeeding protective against Hib?

- At what age does the disease (invasive Hib) typically occur? Why is this important?

PCV VACCINE

Streptococcus pneumoniae is a bacteria that can cause bacteremia, pneumonia, ear infections, and meningitis.

The disease



- Invasive pneumococcal disease causes serious problems. Formerly the 2nd most common cause of meningitis in children. After introduction of Hib vaccine, it is currently **the** most common cause of meningitis.
- Spread via respiratory droplets or direct contact. Risk factors include: HIV infection, immune compromised, daycare, no spleen, Alaska Native, Navajo and White Mountain Apache groups.
- ~17,000 cases per year in the U.S. and 700 cases of meningitis per year before the vaccine was introduced.

The vaccine

- CDC recommended schedule: 2 months, 4 months, 6 months, 12-15 months.
- Who should not get the vaccine?
- Ingredients: saccharides, carrier protein, polysorbate 80, succinate buffer, 125 mcg aluminum.

Special topics

- At what age does invasive pneumococcal disease typically occur? Why is this important?

- Does this vaccine protect against all the serotypes of *Streptococcus?*

IPV VACCINE

Poliovirus is a gastrointestinal virus that affects the intestines. It can cause paralytic polio leading to permanent paralysis or death.

The disease

- Most infections with poliovirus cause no symptoms. About 1% of infections lead to paralytic polio, which causes weakness in major muscle groups, often including the diaphragm (which is necessary to breathe). Can cause permanent paralysis.
- Spread via fecal-oral route, and is highly contagious. Because most cases of the infection result in no symptoms it can be spread without a person knowing they have it.
- Before the vaccine: ~13,000 - 20,000 cases of **paralytic** polio per year in the U.S. Currently: none. Last case of wild virus polio in the United States was in 1979.

The vaccine

- CDC recommended schedule: 2 months, 4 months, 6-18 months, booster ages 4-6.
- Who should not get the vaccine?
- Ingredients: 0.02% formaldehyde, 0.5% 2-phenoxyethanol, trace neomycin, polymyxin B, streptomycin, residual calf serum protein (from growth media)

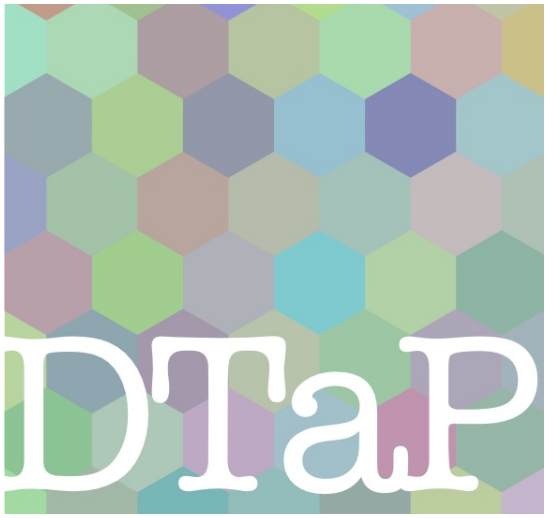
Special topics

- What is the difference between the Oral Polio Vaccine (OPV) and Inactivated Polio Vaccine (IPV)? Why is IPV given in the United States currently?

DTaP/Tdap VACCINE

DTaP/Tdap vaccine is designed to protect against three things: Diphtheria, Tetanus, and Pertussis.

Diphtheria



- Diphtheria is a bacterial infection causing flu-like symptoms with sore throat. It can cause a membrane to form in the back of the throat which blocks the airway leading to death. Diphtheria can also be systemic affecting the heart, nervous system, kidneys, and skin. It is treated with antibiotics and anti-toxin.
- In 1921 there were more than 200,000+ cases, and 15,000+ deaths. Now it is extremely rare (with no cases reported in 2015).

Tetanus

- Occurs from a bacterial infection (*Clostridium tetani).* The toxin causes tetanus leading to paralysis, spasm, respiratory arrest and death. 11% of cases are fatal (up to 50% of neonatal cases). Occurs more commonly in neonates, the elderly, and diabetics. Neonatal tetanus occurs shortly after birth, usually from umbilical cord stump infection, and only occurs when the mother is not immune to tetanus. Neonatal tetanus is very rare in the United States.
- *Clostridium tetani* is found in the soil virtually everywhere. The disease spreads when a puncture wound or cut is contaminated without contact with air. It takes 3-21 days after exposure to develop the disease.
- 580 cases per year with 472 deaths before the introduction of vaccines. There were 30 cases in the United States in 2015, and 0 cases of neonatal tetanus. An estimated 58,000 infants died from neonatal tetanus in 2010 alone worldwide.

Pertussis

- Is also known as "whooping cough." It is a bacterial infection, the toxin causes symptoms. Cold-like symptoms occur first, leading to a severe, paroxysmal cough. Lingering cough can last months.
- It is highly contagious, spread through respiratory droplets. Newborns and infants are most at risk. It is treated with antibiotics if caught in the early stages.
- Before vaccines there were 270,000 cases per year and 10,000+ deaths per year. After introduction of vaccinations there are fewer cases, but it is still prevalent, with 20,000+ cases reported in 2015.

The vaccine

- CDC recommended schedule: 2 months, 4 months, 6 months, 15-18 months, 4 years.
- Who should not get the vaccine?
- Ingredients: 330 mcg aluminum (Daptacel) or 625 mcg aluminum (Infanrix) , <5 mcg residual formaldehyde, <50 ng residual glutaraldehyde, 3.3 mg 2-phenoxyethanol

Special topics

- Why was there a change from DTP to DTaP?
- Does immunity last? What happens to pertussis immunity over time? Does vaccination guarantee immunity to pertussis?
- Are single vaccines available? Why not?
- Is there a relationship between DTaP/Tdap vaccines and allergies, asthma and eczema?

MMR VACCINE

MMR vaccine is designed to protect against three things: measles, mumps and rubella.

Measles

- Measles is a virus which causes high fever, lethargy, cough, nasal discharge, conjunctivitis and a characteristic rash. About 30% of infected patients will have complications, and 1 in 5 will be hospitalized. 1 in 1,000 develop encephalitis, and between 1 in 500 and 1 in 1,000 will die.
- Highly contagious, spread through respiratory droplets in the air.
- Worldwide measles infection is the 5th most common cause of death in children under 5.
- Rare in the United States. Last estimates were 31-39 million illnesses worldwide in a single year.

Mumps

- Virus that usually causes swelling of the parotid glands, but can affect any organ system. Adolescent males can get swelling of the testes (called orchitis) which can reduce fertility or even cause sterility in rare cases. Can also cause miscarriage. Rarely causes encephalitis or deafness.
- Contagious, but less so than measles or chickenpox. Spread via respiratory droplets (airborne) or by direct contact.
- Before the vaccine: 200,000+ cases. Now: rare, with periodic outbreaks of up to a few thousand patients.

Rubella

- Virus that causes a fever and characteristic rash. Rarely causes encephalitis.
- Is a teratogen if Mom contracts rubella in pregnancy. Leads to severe birth defects or miscarriage. Lasting effects of congenital rubella are severe, with no known treatment available.
- Spread through respiratory droplets in the air, or through the placenta. Moderately contagious.
- Before: 20,000 cases of congenital rubella per year. Now: rare.

The vaccine

- Is a live, attenuated virus.
- CDC recommended schedule: 12-15 months, 4-6 years.
- Who should not get the vaccine?
- Ingredients: sorbitol, sodium phosphate, sucrose, sodium chloride, gelatin, human albumin, fetal bovine serum, 25 mcg neomycin.

Special topics

- Can this vaccine be given if the child has a fever? What about a mild cold?
- Are single vaccines available?
- What are the most common adverse events? When do they occur most often?
- Immunity to which component of the vaccine tends to wane over time?
- What does Dr. Erika recommend NOT to do with this vaccine?

VARICELLA

Varicella is a virus that causes an infection known as "chickenpox."

The disease

- Varicella causes flu-like symptoms with characteristic "pox" signs, including spots, vesicles and scabs that are intensely itchy. Usually mild in severity in children aged 1-4, but rarely can cause some complications. Can also cause "shingles" many decades after the primary infection, which is a very painful skin rash.
- Is extremely dangerous if a newborn contracts the disease. Is very dangerous in immune compromised patients. Has a 25-fold higher risk of death in patients who get the disease after 15 years of age.
- Spreads through respiratory droplets or direct contact.
- 4 million cases/year before the vaccine was introduced, 10,000+ hospitalizations, about 100 deaths per year. Last estimates were about 48,000 cases, over a thousand hospitalizations, and about 19 deaths (in 2006).

The vaccine

- CDC recommended schedule: 12-15 months, then age 4-6 years.
- Who should not get the vaccine?
- Ingredients: sucrose, gelatin, sodium chloride, monosodium L-glutamate, sodium phosphate dibasic, potassium phosphate monobasic, potassium chloride. Trace residual neomycin, EDTA, fetal bovine serum. No preservative.

Special topics

- Which children should have a thorough work-up before getting a live virus vaccine (like Varicella)?
- Why is the incidence of shingles (herpes zoster) increasing in adults? Is this related to varicella vaccination?

HEPATITIS A VACCINE

Hepatitis A is a virus that affects the liver, causing stomach-flu like symptoms.

The disease

- Most children (younger than age 6) have NO symptoms. Children who do get symptoms have stomach-flu like symptoms like nausea, vomiting, fever, fatigue, sometimes jaundice. It is usually a minor illness in children.
- Complications typically happen in adults, including immune, nervous, blood, endocrine and kidney problems.
- Spread through fecal-oral route (contaminated food or water) or direct contact.
- Before: 110,000 cases/year and ~7,000 hospitalizations, with 100 deaths per year. Globally 1.4 million cases per year. Now: in the U.S. ~ 1,000 cases/year.

The vaccine

- CDC recommended schedule: 12 months then approximately 6 months later.
- Who should not get the vaccine?
- Ingredients: HAVRIX: 250 mcg aluminum hydroxide. Amino acid supplement, phosphate-buffered saline solution, polysorbate 20, residual MRC-5 cellular protein (< 5 mcg/mL), formalin, neomycin sulfate. No preservatives. VAQTA: 225 mcg aluminum, sodium borate, sodium chloride, bovine albumin, formaldehyde (formalin), neomycin.

Special topics

- Why is “universal vaccination” recommended by the public health authorities even though Hepatitis A typically doesn’t cause symptoms in children?

RSV monoclonal antibody

RSV is a very common respiratory virus that can cause wheezing and apnea in infants and high-risk patients.

The disease

- RSV is a common respiratory virus. It typically causes mild, cold-like symptoms.
- In young infants it can can shortness of breath, low oxygen levels, bronchiolitis, pneumonia and worsening of other underlying medical conditions (especially pulmonary or cardiac issues).
- It is spread through respiratory droplets and contact with contaminated surfaces. It is very contagious.
- It causes 58,000 - 80,000 hospitalizations per year, and around 100 - 300 deaths per year.

The monoclonal antibody

- It is NOT a vaccine!
- Recommended 1 dose for infants age < 8 months entering their first RSV season, and high-risk infants age 8-19 months entering their second RSV season. Can be given as early as 1 week.
- Ingredients: Nirsevimab-alip, arginine hydrochloride, L-histidine monohydrate, polysorbate 80, sucrose, water. No preservatives, adjuvants.

Special topics

- What is a monoclonal antibody? How does it differ from a vaccine?
- What is the difference between Beyfortus and Synagis?
- What about Abrysvo?

SPECIAL TOPICS

Don't mess with the immune system (say NO to Tylenol)

- What is the connection between Tylenol/Acetaminophen/Paracetamol with autism?

- What is the story with Reye's syndrome? When did the rates of autism begin to climb? When did the rates of autism "stall?"

- What is glutathione? Why is this important?

SIDS - sudden infant death syndrome

- What are the risk factors for SIDS?

- What should you NOT do?

Thimerosal

- What is Thimerosal? Why is it in vaccines?

- Is it the same as aluminum?

Abortion and other religious objections to immunizations

- Do vaccines require aborted fetal tissue? Do they require new aborted fetal tissue? Why are these cells lines used? Which vaccines use these cell lines?

- For those of Muslim or Jewish faith - what are the statements of faith regarding use of pork products in immunizations?

Aluminum in vaccines

- Why is aluminum in vaccines? What is a vaccine adjuvant? What is NOT a vaccine adjuvant?

- What is the difference between the limit the FDA sets for IV exposure to aluminum and the limit the FDA sets for vaccine (intramuscular injection) exposure to aluminum? Why?

- Which study shows that aluminum is safe for episodic exposure in infancy? What are some of the criticisms of this study?

- What do some of the mouse studies show?

- Are there any studies that show that aluminum is definitely unsafe in vaccines?

Autism and vaccines

- Is there an association between the MMR and autism?

- Is there an association between thimerosal-containing vaccines and autism?

- What about Tylenol around the time of MMR vaccination?

- What does Dr. Erika think is happening? What does Dr. Erika recommend? (With the understanding that this is just based on common sense, and not necessarily on science…)

VAERS

- What is VAERS?

- How do you report to VAERS? Who can report?

Making vaccines comfortable

- What are Dr. Erika's tricks for keeping kids as comfortable as possible during vaccinations?

VACCINE PLANNING CHART

Vaccination	Dose	Recommended age for dosage per CDC	Minimum interval from previous dose	Minimum age for dose	Your schedule choice	Calendar Date or approx.
RSV	1 of 1	<8 months of age	----	1 week		

Notes:_____

_____

Hepatitis B	1 of 3	Birth	----	Birth		
	2 of 3	1-2 months	4 weeks	4 weeks		
	3 of 3	6-18 months	8 weeks	24 weeks		

Notes:_____

_____

Rotavirus	1 of 3	2 months (maximum 14 weeks)	----	6 weeks		
	2 of 3	4 months	4 weeks	10 weeks		
	3 of 3	6 months (maximum 8 months)	4 weeks	14 weeks		

Notes:_____

_____

Vaccination	Dose	Recommended age for dosage per CDC	Minimum interval from previous dose	Minimum age for dose	Your schedule choice	Calendar Date or approx.
Diphtheria, Pertussis, Tetanus (DTaP)	1 of 5	2 months	----	6 weeks		
	2 of 5	4 months	4 weeks	10 weeks		
	3 of 5	6 months	4 weeks	14 weeks		
	4 of 5	15-18 months	6 months	1 year		
	5 of 5	4-6 years	6 months	4 years		

Notes:_____

_____

Haemophilus Influenza B (HIB)	1 of 3	2 months	----	6 weeks		
	2 of 3*	4 months	4 weeks	10 weeks		
	3 of 3*	6 months	4 weeks	14 weeks		
	4 of 4*	12-15 months	8 weeks	1 year		

Notes: (*if given after a certain age these doses may be dropped. Certain brands of Hib do not require 3rd dose. Catch-up schedule varies depending upon the child's age. See your physician.) _____

_____

Polio (IPV)	1 of 4	2 months	----	6 weeks		
	2 of 4	4 months	4 weeks	10 weeks		
	3 of 4	6-18 months	4 weeks	14 weeks		
	4 of 4	4-6 years	4 weeks	18 weeks		

Notes: _____

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Vaccination	Dose	Recommended age for dosage per CDC	Minimum interval from previous dose	Minimum age for dose	Your schedule choice	Calendar Date or approx.
Pneumoccus (PCV)	1 of 4	2 months	----	6 weeks		
	2 of 4*	4 months	4 weeks	10 weeks		
	3 of 4*	6 months	4 weeks	14 weeks		
	4 of 4*	12-15 months	6 months	1 year		

Notes: (*if given after a certain age these doses may be dropped. Catch-up schedule varies depending upon the child's age. See your physician.) _

Measles, Mumps, Rubella (MMR)	1 of 2	12-15 months	----	1 year		
	2 of 2	4-6 years	4 weeks	13 months		

Notes:

Varicella (Chicken pox)	1 of 2	12-15 months	----	1 year		
	2 of 2	4-6 years	3 months	----		

Notes:

Vaccination	Dose	Recommended age for dosage per CDC	Minimum interval from previous dose	Minimum age for dose	Your schedule choice	Calendar Date or approx.
Hepatitis A	1 of 2	12-23 months	----	1 year		
	2 of 2	(6 months after 1st dose)	6 months	----		

Notes:_____

_____

General notes: Catch-up schedules vary for children with certain specific risk factors, for children doing international travel, for children >4 years of age (or for 3 year olds who will be turning 4 before the schedule is complete). This planning chart does not include the seasonal influenza vaccine, which is given only during flu season. There are many other specifics that don't fit into a small chart like this, so always follow your physician's advice regarding timing of vaccines.

Thanks so much for joining me.

It's been 11 years of researching, re-researching and re-recording this webinar. I'm so happy to share it with you, it is an honor and privilege.