Immunization: General Principles

Travel Vaccines
Vaccine Refusal

Beth Goodman
Oct 2012
Immunization: General Principles

Goals & Objectives

• Review passive and active immunization
• Discuss the different types of active immunization
• Contraindications to vaccines
• Vaccine administration
Immunization: General Principles

• Why do we immunize?
  • Partial or complete protection against infection
  • Prevention from symptomatic illness
  • Creation and maintenance of herd immunity against disease
Immunization: General Principles
Passive Immunization
• What is passive immunization?
• What is an example of PI?
Immunization: General Principles

Passive Immunization

- Passive immunization can provide immediate protection for the host
- Passive immunization can be used in immunocompromised patients
- Examples:
  - HBIG for infants born to HepB+ mothers
  - Synagis for RSV prevention
Immunization: General Principles

Active Immunization

• What is active immunization?
• What are 2 types of vaccines used in AI?
Immunization: General Principles

Active Immunization

- Active immunization induces an immune response in the host
- 2 types of vaccines used in AI include killed and live vaccines
- AI helps maintain herd immunity
Immunization: General Principles

Killed Vaccines

• What is the usual administration route for killed vaccines?
• What are some examples of the types of material found in killed vaccines?
Immunization: General Principles

Killed Vaccines

- Usual route is IM (IPV and Menomune SQ)
- Types of material used in killed vaccines include inactivated whole organisms, detoxified endotoxin, extracts, polysaccharide capsular material with and without a protein conjugate
- Can be given to immunocompromised hosts
- In general, multiple doses are required to elicit an adequate antibody response
Vaccine Trivia

• Which US President was known for having had polio?
• FDR
Immunization: General Principles

Live Vaccines

• What is the usual administration route for live vaccines?
• What type of material is found in live vaccines?
Immunization: General Principles

Live Vaccines

• Usual route SQ or oral
• They are essentially weakened viruses and they actively replicate in the host
• They induced humoral and cell-mediated immunity
• Most people respond to MMR and VZV after the 1st dose
Immunization: General Principles

Live Vaccines

- A 12mo old female received the MMR vaccine 2 weeks prior, but we were out of the varicella vaccine. She is now back for a sick visit and you would like to give her Varivax. Can you give it?
  - What if she received a TST 2 weeks prior? Could she receive the varicella vaccine now?
Immunization: General Principles

Live Vaccines

• A 7yo patient presents to your practice for an initial visit. She has a history of ALL and has been in remission for 3 years. She never received MMR or VZV. Can you give them?

• A 4yo patient presents to your practice and needs the MMR and VZV vaccine before entering preschool. Her older sibling has AML and is currently received chemotherapy. Can you give them?
Immunization: General Principles

Live Vaccines

• Can an HIV+ patient receive live vaccines?
• Can a patient with CGD or terminal complement deficiency receive live vaccines? If yes, which types?
• Can a patient received prednisone therapy receive live vaccines?
Immunization: General Principles

Live Vaccines

• A 12mo old male received IVIG 1mo prior for Kawasaki disease. Can you give them MMR or VZV now?

• A 12mo old male received Synagis 1week prior. Can they receive the MMR vaccine?
Vaccine Trivia

• What vaccine preventable illness has been called the “100 day cough”? 
Vaccine Trivia

- Pertussis
  - Catarrhal phase
  - Paroxysmal phase
  - Convalescent phase
Immunization: General Principles

Contraindications

- What are absolute contraindications to vaccination?
Immunization: General Principles

Contraindications

• Absolute contraindications to vaccination
  • Anaphylaxis after a previous vaccine
  • Anaphylaxis to a specific vaccine component
    • Egg allergy: Yellow Fever, Influenza, (MMR)
Immunization: General Principles

Precautions

• What are precautions to vaccination?
Immunization: General Principles

Precautions

• Precautions
  • Moderate or severe illness with or without a fever
Immunization: General Principles
Contraindications and Precautions

• Can you vaccinate?
  • A 2mo old ex-27wk preemie?
  • A child receiving antibiotics?
  • A child with a URI?
  • A child with RSV infection admitted to the floor?
  • A child who lives with an immunocompromised household contact?
  • A child with a pregnant household contact?
  • A mother who is currently breastfeeding?
Immunization: General Principles

• True or false?
  • Delayed immunization decreases the immune response of most vaccines and patients should receive the entire series over again
  • There is a limit to how many vaccines can be given at one time
  • Accelerated immunization at shorter than recommended intervals can alter the immune response to the vaccine
Immunization: General Principles

• True or false?
  • If the first dose of a vaccine is given 3 days or more before minimum age recommended, the dose should be repeated

• A vaccine is considered valid if administered 4 days before the minimum vaccine interval

• When a vaccine is repeated due to incorrect dosing schedule, you must wait 4 weeks from the last invalid dose before giving the vaccine
Immunization: General Principles

- True or false?
  - Vaccines are given IM or SQ based on the presence of adjuvants in the vaccine

- Foreign vaccines generally can be accepted as valid if the schedule is similar to the US

- You must always use the same vaccine brand for your entire vaccine primary series
Vaccine Trivia

• What was the 1\textsuperscript{st} cancer –prevention vaccine available?
Vaccine Trivia

- Hep B
Immunization: General Principles

Administration

• The preferred site for children less than 1 year is the anterolateral thigh.

• The preferred site for toddlers older than 12 months is the deltoid for IM

• If giving multiple vaccines, they must be separated by different anatomic sites

• Immunoglobulin and vaccines can be given in same anatomic site

• Patients with bleeding disorders should have all injections given IM

• If a vaccine is given IM instead of SQ, it should be repeated
Figure 29-11 Comparison of the angles of insertion for intramuscular, subcutaneous, and intradermal injections.

Immunization: General Principles

Administration

Figure 29-10 Nurse restraining infant for intramuscular injection into the vastus lateralis.
Immunization: General Principles
Administration
Vaccine Trivia

• What is the only disease to be eradicated from the world by a vaccine?
Vaccine Trivia

- Smallpox
  - The last case of natural smallpox was in Somalia in 1977
  - 30% of smallpox cases resulted in death
  - The world’s first vaccine! Dr. Edward Jenner’s smallpox vaccine was actually made from cowpox virus. Jenner called the process “vaccination” from vacca, a Latin word for cow.
Travel Vaccines

• International travel... what vaccines or prophylaxis might you need?
Travel Vaccines

• An 11yo male is travelling with his family to Guatemala. It would be ideal to have protection against which particular diseases?
Travel Vaccines

- An 11yo male is travelling with his family to Guatemala.
  - Hepatitis A
  - Typhoid
Travel Vaccines

- A 9mo male is travelling with his family to India in 1 month. It would be ideal to have protection against which particular diseases?
Travel Vaccines

- A 9mo male is travelling with his family to India in 1 month.
  - Hepatitis A
  - Typhoid (if travelling to rural area)
  - Polio
  - Rabies (anticipating exposure to animals/bats)
  - Measles
  - Malaria
Number of Reported Measles Cases with onset date from Feb 2012 to Aug 2012

Data source: Surveillance CEF the Data HQ as of 17 September 2012.
Malaria-Endemic Countries

- Malaria Endemic
- Not Malaria Endemic

*Note: In this map, countries with areas endemic for malaria are shaded completely even if transmission occurs only in a small part of the country. For more specific within-country malaria transmission information, please see the Yellow Fever and Malaria Information, by Country section in Chapter 3 and the CDC Malaria Map Application (www.cdc.gov/malaria/map).*
Travel Vaccines

- A 4yo female is travelling with her family to Nigeria. It would be ideal to have protection against which particular diseases?
Travel Vaccines

- A 4yo female is travelling with her family to Nigeria.
  - Hepatitis A
  - Meningococcal
  - Yellow fever
  - Malaria
## Travel Vaccines

<table>
<thead>
<tr>
<th>Condition</th>
<th>Vaccine Details</th>
<th>Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hepatitis A</strong></td>
<td>Fecal-oral</td>
<td>Mexico, Central/South America, Africa</td>
</tr>
<tr>
<td><strong>Malaria</strong></td>
<td>Atovaquone/Proguanil (Malarone)</td>
<td>Southern Asia, Africa</td>
</tr>
<tr>
<td></td>
<td>Chloroquine**, Doxycycline, Mefloquine</td>
<td>Mefloquine resistant areas</td>
</tr>
<tr>
<td><strong>Measles</strong></td>
<td>MMR 6mo-12mo</td>
<td>Europe, Asia, parts of Africa</td>
</tr>
<tr>
<td><strong>Meningococcal</strong></td>
<td>Can give ≥2yo</td>
<td>Sub-Saharan Africa</td>
</tr>
<tr>
<td><strong>Polio</strong></td>
<td>Fecal-oral or nasal secretions</td>
<td>India, Africa</td>
</tr>
<tr>
<td><strong>Typhoid</strong></td>
<td>Polysaccharide IM: ≥2years, booster 2 years later</td>
<td>Central America, parts of South America, Sub-Saharan Africa, India</td>
</tr>
<tr>
<td></td>
<td>Oral live: ≥6yrs, 4 capsules taken QOD ≥1 wk before exposure</td>
<td></td>
</tr>
<tr>
<td><strong>Yellow fever</strong></td>
<td>Transmitted by mosquitos ≥9mo</td>
<td>Endemic in tropical South America, Sub-Saharan Africa</td>
</tr>
</tbody>
</table>
Vaccine Trivia

- Which disease is not affected by herd immunity?
  - Pertussis
  - Influenza
  - Tetanus
  - Rotavirus
  - HPV
Vaccine Trivia

- Tetanus
  - Not transmitted from person-to-person – it doesn’t matter how many people around you are immunized, your risk of disease remains the same
Vaccine Hesitancy and Refusal

- Unvaccinated children are more likely to be white, have parents with higher levels of education and higher salaries, and have a mother who is married and lives in a state that allows philosophical exemption from school immunization laws.

Smith PJ et al. Children who have received no vaccines: who are they and where do they live? *Pediatrics* 2004.
Vaccine Hesitancy and Refusal

- The greatest influence in the ultimate decision about immunizing their child is the child’s health care provider
- 1/3 of parents want more information about vaccines

Smith et al. Association between HCPs’ influence on parents who have concerns about vaccine safety and vaccination coverage. *Pediatrics* 2006.
Vaccine Hesitancy and Refusal

- Media vs. Internet
- Myths
  - Vaccines are unsafe
  - Vaccines will give the person the infection
  - Getting the disease the “natural” way is healthier
  - Multiple vaccines causes the immune system to become “overloaded”
Vaccine Hesitancy and Refusal

- *What are all these vaccines for? Are they really necessary?*
- “I know you didn’t get all these vaccines when you were a baby. Neither did I. But we were both at risk of serious diseases like Hib and pneumococcal meningitis. Today, we’re lucky to be able to protect our babies from 14 serious diseases with vaccines.”

- *I’m really not comfortable with my 2-month-old getting so many vaccines at once.* 
- There’s no proven danger in getting all the recommended 2-month vaccines today. Any time you delay a vaccine you leave your baby vulnerable to disease. It’s really best to stay on schedule. But if you’re very uncomfortable, we can give some vaccines today and schedule you to come back in two weeks for the rest, but this is not recommended.
Vaccine Hesitancy and Refusal

• “I’m worried about the side effects of vaccines. I don’t want my child to get any vaccines today.”

• I’ll worry if your child doesn’t get vaccines today, because the diseases can be very dangerous—most, including Hib, pertussis, and measles, are still infecting children in the U.S. We can look at the Vaccine Information Statements together and talk about how rare serious vaccine side effects are.”

• You really don’t know if vaccines cause any long-term effects.”

• We have years of experience with vaccines and no reason to believe that vaccines cause long-term harm. I understand your concern, but I truly believe that the risk of diseases is greater than any risks posed by vaccines. Vaccines will get your baby off to a great start for a long, healthy life.”
Vaccine Hesitancy and Refusal

• “All those people who say that the MMR vaccine causes autism must be on to something.”

• Autism is a burden for many families and people want answers—including me. But well designed and conducted studies that I can share with you show that MMR vaccine is not a cause of autism.”

• MMR and Autism
  • MMR damages the intestinal lining and allows encephalopathic proteins to cross into the bloodstream
  • Thimerosal (contains ethylmercury)
    • But mercury poisoning doesn’t cause autism ...
    • Incidence of autism increased in Denmark, Canada, and California after thimerosal was removed from vaccines
  • Overwhelmed immune system triggers neurologic response
Vaccine Hesitancy and Refusal

• Strategies
  • Targeted education and discussion
  • Acknowledging that NO vaccine is 100% effective or 100% safe
  • Adverse events are usually mild
  • Serious vaccine side effects are less common than serious disease sequelae (i.e. risk of encephalopathy from measles vaccine is 1 in 1 million, 1000x less than the risk of encephalopathy from natural measles)
Vaccine Hesitancy and Refusal

- Strategies
  - Take time to listen
  - Solicit and welcome questions
  - Keep the conversation going
Vaccine Hesitancy and Refusal

- Resources
  - www.cdc.gov/vaccines
  - www.immunize.org
  - www.familiesfightingflu.org
  - www.vaccine.chop.edu (lists “hot topics”)

• A 3-year-old girl is behind on immunizations. What is the maximum number of vaccinations that can be given at once?
  a. 4
  b. 6
  c. 7
  d. 8
  e. No limit
A 4-year-old presents to your office for a WCC. He needs his boosters (MMR, Varicella, DTaP, IPV). He also needs a PPD because he’s traveled to India before and preschool needs documentation of it. What is the best thing to do?

a. Give the vaccines and place a PPD 4-6 weeks from now
b. Give the vaccines and place a PPD 4-6 months from now
c. Place a PPD now – it won’t be affected by the recent vaccines
d. Place a PPD now – and anticipate a false negative
e. Place the PPD now and give the vaccines in 1 month
• Who should not receive the MMR vaccine?
  
a. HIV+ child compliant with HAART
b. Child who’s mom is pregnant
c. Child being treated for TB
d. Child recently hospitalized with Kawasaki who received IVIG 6wks ago
e. Child who had ALL currently in remission
• Which vaccines are contraindicated in those children who have anaphylaxis to egg?
  a. MMR
  b. Yellow fever
  c. Influenza
  d. B and C
  e. All of the above