2011 Immunization Update for Pharmacists

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UNE College of Pharmacy
Objectives

• Discuss the gap between current rates and healthy Maine goals for influenza and pneumonia vaccination.
• Discuss the influenza vaccines for 2011.
• Identify risk groups for complications from influenza/pneumonia infection.
• Recognize the expanded indications for influenza, pneumonia, and DTP vaccination.
• Apply ACIP and CDC recommendations for influenza, pneumonia, herpes zoster, and DTP vaccination.
• Recognize the prevalence and clinical features of herpes zoster including long-term complications.
• Identify the new storage and administration labeling for the herpes zoster vaccine.
Classification of Vaccines

• Live attenuated:
  – Measles, mumps, rubella, varicella, zoster, intranasal influenza

• Inactivated:
  – hepatitis A, hepatitis B, influenza, pneumonia, diphtheria, tetanus

*Epidemiology and Prevention of Vaccine-Preventable Diseases, 12th Edition*
Influenza

- Highly infectious viral illness
- Influenza/pneumonia - 8th leading cause of death in the US
- >90% of deaths among persons ≥65 years old

*Epidemiology and Prevention of Vaccine-Preventable Diseases, 12th Edition*
Influenza Virus Strains

• Influenza A virus
  – Moderate to severe illness
  – All age groups
  – Humans and other animals

• Influenza B virus
  – Milder disease
  – Primarily affects children
  – Humans only

• Influenza C virus
  – Rarely reported in humans
  – No epidemics
Influenza Antigenic Changes

• Antigenic Drift
  – Minor changes
  – May result in epidemic

• Antigenic Shift
  – Major changes
  – May result in pandemic
Did you get a flu vaccine last year?

1. Yes
2. No
Proportion Of Adults Aged 65 And Older Who Received A Flu Shot Within The Past Year

http://www.cdc.gov/flu/
Maine Immunization Law

• **Administration of influenza vaccines.** A pharmacist licensed in this State who meets the qualifications...may administer topically or by injection or by inhalation all forms of influenza vaccines, including intranasal influenza vaccines, to a person 9 years of age or older without a prescription.
2010-11 ACIP/CDC/WHO Recommendations

- World Health Organization: the global H1N1 pandemic is over.
- Routine influenza vaccination is recommended for all persons aged ≥6 months.
- The 2010--11 trivalent vaccines will contain A/California/7/2009 (H1N1)-like, A/Perth/16/2009 (H3N2)-like, and B/Brisbane/60/2008-like antigens.
- Persons aged ≥65 years can be administered any of the standard-dose TIV preparations or Fluzone High-Dose.
- The CDC also recommends that flu vaccine be administered to eligible recipients every year as soon as the vaccine becomes available.
<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Trade Name</th>
<th>Manufacturer</th>
<th>Presentation</th>
<th>Mercury (mcg/0.5 ml)</th>
<th>Age Group</th>
<th>No. of doses</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIV</td>
<td>Fluzone</td>
<td>Sanofi Pasteur</td>
<td>0.25 mL syringe</td>
<td>0</td>
<td>6–35 mos</td>
<td>1 or 2</td>
<td>IM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.5 mL syringe</td>
<td>0</td>
<td>≥36 mos</td>
<td>1 or 2</td>
<td>IM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.5 mL vial</td>
<td>0</td>
<td>≥36 mos</td>
<td>1 or 2</td>
<td>IM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.0 mL MD vial</td>
<td>25</td>
<td>≥6 mos</td>
<td>1 or 2</td>
<td>IM</td>
</tr>
<tr>
<td>TIV</td>
<td>Fluvirin</td>
<td>Novartis Vaccine</td>
<td>5.0 mL MD vial</td>
<td>25</td>
<td>≥4 yrs</td>
<td>1 or 2</td>
<td>IM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.5 mL syringe</td>
<td>&lt;1.0</td>
<td>≥4 yrs</td>
<td>1 or 2</td>
<td>IM</td>
</tr>
<tr>
<td>TIV</td>
<td>Agriflu</td>
<td>Novartis Vaccine</td>
<td>0.5 mL syringe</td>
<td>0</td>
<td>≥18 yrs</td>
<td>1</td>
<td>IM</td>
</tr>
<tr>
<td>TIV</td>
<td>Fluarix</td>
<td>GlaxoSmith Kline</td>
<td>0.5 mL syringe</td>
<td>0</td>
<td>≥3 yrs</td>
<td>1 or 2</td>
<td>IM</td>
</tr>
<tr>
<td>TIV</td>
<td>FluLaval</td>
<td>ID Biomedical</td>
<td>5.0 mL MD vial</td>
<td>25</td>
<td>≥18 yrs</td>
<td>1</td>
<td>IM</td>
</tr>
<tr>
<td>TIV High Dose</td>
<td>Fluzone</td>
<td>Sanofi Pasteur</td>
<td>0.5 mL syringe</td>
<td>0</td>
<td>≥65 yrs</td>
<td>1</td>
<td>IM</td>
</tr>
<tr>
<td>LAIV</td>
<td>FluMist</td>
<td>Med-Immune</td>
<td>0.2 mL sprayer</td>
<td>0</td>
<td>2–49 yrs</td>
<td>1 or 2</td>
<td>Intra-nasal</td>
</tr>
<tr>
<td>TIV ID</td>
<td>Intanza</td>
<td>Sanofi Pasteur</td>
<td>0.1 ml syringe</td>
<td>0</td>
<td>18-59 yrs</td>
<td>1</td>
<td>ID</td>
</tr>
</tbody>
</table>
Live Attenuated Influenza Vaccine (LAIV)
Flumist ®
Live Attenuated Influenza Vaccine

• Indication
  – Healthy people 2 through 49 years of age

• Contraindications
  – Pregnant women
  – People who have long-term health problems with:
    • heart disease
    • kidney or liver disease
    • lung disease
    • metabolic disease, such as diabetes
    • asthma
    • anemia, and other blood disorders
  – Anyone with a weakened immune system.
LAIV Administration

1. Remove rubber tip protector.

2. With the patient in an upright position, head tilted back, place the tip just inside the nostril to ensure FluMist is delivered into the nose.

3. With a single motion, depress plunger as rapidly as possible until the dose-divider clip prevents you from going further.

4. Pinch and remove dose-divider clip from plunger.

5. Place the tip just inside the other nostril and with a single motion, depress plunger as rapidly as possible to deliver remaining vaccine.
Live Attenuated versus Inactivated Influenza Vaccine in Infants and Young Children


- Children 6 to 59 months of age, without a recent episode of wheezing illness or severe asthma.
- Randomized, double-blind study with either trivalent live attenuated influenza vaccine or trivalent inactivated vaccine.
- 7852 children completed the study and were monitored with culture throughout the 04-05 influenza season.
Live Attenuated versus Inactivated Influenza Vaccine in Infants and Young Children


Figure 1. Kaplan–Meier Curves for the Time to the First Culture-Confirmed Report of Influenza in the Two Vaccine Groups.
### Medically Significant Wheezing, Serious Adverse Events, and Rates of Hospitalization According to Age Group

<table>
<thead>
<tr>
<th>Age</th>
<th>Event</th>
<th>Live Vaccine</th>
<th>Inactivated Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no. / total no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-11 mos.</td>
<td>Wheezing</td>
<td>93/684 (13.6)</td>
<td>71/683 (10.4)</td>
</tr>
<tr>
<td></td>
<td>Any serious AE</td>
<td>44/684 (6.4)</td>
<td>23/683 (3.4)</td>
</tr>
<tr>
<td></td>
<td>Hospitalization</td>
<td>42/684 (6.1)</td>
<td>18/683 (2.6)</td>
</tr>
<tr>
<td>12-59 mos.</td>
<td>Wheezing</td>
<td>272/3495 (7.8)</td>
<td>255/3490 (7.3)</td>
</tr>
<tr>
<td></td>
<td>Any serious AE</td>
<td>92/3495 (2.6)</td>
<td>105/3490 (3.0)</td>
</tr>
<tr>
<td></td>
<td>Hospitalization</td>
<td>88/3495 (2.5)</td>
<td>101/3490 (2.9)</td>
</tr>
<tr>
<td>6-59 mos.</td>
<td>Wheezing</td>
<td>365/4179 (8.7)</td>
<td>326/4173 (7.8)</td>
</tr>
<tr>
<td></td>
<td>Any serious AE</td>
<td>136/4179 (3.3)</td>
<td>128/4173 (3.1)</td>
</tr>
<tr>
<td></td>
<td>Hospitalization</td>
<td>130/4179 (3.1)</td>
<td>119/4173 (2.9)</td>
</tr>
</tbody>
</table>
High-Dose Trivalent Inactivated Vaccine (HD TIV)
Fluzone HD ®
Randomized, Double-Blind Controlled Phase 3 Trial Comparing the Immunogenicity of High-Dose and Standard-Dose Influenza Vaccine in Adults 65 Years of Age and Older

Ann R. Falsey,1,2 John J. Treanor,2 Nadia Tornieporth,3 Jose Capellan,5 and Geoffrey J. Gorse4

1Department of Medicine, Rochester General Hospital and 2University of Rochester School of Medicine, Rochester, New York; 3sanofi pasteur, Swiftwater, Pennsylvania; 4Saint Louis Department of Veterans Affairs Medical Center and Saint Louis University, Saint Louis, Missouri; 5sanofi pasteur, Toronto, Canada

• Methods:
  – Multicenter, randomized, double-blind controlled study
  – HD vaccine (60 mcg of hemagglutinin per strain): N=2,575
  – SD vaccine (15 mcg of hemagglutinin per strain): N=1,262
Comparison of responses to high-dose (HD) and standard-dose (SD) influenza vaccine

![Graph showing comparison of antibody titer levels for A/H1N1 and A/H3N2 strains between SD and HD vaccine doses.](https://example.com/graph.png)

*J Infect Dis. 2009;200(2):172-80*
Comparison of systemic side effects to HD and SD influenza vaccine

J Infect Dis. 2009;200(2):172-80
A 30-year-old healthy male requests an annual flu shot. He has no allergies. His wife is currently pregnant. Which flu vaccine is appropriate?

1. TIV SD influenza shot 0.25 ml IM
2. TIV SD influenza shot 0.5 ml IM
3. TIV HD influenza shot 0.5 ml IM
4. Flumist nasal spray 0.1 ml in each nostril
5. Either 1 or 2
6. Either 2 or 3
7. Either 2 or 4
A 30-year-old pregnant female requests an annual flu shot. She has no allergies. Which flu vaccine is appropriate?

1. TIV SD influenza shot 0.25 ml IM
2. TIV SD influenza shot 0.5 ml IM
3. TIV HD influenza shot 0.5 ml IM
4. Flumist nasal spray 0.1 ml in each nostril
5. Either 1 or 2
6. Either 2 or 3
7. Either 2 or 4
Intradermal Influenza Vaccine
Intradermal vs Traditional IM needle Length

Shorter needle length (1.5mm Intanza vs 16mm IM)

Shorter needle length (1.5mm Intanza vs 16mm IM vs 25mm IM needles all available in Australia)
30 Gauge Needle and Less Volume
Intradermal versus Traditional IM Injections
Methods:

- Multicenter, randomized, double-blind controlled study
- ID vaccine (9 mcg of hemagglutinin per strain)  
  N=1,803  
- IM vaccine (15 mcg of hemagglutinin per strain);
Comparison of responses to Intradermal (ID) and Intramuscular (IM) influenza vaccine

Seroprotection Rate

A/H1N1
B

A/H3N2

IM 15 mcg
ID 9 mcg

Comparison of systemic side effects to ID and IM influenza vaccine

Fever
Headache
Malaise
Myalgia

Percent

IM 15 mcg
ID 9 mcg

Comparison of local side effects to ID and IM influenza vaccine

1. Which formulation of the influenza vaccine causes the highest rate of wheezing, especially in young children?

1. Standard Dose Influenza Injection
2. Intranasal Influenza Spray
3. High Dose Influenza Injection
4. Intradermal Influenza Injection
5. Not sure
2. Which side effect is more common with the intradermal influenza vaccine than the IM influenza vaccine?

1. Injection site pain
2. Headache
3. Fever
4. Injection site swelling
5. Malaise
Pneumonia Vaccine
Pneumonia Vaccines

• Pneumococcal Conjugate Vaccine
  – Formally PCV7, now PCV13
  – Single dose vials; no thimerosal
  – Indicated for infants and young children

• Pneumococcal Polysaccharide Vaccine
  – PPSV 23 or Pneumovax
  – Indicated for adults
Pneumococcal Polysaccharide Vaccine Recommendations

- Adults 65 years of age or older
- Persons 2 years of age or older with
  - Chronic illness (diabetes, heart disease, lung disease)
  - Asplenia
  - Immunocompromised
  - HIV infection
  - Cochlear implant
  - Smokers
Pneumococcal Polysaccharide Vaccine
Revaccination

• Single revaccination dose:
  – Persons vaccinated at < 65 years of age AND
  – ≥ 5 years after first dose.
Estimation of effectiveness of pneumococcal vaccination in preventing invasive pneumococcal disease caused by vaccine serotypes

US Centers for Disease Control study in 2837 patients (≥5 years old) by underlying illness, 1978–1992

<table>
<thead>
<tr>
<th>Underlying disease/condition</th>
<th>(No of isolates from vaccinated, unvaccinated subjects)</th>
<th>95% CI</th>
<th>Overall effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immunocompetent, &gt;65 years</td>
<td>70,373</td>
<td>57-85</td>
<td>75%</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>9,122</td>
<td>50-95</td>
<td>84%</td>
</tr>
<tr>
<td>Coronary vascular disease</td>
<td>15,73</td>
<td>23-90</td>
<td>73%</td>
</tr>
<tr>
<td>Chronic pulmonary disease</td>
<td>50,186</td>
<td>26-83</td>
<td>65%</td>
</tr>
<tr>
<td>Anatomic asplenia</td>
<td>89,23</td>
<td>14-95</td>
<td>77%</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>20,96</td>
<td>17-88</td>
<td>69%</td>
</tr>
</tbody>
</table>

Note: data are for patients who received 14-valent or 23-valent vaccine. Overall effectiveness for patients receiving 23-valent vaccine was 60%.

Butler et al., JAMA, 1993
Proportion Of Adults Aged 65 And Older Who Report Ever Having Had A Pneumonia Vaccination

http://www.cdc.gov/flu/
Pneumonia/Influenza Vaccine Coadministration

• Pneumonia and influenza vaccines may be administered on the same day.
• Use separate syringes. Do not mix!
• Inject IM into separate deltoids.
Maine Immunization Law

• A pharmacist immunizer...may administer pneumonia vaccine to a person according to a valid prescription when the person has an existing primary care physician or

• When the person does not have an existing relationship with a primary care physician, the pharmacist may proceed to administer according to a treatment protocol established by an authorized practitioner
JB is a 40-year-old man with diabetes. He has no allergies. His current meds include metformin 500 mg PO BID and lisinopril 20 mg PO QD. Which vaccine is appropriate for him?

1. Pneumovax 0.5 ml IM
2. TIV SD influenza shot 0.5 ml IM
3. TIV HD influenza shot 0.5 ml IM
4. Flumist nasal spray 0.1 ml in each nostril
5. Both 1 and 2
6. Both 2 and 3
7. Both 2 and 4
3. Which of the following statements about the administration of influenza and pneumonia vaccines is true?

1. Same day, opposite arm, separate syringe
2. Same day, same arm, mixed in 1 syringe
3. Must be separated by at least 7 days
4. Must be separated by at least 4 weeks
ZOSTER VACCINE
Epidemiology of Zoster

• More than 90% of the US adult population is at risk for Zoster.
• Approximately 1 million new cases of zoster occur in the United States annually.
• Approximately one in three persons in the general population will develop zoster during their lifetime.
• In excess of 60% of people older than 60 years, especially those with diminished immunity due to diabetes and cancers, are
Rate of herpes zoster and postherpetic neuralgia† by age in the United States

*Per 1,000 person-years.
†Defined as ≥30 days of pain.

http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5705a1.htm?s_cid=rr5705a1_e#fig3
Herpes Zoster Presentation

• Pain:
  • Persistent - burning, throbbing, stabbing, or shooting

• Rash:
  • Unilateral
  • Coalescing clusters of clear vesicles

• Duration:
  • Lesions usually dry and crust in 1 to 2 weeks
  • Neuropathic pain that persists more than 30 days after the rash has healed is consistent with PHN

http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5705a1.htm?s_cid=rr5705a1_e#fig1
PREVENTION OF ZOSTER AND POSTHERPETIC NEURALGIA

ZOSTAVAX® (Zoster Vaccine Live)
Zoster Vaccine Indication

- ACIP recommends routine vaccination of all persons aged >60 years with 1 dose of zoster vaccine.
- **NEW LABELING:** “ZOSTAVAX is a live attenuated virus vaccine indicated for prevention of herpes zoster (shingles) in individuals 50 years of age and older.”
- Persons who report a previous episode of zoster and persons with chronic medical conditions (e.g., chronic renal failure, diabetes mellitus, rheumatoid arthritis, and chronic pulmonary disease) can be vaccinated unless those conditions are contraindications or precautions.
- Zoster vaccination is not indicated to treat acute zoster, to prevent persons with acute zoster from developing PHN, or to treat ongoing PHN.

Recommendations of the Advisory Committee on Immunization Practices (ACIP).
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5705a1.htm?sscem=5705a1_e
Vaccine Contraindications

• **Allergy to neomycin** or any vaccine component
• **Pregnancy**
• **Immunocompromised** status
  – AIDS or other clinical manifestations of HIV, including persons with CD4+ T-lymphocyte values \( \leq 200 \) per mm\(^3\)
  – malignant neoplasms affecting the bone marrow
  – chemotherapy or radiation within the last 3 months
  – Persons on immunosuppressive therapy, including high-dose corticosteroids (>20 mg/day of prednisone or equivalent) lasting two or more weeks
Zostavax® Efficacy and Safety Trial (ZEST)*

• Study Population
  – 22,439 adults 50 to 59 years of age.
  – Immunocompromised patients were excluded.

• Study Design
  – Randomized, double-blind, placebo-controlled trial.
  – Single dose of live, varicella zoster vaccine.
  – Primary outcome: confirmed zoster cases during 2 years of follow-up

ZEST & Shingles Prevention Study (SPS) Results

Vaccine Efficacy (%)

- >80 yrs (n=1,263): 18% (95% CI -29 to 48)
- 70-79 yrs (n=7,621): 41% (28 to 52)
- 60-69 yrs (n=10,370): 64% (56 to 71)
- 50-59 yrs (n=11,211): 70% (54 to 81)

Merck letter to healthcare providers January 25, 2010

• ZOSTAVAX and PNEUMOVAX® 23 should not be given concomitantly because concomitant use resulted in reduced immunogenicity of ZOSTAVAX
  – Randomized, double-blind trial with 473 adults
  – Waiting 4 weeks between vaccinations is recommended

• Merck is not recommending revaccination for patients who previously received Zostavax and...
Storage and Handling

- **Zoster vaccine must be stored frozen at an average temperature of \( \leq 5^\circ F (\leq -15^\circ C) \) until it is reconstituted for injection. Diluent may be stored at room temp.**

- Any freezer that has a separate sealed freezer door and reliably maintains an average temperature of \( \leq 5^\circ F (\leq -15^\circ C) \) is acceptable for storing zoster vaccine.

- The vaccine must be discarded if not used within 30 minutes after reconstitution.

Administration

• Zostavax: 0.65-mL dose (reconstituted)
• SQ – upper, outer triceps
• 5/8 inch, 25 gauge needle
4. Which of the following statements about the administration of influenza and zoster vaccines is true?

1. Same day, opposite arm, separate syringe
2. Same day, same arm, mixed in 1 syringe
3. Must be separated by at least 7 days
4. Must be separated by at least 4 weeks
5. Which of the following statements about the administration of pneumonia and zoster vaccines is true?

1. Same day, opposite arm, separate syringe
2. Same day, same arm, mixed in 1 syringe
3. Must be separated by at least 7 days
4. Must be separated by at least 4 weeks
Maine Immunization Law

• A pharmacist immunizer...may administer shingles or herpes zoster vaccine to a person according to a valid prescription when the person has an existing primary care physician or

• When the person does not have an existing relationship with a primary care physician, the pharmacist may proceed to administer according to a treatment protocol established by an authorized practitioner
KL is a 62-year-old man with heart disease. He has no allergies. His meds include metoprolol, simvastatin, and NTG SL. Which vaccine is appropriate for him?

1. Pneumovax 0.5 ml IM
2. TIV SD influenza shot 0.5 ml IM
3. TIV HD influenza shot 0.5 ml IM
4. Flumist nasal spray 0.1 ml in each nostril
5. Zostavax 0.65 ml SQ
6. Both 1 and 2
7. 1, 2 and 5
8. 1, 3 and 5
9. 1, 4 and 5
RR is a 70-year-old woman with COPD. She has no allergies. Her meds include albuterol, Pulmicort and Spiriva. She has an 80-pack-year history of smoking. She quit smoking 5 years ago. Her last pneumonia shot was 8 years ago. Which vaccine is appropriate for her?

1. Pneumovax 0.5 ml IM
2. TIV SD influenza shot 0.25 ml IM
3. TIV HD influenza shot 0.5 ml IM
4. Flumist nasal spray 0.1 ml in each nostril
5. Zostavax 0.65 ml SQ
6. Both 1 and 2
7. 1, 2 and 5
8. 1, 3 and 5
9. 1, 4 and 5

Correct answer: 8.
Pertussis- containing Vaccine
## Comparison of 20th Century and current US Morbidity of VPDs

<table>
<thead>
<tr>
<th>Diseases</th>
<th>20th Century Annual Morbidity</th>
<th>2010 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>Polio (paralytic)</td>
<td>16,316</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Measles</td>
<td>530,217</td>
<td>61</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>Mumps</td>
<td>162,344</td>
<td>2,528</td>
<td>98%</td>
</tr>
<tr>
<td>Pertussis</td>
<td>200,752</td>
<td>21,291</td>
<td>89%</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>21,053</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Rubella</td>
<td>47,745</td>
<td>6</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>Congenital Rubella Syndrome</td>
<td>152</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Tetanus</td>
<td>580</td>
<td>8</td>
<td>99%</td>
</tr>
<tr>
<td>Haemophilus influenzae</td>
<td>20,000</td>
<td>270</td>
<td>99%</td>
</tr>
</tbody>
</table>
Pertussis Morbidity & Mortality in Maine
Early 20th century, Portland, ME vs. contemporary Maine

![Graph showing pertussis incidence and mortality rates in Portland, Maine (1916-1920) and the State of Maine (2006-2010). The graph compares incidence and mortality rates per 100,000 population.]
Why Do We Keep Vaccinating?
Reemergence of a Pandemic
Diphtheria in the Former Soviet Union Countries
California Pertussis Outbreak – 2010

- 9,477 confirmed, probable and suspect cases of pertussis (rate = 24.2 cases/100,000); 514 in 2011
- 663 were hospitalized (63% were infants <6 months of age)
- Ten deaths reported of infants < 3 months of age
  - 9 (90%) were unvaccinated infants <2 months
Pertussis

• Highly contagious respiratory infection, commonly known as whooping cough

• Caused by a bacterium, *Bordetella pertussis*, and primarily mediated by toxins
Pertussis Clinical Features

- Incubation period: 7-10 days (range 4-21 days)
- Catarrhal stage: 1-2 weeks
- Paroxysmal cough stage: 1-6 weeks
- Contagious period: Catarrhal stage & first two weeks of cough onset
- Convalescence: Weeks to months
Pertussis among Adolescents & Adults

- Disease often milder
- Infection may be asymptomatic, or may present as classic pertussis
- Persons with mild disease may transmit the infection
- Older persons often source of infection for children
Pertussis—United States, 1940-2007
Source of Pertussis Transmission to Infants

- Household members responsible for 75 - 83 %
- Parents and siblings were common sources
  - Parents (53%)
  - Siblings (16-20%)
  - Aunts/uncles (10%)
  - Friends/cousins/others (10-24%)
  - Grandparents (2%)
  - Caretakers (2%)
Pertussis-Containing Vaccines

• DTaP (pediatric)
  – approved for children 6 weeks through 6 years
  – 80-90% effectiveness after 3 doses

• Tdap (adolescent and adult)
  – approved for persons 10 through 64 years (Boostrix) and 11 through 64 years (Adacel)
  – every 10 year one booster
  – one booster reduces the risk of pertussis by 60% -
Adolescent and Adult Pertussis Vaccination

• Primary objective
  – protect the vaccinated adolescent or adult

• Secondary objective
  – reduce reservoir of *B. pertussis*
  – potentially reduce incidence of pertussis in other age groups and settings
DTaP Adverse Reactions

- Local reactions: 20%-40% (pain, redness, swelling)

- Temp of 101 degree or higher: 3%-5%

- More severe adverse reactions: not common

- Local reactions: more common following 4th and 5th doses
Contraindications

• Severe allergic reaction to vax component or prior dose

• Encephalopathy, not due to another identifiable cause, occurring within 7 days of vaccination
DTaP Precautions*

• Moderate or severe acute illness
• Temperature >105°F (40.5°C) or higher within 48 hours with no other identifiable cause
• Collapse or shock-like state (hypotonic hyporesponsive episode) within 48 hours
• Persistent, inconsolable crying lasting >3 hours, occurring within 48 hours
• Convulsions with or without fever occurring within 3 days

*may consider use in outbreaks
New Tdap Recommendations*
Ages 7 through 10 years

Those who are “not fully immunized” against pertussis and for whom no contraindication to pertussis vaccine exists, should receive a single dose of Tdap

“Not fully immunized”

– fewer than 4 doses of DTaP
– 4 doses of DTaP and last dose was prior to age 4 years
– with unknown vaccination status

*off-label recommendation. MMWR 2011; 60 (No. 1):13-15
New Tdap Recommendations*
Ages 7 through 10 years

Those never vaccinated against tetanus, Diphtheria, or pertussis or who have unknown vaccination status should receive a series of three vaccinations containing tetanus and diphtheria toxoids. The first of these three should be Tdap.

*off-label recommendation. MMWR 2011; 60 (No. 1):13-15
New Tdap Recommendations for Adolescents

- Persons 11-18 years of age who have not received Tdap should receive a single dose followed by Td booster doses every 10 years.

- Adolescents should preferably receive Tdap at the 11 -12 year-old preventive healthcare visit.

MMWR 2011; 60 (No. 1):13-15
New Tdap Recommendations

• Tdap can be administered regardless of the interval since the last tetanus and diphtheria toxoid-containing vaccine

• While longer intervals between Td and Tdap vaccination could decrease the occurrence of local reactions, the benefits of protection against pertussis outweigh the potential risk for adverse events

*MMWR 2011; 60 (No. 1):13-15*
Cocooning Strategy to Protect Infants from Pertussis

- Vaccinate anyone (including 65Y and older*) in contact with infants under 12 months age
- Women of childbearing age (before or postpartum - even if breastfeeding)
- Tdap is not contraindicated during pregnancy; however, if there is no risk of acquiring or transmitting pertussis during pregnancy ACIP recommends deferring until postpartum

Off-label recommendation. *MMWR 2011; 60 (No. 1):13-15
ACIP provisional recommendations
Use of Tdap - Health Care Professionals
(April 4, 2011)

• HCP regardless of age should receive a single dose of Tdap as soon as feasible regardless of time of last Td dose

• Tdap is not currently licensed for multiple administrations

• Hospitals & ambulatory care facilities should provide Tdap for HCP
AB is a 52-year-old woman with hypertension. She has no allergies. Her meds include amlodipine 10 mg PO QD. She smokes 1 PPD. Her young grandchildren live with her. Which vaccine is appropriate for her?

1. Pneumovax 0.5 ml IM
2. TIV SD influenza shot 0.5 ml IM
3. TIV HD influenza shot 0.5 ml IM
4. Flumist nasal spray 0.1 ml in each nostril
5. Zostavax 0.65 ml SQ
6. Tdap 0.5 ml IM
7. Both 1 and 2
8. 1, 3 and 5
9. 1, 2, 5, and 6
KM is a 70-year-old woman with rheumatoid arthritis and osteoporosis. She has no allergies. Her meds include MTX 10 mg Qweek and alendronate 70 mg qweek. She frequently cares for her young grandchildren. Which vaccine is appropriate for her?

1. Pneumovax 0.5 ml IM
2. Tdap 0.5 ml IM
3. TIV HD Flu shot 0.5 ml IM
4. Flumist nasal spray 0.1 ml in each nostril
5. Zostavax 0.65 ml SQ
6. Both 1 and 3
7. 1, 2 and 3
8. 1, 3 and 5
9. 1, 4 and 5

Correct answer: 7. 1, 2 and 3
QUESTIONS???