Immunization Recommendations in Primary Care
Betsy Blake, PharmD, BCPS
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Disclosure
• I have nothing to disclose.

Objectives - Pharmacists -
• Learning Objectives: At the completion of this activity, the pharmacist will be able to:
  1. Describe recent changes in immunization schedules
  2. Apply immunization recommendations to specific patients
  3. Identify the ideal timing of specified vaccinations

Objectives - Pharmacy Technicians -
• Learning Objectives: At the completion of this activity, the pharmacy technician will be able to:
  1. Describe recent changes in immunization schedules
  2. Identify methods to assist the pharmacist with enhancing vaccination rates and improving healthcare outcomes.

Overview
• Updated vaccine schedules and benefits
• Vaccines recommended in primary care
  – Influenza vaccine
  – Pneumococcal vaccine
  – Herpes zoster vaccine
• Reporting adverse effects

New Vaccine Schedules
Updated annually
Changes in Recommendations

- Standardized acronyms for vaccines used
- Columns for medical conditions and other indications reordered to align similar medical conditions or special populations
- Footnotes limited to pertinent information for vaccines
  - Condensed, simplified, standardized
- Added table of contraindications and precautions for vaccines instead of separate document

Notable Changes – Adults

- **Hepatitis B vaccination**
  - Adults with chronic liver disease should receive a HepB series
- **Meningococcal vaccination**
  - Changes in dosing guidance for
    - Adults with HIV infection
    - Serogroup B meningococcal vaccines
- **Other updates** – influenza vaccine, HPV vaccine

2017 Recommended Immunization Schedule for ADULTS

![Image of the 2017 Recommended Immunization Schedule for Adults]

Benefits of Vaccination

![Benefits of Vaccination Image]
Economic Burden for Vaccine-Preventable Diseases

- In 2015, economic burden of $9 billion from vaccine-preventable diseases
  - Related to 10 vaccines for adults ≥19 years old
  - Unvaccinated adults responsible for ~80%
    - At a cost of $7.1 billion
  - Highlights the need to improve vaccination rates

Influenza Vaccine

- Vaccination coverage rates – 2016-17

<table>
<thead>
<tr>
<th>Population</th>
<th>Vaccinated 2016-17</th>
<th>Healthy People 2020 Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients ≥6 months of age</td>
<td>46.8% (↑)</td>
<td>70%</td>
</tr>
<tr>
<td>All ≥6 months – South Carolina</td>
<td>47.4% (↑)</td>
<td></td>
</tr>
<tr>
<td>6 months to 17 years old</td>
<td>59.0% (+/-)</td>
<td></td>
</tr>
<tr>
<td>&gt;18 years old</td>
<td>43.3% (↑)</td>
<td></td>
</tr>
</tbody>
</table>

Influenza Vaccine – Pregnancy

- Recommended for vaccination since 2004
  - During any trimester

- 2016-17 – 53.6% of pregnant women vaccinated against influenza
  - More likely to be vaccinated if recommended by a provider
**Influenza Vaccine – Pregnancy**

- Is there a higher risk of miscarriage?
  - Previous studies have NOT indicated a higher risk
  - Recent study
    - Case-control study over 2010-11 and 2011-12 seasons
    - Utilized Vaccine Safety Datalink
    - Reviewed data for 919 cases during primary exposure window 28 days prior to spontaneous abortion
    - Adjusted odds ratio – 2.0 (95% CI, 1.1-3.6)
      - Significant among women vaccinated in previous influenza season with pH1N1-containing vaccine
      - No association during other time frames

**Influenza Vaccine**

- 2016-17 vaccine effectiveness – 42% (35-48%)
  - Reduced overall risk for influenza-associated medical visits
  - Variations by age
    - 61% - children 6 months to 8 years
    - 25% - adults 65 years of age and older
  - By subtype
    - A/H1N1pdm09 – 54%
    - A/H3N2 – 34%
    - B/Yamagata – 55%
    - B/Victoria – 60%

**2017-18 Influenza Vaccine Composition Recommendations**

<table>
<thead>
<tr>
<th>Vaccine Component</th>
<th>2017-18</th>
<th>2016-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>A – (H1N1)pdm09-like</td>
<td>a/Michigan/45/2015</td>
<td>a/California/7/2009</td>
</tr>
<tr>
<td>A – (H3N2)-like</td>
<td>a/Hong Kong/4801/2014</td>
<td>a/Hong Kong/4801/2014</td>
</tr>
<tr>
<td>B</td>
<td>b/Brisbane/00/2008-like – Victoria lineage</td>
<td>b/Brisbane/00/2008-like – Victoria lineage</td>
</tr>
<tr>
<td>Quadrivalent Vaccine</td>
<td>b/Phuket/3073/2013-like – Yamagata lineage</td>
<td>b/Phuket/3073/2013-like – Yamagata lineage</td>
</tr>
</tbody>
</table>

Australia – record cases of flu this season. Mainly H3N2.

**2017-18 Recommendations**

- Recommendation continues for annual vaccination for all persons ≥ 6 months old
  - Without contraindications
    - CAN get the flu shot
      - Children ≥6 months of age
      - Pregnant women
      - People with chronic health conditions
    - CANNOT get the flu shot
      - Children <6 months of age
      - People with severe, life threatening allergies
      - Gelatin
      - Antibiotics
      - Other ingredients
    - Talk to your doctor first
      - If you ever had Guillain-Barré Syndrome
      - Moderate-to-severe acute illness (fever)
      - If you have an allergy to eggs

CDC recommends that pregnant women may receive any licensed, recommended, age-appropriate influenza vaccine.

No studies evaluating RIV3 or RIV4

CDC recommends that pregnant women may receive any licensed, recommended, age-appropriate influenza vaccine.
2016-17 Recommendations

- **Egg Allergy – Updated**
  - Only hives \(\rightarrow\) any licensed and recommended influenza vaccine
  - People with history of severe allergic reaction to egg – any symptom other than hives \(\rightarrow\) any licensed and recommended influenza vaccine
    - Vaccinated in inpatient or outpatient medical setting
    - Supervised by any healthcare provider able to recognize and manage severe allergic reactions
    - Consider use of recombinant influenza vaccine (egg-free)
  - Previous severe allergic reaction to vaccine is a contraindicated to any use of the vaccine
  - Recent CDC study – rate of anaphylaxis = 1.31 per 1 million vaccine doses given

2017-18 Available Vaccines

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Manufacturer</th>
<th>Type</th>
<th>Age</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afluria</td>
<td>Seqirus</td>
<td>IIV3</td>
<td>&gt;5 years</td>
<td>IM</td>
</tr>
<tr>
<td>Fluad</td>
<td>Seqirus</td>
<td>aIIV3</td>
<td>≥65 years</td>
<td>IM</td>
</tr>
<tr>
<td>Fluad® Quad.</td>
<td>GSK Biologicals</td>
<td>IIV4</td>
<td>≥65 years</td>
<td>IM</td>
</tr>
<tr>
<td>Flublok</td>
<td>Protein Sciences Corp.</td>
<td>RIV3</td>
<td>≥65 years</td>
<td>IM</td>
</tr>
<tr>
<td>Fluad® Quad.</td>
<td>Seqirus</td>
<td>IIV4</td>
<td>&gt;6 months</td>
<td>IM</td>
</tr>
<tr>
<td>Fluadin®</td>
<td>ID Biomedical Corp.</td>
<td>IIV4</td>
<td>18-64 years</td>
<td>IM</td>
</tr>
<tr>
<td>Fluzone High Dose</td>
<td>Sanofi Pasteur</td>
<td>IIV3</td>
<td>≥65 years</td>
<td>IM</td>
</tr>
<tr>
<td>Fluzone Quad.</td>
<td>Sanofi Pasteur</td>
<td>IIV4</td>
<td>≥6 months</td>
<td>IM</td>
</tr>
<tr>
<td>Fluzone Intradermal Quad.</td>
<td>Sanofi Pasteur</td>
<td>IIV4</td>
<td>18-64 years</td>
<td>ID</td>
</tr>
</tbody>
</table>

*Still no LAV*

So what do you do?

- Local prescriber is adamant that high-dose influenza vaccine be given to patients over 65 years old.

- Which of the following influenza vaccines would meet her request?
  A. Fluzone® Intradermal
  B. Fluzone® High-dose
  C. Fluad®
  D. Afluria®

High-dose Influenza Vaccine

- >65 years old
  - 80-90% of seasonal flu-related deaths
  - 50-70% of hospitalizations
  - Antibody response and protection lower

- Available products:
  - Fluzone High Dose® (IIV3-HD) - 4 times hemagglutinin
  - Flud® (aIIV3) - contains MF59 adjuvant

New Influenza Vaccine

- **Fluad™** – FDA approved November 2015
  - Standard dose [adjuvanted](http://www.cdc.gov/flu/protect/vaccine/adjuvant.htm) trivalent inactivated influenza vaccine (aIIV3)
    - Contains MF59 adjuvant
      - Oil-in-water emulsion of squalene oil
      - Enhances immune response to vaccination
      - More effective in preventing lab-confirmed influenza compared to IIV
  - Approved for people ≥65 years of age
  - Adverse events: pain, redness at injection site, headache, muscle aches, malaise

So what do you do?

How do you respond to her request?

A. Order high-dose influenza vaccine to give to all patients ≥65 years old
B. Order limited supply of high-dose influenza vaccine for select patients
C. Do not stock high-dose influenza vaccine
High-dose Influenza Vaccine

- Is it more efficacious?
  - IIV3-HD compared to standard dose (IIV3-SD)
  - 31,989 participants over 2 seasons
  - Primary end point – laboratory-confirmed influenza associated with influenza-like illness

<table>
<thead>
<tr>
<th></th>
<th>IIV3-HD</th>
<th>IIV3-SD</th>
<th>Relative Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary endpoint</td>
<td>1.4%</td>
<td>1.9%</td>
<td>24.2% (9.7-36.5%)</td>
</tr>
</tbody>
</table>

- Vaccinate 200 patients with IIV3-HD to prevent 1 case of flu
- Hemaglutination-inhibition antibody geometric mean titers and seroprotection rates significantly higher 28 days after vaccination


Pneumococcal Vaccine

2017 Recommendations

- Available vaccines:
  - Pneumococcal conjugate 13-valent – PCV13
  - Pneumococcal polysaccharide 23-valent – PPSV23

<table>
<thead>
<tr>
<th>Both</th>
<th>PCV13</th>
<th>PPSV23</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 3, 4, 5, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F</td>
<td>6A</td>
<td>2, 8, 9N, 10A, 11A, 12F, 15A, 17F, 20, 22F, 33F</td>
</tr>
</tbody>
</table>

- Adult recommendations:
  - PCV13 – 1 dose
    - Administer first if possible – only recommended for certain medical conditions
  - PPSV23 – 1, 2, or 3 doses
    - In general, 1-year interval between 2 vaccines in adults without high-risk conditions

Pop Quiz

- Which of the following influenza vaccines should be given to a 55-year-old woman this year?
  - A. Fluzone Quadrivalent (IIV4)
  - B. FluMist (LAIV4)
  - C. Fluarad (aIIV3)
  - D. Fluzone High-Dose (IIV3)

Pneumococcal Vaccination – ADULTS

<table>
<thead>
<tr>
<th>PPSV23 Vaccine</th>
<th>Vaccinated 2015 South Carolina</th>
<th>Vaccinated 2015 United States</th>
<th>Healthy People 2020 Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumococcal – 18-64 years with increased risk</td>
<td>31.6%</td>
<td>33.5%</td>
<td>60%</td>
</tr>
<tr>
<td>Pneumococcal – ≥65 years</td>
<td>72.2%</td>
<td>71.9%</td>
<td>90%</td>
</tr>
</tbody>
</table>

- Claims data from Medicare Parts A and B - ≥65 years old
  - 43.2% received ≥1 dose of PPSV23
  - 31.5% received ≥1 dose of PCV13
  - 18.3% received Both

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5331003/

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6309284/
Benefits of Pneumococcal Vaccine

- Conjugate vaccine introduction for children
  - PCV7 in 2000 and PCV13 in 2010
  - Significant decline in invasive pneumococcal disease in children <5 years old
    - 1998 – 100 cases per 100,000 people
    - 2015 – 9 cases per 100,000 people
  - Provided additional protection for adults
    - Direct vaccination
    - Indirect effects of herd immunity
  - PCV13 unique serotypes cause 20-25% of invasive pneumococcal disease (IPD)
  - 10% of community-acquired pneumonia

https://www.cdc.gov/pneumococcal/surveillance.html

Pneumococcal Vaccine

- CAPITA Trial - 2008-2013
  - Randomized, placebo-controlled trial
    - ~85,000 adults >65 years of age in the Netherlands
  - Evaluated efficacy of PCV13 in preventing first episodes of vaccine-type strains of
    - Pneumococcal community-acquired pneumonia
    - Non-bacteremic and non-invasive pneumococcal community-acquired pneumonia
    - Invasive pneumococcal disease (IPD)
  - No pneumococcal vaccine recommended in the Netherlands for adults


Pneumococcal Vaccines - Vaccine Effectiveness -

- Compared to placebo for vaccine-type infections

<table>
<thead>
<tr>
<th>End Point</th>
<th>Vaccine Efficacy</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirmed community-acquired pneumonia - First episode</td>
<td>45.6% (21.8 to 62.5)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Confirmed non-bacteremic and non-invasive community-acquired pneumonia - First episode</td>
<td>63% (14.2 to 65.3)</td>
<td>0.007</td>
</tr>
<tr>
<td>Invasive pneumococcal disease - First episode</td>
<td>75% (41.4 to 90.8)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Confirmed vaccine-type community-acquired pneumonia - All episodes</td>
<td>42.4% (18.4 to 59.7)</td>
<td>0.004</td>
</tr>
</tbody>
</table>


Pneumococcal Vaccines

- Immunocompromised (≥19 years of age)
  - Asplenia
  - Congenital or acquired immunodeficiency
  - Chronic renal failure or nephrotic syndrome
  - Solid organ transplant
  - Iatrogenic immunosuppression


Pneumococcal Vaccines

- Immunocompetent (19-64 years)
  - Chronic heart disease
  - Pulmonary disease
  - Diabetes
  - Alcoholism
  - Chronic liver disease

**Pneumococcal Disease**

- >65 years old
  - No previous vaccination
    - PCV13 1 year PPSV23
  - Previous vaccination with PPSV23 ≥65 years
    - One PPSV23 >65 years 1 year PCV13
  - PPSV23 before age 65 years
    - PPSV23 <65 years old 1 year PCV13 ≥65 years 1 year PPSV23 ≥65 years ≥5 years

**Pop Quiz**

- Which of the following recommendations would be **appropriate** for use of the pneumococcal conjugate vaccine – PCV13?

  A. To replace use of the PPSV23
  B. Given with PPSV23 to a 19-year-old patient undergoing emergency appendectomy
  C. 8 weeks prior to PPSV23 in 54-year-old patient with cochlear implants
  D. All adult patients with diabetes

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**Herpes Zoster Vaccine**

- One dose subcutaneous vaccine recommended for adults ≥60 years old
  - FDA approved ≥50 years old
  - Whether or not recalled having chickenpox
    - 99% of Americans ≥40 years old had chickenpox
    - Even if patient had shingles
  - Reduces risk of developing shingles by 51%
    - Postherpetic neuralgia by 67%

**Pop Quiz**

- Bob received a PPSV23 vaccination at age 62. His only medical conditions are DM and HTN. He just turned 65 and is asking about a pneumococcal vaccine. What do you recommend?

  A. Revaccinate with PPSV23 today. Recommend PCV13 in 8 weeks.
  B. Vaccinate with PCV13 today. Recommend PPSV23 in 2 years.
  C. Vaccinate with both PCV13 and PPSV23 today.
  D. Vaccinate with PCV13 today. Recommend PPSV23 in 8 weeks.

**Herpes Zoster Vaccine**

- Recent news release 2/27/17
  - Clinical Infectious Diseases
    - Data collected 2007-2014 from ~2 million Medicare beneficiaries
    - 74% effective → preventing hospitalizations for shingles up to 3 years after vaccination
      - 55% effective → ≥4 years after vaccination
    - 57% effective → preventing chronic pain – 3 years
      - 45% effective → ≥4 years after vaccination

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http://www.cdc.gov/vaccines/safe/violence.htm

http://www.cdc.gov/vaccines/safe/violence.htm
On the horizon . . .

• **Adjuvanted herpes zoster vaccine**
  - Recombinant varicella-zoster virus glycoprotein E with adjuvant called AS01s to enhance immune response and improve efficacy
  - 2-dose series – 2 months apart – given IM
  - Increased injection site reactions

• **Recent study**
  - Reduces the risk of shingles and postherpetic neuralgia by 89.8% in patients ≥70 years old
  - Previous data – 97.9% effective in preventing shingles in patients ≥50 years old
  - Followed 3.7 years

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Adverse Events

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Reporting Adverse Events from Immunizations

• Vaccine Adverse Events Reporting System (VAERS)
  - Report clinically important adverse events that occur after vaccination

• **June 30, 2017** – CDC and FDA implemented a revised reporting form and process for submitting reports to VAERS
  - VAERS 2.0 – submit directly online
    - [https://vaers.hhs.gov/esub/index.jsp](https://vaers.hhs.gov/esub/index.jsp)
  - May download and complete the form to upload

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Last Pop Quiz

• **Bob is a 49-year-old man with diabetes, hypertension, and dyslipidemia without any prior surgeries. Which of the following vaccines would you recommend he receive today?**
  A. 23-valent pneumococcal polysaccharide vaccine
  B. Meningococcal vaccine
  C. Herpes zoster vaccine
  D. Human papilloma virus quadrivalent vaccine

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Immunization Recommendations in Primary Care

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October 2017