Pharmacists Prescribing Immunizations: “Give it your Best Shot!”

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Disclosures

• No conflicts or financial interests with the manufacturers or any products named in this presentation
Poll Everywhere Introduction

What were the 2016 HPV vaccine series completion rates for adolescents ages 13-17 years old?

A) Female 40% and Male 5%
B) Female 40% and Male 20%
C) Female 40% and Male 30%
D) Female 80% and Male 50%

Pharmacist Objectives

1. Review 2017 changes to ACIP immunization recommendations.
2. Recognize contraindications and possible adverse reactions associated with the vaccines discussed.
3. Develop a vaccination plan for individual case studies.
Technician Objectives

1. Develop knowledge of ACIP immunization recommendations.
2. Explain general vaccination principles.
3. Identify patient populations at increased risk for vaccine-preventable diseases.

2017 ACIP Recommendations

- Influenza
- Meningococcal
- HPV
- Pneumococcal
- Hep B (3/6/2017)
- Tdap
- Polio clarification (2/17/2017)
Influenza 2016-2017

- Flu season peaked end of February 2017
- Flu viruses circulate at low levels during the summer
- 2016-2017 vaccine reduced the risk of influenza by 48%
- Strains:
  - A/California/7/2009 (H1N1)pdm09-like virus
  - A/Hong Kong/4801/2014 (H3N2)-like virus
  - B/Brisbane/60/2008-like virus (B/Victoria lineage)
  - B/Phuket/3073/2013-like virus (B/Yamagata lineage)-quadrivalent only

Influenza 2017-2018

- CDC recommends getting annual influenza vaccine before the end of October 2017
- Vaccine recommended for all persons >6 months of age
  - 2 doses (given > 4 weeks apart) for children under 8 who have only received ≤1 dose
- Live-attenuated influenza vaccine (LAIV) still not recommended in any population for 2017-2018 due to concern regarding efficacy
- Two new quadrivalent influenza vaccines available
- Changes in age requirements for some pediatric formulations (Afluria, Flulaval Quad)
Influenza 2017-2018

• Influenza strains included in vaccination:
  • A/Michigan/45/2015 (H1N1)pdm09-like virus
  • A/Hong Kong/4801/2014 (H3N2)-like virus
  • B/Brisbane/60/2008-like virus (Victoria lineage)
  • B/Phuket/3073/2013-like virus (B/Yamagata lineage)-quadrivalent only

Influenza 2017-2018

• Formulations:
  • Inactivated Influenza vaccine (IIV3/IIV4 + preservative)
  • Intradermal inactivated vaccine for 18-64 years (ID-IIV4)
  • Cell-culture based inactivated influenza vaccine for ≥4 years (cc-IIV4 + preservative)
  • Recombinant influenza vaccine for ≥18 years (RIV3 and RIV4)
  • High-dose for ≥65 years (HD-IIV3)
  • Adjuvanted inactivated influenza vaccine for ≥65 years (aIIV3)

  • For full list of products visit: https://www.cdc.gov/flu/about/qa/vaxsupply.htm
  • LAIV not recommended
### High-Dose (HD) vs Standard Dose

- Patients \( \geq 65 \)yrs have 50-75% lower antibody titers
- HD formulation contains 4x the amount of hemagglutinin antigen
- ACIP lists HD formulation as an option for persons \( \geq 65 \)years
- **Do higher Ab titers = improved efficacy?**

### High-Dose (HD) vs Standard Dose

  - RCT, 2-season study (2011-2013), >30,000 participants \( \geq 65 \) years
  - Similar rates of influenza 1.4% in HD group and 1.9% in SD group
    (relative efficacy 24.2%; 95% CI 9.7-36.5%)

- **Izurieta et al. Lancet 2015;15:293-300.**
  - Retrospective cohort (2012-2013), 2,545,275 patients \( \geq 65 \) years
  - 22% reduction in probable influenza infections in patients receiving HD
    (95% CI 15-29%)
  - 22% reduction in influenza-related hospital admissions in patients receiving HD
    (95% CI 16-27%)

- **Gravenstein et al. Lancet Resp Med 2017;5:738-746**
  - RCT for 2013-2014 season, >38,000 residents of nursing homes \( \geq 65 \) years
  - Lower risk for respiratory-related hospitalization in patients receiving HD
    (RR 0.87; 95% CI 0.776-0.982)
Egg Allergy

- **Mild reaction** (hives)
  - May receive any recommended flu vaccine (i.e., any form of IIV or RIV based on age/health recs)

- **Severe reaction** (angioedema, respiratory distress, lightheadedness, recurrent emesis; or required epinephrine or another emergency medical intervention)
  - May receive any recommended flu vaccine (i.e., any form of IIV or RIV based on age/health recs)
  - Vaccine should be administered in an inpatient or outpatient medical setting
  - Vaccine administration should be supervised by a health care provider who is able to recognize and manage severe allergic conditions

Question 1

A physician would like to give a 27yo pregnant female in her second trimester a flu shot. Which formulation would you recommend?

A. Live attenuated influenza vaccine (LAIV4)  
B. Inactivated influenza vaccine (IIV) with preservative  
C. IIV without preservative  
D. Recommend waiting until after delivery  
E. Answer B or C
Question 2

68yo female picking up her prescriptions at your pharmacy states that she was hospitalized last year with the flu. She is interested in being vaccinated this year. She has never been vaccinated in the past. She has no allergies. Your pharmacy carries the LAIV, IIV4 standard dose, IIV3 high-dose, and Fludad (aIIV3). Which formulation do you recommend for this patient?

A. LAIV  
B. IIV4 standard-dose  
C. IIV3 high-dose  
D. aIIV3  
E. B, C, or D

Meningococcal Disease

• Encapsulated organism
• 13 serotypes of *Neisseria meningitidis*
  • Most common serotypes in US are B, C, and Y
• ~1,000 cases reported each year in the US
Meningococcal Disease

- Persons at risk for *N. meningitidis* infection:
  - Persons with anatomic or functional asplenia
  - Persons with terminal complement deficiency
  - Laboratory personnel exposed to *N. meningitidis*
  - Foreign travelers (e.g., Africa)
  - Military
  - College freshmen
  - HIV

Meningococcal Incidence by Serogroup and Age-Group, 2006-2015

Meningococcal Vaccine

- Conjugate & polysaccharide vaccines that cover serotypes A, C, W, Y
  - 2-dose series
  - Conjugate formulations MenACWY
    - Menactra®
    - Menveo®
    - Pure polysaccharide formulation MPSV4
      - Menomune®
  - Routine vaccination at ages 11-12 with a booster at 16 years of age
  - High-risk patients:
    - Primary series entails two doses given at least 8 wks apart
    - Booster every 5 years for people who remain at high risk

Meningococcal Protection: Waning Immunity

Meningococcal Vaccination Coverage Among Adolescents (2015)

- 81.3% of adolescents received ≥1 dose (by 13–17 years of age)
- 33.3% of adolescents received second dose (by 17 years of age)

Meningococcal B Vaccine

- Serotype B outbreak 2013-2015
- FDA-approved meningococcal serogroup B vaccines for person 10-25yrs
  - MenB-4C (Bexsero®) is a 2-dose series
  - MenB-FHbp (Trumenba®) is a 3-dose series
- Vaccines are not interchangeable

CDC. MMWR. 2016;65(33):850-858.
Meningococcal B Vaccine

- Indications for adults and children ≥10:
  - Asplenia
  - Persistent complement component deficiency
  - Eculizumab
  - Laboratory personnel exposed to *N. meningitidis*
  - Persons at risk during outbreak

- Persons 16-23yrs (preferred age is 16 through 18 years) may be vaccinated

New Meningococcal Vaccine Recommendations for 2017

- HIV has been added to high-risk group
  - Vaccinate against serotypes A, C, W, Y
    - 2-dose primary series (if not previously completed)
    - Booster every 5 years
    - Vaccination against serotype B not recommended

- 2-dose series (at 0 and 6 mos) of MenB-FHbp (Trumenba) acceptable for young adults aged 16-23 years (preferred age 16-18) who are healthy and not at increased risk for serogroup B*

*CDC. MMWR May 19, 2017 /66(19);509–513.*
A 19 yo healthy female received MenACWY at ages 11 and 18. What additional meningococcal vaccines will she need?

A. MenACWY  
B. MPSV4  
C. MenB  
D. N/A. She does not need additional vaccination for meningococcal disease.

A 26 yo healthy male received MenACWY at ages 11 and 16. What additional meningococcal vaccines will he need?

A. MenACWY  
B. MPSV4  
C. MenB  
D. None
Human Papillomavirus (HPV)

- Most common sexually transmitted infection
- Most infections are **asymptomatic**
  - Strains 6 and 11 are associated with genital warts
  - Strains 16, 18, 31, 33, and 35 are associated with cancer
- Most individuals are able to clear infection
  - 70% become HPV DNA negative within one year
  - 90% become HPV DNA negative within two years
- Leading cause of cervical cancer (11,000 cases diagnosed annually)

HPV Vaccination

- Prevaccination assessments are not recommended
- Vaccination does not treat existing infections
- Cervical cancer screening recommendations have not changed
HPV Vaccine Updates

- HPV2 no longer listed on the schedule
  - Removed from US market
  - All available doses have expired
- Patients aged 9-10 may now be vaccinated in even absence of high-risk condition
- 2-dose series available for persons initiating/completing vaccine before 15 years (min interval of 5 mos)

HPV Vaccines

<table>
<thead>
<tr>
<th>Gardasil®4 (HPV4)</th>
<th>Gardasil®9 (HPV9)</th>
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<tbody>
<tr>
<td>Inactivated vaccine</td>
<td>Inactivated vaccine</td>
</tr>
<tr>
<td>Strains 16 &amp; 18 (cancer)</td>
<td>Strains 16, 18, 31, 33, 45, 52, &amp; 58 (cancer)</td>
</tr>
<tr>
<td>Strains 6 &amp; 11 (genital warts)</td>
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</tr>
<tr>
<td>For use in <strong>females &amp; males</strong> ages 9-26</td>
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</table>

*HPV9 expected to replace HPV4

CDC MMWR March 27, 2015;64(11):300-304.
Question 5

A 27yo female received HPV vaccination at age 24y and 25y. She is in your pharmacy today and would like to complete the series. She cannot remember which formulation she received originally. What do you recommend for this patient?

A. Do not vaccinate. The patient is too old to complete the series.
B. Complete the series today with HPV4 or HPV9.
C. Restart the series today with HPV9, since the patient did not follow the vaccine schedule.

Pneumococcal Disease

- *Streptococcus pneumoniae*
  - Encapsulated organism (90 serotypes)
  - Causes invasive disease
    - Pneumonia
    - Meningitis
- Risk Factors:
  - Young and elderly (<24 mo or >65 yr)
  - Health conditions including: asplenia, heart disease, lung disease or asthma, ESRD, cirrhosis, DM, immunosuppression (e.g., HIV/AIDS, cancer)
  - Smoking
  - Alcohol abuse
Annual Rates of Hospitalization after the Introduction of PCV7

- Estimates done using Nationwide Inpatient Sample (NIS) database
- Decline in # of hospitalizations were sustained over 10 years
- Reductions also seen in adults
- Represents 168,000 fewer hospitalizations in 2009


PCV13 vs PPSV23

- Pure polysaccharide vaccine (PPSV23)
  - Original vaccine that did not induce immune response in children <2yr
- Conjugate vaccinate (PCV13)
  - Polysaccharide vaccine conjugated to protein carrier to induce better immune response in children
  - Found to have improved immune response rates in certain adult populations as well
Pneumococcal Vaccine Updates

• No big changes!

• References to 7-valent pneumococcal conjugate vaccine (PCV7) have been removed. All healthy children who may have received PCV7 as part of a primary series have now aged out of the recommendation for pneumococcal vaccine.

Immunocompetent Adults ≥65 years1-6

• Should receive:
  • PCV13 first (if never received as an adult)
  • PPSV23 ≥1 year after PCV13* (and ≥ 5 years after last PPSV23)

*Immunocompromised patients and persons with asplenia, CSF leak, or cochlear implant should receive PPSV23 ≥8 weeks after PCV13 to minimize risk window for invasive disease caused by serotypes unique to PPSV23 in these highly vulnerable groups.

Immunocompetent Persons w/ Risk Factors* 19-64 years

• Should receive:
  • PPSV23 between ages 19-64y

*Includes: chronic heart disease, chronic lung disease or asthma, diabetes mellitus, alcoholism, chronic liver disease, cirrhosis, viral hepatitis, cigarette smoking

Adults w/ Asplenia, CSF leak, Cochlear Implant, or Immunosuppression* 19-64y

• Should receive:
  • PCV13** first (but ≥1 yr after PPSV23 if not given first)
  • PPSV23 ≥8 weeks*** after PCV13
  • PPSV23 one-time revaccination between ages 19-64 (≥5yrs after last PPSV)

*Immunosuppression includes: congenital or acquired immunodeficiency (includes HIV infection), chronic renal failure, malignancy, leukemia, lymphoma, multiple myeloma, Hodgkin disease, iatrogenic immunosuppression, and transplant
**PCV13 should only be given once as an adult
***To minimize risk window for invasive disease caused by serotypes unique to PPSV23 in these highly vulnerable groups
A 24 yo M has no PMH. He currently smokes 1ppd. He has not received any pneumococcal vaccines as an adult. Recommend a pneumococcal vaccine schedule for this patient.

A. He should receive PCV13 today at 24y, PPSV23 at age 25y, and PPSV23 at 65y
B. He should receive PPSV23 today at 24y, PPSV23 at age 65y, and PCV13 at 66y
C. He should receive PPSV23 today at 24y, PCV13 at age 65y followed by PPSV23 8 weeks later at 65y
D. He should receive PPSV23 today at 24y, PCV13 at age 65y, and PPSV23 at 66y

A 65yo female admitted for hip replacement. PMH significant for DM Type 2. Received PPSV23 vaccine 9 months ago at age 64y. Recommend a pneumococcal vaccine schedule for this patient.

A. She should receive PCV13 in 3 months (65y) and PPSV23 at age 66y.
B. She should receive PCV13 in 3 months (65y) and PPSV23 at age 70y.
C. She should receive PCV13 in 3 months (65y) and PPSV23 at age 69y.
D. She should receive PPSV23 in 3 months (65y) and PCV13 at age 66y.
Hep B

- 3-dose series
- New recommendation:
  - Administer within 24-hr of birth (no longer by hospital discharge)
  - Adults with chronic liver disease, including, but not limited to, hepatitis C virus infection, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, and an alanine aminotransferase (ALT) or aspartate aminotransferase (AST) level greater than twice the upper limit of normal should receive a HepB series.

Tdap

- Tdap footnote updated for pregnancy (27-36 wks)
  - Updated to reflect preference for vaccination earlier during this period
  - Data suggest that vaccinating earlier during this period will maximize passive immunity transfer to infant
Question 8

A 22yo pregnant female (29 weeks) is picking up her asthma inhalers. No other significant PMH. Additional medications include oral contraception. Her vaccination history includes:
  • Up-to-date with childhood vaccines
  • TD at 17 years of age
  • Inactivated influenza last year
  • Completed HPV series 2 years ago

Which vaccinations should she receive today?

A. Influenza  
B. Tdap  
C. PPSV23  
D. A and B  
E. All of the above

Helpful Resources

• Centers for Disease Control and Prevention  
  • www.cdc.gov/vaccines

• Immunization Action Coalition  
  • www.immunize.org
  • www.vaccineinformation.org

• American Academy of Pediatrics  
  • www2.aap.org/immunization

• Children's Hospital of Philadelphia (CHOP)  
  • http://www.chop.edu/centers-programs/vaccine-education-center