`Tis the Season
Influenza and Pneumococcal Vaccine Updates

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Pharmacy Grand Rounds
September 20, 2016
Objectives

• Identify current influenza and pneumococcal immunization recommendations

• Explain rationale behind the current recommendations

• Select an appropriate influenza and pneumococcal immunization schedule for patients
Influenza Vaccine
Who should receive the influenza vaccine?

• All persons > 6 months of age without contraindications

Types of Influenza Vaccines

- **Inactivated Influenza Vaccines (IIVs)**
  - Available as trivalent (IIV3) & quadrivalent (IIV4)

- **Recombinant Influenza Vaccine (RIV)**
  - 1 RIV product → Flublok

- **Live Attenuated Influenza Vaccine (LAIV)**
  - 1 LAIV4 product → FluMist Quadrivalent

Influenza Update #1 for 2016-17 Season

• Vaccine Composition:
  
  • Trivalent vaccines:
    • A/California/7/2009
    • A/Hong Kong/4801/2014
    • B/Brisbane/60/2008
  
  • Quadrivalent vaccines:
    • All of the above strains plus…
    • B/Phuket/3073/2013

Influenza Update #2 for 2016-17 Season

• LAIV4 should NOT be used
  • ACIP interim recommendation
# Intranasal Efficacy Concerns

<table>
<thead>
<tr>
<th>Study</th>
<th>U.S. Influenza Vaccine Effectiveness Network</th>
<th>Department of Defense Laboratory-based Influenza Surveillance</th>
<th>ICICLE Observational Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
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<tr>
<td><strong>Timeframe</strong></td>
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<tr>
<td><strong>Design</strong></td>
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<tr>
<td><strong>Efficacy Results</strong></td>
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**LAIV4**: quadrivalent live attenuated influenza vaccine  
**IIV3/4**: trivalent/quadrivalent inactivated influenza vaccine  
**IIV**: inactivated influenza vaccine

CDC Web site. Available at: [www.cdc.gov/media/releases/2016/s0622-laiv-flu.html](http://www.cdc.gov/media/releases/2016/s0622-laiv-flu.html)
LAIV vs. IIV Efficacy from US Flu VE Network

LAIV3: trivalent live attenuated influenza vaccine
LAIV4: quadrivalent live attenuated influenza vaccine
IIV3: trivalent inactivated influenza vaccine
IIV3/4: trivalent/quadrivalent inactivated influenza vaccine

Conflicting Evidence in Canada

- Does vaccinating children & adolescents with LAIV provide better community protection than IIV?

**Design**
- Cluster randomized blinded trial
- Conducted between October 2012 and May 2015

**Primary endpoint**
- Reverse transcriptase polymerase chain reaction-confirmed influenza A or B virus

**Population**
- 52 Hutterite colonies in Alberta & Saskatchewan, Canada
- 1186 Canadians aged 36 months to 15 years received vaccine

IIV: inactivated influenza vaccine
Conflicting Evidence in Canada

• Intervention
  • Randomly assigned, blinded
    • Trivalent LAIV or trivalent IIV

• Results
  • Rate of influenza A or B virus infection:
    • LAIV: 5.3%
    • IIV: 5.2%
    • Hazard ratio: 1.03 (95% CI 0.85 to 1.24)

• Limitations
  • Canada using LAIV3
  • U.S. using LAIV4

LAIV: live attenuated influenza vaccine
LAIV3: trivalent live attenuated influenza vaccine
LAIV4: quadrivalent live attenuated influenza vaccine
IIV: inactivated influenza vaccine

Hypothesis for LAIV4 decreased effectiveness

- Suboptimal vaccine component performance
- Potential interference among live viruses
- More highly vaccinated population
Influenza Update #3 for 2016-17 Season

- History of severe allergic reaction to egg

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Influenza Vaccine Product</th>
<th>Administration Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only hives</td>
<td>Any licensed &amp; recommended influenza vaccine</td>
<td>Supervision NOT required</td>
</tr>
<tr>
<td>Any symptom other than hives</td>
<td>Any licensed &amp; recommended influenza vaccine</td>
<td>Vaccinate under the supervision of a health care provider</td>
</tr>
</tbody>
</table>

Influenza Update #3 for 2016-17 Season

• No longer need to monitor egg-allergic recipients for 30 minutes postvaccination

  • Consider monitoring all patients at least 15 minutes postvaccination

Assessment Question #1

• What is a potential reason(s) for the decreased efficacy with LAIV4?

a) Interference amongst vaccine strains
b) Recipient is not inhaling full dose
c) Population is more highly vaccinated
d) A & C
e) A, B, & C

LAIV4: quadrivalent live attenuated influenza vaccine
**Influenza Vaccine Highlights**

- Continue recommending influenza vaccine for
  - Patients $\geq$ 6 months of age

- Intranasal flu vaccine is **not** recommended

- Egg-allergic patients:
  - Administer under supervision of health care provider
    - If history of severe allergic reaction (other than hives)
    - 30 minute post-vaccination observation no longer required
Pneumococcal Vaccine
# Types of Pneumococcal Vaccines

<table>
<thead>
<tr>
<th>Product</th>
<th>PCV13 (Prevnar 13)</th>
<th>PPSV23 (Pneumovax 23)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>13-valent pneumococcal conjugate vaccine</td>
<td>23-valent pneumococcal polysaccharide vaccine</td>
</tr>
<tr>
<td>Dose</td>
<td>0.5 mL</td>
<td>0.5 mL</td>
</tr>
<tr>
<td>Route</td>
<td>IM</td>
<td>IM or SC</td>
</tr>
<tr>
<td>Preservatives</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Pharmacologic Category</td>
<td>Inactivated vaccine</td>
<td>Inactivated vaccine</td>
</tr>
</tbody>
</table>

**PCV13 & PPSV23 are NOT interchangeable**

PCV13: pneumococcal conjugate vaccine (13 valent)  
PPSV23: pneumococcal polysaccharide vaccine (23 valent)  
IM: intramuscular  
SC: subcutaneous

Why do we need to give 2 vaccines?

• Polysaccharide antigens are poorly immunogenic in children < 2 years old

• PCV13 has shown to elicit similar or higher antibody titers compared to PPSV23

• Giving PPSV23 followed by PCV13 has shown lower antibody response than giving PCV13 first

• Potential for broader protection by utilizing both vaccines
Review of CAPiTA Trial

- Determine efficacy of pneumococcal conjugate vaccine in adults ≥ 65 years

- Design
  - Parallel-group, randomized, placebo-controlled, double-blind trial

- Primary Endpoint
  - Efficacy of PCV13 in prevention of a 1st episode of confirmed vaccine-type CAP

- Population
  - ≥ 65 years of age
  - Enrolled between 9/15/2008 and 1/30/2010

- Intervention
  - Randomly assigned 1:1 to receive PCV13 or placebo
Review of CAPiTA Trial

Number of Confirmed CAP with vaccine-type strain

PCV13: pneumococcal conjugate vaccine (13 valent)
CAP: community acquired pneumonia

Does my patient need a pneumococcal vaccine?

• How old are they?
  • 19 – 64 years of age
  • ≥ 65 years of age

• Medical history?
  • Immunocompetent with specific chronic diseases
  • Immunocompromised
  • Functional or anatomic asplenia
  • Cerebrospinal fluid (CSF) leak
  • Cochlear implant

• Vaccine naïve?
General Guidelines

- Adults recommended to receive:
  - 1 dose of PCV13
  - 1, 2, or 3 doses of PPSV23

- Ideally PCV13 should be given 1\textsuperscript{st} \textit{(when both are indicated)}

- Separate PCV13 & PPSV23 by at least 1 year
  - \textit{Exception}: separate by at least 8 weeks
    - Adults with immunocompromising conditions
    - Anatomical or functional asplenia
    - Cerebrospinal fluid leak
    - Cochlear implant

- Separate PPSV23 doses by at least 5 years

PCV13: pneumococcal conjugate vaccine (13 valent)
PPSV23: pneumococcal polysaccharide vaccine (23 valent)

## Pneumococcal Vaccination 19 – 64 Years Old

<table>
<thead>
<tr>
<th>Immune Status</th>
<th>Immunocompetent</th>
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<tbody>
<tr>
<td>Risk Factors</td>
<td>• Alcoholism</td>
</tr>
<tr>
<td></td>
<td>• Cardiac: except hypertension</td>
</tr>
<tr>
<td></td>
<td>• Diabetes</td>
</tr>
<tr>
<td></td>
<td>• Liver</td>
</tr>
<tr>
<td></td>
<td>• Pulmonary</td>
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<tr>
<td></td>
<td>• Smoking</td>
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<tr>
<td></td>
<td>• Cerebrospinal fluid leak</td>
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<td></td>
<td>• Cochlear implant</td>
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MMWR. 2010;59(34):1102-1106
MMWR. 2012;61(40):816-819
CDC Web site. Recommended Adult Immunization Schedule. Available at: https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf
## Pneumococcal Vaccination 19 – 64 Years Old

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<thead>
<tr>
<th>Immune Status</th>
<th>Immunocompromised or Functional/Anatomic Asplenia</th>
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<tr>
<td>Vaccine Naïve</td>
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**Vaccine Type**
- PCV13: pneumococcal conjugate vaccine (13 valent)
- PPSV23: pneumococcal polysaccharide vaccine (23 valent)
# Pneumococcal Vaccination > 65 Years Old

<table>
<thead>
<tr>
<th>Vaccine Naïve</th>
<th>Yes</th>
<th>No Previously received PPSV23 at age &gt; 65</th>
<th>No Previously received PPSV23 at age &lt; 65</th>
<th>No Previously received PCV13 &amp; possibly PPSV23 at age &lt; 65</th>
</tr>
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<tbody>
<tr>
<td>Interval</td>
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**Vaccine Type**
- PCV13: pneumococcal conjugate vaccine (13 valent)
- PPSV23: pneumococcal polysaccharide vaccine (23 valent)

**Interval**
- PCV13: 1 year after PCV13 and 5 years after PPSV23
- PPSV23: 1 year after PPSV23

**Further Reading**
- Tomczyk S et al. MMWR. 2014;63(37):822-825
- Kobayashi M et al. MMWR. 2015;64(34);944-947
- MMWR. 2012;61(40);816-819
- MMWR. 2010;59(34);1102-1106
- CDC Vaccine Schedules App

**Notes**
Case for Assessment Questions # 2 & 3

• 71 year old male with PMH significant for GERD, hypertension, migraines, and history of smoking 1 pack per day x20 years (quit 8 years ago). Immunization history: PPSV23 01/2005, influenza vaccine 9/2013, 9/2014, 10/2015, Tdap 7/2011.
Assessment Question #2

- Does patient qualify for a pneumococcal vaccine?
  
  a) Yes
  
  b) No
Assessment Question #3

• What pneumococcal vaccine regimen would you recommend?
  a) PCV13 now
  b) PPSV23 now, followed by PCV13 in 9/2017
  c) PPSV23 now, followed by PCV13 in 9/2017, then PPSV23 in 9/2022
  d) PCV13 now, followed by PPSV23 in 9/2017

PCV13: pneumococcal conjugate vaccine (13 valent)
PPSV23: pneumococcal polysaccharide vaccine (23 valent)
Pneumococcal Vaccine Highlights

• Vaccination sequence & timing dependent upon:
  • Age
  • Medical history
  • Pneumococcal vaccine history

• Adults recommended to receive:
  • 1 dose of PCV13
  • Up to 3 doses of PPSV23

• Interval either 8 weeks, 1 year, or 5 years
Questions & Discussion
`Tis the Season
Influenza and Pneumococcal Vaccine Updates

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