Vaccine responses in the elder...in older adults

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Faculty Disclosure Information

- I have not had a financial interest or other relationship with the manufacturers of the products that will be discussed in my presentation.
- This presentation will not include discussion of pharmaceuticals or devices that have not been approved by the FDA.
- I will not be discussing unapproved or "off-label" uses of pharmaceuticals or devices.

Objectives

- Review current vaccine recommendations for adults 60 years and older including the rationale for these recommendations

Immunosenescence

- ↓ # plasmacytoid DC (pDC)
- ↓ capacity of pDC to make TNF-α and IFN-α after TLR7/9 stimulation
- ↓ capacity of myeloid DC (mDC) to make TNF-α, IL-6 and IL-12 after TLR2/4 stimulation
- ↓ # CD19+CD27+IgD- "switched" memory B cells
- ↓ amount and affinity of Ab responses

Immunosenescence

- ↑ # Treg
- ↑ Treg production of IL-10 and TGF-β (immunosuppressive)
- ↓ # Th17 (↓ recruitment and activation of neutrophils)
Attention Older Adults!
Vaccines are not just for kids!

Influenza: CDC

- Hospitalization rates highest for adults aged ≥65 years; among persons aged ≥65 years with high-risk underlying medical conditions, 560 influenza-associated hospitalizations per 100,000 persons
- Yearly average of 21,098 influenza-related deaths occurred among adults aged ≥65 years (90% of all influenza deaths)

Influenza vaccine

RDBPCT ≥ 60 years old

Table 5 - Relative Risks (RRs) and 95% Confidence Intervals (CI) of Respiratory Participants Compared with Nonparticipants in Relation to Serological Influenza and Clinical Influenza

Influenza vaccine responses elderly vs young adults

Influenza vaccine: HD vs SD


**Influenza vaccine: CDC**

- The desire to improve responses among adults aged ≥65 years led to the development of a vaccine with more antigen than standard-dose IIV.
- High-dose IIV among persons aged ≥65 years elicited substantially higher titers.
- Whether the higher postvaccination immune responses observed among High-Dose vaccine recipients will result in greater protection against influenza illness is under study.
- No preferential recommendation is made for high-dose IIV over standard dose IIV for persons aged ≥65 years.

MMWR 2013;62(RR-7)

**Pneumococcal vaccine: CDC**

- The incidence of invasive pneumococcal disease ranges from 3.8 per 100,000 among persons aged 18–34 years to 36.4 per 100,000 among those aged ≥65 years.
- PPSV23 effectiveness is 50% to 80% for prevention of IPD among immunocompetent older adults and adults with various underlying illnesses.

MMWR 2010;59(34), 2012;61(40)

**Pneumococcal vaccines**

- PPSV23 contains 12 of the serotypes included in PCV13, plus 11 additional serotypes, i.e., PCV13 contains one serotype not included in PPSV23.

**Antibody response to initial and booster PPSV23**


**Mice primed with conjugate vaccine and boosted with conjugate, polysaccharide or saline have...**

- fewer specific B cells
- more apoptotic specific B cells

Brynjolfsson et al. JID 2012;205:422-30

**Adolescents and Adults 18-64 Years of Age**

- Initial Vaccination
- Subsequent Vaccination Year 3-6
- Adalimumab
- Follow-up by a nurse or physician

- "Potential advantage of initial PCV administration, which permits the establishment of an immune state that results in appropriate recall responses upon subsequent immunization with either PCV13 or PPSV23."

- All persons should be vaccinated with PPSV23 at age 65 years.
- Those who received PPSV23 before age 65 years for any indication should receive another dose of the vaccine at age 65 years or later if at least 5 years have passed since their previous dose.
- Those who receive PPSV23 at or after age 65 years should receive only a single dose.
Tdap vaccine: CDC

- To reduce pertussis morbidity among adults and maintain the standard of care for tetanus and diphtheria prevention and to reduce the transmission of pertussis to infants

MMWR 2006;55(RR17)

Interval between Td and Tdap

- However, in a recent study, the rates of injection site reactions to Tdap were no different in those vaccinated less than 2 years than in those vaccinated more than 2 years after previous Td.
- Another study found no higher rates of injection site reactions whether a Tdap-containing vaccine was administered one month after a Td-containing vaccine or placebo.

Interval between Td and Tdap

- Thus, with the pertussis disease burden continuing to be substantial, it is now recommended that Tdap be given to all adolescents and adults regardless of interval since the last Td.
- This includes those 65 years of age and older in whom the vaccine has been found to be equally safe and immunogenic.
Zoster

- Occurs most frequently among older adults
- 1/3 will develop zoster during their lifetime
- 1 million episodes in the US annually
- Common complications:
  - Postherpetic neuralgia (PHN) chronic, often debilitating pain 10%–18%.
  - Eye involvement that can result in loss of vision

MMWR 2008:57(RR-5)

Zoster vaccine

- VARIVAX, Each 0.5-mL dose contains 1350 plaque-forming units (PFU) of Oka/Merck strain of varicella virus (VZV)
- ZOSTAVAX, Each 0.65-mL dose contains 19,400 PFU of Oka/Merck VZV

MMWR 2008:57(RR-5)

Zoster vaccine: efficacy in prevention of HZ and PHN


Zoster vaccine: prior history of zoster

<table>
<thead>
<tr>
<th></th>
<th>Vaccinated Cohort</th>
<th>Unvaccinated Cohort</th>
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<tbody>
<tr>
<td>Case</td>
<td>Person-Years</td>
<td>Incidence (%)</td>
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<td>Group</td>
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<tr>
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<td>0–9 years</td>
<td>240</td>
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<td>10–19 years</td>
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<td>50–69 years</td>
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<tr>
<td>70+ years</td>
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<tr>
<td>Overall</td>
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</table>

* No. of cases per 1000 person-years.

Zoster vaccine: CDC

- Repeated zoster has been confirmed in immunocompetent persons after a previous episode
- The risk for zoster following an earlier episode is unknown
- Reported diagnosis or history might be erroneous
- No laboratory evaluations exist to test for the previous occurrence of zoster

MMWR 2008;57(RR-5)

Zoster vaccine: CDC

- Routine vaccination of all immunocompetent persons aged >60 years with 1 dose
- Persons who report a previous episode of zoster can be vaccinated
- Not indicated to treat acute zoster, to prevent persons with acute zoster from developing PHN, or to treat ongoing PHN

MMWR 2008;57(RR-5)

Changes you may wish to make in practice

- Make assessment of immunization status a routine part of allergy / immunology visits for older adults
- Don’t assume they are receiving their vaccinations elsewhere
- Administer IIIV, PPSV23, Tdap and Zoster vaccines to all eligible recipients