Vaccinations for Older Patients

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Objectives

• Incorporate current CDC guidelines into your practice

• Identify and vaccinate high risk patients

• Discuss vaccine myths with patients and other providers
Introduction

Immunization is the process whereby a person is made immune or resistant to an infectious disease.

Vaccines stimulate immune system to protect the person against subsequent infection or disease.


Types of Vaccines

• Attenuated
  • An infectious agent altered to become harmless or less virulent.
  • Small risk of acquiring the disease
  • Should be avoided if immunocompromised
  • May induce more permanent immunity

Sources: www.vaccines.gov
Types of Vaccines

• **Inactivated**
  • Pathogen is destroyed by heat, chemicals or radiation
  • Stimulate a weaker immune response
  • May require a booster
  • Examples: Influenza, Hepatitis A and B

Sources: www.vaccines.gov

Types of Vaccines

• **Toxoids**
  • Used to induce immunity against toxins produced by pathogens
  • Toxins inactivated with formalin to render harmless
  • Examples: Diphtheria and tetanus

Sources: www.vaccines.gov
# Types of Vaccines

<table>
<thead>
<tr>
<th>Live</th>
<th>Inactivated</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Influenza (intranasal)</td>
<td>• Influenza (IM)</td>
</tr>
<tr>
<td>• Herpes zoster</td>
<td>• Diphtheria, tetanus, pertussis</td>
</tr>
<tr>
<td>• MMR</td>
<td>– (Diptheria/tetanus: toxoids)</td>
</tr>
<tr>
<td>• Varicella</td>
<td>• Haemophilus influenza type B</td>
</tr>
<tr>
<td></td>
<td>• Hepatitis A</td>
</tr>
<tr>
<td></td>
<td>• Hepatitis B</td>
</tr>
<tr>
<td></td>
<td>• Meningococcal</td>
</tr>
<tr>
<td></td>
<td>• Pneumococcal</td>
</tr>
</tbody>
</table>

# Vaccination Response

- **Vaccination type** (attenuated vs inactivated)
- Interval between doses or number of doses
- Age
- Genetic background
Special Populations

• Severely immunocompromised patients
  • Active malignancy, alcoholics, HIV
  • Should not receive live vaccines
• Immunosuppressive therapy
  • Prednisone ≥20mg daily for at least 2 weeks
    • Wait 1 month before administering live vaccines
  • Tumor necrosis factor alpha inhibitors

Source: National Center for Immunization and Respiratory Diseases

Special Populations

• Vaccinate before starting immune Tx
  • Examples: TNF alpha inhibitors (Humira, Remacade, Enbrel), methotrexate, AZA
• Live vaccinations may cause disease in compromised patients
• Inactivated vaccines may not stimulate immunity in compromised patients

Source: US Pharmacist
Community Immunity

- Commonly known as ‘herd immunity’
- A critical portion of the population is immunized against a contagious disease
- Disease reservoir is reduced or eliminated
- Unvaccinated people benefit from contained contagion

Source: The National Institute of Allergy and Infectious Diseases (NIAID)

Community Immunity

- R0 (R naught) is the number of people predicted to become infected by one person
- R0 for influenza is about 1.5 – 2.0
- R0 for pertussis is about 15
- R0 is the basis for calculating threshold
Community Immunity

<table>
<thead>
<tr>
<th>Disease</th>
<th>R0</th>
<th>Threshold (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mumps</td>
<td>4-7</td>
<td>75–86</td>
</tr>
<tr>
<td>Polio</td>
<td>5-7</td>
<td>80–86</td>
</tr>
<tr>
<td>Smallpox</td>
<td>5-7</td>
<td>80–85</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>6-7</td>
<td>85</td>
</tr>
<tr>
<td>Rubella</td>
<td>6-7</td>
<td>83–85</td>
</tr>
<tr>
<td>Pertussis</td>
<td>12-17</td>
<td>92–94</td>
</tr>
<tr>
<td>Measles</td>
<td>12-18</td>
<td>83–94</td>
</tr>
</tbody>
</table>

Vaccination Recommendations

- CDC (Centers for Disease Control and Prevention)
  - Publishes schedules from recommendations made by
    - ACIP – Advisory Committee on Immunization Practices
    - Committee on Infectious Disease of the American Academy of Pediatrics
    - American Academy of Family Physicians
## Contraindications

<table>
<thead>
<tr>
<th>Anaphylactic Allergy to:</th>
<th>Avoid these Vaccines:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eggs</td>
<td>Influenza (all except Flublok)</td>
</tr>
<tr>
<td>Gelatin</td>
<td>Varicella, MMR, Zostavax</td>
</tr>
<tr>
<td>Neomycin</td>
<td>MMR, Polio, Varicella, Zostavax</td>
</tr>
<tr>
<td>Aspirin</td>
<td>LAIV, Varicella: Reye’s syndrome</td>
</tr>
</tbody>
</table>
### Adult Immunization Schedule

**Figure 1. Recommended adult immunization schedule, by vaccine and age group**

<table>
<thead>
<tr>
<th>VACCINE</th>
<th>18-64 yrs</th>
<th>65 yrs &amp; older</th>
<th>19-26 yrs</th>
<th>27-49 yrs</th>
<th>50-69 yrs</th>
<th>≥ 70 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td>1 dose annually</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tetanus, diphtheria, pertussis (Tdap)</td>
<td>Substitute 1 time dose of Td for Td booster; then boost with Td every 10 yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varicella</td>
<td>1 dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A (HepA)</td>
<td>2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis B (HepB)</td>
<td>2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis B (HepB)</td>
<td>3 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningococcal conjugate A (MenACWY)</td>
<td>1 or 2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningococcal conjugate C (MenC)</td>
<td>1 dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal 23-valent conjugate (PCV23)</td>
<td>1 or 2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal polysaccharide (PPV23)</td>
<td>1 dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubella</td>
<td>1 dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varicella</td>
<td>2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varicella</td>
<td>3 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
- Report any death or serious adverse events to the Vaccine Adverse Event Reporting System (VAERS). Reporting forms and instructions on filing a VAERS report are available at www.vaers.hhs.gov or by telephone, 800-822-7967.
- Additional information about the vaccines is available on the Centers for Disease Control and Prevention (CDC) website, www.cdc.gov/vaccines.
- The recommendations in this schedule were approved by the Advisory Committee on Immunization Practices (ACIP), the American Academy of Family Physicians (AAFP), the American Academy of Nurse Practitioners (AANP), the America College of Obstetricians and Gynecologists (ACOG), and the American Pharmacists Association (APhA).

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### Influenza
Influenza

- Influenza vaccine
  - Each contains antigens for 2 Type A and 1 or 2 Type B
  - Antigen selection based on recent outbreaks
  - Reduces risk by 90% in healthy adults
  - Reduces risk in frail elderly by 30-40%
    - But 2-4 times morbidity and mortality

Influenza Vaccines Types

- IIV: Inactivated influenza vaccine
  - IIV3: Contains 2 type A and 1 Type B
  - IIV4: Contains 2 type A and 2 Type B
  - RIV3: Recombinant influenza vaccine, trivalent
    - FluBlok: no egg proteins, use with egg allergies
Influenza Vaccines Types

• IIV: High-dose inactivated influenza vaccine
  • Approved for people age 65 and older
  • Has four times the amount of antigen
  • Reported to be 25% more effective as prevention
  • CDC does not specifically recommend
  • Patients more likely to develop side effects
    • Fever, injection site pain

Influenza Vaccines Types

• LAIV: Live attenuated influenza vaccine
  • LAIV4: Flumist: Contains 2 Type A and 2 B
  • Not for use in immunocompromised patients
  • Not for use in moderate/severely ill patients
  • Approved for ages 2 – 49
  • CDC does not specifically recommend

Source: www.cdc.gov
Tetanus, Diphtheria, Pertussis

• Available in combination only
  • Td – tetanus toxoid, diphtheria toxoid
  • Tdap – tetanus and diphtheria toxoids with acellular pertussis
• Recommendations
  • Td – booster every 10 years
  • Tdap
    • One time dose to replace Td booster
    • For adults who have close contact with infants < 12 months old

Source: www.cdc.gov

Tetanus
Tetanus

- Caused by *Clostridium tetani*
- Spores are found in soil, dust, feces
- Disease caused by toxin
  - Binds in the CNS, blocks neurotransmitters which prevents muscle relaxation and causes tetany

Tetanus

- Presents with descending symptoms
  - Trismus (lockjaw), difficulty swallowing, muscle rigidity and spasms
- Symptoms persist for about one month
- Over 30% mortality
- Complications
  - Respiratory distress, bone fractures, pneumonia
Diphtheria

- Caused by *Corynebacterium diphtheriae*
- Can involve any mucous membrane
- Exudative pharyngitis is most common
  - Pulmonary obstruction due to pseudo membrane formation
Pertussis

Whooping Cough
This infection causes uncontrollable and violent bouts of cough leading to extreme difficulty in breathing.

Pertussis Vaccine

- Whole cell pertussis vaccine (DTwP)
  - Linked to acute encephalopathy and seizures
  - No longer available
- Acellular pertussis vaccine (DTaP, Tdap)
  - Developed due side effects of DTwP
  - Contains components of cell of the bacteria
  - Fewer AE with no reports of encephalopathy
Acellular Pertussis Vaccine

- Less effective than whole-cell vaccine
- Give one Tdap in place of tetanus booster
- Immunized patient may be carriers
- Recent resurgence in whooping cough
  - Possibly due to immunized carriers
  - Not having received adult booster (Tdap)
  - Unimmunized patients create reservoir of disease

Varicella – Chicken pox
Varicella – Shingles

Varicella Zoster

- Caused by varicella zoster virus
- Chicken pox is the primary infection
- Herpes zoster ("shingles") – reactivation
- Highly contagious via respiratory transmission or contact
Varicella Vaccine

- Live attenuated vaccine
- Adult recommendation
  - US born after 1979 without evidence of vaccination or previous infection
  - Younger than 60 years old
  - Should receive two doses 4 - 8 weeks apart

Zoster Vaccine

- Identical to varicella vaccine but with ~15x higher titer
- Not to be given if previous varicella vaccination
- Vaccine group had 51% less episodes of zoster
- CDC recommends to adults 60 and over

Source: www.cdc.gov
Pneumococcal Vaccine

- Streptococcus pneumoniae
  - 90 known serotypes
  - Drug resistant strains are becoming more common – up to 30%
  - 23 serotypes account for 85-90% of invasive disease
  - 13 serotypes account for 61% of disease in younger patients
Pneumococcal Vaccine

- 23-valent pneumococcal polysaccharide vaccine
  - Pneumovax (PPSV23)
  - Indicated for adults > 50 and children > 2 years old
- 13-valent pneumococcal conjugate vaccine
  - Prevnar 13 (PCV13)
  - Approved 2/2010

Pneumococcal Vaccine

- Adults over 65
Pneumococcal Vaccine

**General Recommendations**
- All patients 65 or over – Prevnar 13 followed by Pneumovax 12 months later
- Under age 65 - Pneumovax should be given only in any of the following conditions:
  - Smokers and nursing home residents
  - Chronic heart, lung, or liver disease
  - Alcoholism
  - Diabetes

Source: Recommended Adult Immunization Schedule, Footnote 8

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Pneumococcal Vaccine

**Immunocompromised Recommendations**
- No previous – Prevnar 13 followed by Pneumovax in 8 weeks, booster in 5 years
- Previous Pneumovax – Prevnar 13 in 1 year
- Previous Prevnar 13 – Pneumovax in 8 weeks
- Vaccinate at least 2 weeks before immunosuppressive therapy or splenectomy
- Vaccinate newly diagnosed HIV patients early

Source: Recommended Adult Immunization Schedule, Footnote 8
Pneumococcal Vaccine

- Qualifications for immunocompromise:
  - All immunodeficiency and malignancy,
  - Transplant patients
  - Organ failure, including functional asplenia
  - Immunosuppressive therapy

Source: Recommended Adult Immunization Schedule, Footnote 8

Medicare Coverage

- Medicare Part B
  - Influenza, standard and high-dose
  - Prevnar 13 and Pneumovax
  - Tdap (if associated with an injury)
- Medicare Part D
  - Zoster vaccine
  - Tdap (preventive)

Source: Journal of the American Geriatric Society, 2015
Vaccine Information Statements

• Required under the National Childhood Vaccine Injury Act
• "All health care providers...shall, prior to administration of each dose of the vaccine, provide a copy to keep of the relevant current edition...
• www.cdc.gov/vaccines/pubs/vis

Vaccine Information Statements

• The medical record must include:
  • The edition date of the VIS
  • The date it was provided to the patient
  • Name, address, and title of person administering the vaccine
  • Date of administration
  • Vaccine manufacturer and lot number

Source: www.cdc.gov/vis
MYTHS About Vaccines

• “Aluminum leads to dementia and neurologic diseases”
  • Used in some vaccines to improve the immune response for over 70 years
  • Quickly eliminated
  • More aluminum is absorbed through food, drink, and antacids than vaccines

Source:  www.chop.edu; www.nap.edu; www.cdc.gov

MYTHS About Vaccines

• “Formaldehyde causes blindness, encephalopathy, seizures, leukemia”
  • Used to detoxify toxins
  • Used to inactivate viral vaccines
  • Miniscule amount in vaccine is safe

Source:  www.chop.edu; www.cdc.gov
MYTHS About Vaccines

• “The pneumonia shot doesn’t work”
  • General misconception that the vaccine prevents all pneumonia
    • Providers need be clear regarding the purpose
  • 60 – 70% effective in preventing pneumococcal pneumonia

Source: www.cdc.gov

MYTHS About Vaccines

• “The flu shot doesn’t work”
  • Age and comorbidities can be a factor
    • Consider high-dose vaccine if appropriate
  • Depends on the strains of virus in the vaccine
  • Vaccine will provide at least some protection in either situation

Source: www.cdc.gov; www.chop.edu; www.adultvaccination.org;
MYTHS About Vaccines

• “I can get the flu from the vaccine”
  • Inactivated influenza vaccine does not contain any live virus
  • It is incapable of causing the flu
  • Muscle aches and low-grade fever can occur
    • Preemptively recommend acetaminophen or nsaids

Source: www.cdc.gov; www.vaccineinformation.org; www.chop.edu;

Provider MYTHS

• “You have to wait at least 5 years between Td and Tdap vaccines”
  • There is no minimum interval between these vaccines
  • Could be given together if necessary

Source: www.cdc.gov; www.immunize.org;
Provider MYTHS

• “You can only give one vaccine per visit”
  • There is not established limit
  • All recommended vaccines should be administered during the same visit
  • Live vaccines can be given together OR separated by 4 weeks
  • Inactivated vaccines can be given together or at any interval

Source: www.cdc.gov; www.immunize.org

Provider MYTHS

• “You can’t give vaccines to ill patients”
  • Vaccines can be given during mild acute illness with a fever
  • Vaccines can be given during a course of antibiotics

Source: www.cdc.gov; www.immunize.org
**Provider MYTHS**

- “You need to check vitals prior to vaccination”
  - ACIP does not recommend checking vitals before vaccination
  - Mild illness and fever is not a reason to withhold administration
  - Can increase visit time unnecessarily

Source: www.cdc.gov; www.immunize.org;

**Resources**

- American Geriatric Society – www.jags.com
- CDC - www.cdc.gov/vaccines/
- Immunization Action Coalition - www.immunize.org/
- Morbidity and Mortality Weekly Report - www.cdc.gov/mmwr/
- National Foundation for Infectious Diseases - www.nfid.org/
- National Network for Immunization Information - www.immunizationinfo.org/
- Natural News - www.naturalnews.com
- Vaccine Adverse Event Reporting System - vaers.hhs.gov/
- WebMD – www.webmd.com
Questions