VACCINATIONS FOR OLDER PATIENTS

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Objectives

• Incorporate current CDC guidelines into your practice

• Identify and vaccinate appropriate adult 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 the immune system to protect the person against infection and disease.

World Health Organization, 2016

Types of Vaccines

• Attenuated
  • An infectious agent altered to become harmless or less virulent
  • Should be avoided if immunocompromised
  • May induce more permanent immunity
  • Worst case: may cause disease

www.vaccines.gov
Types of Vaccines

- **Inactivated**
  - Pathogen is destroyed by heat, chemicals or radiation
  - Stimulate a weaker immune response
  - May require a booster dose
  - Worst case: does not work

[www.vaccines.gov](http://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

[www.vaccines.gov](http://www.vaccines.gov)
Examples of Vaccines (adult)

**Live**
- Influenza (intranasal)
- Zostavax
- Varicella

**Inactivated**
- Influenza (IM)
- TDAP
- Shingrex
- Hepatitis A & B
- Pneumococcal

Immunosenescence

- Progressive, age-related deterioration in the ability to respond to infections
- Increased susceptibility to cancers and infections
- Associated with a higher mortality rate in the elderly
- Decreased response to vaccinations

*Immunology. 2007 Apr; 120(4): 435–446*
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
  - Biologicals: safe to administer vaccine, best to give prior to starting therapy

Source: National Center for Immunization and Respiratory Diseases

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

- **Ro (R naught)** is the number of people predicted to become infected by one person.
- **Ro for influenza** is about 1.5.
- **Ro for pertussis** is about 15.
- **Ro** is the basis for calculating threshold.
- **Example:** Ro for measles is about 15.
  - (Vax pop 90%): 1 – 2 – 3 – 5 – 8 people

### Disease Immunity Table

<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)
  - Publishes schedules from recommendations made by
    - ACIP – Advisory Committee on Immunization Practices
    - American Academy of Family Physicians
    - American College of Obstetrics and Gynecology
    - American College of Physicians

Adult Immunization Schedule 2019

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>18–21 years</th>
<th>22–26 years</th>
<th>27–49 years</th>
<th>50–64 years</th>
<th>≥65 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza inactivated (IV) or Influenza recombinant (IV)</td>
<td></td>
<td></td>
<td>1 dose annually</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Influenza live attenuated (LAIV)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tetanus, diphtheria, pertussis (Tdap or Td)</td>
<td></td>
<td></td>
<td></td>
<td>1 dose Tdap, then Td booster every 10 yrs</td>
<td></td>
</tr>
<tr>
<td>measles, mumps, rubella (MMR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varicella (VAR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zoster recombinant (RZV) preferred</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zoster live (ZV)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Female</td>
<td>2 or 3 doses depending on age at initial vaccination</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Male</td>
<td>2 or 3 doses depending on age at initial vaccination</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal conjugate (PCV13)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal polysaccharide (PPSV23)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

1 or 2 doses depending on indication
Influenza

- Trivalent and quadrivalent forms
- Antigen selection based on recent outbreaks
- May take nearly 6 months to create
- Reduces risk by 90% in healthy adults
- Reduces risk in frail elderly by 30-40%
  - Up to 4x morbidity/mortality due to flu
Influenza

- High-dose influenza vaccine
  - Approved for people age 65 and older
  - 4x the amount of antigen
  - Reported to be 25% more effective compared to regular dose
  - CDC does not specifically recommend
  - Patients more likely to develop side effects
    - Fever, injection site pain

Influenza

- Attenuated, intranasal vaccine
  - 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

www.cdc.gov
Tetanus, Diphtheria, Pertussis

- **Forms**
  - Td – tetanus toxoid, diphtheria toxoid
  - Tdap – tetanus and diphtheria toxoids with acellular pertussis

- **Recommendations**
  - Td – every 10 years
  - Tdap
    - One time dose to replace Td booster
    - For adults who have close contact with infants < 12 months old

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Tetanus

Sir Charles Bell's portrait of a soldier dying of tetanus. The characteristic rigidity of the body is referred to as opisthotonos and risus sardonicus. Original in the Royal College of Surgeons of Edinburgh, Scotland.
Tetanus

- Caused by *Clostridium tetani*
- Spores are found in soil, dust, feces
- Disease does not confer immunity
- 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 Virus

- Chicken pox is the primary infection
- Herpes zoster ("shingles") – reactivation
- Highly contagious
- Varicella vaccine part of childhood regimen
- Can be given up to age 40
- Unknown if life-long immunity
Zoster Vaccine

- Two forms
  - Zostavax (live attenuated)
  - Shingrex (inactivated)
- Recommendation
  - All patients over age 50
  - Shingrex preferred due to safety and efficacy
  - Regardless of previous varicella vaccination

Zostavax

- Identical to varicella vaccine (attenuated) but with ~15x higher titer
- About 50% effective
- Can not be given to immunocompromised
- CDC recommends to adults 60 and over

www.cdc.gov
Shingrix

- Recombinant zoster vaccine
- Should be given to all patients previously immunized patients
- Two-part dose given 2 – 6 months apart
- Preferred vaccine by CDC
- For patient age 50 and older

www.cdc.gov

Pneumococcal Vaccine
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 poly-saccharide vaccine
  - Pneumovax (PPSV23)
  - Indicated for adults over age 50
- 13-valent pneumococcal conjugate vaccine
  - Prevnar 13 (PCV13)
  - Indicated for adults over age 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 in any of the following conditions:
    - Smokers and nursing home residents
    - Chronic heart, lung, or liver disease
    - Alcoholism
    - Diabetes

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

Recommended Adult Immunization Schedule, Footnote 8
Pneumococcal Vaccine

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

- Recommended Adult Immunization Schedule, Footnote 8

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

www.cdc.gov/vis

Litigation and Liability

- 2016 CA law removes all exemptions for childhood vaccines
- CDC guidelines and quality measures are in place
- Would be difficult to prove preventable outcome
- Who would be liable?
Summary

- Shingrix after age 50
- Prevnar 13 and Pneumovax 23 after age 65, one year apart
- Tdap once as an adult to replace Td
- Influenza yearly
- Use high dose influenza over 65

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
MYTHS About Vaccines

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

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

www.cdc.gov
MYTHS About Vaccines

• “The flu shot doesn’t work”
  - Age and comorbidities can be a factor
    - Consider high-dose vaccine over age 65
  - Depends on the strains of virus in the vaccine
  - Vaccine will provide at least some protection

  - 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
  - No chance of causing the flu
  - Muscle aches and low-grade fever can occur
    - Preemptively recommend acetaminophen or nsaids

  - 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

  • www.cdc.gov
  • www.immunize.org;

Provider MYTHS

• “You can only give one vaccine per visit”
  • There is no 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 at any interval

  • 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

  - 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

  - www.cdc.gov; www.immunize.org;
Resources

- American Geriatric Society – www.jags.com
- British Society of Rheumatology
- 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