Vaccines in the Long-Term Care Facility

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Objectives

• Review basic knowledge of vaccines and the importance of their use in the long-term care facility (LTCF)
• Describe the vaccine-preventable diseases patients in the LTCF are at highest risk of acquiring, as well as the less common but potential diseases
• Accurately summarize vaccine information including indications, contraindications, and precautions

Disclosure

I, Spencer Durham, have no actual or potential conflict of interest in relation to this program.
Definitions

- **Vaccine**: “A product that stimulates a person’s immune system to produce immunity to a specific disease, protecting the person from that disease”
- **Vaccination**: “the introduction into humans or domestic animals of microorganisms that have previously been treated to make them harmless for the purpose of inducing the development of immunity”

Vaccines

- Concept of vaccination has been used for centuries
  - Probably originated from inoculation to prevent smallpox
- Many scientists have studied and created vaccines:
  - Edward Jenner
  - Louis Pasteur
  - Jonas Salk

Vaccines

- “Vaccine”
  - First coined by Edward Jenner when investigating smallpox
  - derived from *Variolae vaccinae*
  - Latin translation of the word “cowpox”
    - “Vacca” means “cow”
  - Jenner discovered that dairymaids infected with cowpox did not acquire smallpox
  - He is now largely credited with having invented the first vaccine
Vaccines

• Advantages to vaccines:
  – Prevent diseases
  – Mitigate effects of diseases
  – Promotion of herd immunity
  – Elimination of diseases
    • Polio
  – Eradication diseases
    • Smallpox
    • Rinderpest

Vaccines

• Disadvantages to vaccines:
  – Effectiveness is not always certain (i.e., immune compromised states)
  – Adverse effects
    • Usually very mild (injection site reactions, fever, headache)
  • In general, vaccines are overwhelmingly well-tolerated and safe

Vaccines

• Vaccines are widely used in persons of all ages
• Some patients are more susceptible to diseases, or at a greater risk of complications and sequela:
  – Extremes of age
  – Chronic medical conditions
  – Immunosuppression
• Many patients residing in LTCFs are at a higher risk of complications for vaccine-preventable diseases
Long-Term Care Facilities

• Need for LTCFs is expected to increase in the coming decades
  – Rapidly aging population
  – Increased life expectancy
• Infectious diseases are a common occurrence in the LTCF setting
  – Influenza
  – Pneumonia
  • *Streptococcus pneumoniae*

Long-Term Care Facilities

• The Centers for Medicare and Medicaid Services (CMS) use influenza and pneumococcal vaccination rates as a quality measure
• Vaccination important not only for individual patients, but also to promote herd immunity within the LTCF and to avoid outbreaks

Long-Term Care Facilities

• Patients in LTCFs may be eligible for and benefit from a variety of vaccines
  – Influenza
  – Pneumococcal
  – Herpes zoster
• Other vaccines may be necessary in patient specific scenarios
  – *Haemophilus*
  – Meningococcal
  – Hepatitis B
What vaccines are most important for patients in the LTCF to receive?

- Influenza
  - Highly contagious respiratory virus spread through droplets
    - Sneezing, coughing, talking
    - Fomites
      - Less common
  - Disease severity varies widely, from very mild to severe, sometimes resulting in death
  - All age groups affected

- Influenza
  - Complications:
    - Ear/sinus infections
    - Bacterial pneumonia
    - Severe dehydration
    - Exacerbations of chronic disease states:
      - Heart failure
      - Diabetes mellitus
      - Asthma
      - COPD
Influenza

• Groups at high risk of complications:
  – ≥ 65 years of age
  – Chronic diseases
  – Pregnant women
  – Pediatric patients
• Residents of LTCFs often fall into high-risk groups
• Confined environment also makes spreading and acquisition more likely

Influenza Vaccine

• Annual vaccination recommended for all persons ≥6 months of age
• Persons ≥ 65 years can should receive either:
  – High dose vaccine
    • 4x antigen amount than regular dose
  – Vaccine with adjuvant
    • Added ingredient to elicit a stronger immune response
• Other adults may receive the standard vaccine

Influenza Vaccine

• Contraindications:
  – Severe allergic reactions:
    • Previous vaccines
    • Vaccine components
    • Egg protein
• Precautions:
  – History of Guillain-Barré syndrome
  – Acute illness ± fever
  – Egg allergy (hives only)
Pneumococcus

- *Streptococcus pneumoniae*
- Colonizes upper respiratory tract
- Common pathogen implicated in a variety of diseases
  - Respiratory infections
    - Pneumonia
  - Meningitis
  - Bacteremia/sepsis
  - Osteomyelitis

Pneumococcus

- Spread through close contact, coughing, sneezing, etc.
- All age groups at risk
- Increased risk:
  - ≥ 65 years of age
  - Chronic diseases
  - Immune suppression
- Antimicrobial resistance is increasing
- Outbreaks can occur in LTCFs and other close quarters

Pneumococcus Vaccine

- Two vaccines are currently available:
  - Prevnar 13 (conjugated vaccine)
    - Polysaccharide component is attached to a protein component
    - Elicits a strong immune response in younger patients
  - Pneumovax 23 (polysaccharide vaccine)
    - Composed of polysaccharide components of the bacterial surface capsule
    - Induces B-cells without the help of T-cells
    - Typically induces a potent immune response; used for high-risk patients
Pneumococcal Vaccine

• Prevnar 13
  — One dose recommended for all adults ≥ 65 years of age
  — ≤ 64 years with certain conditions should receive one dose
    • Immunosuppression
    • Asplenia
    • CSF leaks
    • Cochlear implants

• Pneumovax 23
  — One dose recommended for all adults ≥ 65 years of age
  — ≤ 64 years with certain conditions should receive two doses given 5 years apart
    • Chronic heart, lung, kidney diseases
    • Asplenia
    • Immunosuppression
    • CSF leaks and cochlear implants

• In patients who require both Prevnar 13 and Pneumovax 23:
  — Prevnar 13 should be administered first
    • Do not administer together
  — Separate doses by at least one year
    • 8 weeks in cases of chronic diseases, asplenia, etc.
• Contraindications: severe allergic reaction to prior vaccine
• Precaution: Moderate/severe acute illness ± fever
<table>
<thead>
<tr>
<th>Herpes Zoster</th>
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<tbody>
<tr>
<td><strong>“Shingles”</strong></td>
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<tr>
<td>Caused by varicella zoster virus (VZV)</td>
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<tr>
<td>Highly prevalent, with &gt; 1 million cases diagnosed annually</td>
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<td>— 1 out of every 3 people will develop shingles during their lifetime</td>
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<td>Characterized by a painful rash and blisters on one side of the body</td>
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<td>Risk increases with age</td>
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<td>— Half of all cases occur in &gt; 60 years of age</td>
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<tbody>
<tr>
<td>VZV is also the cause of varicella (chickenpox)</td>
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<tr>
<td>After initial infection, the virus stays dormant in the body</td>
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<td>Reactivation can occur anytime after initial infection</td>
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<tr>
<td>— Stress</td>
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<tr>
<td>— Immune suppression</td>
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<td>— Other diseases</td>
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<tr>
<td>VZV is spread through direct contact with the virus</td>
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<td>— Usually through fluids from the blisters of someone infected</td>
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<td>— Can be spread from blisters of chickenpox or shingles</td>
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<tr>
<td>Once the blisters develop crusts, the person is no longer contagious</td>
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Herpes Zoster

• Complications of herpes zoster infection:
  – Most common complication is post-herpetic neuralgia (PHN)
    • Pain persists despite resolution of the rash
    • Pain can be debilitating in some patients
  – Ophthalmic sequela can also occur
  – Bacterial superinfection
    • Staphylococcus aureus
    • Streptococcus species

Herpes Zoster Vaccine

• Live virus
• Vaccination recommended for the following:
  – All persons ≥ 60 years of age, regardless of prior episodes of zoster or varicella
    • No need to screen for prior varicella
  – Vaccine is approved for use in persons ≥ 50 years of age
    • However, CDC does not recommend vaccination until age 60

Herpes Zoster Vaccine

• Contraindications:
  – Severe allergic reaction to any vaccine component
    • Gelatin
    • Neomycin
  – Severe immunodeficiency
    • Cancer or receipt of chemotherapy
    • HIV
    • Long-term immunosuppressive therapy (i.e., steroids)
    • Congenital immunodeficiency
    • Pregnancy
Herpes Zoster Vaccine

- Precautions:
  - Moderate/severe acute illness ± fever
  - Receipt of antivirals 24 hours prior to vaccination
    - Acyclovir
    - Famciclovir
    - Valacyclovir
  - These antivirals should also be avoided for 14 days post-vaccination

What are some other vaccines to consider in patients in the LTCF?

Haemophilus

- *Haemophilus influenzae*
  - Normally reside in the upper respiratory tract
    - Typically are non-pathogenic, but can cause infections under the right circumstances
  - Can cause localized or more invasive infections
  - Spread through contact with respiratory droplets
    - Coughing, sneezing, etc.
Haemophilus

- Responsible for a variety of clinical syndromes:
  - Upper respiratory infections
    - Otitis media
    - Sinusitis
    - Epiglottitis
  - Pneumonia
  - Meningitis
  - Bacteremia/sepsis
  - Skin/soft tissue infections (less common)

- Divided into two broad categories:
  - Unencapsulated strains
  - Encapsulated strains

- Encapsulated
  - Six types, designated “a,b,c,d,e,f”
  - Capsules are a major virulence factor
  - Type “b” (Hib) is most prevalent and well-known
    - Causes almost all cases of Haemophilus-induced meningitis and other invasive diseases

- Unencapsulated (nontypeable)
  - Generally less virulent, but can still cause less invasive diseases, such as upper respiratory infections

- Risk factors
  - ≤ 5 years of age
  - ≥ 65 years of age
  - Asplenia
  - Immunocompromised


**Haemophilus Vaccine**

- The only available vaccine targets Hib
  - No other typeable and no nontypeable strains are covered through vaccination
- Vaccination is highly effective
  - In 2013, there were < 40 cases of Hib infection in children < 5 years of age

**Haemophilus Vaccine**

- There is no specific recommendation for vaccination in adults
  - Most adults and older adults are not at a high risk for Hib
- Vaccine recommended for asplenia and hematopoietic stem cell transplantation
- Screen all LTCF patients for asplenia
  - Do not forget to consider functional asplenia

**Meningococcus**

- *Neisseria meningitidis*
- Common cause of bacterial meningitis in adults and children
- ~10% of the population carry the bacteria in the nose and throat
- Five strains cause the vast majority of disease worldwide: A, B, C, W, Y
  - B, C, and Y are most common in the United States
**Meningococcus**

- Spread through close contact via respiratory secretions
  - Coughing
  - Kissing
- Usually occurs in those living in close quarters
  - College dormitories
  - Military barracks
- Not spread through casual contact

**Meningococcal Vaccine**

- 3 different vaccines available in the United States that cover serotypes B, C, and Y
- In general, children and young adults are typically at highest risk, and vaccination efforts are targeted towards them
- However, some adults meet criteria as well:
  - Complement component deficiency
  - Anatomical or functional asplenia
  - Part of a population at risk due to an outbreak

**Hepatitis B**

- Major cause of liver disease
- Transmitted through mucosal or percutaneous contact with infected bodily fluids
  - Blood
  - Semen
- Risk factors for patients in LTCFs:
  - Sexual contact
  - Hemodialysis
Hepatitis B Vaccine

• Vaccine recommendations likely to apply to the LTCF setting:
  – End-stage renal disease, including receipt of dialysis
  – Chronic liver disease
  – ≤ 59 years of age with diabetes mellitus
    • Consider vaccination for ≥ 60 years of age
  – HIV infection
  – Sexually active patients

Resources

• Centers for Disease Control (CDC) website
  – www.cdc.gov/vaccines
• Department of Health and Human Services (DHHS)
  – www.vaccines.gov

References

• Kim DK, Bridges CB, Harriman KH. Advisory Committee on Immunization Practices Recommended Immunization Schedule for Adults Aged 19 Years or Older — United States, 2016. MMWR Morb Mortal Wkly Rep 2016;65( RR-40).