Hot Topics in Geriatric Medicine: Vaccination in Older Adults

A presentation for HealthTrust Members
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Speaker Disclosures

The presenter has no real or perceived conflicts of interest related to this presentation.

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Objectives: Pharmacist & Nursing

- Describe age related changes to the immune system and respiratory tract
- Compare and contrast standard and high dose influenza vaccinations
- Explain shared decision making for PCV13 in immunocompetent adults 65 and older
- Discuss management of shingles vaccination during shortage

Objectives: Technician

- List brand names for influenza vaccinations indicated in older adults
- Recall appropriate storage conditions for vaccinations indicated in older adults

Background

Immunosenescence

- Immunosenescence: age related changes to the immune system
- Immunocompetence ↓ with age
- Innate Immunity
  - Thinning of skin and loss of elasticity
  - ↓ signaling of neutrophils and migration to site of illness
  - ↓cytotoxic natural killer cells, ↑cytokine production by natural killer cells
- Adaptive Immunity
  - Thymus decreases in size
    - ↓T cell maturation
  - ↓ antibody production in response to antigens

Source: Inouye SK. Hazard's Geriatric Medicine and Gerontology. 2017. 7e.

Respiratory Tract Changes

- Decreased elasticity of lung tissue
  - Changes to chest wall and muscles preserve lung capacity
  - Unable to quickly move air in and out of lungs
- All measures of air flow ↓ with age
- Rapid closure of small alveoli
  - ↑ residual lung volume and dead air space
  - ↓ arterial oxygen tension linearly with age

Source: Inouye SK. Hazard's Geriatric Medicine and Gerontology. 2017. 7e.

Immunosenescence Summary

- Both innate and adaptive immunity decline with age
  - ↑ incidence and severity of illness
  - ↓ response to vaccines
- Vaccination is the most effective measure to prevent infection
- Influenza and pneumonia are the 8th leading cause of death in the US
  - 55,672 deaths in 2017 for all age categories
  - 46,862 deaths in 2017 for those 65 and older

Source: Inouye SK. Hazard's Geriatric Medicine and Gerontology. 2017. 7e.
Influenza [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/flu/prevent/qa_fluzone.htm

Knowledge Check 1

1. Which of the following is NOT an example of age related changes to the immune system?

A. Decrease B cell production

B. Skin thinning

C. Decreased T cell maturation

D. Decrease migration of NK cells to site of illness

Knowledge Check 1 Response

1. Which of the following is NOT an example of age related changes to the immune system?

A. Decrease B cell production

B. Skin thinning

C. Decreased T cell maturation

D. Decrease migration of NK cells to site of illness

Immunization Overview

Table 1 Recommended Adult Immunization Schedule by Age Group, United States, 2020

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
Influenza inactivated (IIV) or **Influenza recombinant** (RIV)	1 dose annually			
or				
Influenza live, attenuated (LAIV)	1 dose annually			
Tetanus, diphtheria, pertussis (Tdap or Td)	1 dose Tdap, then Td or Tdap booster every 10 years			
Measles, mumps, rubella (MMR)	1 or 2 doses depending on indication (if born in 1957 or later)			
Varicella (VAR)	2 doses (if born in 1980 or later)		2 dos s	
Zoster recombinant (RZV) *(preferred)*			2 d ses	
or			r	
Zoster live (ZVL)			1 d se	
Human papillomavirus (HPV)	2 or 3 doses depending on age at initial vaccination or condition	27 through 45 years		
Pneumococcal conjugate (PCV13)	1 dose			65 years and older
Pneumococcal polysaccharide (PPSV23)	1 or 2 doses depending on indication			1 dose
Hepatitis A (HepA)	2 or 3 doses depending on vaccine			
Hepatitis B (HepB)	2 or 3 doses depending on vaccine			
Meningococcal A, C, W, Y (MenACWY)	1 or 2 doses depending on indication, see notes for booster recommenda ions			
Meningococcal B (MenB)	2 or 3 doses depending on vaccine and indication, see notes for booster recom nendations			
	19 through 23 years			
***Haemophilus influenzae* type b** (Hib)	1 or 3 doses depending on indication			

Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of past infection

Recommended vaccination for adults with an additional risk factor or another indication

Recommended vaccination based on shared clinical decision-making

No recommendation/ Not applicable

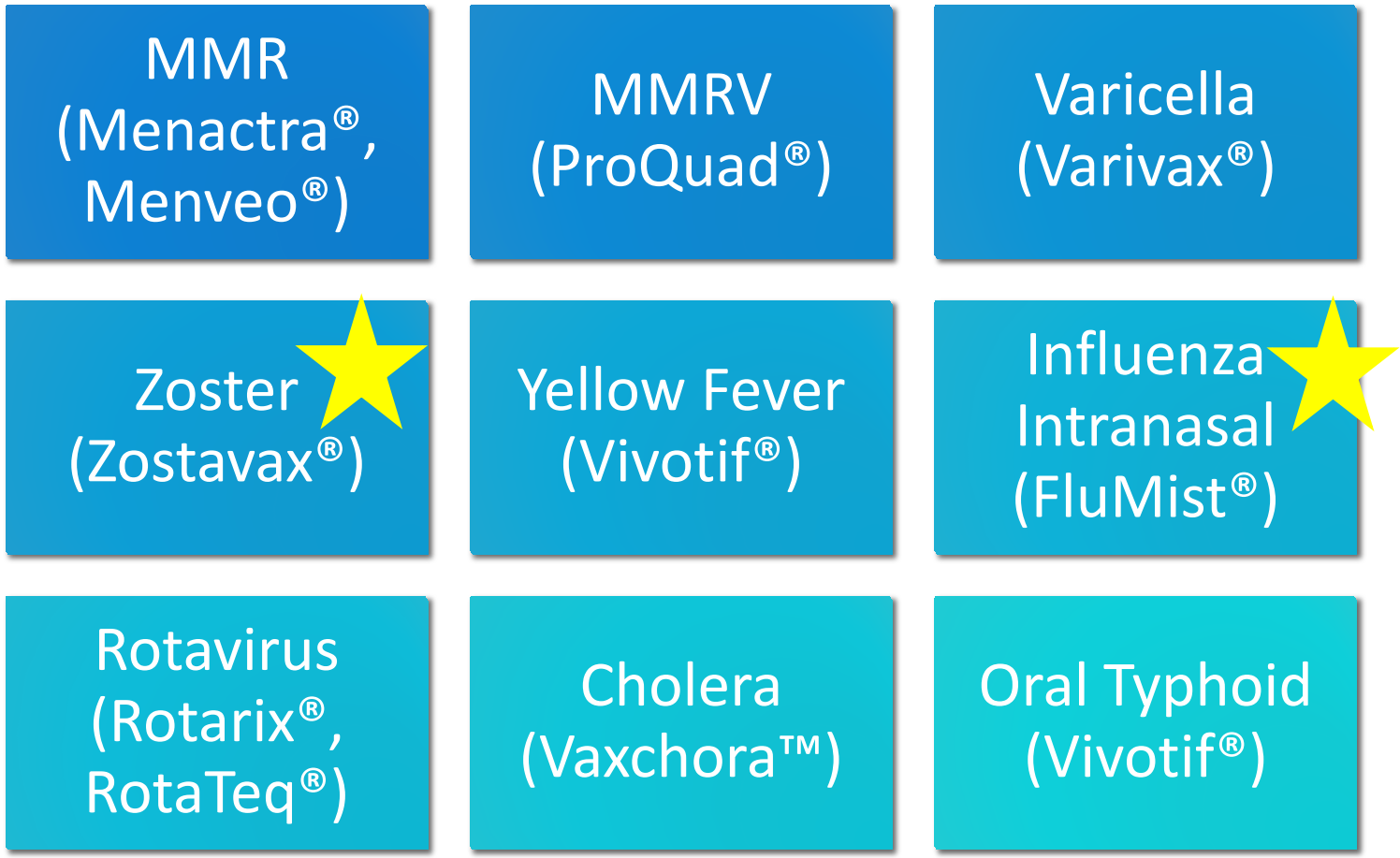
Source: Recommended Adult Immunization Schedule [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf

Live vs. Inactivated Vaccines

- Live attenuated (weakened) vaccines
  - Made from viruses or bacteria in laboratory
  - Must retain the ability to replicate (grow) and produce immunity
  - Most similar to actual disease and produce a strong immune response
- Inactivated vaccines
  - Made from viruses or bacteria (whole or fractions)
  - Do not replicate (killed)
    - Antigen load stimulates immune response
  - May contain adjuvants to enhance immune response but usually diminishes with time
    - May require supplemental doses, or boosters

Source: Principles of Vaccination [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/prinvac.pdf

Live Vaccines



Source: Principles of Vaccination [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/prinvac.pdf

General Contraindications to Vaccination

- Severe or anaphylactic reaction following a dose of a vaccine is a contraindication to subsequent doses of that vaccine
- Live vaccines are contraindicated in pregnancy and immunosuppression
- Moderate or severe acute illness
  - Reasonable to delay vaccination until resolved

Source: Principles of Vaccination [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/prinvac.pdf

Influenza Vaccination

Influenza Vaccine Recommendations

- For all persons age 6 months or older: 1 dose of any vaccine appropriate for age and health status annually
- Contraindications to live attenuated influenza virus (LAIV):
  - Immunocompromised
  - Anatomic of functional asplenia
  - Caregiver or close contact of severely immunosuppressed persons who require a protected environment
  - Cochlear implant
  - Cerebrospinal fluid-oropharyngeal communication
  - Pregnancy
  - Received influenza antiviral medications within the previous 48 hours

Source: Recommended Adult Immunization Schedule [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf

Influenza Vaccine Contraindications

- History of Guillain-Barré syndrome within 6 weeks of previous of influenza vaccine
  - Avoid unless vaccination benefits outweigh risks for those at higher risk for severe complications from influenza
- Egg Allergy
  - Hives only
    - 1 dose any vaccine appropriate for age and health status
  - More severe than hives (e.g., angioedema, respiratory distress)
    - 1 dose any vaccine appropriate for age and health status
      - Administer in a medical setting under supervision of health care provider who can recognize and manage severe allergic reactions

Source: Recommended Adult Immunization Schedule [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf

Influenza Vaccines

- Influenza A and B: types that cause epidemic human disease
- Trivalent vs. quadrivalent
  - Trivalent- protects against two strains of influenza A (H1N1 and H3N2) and one strain of influenza B
  - Quadrivalent- protects against two strains of influenza A (H1N1 and H3N2) and two strains of influenza B

Source: Influenza [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/flu/prevent/qa_fluzone.htm

Types of Influenza Vaccines 2019-2020

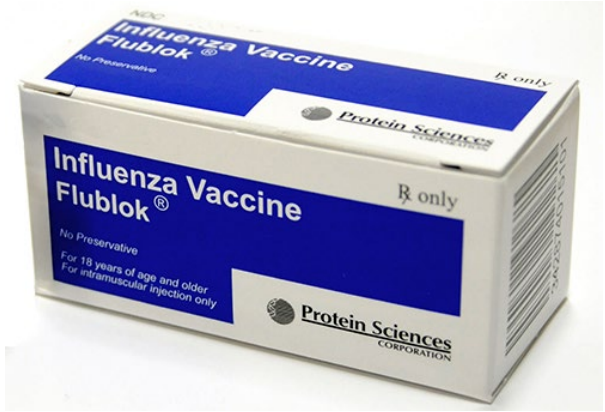
Type of Influenza Vaccine	Abbreviation	Brand Name
Inactivated influenza vaccine, quadrivalent, standard-dose	SD-IIV3	-
Inactivated influenza vaccine, quadrivalent, standard-dose	SD-IIV4	Fluarix, Fluzone®, Afluria®, FluLaval
Inactivated influenza vaccine, quadrivalent, standard-dose, cell culture-based	ccIIV4	Flucelvax®
Live attenuated influenza vaccine, quadrivalent	LAIV4	FluMist®
Recombinant influenza vaccine, quadrivalent	RIV4	Flublok®
Adjuvanted inactivated influenza vaccine, trivalent, standard-dose	aIIV3	Fluad®
Inactivated influenza vaccine, trivalent, high-dose	HD-IIV3	Fluzone High Dose®

Source: Influenza [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/flu/prevent/qa_fluzone.htm

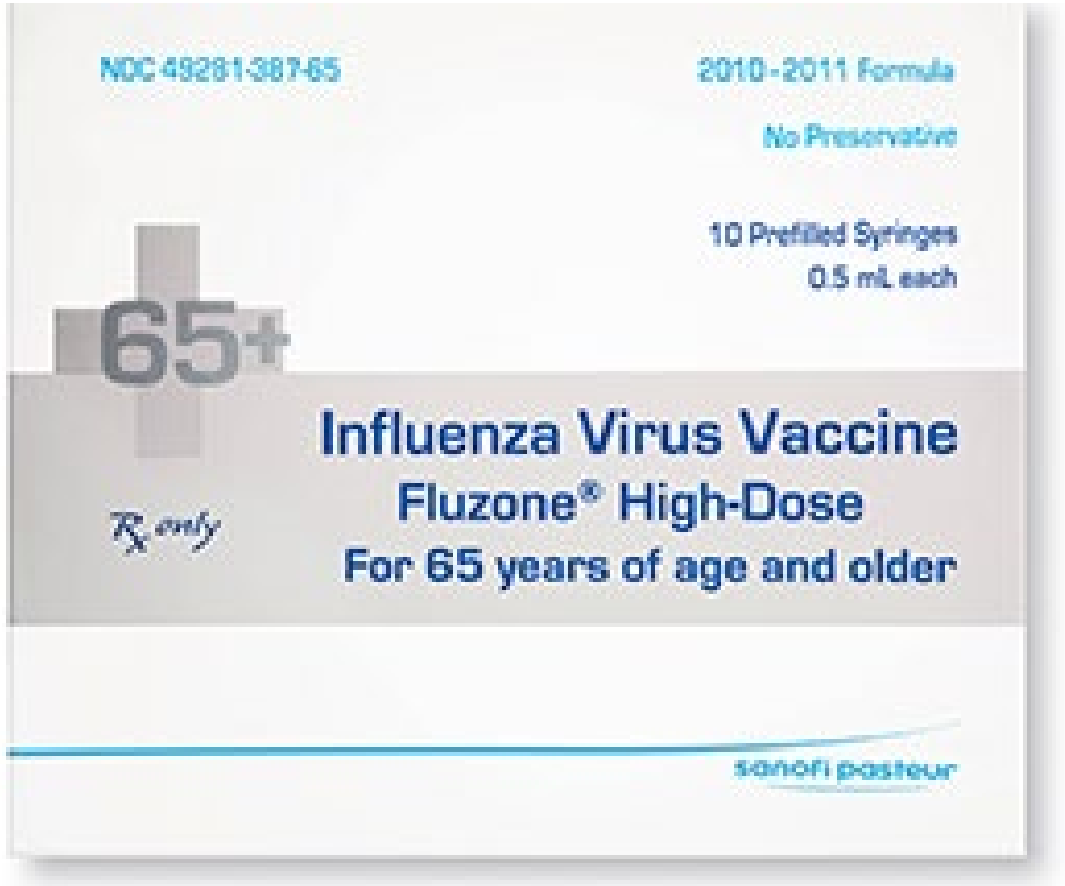
Non-Egg Cultured Vaccines

- Flucelvax ® Quadrivalent- ccIIV4
  - Cultured in canine kidney cells
  - May still contain miniscule amounts of egg
  - Indicated: ≥4 years

- Flublok ® Quadrivalent- RIV4
  - Recombinant
  - Cultured in insect cells
  - Contains no egg
  - Slightly shorter shelf life
  - Indicated: ≥18 years



Source: Flublok [prescribing information]. Meriden, CT: Protein Sciences Corporation; 2013.;
Flucelvax [prescribing information]. Summit, NJ: Seqirus Inc; 2019.



Vaccines licensed for age ≥ 65 years only

- Trivalent, high dose influenza vaccine (HD-IIV3)
  - Fluzone High Dose ®
- Contains 4x the amount of antigen
- 0.5 mL IM injection pre-filled syringe
- Store in refrigerator, do not freeze
  - Discard if vaccine if frozen

Source: Fluzone High-Dose vaccine [prescribing information]. Swiftwater, PA: Sanofi Pasteur Inc; 2017.

Efficacy of High-Dose vs. Standard-Dose Influenza Vaccine in Older Adults by DiazGranados et al

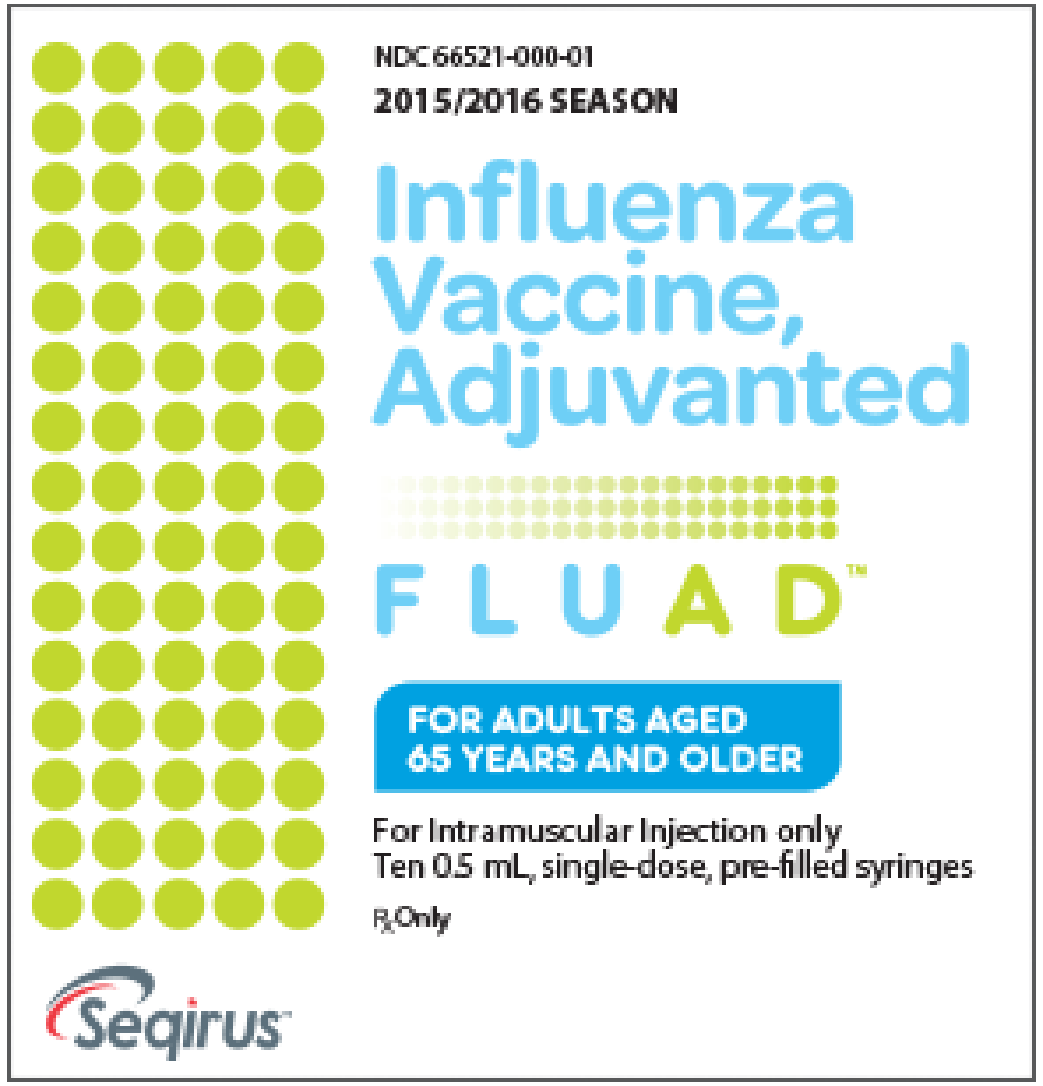
- Study design:
  - Phase IIIb-IV, multicenter, randomized, double-blind, active controlled trial
- Purpose:
  - To compare IIV3-HD with IIV3-SD in adults 65 years and older
- Patient population (n= 31,989)
  - Adults 65 years or older without moderate or severe acute illnesses
- Intervention:
  - Randomly assigned in a 1:1 ratio to receive a single dose of IIV3-HD (60 mcg of hemagglutinin per strain) or IIV3-SD (15 mcg of hemagglutinin per strain)

Source: DiazGranados CA et al. NEJM. 2014 Aug; 371 (7): 635-45.

DiazGranados, et al.

- Endpoints:
  - Superiority= if lower bound of 95% CI for RRR exceeded 9.1
  - Laboratory confirmed influenza caused by any viral type
    - IIV3-HD= 228 (1.4%) vs IIV3-SD= 301 (1.9%); RRR= 24.1 (95% CI, 9.7 to 36.5)
- Conclusion:
  - "This study showed that IIV3- HD as compared with IIV3-SD significantly improved protection against laboratory-confirmed influenza illness. It also showed that IIV3-HD was associated with superior immune responses as compared with IIV3-SD."

Source: DiazGranados CA et al. NEJM. 2014 Aug; 371 (7): 635-45.



Vaccines licensed for age ≥ 65 years only

- Adjuvanted inactivated influenza vaccine (aIIV3)
  - Fluad ®
- Contains MF59, an oil-in-water adjuvant
  - Intended to provide better immune response
- 0.5 mL IM injection, prefilled syringe
- Store in refrigerator, do not freeze, protect from light
  - Discard vaccine if frozen

Source: Fluad [prescribing information]. Cambridge, MA: Seqirus; 2018.

Comparison of the safety and immunogenicity of an MF59®-adjuvanted with a non-adjuvanted seasonal influenza vaccine in elderly subjects by Frey at al

- Study design:
  - Phase III, randomized, observer-blinded, multisite trial
- Purpose:
  - To evaluate the lot-to-lot consistency, immunogenicity, clinical effectiveness, reactogenicity, and safety of a MF59-adjuvanted seasonal influenza vaccine in subjects aged ≥65 years
- Patient population (n= 7082):
  - Adults 65 years and older
  - Without impaired/altered immune function, behavioral or cognitive impairment, a psychiatric condition, bleeding disorder, hypersensitivity to any vaccine component
- Intervention:
  - Randomly assigned in a 1:1:1:3 ratio to receive either one of three lots of adjuvanted trivalent influenza vaccine (aTIV) or non-adjuvanted trivalent influenza vaccine (TIV)

Source: Frey et al. Vaccine. 2014 Sept; 32 (39): 5027-34.

Frey et al

Table 3
Ratios between geometric mean titers (GMT) and differences in seroconversion rates at Day 22 (95% CI) for aTIV compared with TIV for the entire study population and for the high-risk subgroup (per-protocol set).

Strain	Entire study population		High-risk group	
	Ratio of GMT	Difference in seroconversion (%)	Ratio of GMT	Difference in seroconversion (%)
Homologous strains				
A/H1N1	**1.40 (1.32–1.49)**	**9.2 (7.1–11.3)**	**1.38 (1.25–1.52)**	**11.1 (7.5–14.6)**
A/H3N2	**1.61 (1.52–1.70)**	**12.7 (10.5–14.9)**	**1.57 (1.44–1.72)**	**13.5 (9.8–17.2)**
B strain	**1.15 (1.08–1.21)**	**5.2 (3.0–7.4)**	**1.12 (1.03–1.21)**	**5.0 (1.4–8.5)**
Heterologous strains				
A/H3N2 (Wisconsin)	**1.45 (1.29–1.63)**	**11.3 (6.7–15.9)**	**1.35 (1.13–1.61)**	**12.3 (4.8–19.9)**
A/H3N2 (Brisbane)	**1.36 (1.23–1.50)**	**11.9 (7.3–16.6)**	**1.29 (1.10–1.50)**	**12.6 (5.0–20.2)**
B strain	**1.09 (0.98–1.21)**	**4.0 (−0.4–8.4)**	**1.11 (0.95–1.30)**	**4.8 (−2.1–11.8)**

	Non-inferiority	Superiority
Ratio of geometric mean titers	Lower bound of 95% CI >0.67	Lower bound of 95% CI >-10%
Difference in seroconversion	Lower bound of 95% CI >1.5	Lower bound of 95% CI >10%
*for at least 2/3 strains		

Source: Frey et al. Vaccine. 2014 Sept; 32 (39): 5027-34.

Frey, et al.

- Conclusion:
  - “aTIV elicited a significantly higher antibody response than TIV, especially against A/H3N2 strains, although superiority by pre-defined criteria was not formally met. The study demonstrates potential immunological benefits of MF59-adjuvanted influenza vaccines for the elderly.”

Source: Frey et al. Vaccine. 2014 Sept; 32 (39): 5027-34.

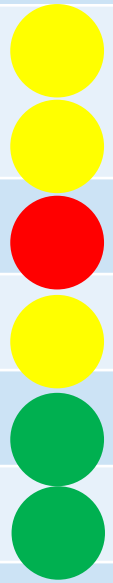
Fluzone High Dose® or Fluad®?

- CDC and ACIP have not expressed a preference for any influenza vaccination
  - Flu vaccination is the first and most important step in protecting against the flu
- Clinical trials are currently underway comparing Fluzone High Dose® and Fluad®

Source: Influenza [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/flu/prevent/qa_fluzone.htm

Types of Influenza Vaccines 2019-2020

Type of Influenza Vaccine	Brand Name	Use in Adults 65+
SD-IIV3	-	-
SD-IIV4	Fluarix, Fluzone®, Afluria, FluLaval®	
ccIIV4	Flucelvax® Age 2-49	
LAIV4	FluMist®	
RIV4	Flublok®	
aIIV3	Fluad®	
HD-IIV3	Fluzone High Dose®	



Source: Influenza [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/flu/prevent/qa_fluzone.htm

New Influenza Vaccines for 2020-2021

- Fluzone High Dose Quadrivalent® (HD-IIV4)
  - FDA approved: November 2019
  - 0.7 mL IM injection, prefilled syringe
  - Store in refrigerator
  - Approved for use in adults 65+
- Fluad Quadrivalent ® (aIIV4)
  - FDA approved: February 2020
  - 0.5 mL IM injection, prefilled syringe
  - Store in refrigerator
  - Approved for use in adults 65+

Source: Fluzone High Dose [Prescribing Information]. Swiftwater, PA: Sanfi Pasteur Inc; 2019.
Fluad Quadrivalent [Prescribing Information]. Summit, NJ: Seqirus Inc; 2020.

Knowledge Check 2

2. Which of the following is an adjuvanted influenza vaccine?

A. Flublok ®

B. Fluzone High Dose ®

C. Fluad ®

D. FluLaval ®

Knowledge Check 2: Response

2. Which of the following is an adjuvanted influenza vaccine?

A. Flublok ®

B. Fluzone High Dose ®

C. Fluad ®

D. FluLaval ®

Knowledge Check 3

3. How does the high dose influenza vaccine compare to the standard dose?

A. It has 2x the amount of hemagglutinin compared to the standard dose

B. It has 4x the amount of hemagglutinin compared to the standard dose

C. It is adjuvanted while the standard is not

D. It is 1 mL while the standard dose is 0.5 mL

Knowledge Check 3: Response

3. How does the high dose influenza vaccine compare to the standard dose?

A. It has 2x the amount of hemagglutinin compared to the standard dose

B. It has 4x the amount of hemagglutinin compared to the standard dose

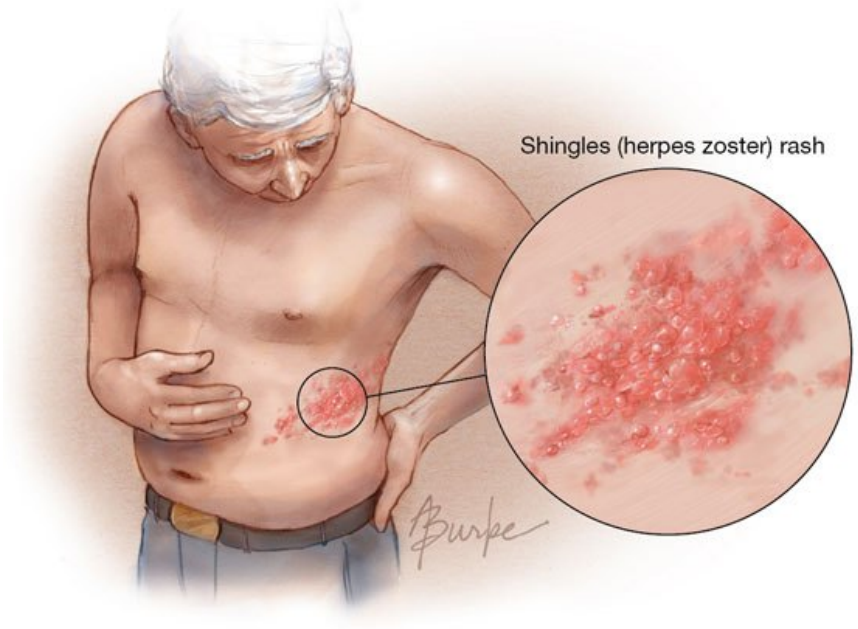
C. It is adjuvanted while the standard in not

D. It is 1 mL while the standard dose is 0.5 mL

Zoster Vaccination

Herpes Zoster (Shingles)

- Establishes latency in cells of dorsal root ganglia
- Reactivates with advancing age or a weakened immune system
- Appears as localized rash in dermatomes
- Complications:
  - Postherpetic neuralgia (PHN)
  - Scarring
  - Bacterial infection
  - Ocular abnormalities

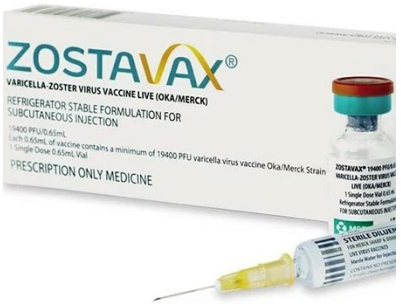


Source: Varicella [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/pubs/pinkbook/varicella.html

Herpes Zoster Vaccines

Zoster Vaccine Live (Zostavax ®)- ZVL

- Live vaccine
- ≥60 years old
- 1 dose
- Given subcutaneously
- Store in freezer
- Not preferred



Recombinant Zoster Vaccine, Adjuvanted (Shingrix)- RZV

- Inactivated vaccine
- ≥50 years old
- 2 doses, separated by 2-6 months
- Given intramuscularly
- Store in refrigerator
- Reconstitute prior to administration
- ***ACIP preferred***
- Immunocompetent adults who received Zostavax ® should still receive Shingrix

Vaccinate even if patient has history of shingles as recurrence is possible

Source: Varicella [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/pubs/pinkbook/varicella.html
Zostavax [Prescribing Information]. Whitehouse Station, NJ: Merk; 2019.
Shingrix [Prescribing Information]. Triangle Park, NC: Glaxo Smith Kline Biologicals; 2019.

Efficacy of an Adjuvanted Herpes Zoster Subunit Vaccine in Older Adults by Lal, et al.

- Study design:
  - Randomized, placebo controlled, phase 3 trial
- Purpose:
  - To evaluate the efficacy and safety of an adjuvanted herpes zoster subunit vaccine (HZ/su) in older adults
- Patient population (n= 15,411):
  - 50 years and older
  - Without history of herpes zoster infection, previous herpes zoster vaccination, or immunosuppressed
- Intervention:
  - Randomly assigned in a 1:1 ratio to receive either 2 doses of vaccine or placebo

Source: Lal H et al. NEJM. 2015 May; 372: 2087-96.

Lal, et al.

- Endpoints:
  - Confirmed herpes zoster episode
    - Vaccine group= 6 participants (incidence 0.3 per 1000 person years) vs. placebo group= 210 participants (incidence 9.1 per 1000 person years)
    - Overall vaccine efficacy 97.2% (95% CI, 3.7 to 99.0)
- Conclusion:
  - "The HZ/su vaccine significantly reduced the risk of herpes zoster among adults who were 50 years of age or older, and overall efficacy was well preserved among participants who were 70 years of age or older."

Source: Lal H et al. NEJM. 2015 May; 372: 2087-96.

Shingrix Recommendations

- Age 50 years or older

- Minimum interval= 4 weeks
  - If 2nd dose administered sooner than 4 weeks, repeat 2nd dose
- Administer at least 2 months after Zostavax ®

Recommended regardless of previous herpes zoster history or Zostavax ® vaccination

Source: Recommended Adult Immunization Schedule [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf

Herpes Zoster Vaccine Recommendations

- Special situations
  - Pregnancy:
    - ZVL (Zostavax ®) contraindicated
    - Consider delaying RZV (Shingrix) until after pregnancy if RZV (Shingrix) is otherwise indicated
  - Severe immunocompromising conditions (including HIV infection with CD4 count <200 cells/µL):
    - ZVL (Zostavax ®) contraindicated
    - Recommended use of RZV (Shingrix) under review

Source: Recommended Adult Immunization Schedule [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf

Herpes Zoster Vaccination During Shingrix Shortage

- Ordering limits, intermittent shipping delays, and the high demand for Shingrix have resulted in recent shortages
- Give first preference to patients requiring their second dose
  - If vaccine unavailable and time since first dose has been >6 months, administer second dose when available, no need to restart series
- Refer patients to Vaccine Finder (vaccinefinder.org)
- May consider Zostavax ® vaccination
  - If patient allergic to Shingrix
  - Patient requests immediate vaccination and Shingrix is unavailable

Shingles [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/vpd/shingles/hcp/shingrix/faqs.html

Knowledge Check 4

4. Which of the following are reasons to administerZostavax ® instead of Shingrix? Select all that apply

A. Allergy to Shingrix

B. Patient requests immediate vaccination and Shingrix is unavailable

C. History of herpes zoster infection

D. Patient is immunocompromised

Knowledge Check 4: Response

4. Which of the following are reasons to administerZostavax ® instead of Shingrix? Select all that apply

A. Allergy to Shingrix

B. Patient requests immediate vaccination and Shingrix is unavailable

C. History of herpes zoster infection

D. Patient is immunocompromised

Pneumococcal Vaccination

Pneumococcal Disease

- Caused by *Streptococcus pneumoniae*
- Gram-positive, catalase-negative organism
- Also known as pneumococcus
- Spread through respiratory secretions
- Also causes ear infections, sinus infections, meningitis and sepsis
- Incubation period: 1 to 3 days
- Symptoms
  - Fever
  - Chills
  - Chest pain
  - Productive cough
  - Dyspnea
  - Tachycardia
  - Malaise or weakness

Source: Pneumococcal Disease [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/pubs/pinkbook/pneumo.html

Invasive vs. Noninvasive Pneumococcal Disease

- Noninvasive pneumococcal disease
  - Does not involve major organs
    - Otitis media
    - Bronchitis
    - Sinusitis
- Invasive pneumococcal disease
  - Involves a major organ or blood
    - Bacteremia
    - Sepsis
    - Meningitis
    - Pneumonia

Pneumococcal Disease [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/pubs/pinkbook/pneumo.html

Complications

- Pneumococcal pneumonia
  - 400,000 hospitalizations per year
  - 36% of adult community-acquired pneumonias
  - Fatality 5%–7%, higher in elderly
  - Most common cause of severe pneumonia
- Pneumococcal bacteremia
  - 12,000 cases per year
  - Fatality 20%; up to 60% in the elderly population
- Pneumococcal meningitis
  - 3000–6000 cases per year
  - Fatality 8% in children, 22% in adults

Source: Pneumococcal Disease [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/pubs/pinkbook/pneumo.html

Risk Factors for Invasive Disease

- Immunocompromised
- Asplenia
- Chronic heart, pulmonary, liver, or renal disease
- Cigarette smoking
- Cerebrospinal fluid (CSF) leak
- Cochlear implant

Source: Pneumococcal Disease [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/pubs/pinkbook/pneumo.html

Vaccine Efficacy

Pneumococcal Conjugate Vaccine (PCV13)

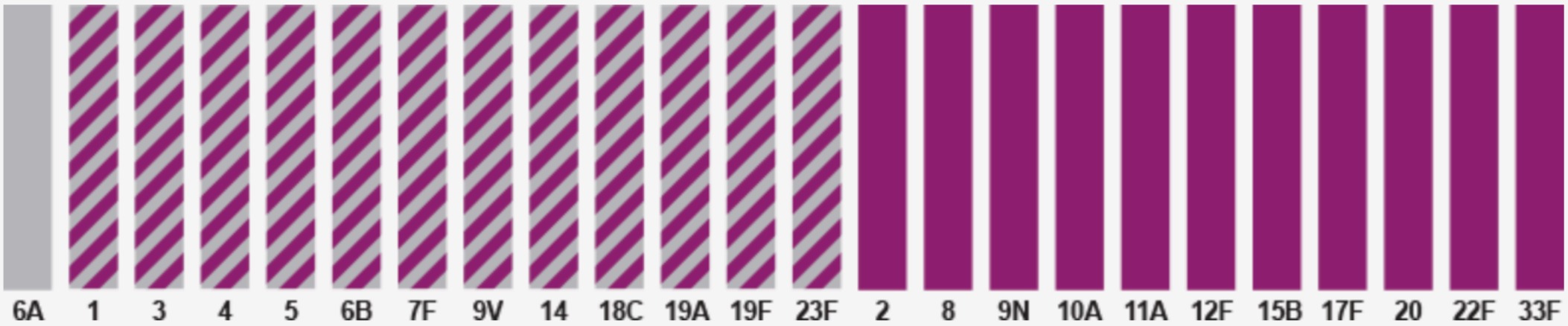
- 90% effective against invasive disease in children
- 75% efficacy against invasive disease in adults older than 65 years
- 45% efficacy against non-bacteremic pneumococcal pneumonia in adults older than 65 years

Pneumococcal Polysaccharide Vaccine (PPSV23)

- Not effective in children younger than 2 years
- 60%–70% efficacy against invasive disease
- Less effective in preventing pneumococcal pneumonia

Source: Pneumococcal Disease [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/pubs/pinkbook/pneumo.html

PCV13 vs. PPSV23



PCV13=13-valent pneumococcal conjugate vaccine.

PPSV23=23-valent pneumococcal polysaccharide vaccine.

PNEUMOVAX 23 (PPSV23) will not prevent disease caused by capsular types of pneumococcus other than those contained in the vaccine.

Source: Pneumococcal Vaccine Serotypes [Internet]. Merk; [cited May 5, 2020]. Available from: https://www.merckvaccines.com/pneumovax23/pneumococcal-serotypes-ppsv23-pcv13/

Pneumococcal Vaccines

Pneumococcal Conjugate Vaccine (PCV13)

- Brand name: Prevnar 13 ®
- Dose: 0.5 mL dose; IM (deltoid)

ACIP Adult Recommendations

- Age ≥65- 1 dose based on shared decision making

Pneumococcal Polysaccharide Vaccine (PPSV23)

- Brand name: Pneumovax 23 ®
- Dose: 0.5 mL dose; IM (deltoid) or SC

ACIP Adult Recommendations

- Age ≥65- 1 dose

Source: Recommended Adult Immunization Schedule [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf

Prevnar 13 [Prescribing Information]. Philadelphia, PA: Pfizer; 2017.
Pneumovax 23 [Prescribing Information]. Whitehouse Station, NJ: Merk; 2019.

Shared Clinical Decision Making

- Providers and patients share information and support patients to consider options in making a decision
  - As opposed to providers making a decision on the patient's behalf
- Used when a treatment may be recommended for an individual, but not the population as a whole
- Three Steps
  - Introduce choices
  - Describe options
  - Help patients explore preferences and make a decision

Source: Elwyn G et al. JGIM. 2012 May; 27 (10): 1361-7.

Early Impact of 13-Valent Pneumococcal Conjugate Vaccine Use on Invasive Pneumococcal Disease Among Adults With and Without Underlying Medical Conditions- United States by Ahmed, et al.

- Study design:
  - Retrospective chart review of Active Bacterial Core surveillance, a laboratory/population-based system established by the Centers for Disease Control and Prevention's Emerging Infections Program with approx. 23.3 million adults
- Purpose:
  - To assess the impact of PCV13 and magnitude of indirect effects among adults with and without indications for PCV13 use
- Patient population:
  - Adults >19 with isolation of pneumococcus from a sterile site (eg., blood, CSF)
- Intervention:
  - Incidence of invasive pneumococcal disease in 2013-2014 and 2007-2008 by age and serotype group among adults with and without PCV13 indications

Source: Ahmed SS et al. Clin Infect Dis. 2019 Aug; [Epub ahead of print].

Ahmed, et al.

- Endpoints:
  - Percentage change in incidence of PCV13-type invasive pneumococcal disease among adults 65 and older pre and post- PCV13
    - Healthy adults= -71% (95% CI, -77 to -64)
    - Adults with immunocompromising conditions= -68% (95% CI,-76 to -60)
- Conclusion:
  - “Invasive pneumococcal disease (IPD) incidence among US adults declined after PCV13 introduction in children. Similar reductions in PCV13-type IPD in those with and without PCV13 indications suggest that observed benefits are largely due to indirect effects from pediatric PCV13 use rather than direct use among adults.”

Source: Ahmed SS et al. Clin Infect Dis. 2019 Aug; [Epub ahead of print].

Shared Clinical Decision Making for PCV13

- PCV13 vaccination is no longer routinely recommended for all adults aged ≥65 years
- Factors to consider:
  - Persons residing in nursing homes or other long-term care facilities
  - Incidence is higher among persons with chronic heart, lung, or liver disease, diabetes, or alcoholism, and those who smoke cigarettes or who have more than one chronic medical condition
  - Persons residing in settings with low pediatric PCV13 uptake
  - Persons traveling to settings with no pediatric PCV13 program

Source: Recommended Adult Immunization Schedule [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf

Pneumococcal Vaccination

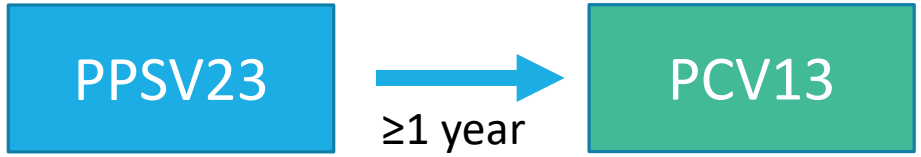
- Routine vaccination age 65 years or older: 1 dose PPSV23
  - If PPSV23 was administered prior to age 65, administer 1 dose PPSV23 at least 5 years after previous dose
- Shared clinical decision making age 65 years or older
  - 1 dose PCV13 based on shared clinical decision making
  - If both PCV13 and PPSV23 are to be administered, PCV13 should be given first
  - Separate PCV13 and PPSV23 by at least 1 year
  - Do not give both PCV13 and PPSV23 at the same visit

Source: Recommended Adult Immunization Schedule [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf

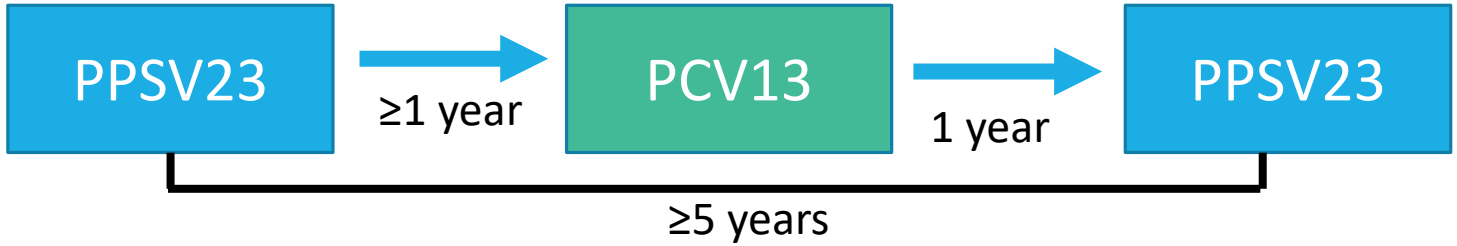
Pneumococcal Vaccination

- Routine vaccination for adults ≥65

- Previously received PPSV23 at age ≥ 65



- Previously received PPSV23 before age 65



Source: Recommended Adult Immunization Schedule [Internet]. Centers for Disease Control and Prevention; [cited May 5, 2020]. Available from: https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf

Knowledge Check 5

5. Which of the following is NOT a factor to consider for shared decision making regarding PCV13 vaccination is adults 65 and older?

A. Residence in long term care facility

B. Chronic heart disease

C. Current smoker

D. Recent hospital admission

Knowledge Check 5: Response

5. Which of the following is NOT a factor to consider for shared decision making regarding PCV13 vaccination is adults 65 and older?

A. Residence in long term care facility

B. Chronic heart disease

C. Current smoker

D. Recent hospital admission

Knowledge Check 6

6. Which of the following vaccines should be stored in the freezer?

A. Fluzone High Dose ®

B. Prevnar ®

C. Fluad ®

D. Zostavax ®

Knowledge Check 6 Response

6. Which of the following vaccines should be stored in the freezer?

A. Fluzone High Dose ®

B. Prevnar ®

C. Fluad ®

D. Zostavax ®

Resources

1. https://www.cdc.gov/vaccines/
2. https://www.immunize.org/
3. https://vaccinefinder.org/
4. CDC Advisory Committee on Immunization Practices

Thank You!

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