

Vaccines and Prevention

Author:

Hilary Faust, MD
Faculty
University of Wisconsin

Editor:

Stacey Kassutto, MD, MA
*Director, IM Residency Simulation Education
Core Faculty, Pulmonary Fellowship Education
Associate Director, Medical Education
Leadership Track
Assistant Professor of Clinical Medicine
University of Pennsylvania*

Section Editors:

Sugeet Jagpal, MD
*Associate Program Director
Assistant Professor of Medicine
Rutgers Robert Wood Johnson Medical School*

Trevor Steinbach, MD

*Associate Program Director for Ambulatory Education
University of Colorado*

Learning Objectives:

1. Discuss the indications for different forms of pneumococcal vaccine
2. Review indications and contraindications for the influenza vaccine
3. Review indications for vaccination in patients with splenectomy
4. Review indications and contraindications for the covid19 vaccine

Scenario:

Mrs. Smith is a 64-year-old woman with diabetes with an additional past medical history of Hodgkin's Lymphoma in the 1970s s/p mantle radiation, complicated by systolic and restrictive cardiomyopathy with LVEF 30% and radiation pulmonary fibrosis. She is coming to you to establish care and evaluate her chronic dyspnea.

Question 1: Is Mrs. Smith at high risk for pneumonia? What vaccinations would you consider for her?

She is considered at increased risk for pneumonia due to her congestive heart failure and chronic lung disease. Under the current ACIP recommendations, she meets criteria to receive 1 dose of pneumococcal conjugate vaccine (PCV), either PCV20 or PCV15. When PCV15 is used, it should be followed by a dose of PPSV23. Conditions that are recommended to receive vaccination before age 65 include alcoholism, chronic heart, liver, or lung disease, chronic renal failure, cigarette smoking, cochlear implant, congenital or acquired asplenia, cerebrospinal fluid leak, diabetes mellitus, generalized malignancy, HIV, Hodgkin disease, immunodeficiency, iatrogenic immunosuppression, leukemia, lymphoma, or multiple myeloma, nephrotic syndrome, solid organ transplant, sickle cell disease, or other hemoglobinopathies. Due to her age and cardiopulmonary conditions she should also receive the annual influenza vaccination. In addition, at this time she should also receive one of the available COVID-19 vaccines.

Question 2: Mrs. Smith has now returned for follow up and reports that she just turned 65. Does she need any updates to her vaccinations?

In 2022, the ACIP changed guidance to recommend use of either PCV20 alone or PCV15 in series with PPSV23 for all adults aged ≥ 65 years. When PCV15 is used, the recommended interval between administration of PCV15 and PPSV23 is ≥ 1 year. A minimum interval of 8 weeks can be considered for adults with an immunocompromising condition, cochlear implant, or cerebrospinal fluid leak to minimize the risk for IPD caused by serotypes unique to PPSV23 in these vulnerable groups. For Ms. Smith, it is important to let her know that her chronic heart and lung disease, as well as her diabetes, puts her at increased risk. 24 per 100,000 US adults get pneumococcal pneumonia each year, accounting for 9.3% of community acquired pneumonia hospitalizations.

Question 3: What is the recommended vaccination schedule for adults greater than 65?

TABLE 1. Recommendations for use of 15-valent pneumococcal conjugate vaccine in series with 23-valent pneumococcal polysaccharide vaccine or 20-valent pneumococcal conjugate vaccine in pneumococcal conjugate vaccine-naïve adults aged ≥19 years — United States, 2022

Medical indication group	Specific underlying medical condition	Age group, yrs	
		19–64	≥65
None	None	None	1 dose of PCV20 or 1 dose of PCV15 followed by a dose of PPSV23 ≥1 years later*
Underlying medical conditions or other risk factors	Alcoholism Chronic heart disease [†] Chronic liver disease Chronic lung disease [‡] Cigarette smoking Diabetes mellitus Cochlear implant CSF leak Congenital or acquired asplenia Sickle cell disease or other hemoglobinopathies Chronic renal failure** Congenital or acquired immunodeficiencies**,†† Generalized malignancy** HIV infection** Hodgkin disease** Iatrogenic immunosuppression**,§§ Leukemia** Lymphoma** Multiple myeloma** Nephrotic syndrome** Solid organ transplant**	1 dose of PCV20 or 1 dose of PCV15 followed by a dose of PPSV23 ≥1 years later [§]	1 dose of PCV20 or 1 dose of PCV15 followed by a dose of PPSV23 ≥1 years later*

Abbreviations: CSF = cerebrospinal fluid; PCV15 = 15-valent pneumococcal conjugate vaccine; PCV20 = 20-valent pneumococcal conjugate vaccine; PPSV23 = 23-valent pneumococcal polysaccharide vaccine.

* Adults with immunocompromising conditions, cochlear implant, or CSF leak might benefit from shorter intervals such as ≥8 weeks. These vaccine doses do not need to be repeated if given before age 65 years.

[†] Includes congestive heart failure and cardiomyopathies.

[‡] Adults with immunocompromising conditions, cochlear implant, or CSF leak might benefit from shorter intervals such as ≥8 weeks.

[§] Includes chronic obstructive pulmonary disease, emphysema, and asthma.

** Indicates immunocompromising conditions.

†† Includes B- (humoral) or T-lymphocyte deficiency, complement deficiencies (particularly C1, C2, C3, and C4 deficiencies), and phagocytic disorders (excluding chronic granulomatous disease).

§§ Diseases requiring treatment with immunosuppressive drugs, including long-term systemic corticosteroids and radiation therapy.

Question 4: Mrs. Smith asks if she should be receiving the influenza vaccination. Is she in a high priority group?

Mrs. Smith has several indications for the influenza vaccination. Adults over age 50 are high priority. Furthermore, she has chronic respiratory and cardiac conditions. Even though at the current time concern is highest for COVID-19 infection, it is important to acknowledge the long history of influenza as a common cause of serious illness and the likelihood that it will re-emerge in the future. Since she is 65, it is reasonable to give the high dose influenza vaccination. The following are high priority groups:

a. Populations at Higher Risk for Medical Complications Attributable to Severe Influenza

1. Children 6 through 59 months
2. Persons ≥50 years
3. Those with chronic pulmonary (including asthma) or cardiovascular (except isolated hypertension), renal, hepatic, neurologic, hematologic, or metabolic disorders (including diabetes mellitus)
4. Immunocompromised due to any cause (including immunosuppression caused by medications or by HIV infection);
5. Pregnant women
6. Children and adolescents receiving aspirin or salicylates
7. Nursing home/long-term care facility residents

8. American Indians/Alaska Natives
9. Morbidly obese persons (BMI ≥ 40).
- b. People who live with or care for those at risk for Influenza-related complications:
 1. Health care personnel
 2. Household contacts (including children) and caregivers of children < 5 years and adults ≥ 50 years old
 3. Household contacts (including children) and caregivers of persons with high-risk medical conditions

Question 5: What is this high dose influenza vaccination? What is the difference between it and the regular influenza vaccination? Are there any other flu vaccines I should know about?

a. Regular influenza vaccination

1. Trivalent vs quadrivalent
 - i. 42% of all influenza B infections caused by non-included B strain, so quadrivalent $>$ trivalent
 - ii. 26% of all infections are due to Influenza B

b. High dose trivalent influenza vaccination (Fluzone) or adjuvant conjugated (Fluad)

1. Adults > 65 years old
2. High dose contains 60 mcg antigen vs 15 mcg
3. Adjuvant is conjugated to stimulate better cellular immunity
4. Cell cultured vaccine (Flublok and Flucelvax)
5. May avoid some issues with frequent mutations related to growing in eggs

c. Intradermal

d. Not covering live attenuated

Question 6: Mrs. Smith has an egg allergy. What are her options?

- a. If her only reaction to eggs is hives, she can get any licensed flu vaccine.
- b. Symptoms other than hives after exposure to eggs, such as angioedema, respiratory distress, lightheadedness, recurrent emesis, or need for epinephrine or another emergency medical intervention, prompt the recommendation that the vaccine be given in a medical setting supervised by a health care provider who can manage severe allergic conditions. (Settings include hospitals, clinics, health departments, and physician offices). People with egg allergies no longer have to wait 30 minutes after receiving their vaccine.
- c. Cell-based flu vaccine (Flucelvax) has a much smaller amount of egg protein (the original vaccine virus is grown in eggs, but production does not occur in eggs.) Recombinant vaccine (Flublok) is the only vaccine that is completely egg free. (CDC)

Question 7: Mrs. Smith also reports that she had a splenectomy during her treatment for lymphoma. Now what changes to her care are needed?

All patients who are anatomically or functionally asplenic are at high risk for encapsulated organisms including **S. pneumoniae**, **H. influenzae** and **N. meningitidis**. Ideally these patients are vaccinated > 2 weeks prior to splenectomy; if not possible they can be vaccinated on post op day 14 or at the time of suspicion of functional asplenia.

For *S. pneumoniae*, asplenic individuals should receive **PCV13 followed by PPSV23 >8 weeks later**. Other groups for whom PCV13 should be given first, followed by PPSV23, include those with **immunocompromising condition** (eg, HIV infection, solid organ transplant, CKD, hematologic malignancy, generalized malignancy, steroids) **cerebrospinal fluid leak, cochlear implant, or advanced kidney disease**.

- a. Americans over the age of 5 years old are almost entirely immune to *H. influenzae* type B.
- b. The ACIP recommends vaccination against *N. meningitidis* with meningococcal quadrivalent conjugate vaccine (Menveo or Menactra) AND serotype B vaccination (Trumenba or Bexsero).
- c. Also, asplenic individuals are at risk for fulminant sepsis from *Campylobacter jejuni*, severe babesiosis, and should not receive the live active influenza vaccination. They CAN receive other live vaccinations.

Question 8: Mrs. Smith tells you she is about to become a grandmother. What other vaccination might she consider?

- a. Tdap vaccination recommendations:
 1. All pregnant women during each pregnancy
 2. Adults over age 19 who have not been vaccinated to address waning pertussis immunity

Question 9: What about the covid19 vaccine?

COVID-19 vaccination is recommended for all people 5 years and older, and the indications will likely continue expanding to younger age groups. At the time of this writing in the spring of 2022, the recommendations for ideal protection are as follows for mRNA-based vaccines (those made by Moderna or Pfizer/BioNTech): 2 doses for ages 5-11, 3 doses for ages 12-49, and 4 doses for 50+. Patients with immune compromise at any age >5 are also recommended to receive 4 doses. Anyone who initially received the single shot Janssen vaccine should be given a booster with either mRNA-based vaccine at least 2 months after his or her initial injection for optimal protection. These recommendations are likely to evolve as more is learned about the optimal boosting strategy or as vaccines for variants undergo further study.

Question 10: Mrs. Smith asks you about the differences amongst the different manufactured covid vaccines available in the USA.

The Pfizer-BioNTech and Moderna vaccines are lipid nanoparticle-formulated, nucleoside-modified mRNA vaccines encoding the prefusion spike glycoprotein of SARS-CoV-2, the virus that causes COVID-19. The Janssen vaccine is a recombinant replication-incompetent adenovirus type 26 (Ad26) vector encoding the stabilized prefusion spike glycoprotein of SARS-CoV-2. None of the currently authorized COVID-19 vaccines are live virus vaccines.

A person is considered fully vaccinated against COVID-19 ≥ 2 weeks after receipt of the second dose in a 2-dose series (Pfizer-BioNTech and Moderna) or ≥ 2 weeks after receipt of the single dose of the Janssen vaccine.

Question 11: She also asks you about vaccine co-administration.

None of the currently authorized COVID-19 vaccines are live virus vaccines. According to the CDC, the COVID-19 vaccine may be co-administered with other vaccines (including with live, attenuated vaccines).

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