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Vaccines and Prevention

An APCCMPD Ambulatory Care Curriculum Teaching Script

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Vaccines and Prevention

Scenario 1:

Mrs. Smith is a 49-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 left ventricular ejection fraction (LVEF) of 30% and radiation-induced 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 pneumococcal vaccinations would you consider for her?

Question 2:
Mrs. Smith has now returned for follow-up and reports that she just turned 50. Does she need any updates on her vaccinations?

Question 3:
What is the recommended pneumococcal vaccination schedule for adults greater than 50? If Ms. Smith had previously received a pneumococcal vaccine, how does that change the recommendations?

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

Question 5:
What is the 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?

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

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

Question 8:
Mrs. Smith tells you she is about to become a grandmother. In addition to what has already been discussed, what other vaccination might she consider?

Question 9:
What about the COVID-19 vaccine?

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

Question 11:
Mrs. Smith asks if she should eventually receive the respiratory syncytial virus (RSV) vaccine as well? What should you consider when discussing this vaccine with her?

Question 12:
She also asks you about vaccine co-administration. What do you tell her regarding recommendations for receiving more than one vaccine at a time?

Vaccines and Prevention

Educational 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 COVID-19 vaccine
5. Review indications and contraindications for the RSV vaccine

Scenario 1:

Mrs. Smith is a 49-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 left ventricular ejection fraction (LVEF) of 30% and radiation-induced 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 pneumococcal vaccinations would you consider for her?

Mrs. Smith meets criteria to receive the pneumococcal conjugate vaccine (PCV) due to her chronic medical conditions. She is considered at increased risk for pneumonia due to her congestive heart failure and chronic lung disease. If she has never received a pneumococcal vaccination before, under the current Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP) recommendations, she meets criteria to receive 1 dose of PCV, either PCV21, PCV20, or PCV15. When PCV15 is used, it should be followed by a dose of the pneumococcal polysaccharide vaccine (PPSV23). ACIP recommends pneumococcal vaccination for adults aged 19-49 with medical conditions which predispose them to invasive pneumococcal disease (IPD), including alcoholism, chronic heart disease, including congestive heart failure and cardiomyopathies, chronic liver disease, chronic lung disease, including chronic obstructive pulmonary disease, emphysema, and asthma, cigarette smoking, diabetes mellitus, cochlear implants, cerebrospinal fluid (CSF) leak, or immunocompromising conditions (chronic renal failure, nephrotic syndrome, immunodeficiency, iatrogenic immunosuppression, generalized malignancy, HIV infection, Hodgkin disease, leukemia, lymphoma, multiple myeloma, solid organ transplant, congenital or acquired asplenia, or sickle cell disease or other hemoglobinopathies).[1]

PCV15 covers for 15 different serotypes of pneumococcal disease, while PCV20 adds on an additional 5 serotypes not covered by PCV15 (Figure 1). To attain broader serotype

coverage, the CDC recommends the PCV15 be followed by PPSV23 at least 1 year after PCV15 administration. Rather than 1 year, a minimum interval of 8 weeks between PCV15 and PPSV23 administration may be considered for patients with cochlear implants, cerebrospinal fluid leak, or immunocompromising conditions in order to decrease their time at risk for IPD from serotypes covered by PPSV23.[1]

PCV21 is the newest conjugate vaccine available in the United States. From 2018 to 2022, about 80% of invasive pneumococcal disease cases among adults eligible for vaccination were caused by serotypes included in PCV21, with 20%–30% of cases attributable to the eight new serotypes added in PCV21 (Figure 1). Importantly, serotype 4 is not included in PCV21. In regions of the Western United States where higher proportions of disease are related to this serotype, PCV20 or PCV15 followed by PPSV23 administration are recommended over PCV21. These regions include Alaska, Colorado, the Navajo Nation, New Mexico, and Oregon. Adults <65 years old with specific underlying conditions are most at risk for developing pneumococcal disease related to serotype 4, namely: alcoholism, chronic lung disease, cigarette smoking, homelessness, and injection drug use.[1]

Figure 1. Pneumococcal Serotypes Included in Pneumococcal Vaccinations[1]

FIGURE. Serotypes*,† included in pneumococcal vaccines currently recommended for adults — United States, 2024

■ Included in vaccine ☐ Not included in vaccine

Vaccine	Serotype																														
	1	3	4	5	6A	6B	7F	9V	14	18C	19A	19F	23F	22F	33F	8	10A	11A	12F	15B	2	9N	17F	20	15A	15C	16F	23A	23B	24F	31	35B
PCV21		■			■		■				■			■	■	■	■	■	■			■	■	■	■	■	■	■	■	■	■	■
PPSV23	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■								
PCV20	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■												
PCV15	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■																	

Abbreviations: PCV = pneumococcal conjugate vaccine; PCV15 = 15-valent PCV; PCV20 = 20-valent PCV; PCV21 = 21-valent PCV; PPSV23 = 23-valent pneumococcal polysaccharide vaccine.

Figure reproduced from Use of 21-Valent Pneumococcal Conjugate Vaccine Among U.S. Adults: Recommendations of the Advisory Committee on Immunization Practices – United States 2024 by Kobayashi et al.

Question 2: Mrs. Smith has now returned for follow-up and reports that she just turned 50. Does she need any updates on her vaccinations?

In 2024, the ACIP changed guidance to recommend pneumococcal vaccination for all adults aged ≥50 years. Options for vaccination are PCV20 alone, PCV21 alone, or PCV15 followed by PPSV23 ≥1 year apart, though a minimum interval of 8 weeks can be considered for adults with an immunocompromising condition, cochlear implant, or cerebrospinal fluid leak.[2]

Question 3: What is the recommended pneumococcal vaccination schedule for adults greater than 50? If Ms. Smith had previously received a pneumococcal vaccine, how does that change the recommendations?

All adults aged 50 or greater are recommended to receive either PCV20 or PCV21 if they have not received any pneumococcal vaccine before, or if they received PPSV23 or PCV13 at any age. They should receive this one year or longer after their most recent vaccination. If they received only PCV15, then they should receive PPSV23 one year later. If they have received PCV15 & PPSV23, PCV20, or PCV21, their vaccination schedule is complete. If the

patient had previously received a PCV13 or PPSV23 vaccination in prior years, the ACIP recommends vaccination with either PCV20 or PCV21 to provide broader serotype coverage (Figure 2).[3]

Figure 2. CDC Vaccination Schedule for Pneumococcal Vaccination for Adults Aged 50 or Greater[4]

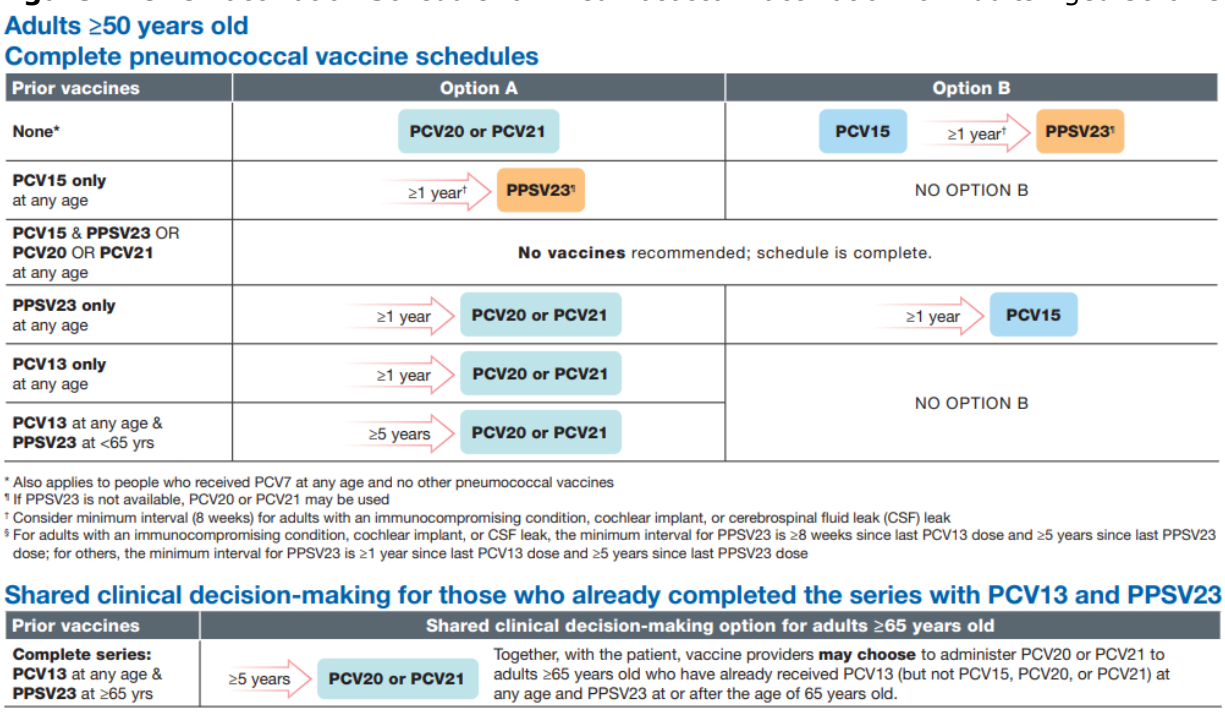

Figure from Pneumococcal Vaccine Timing for Adults, Centers for Disease Control and Prevention 2024.

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

All patients older than 6 months should receive annual influenza vaccination if they do not have a contraindication (history of severe allergies to a vaccine ingredient or prior flu vaccines). Additionally, her cardiopulmonary conditions put her at higher risk for severe illness due to influenza, so vaccination is especially important in her case.[5] It is important to prioritize vaccination in those who are at risk for developing severe complications from influenza, or for persons who live with/care for persons at high risk for complications. 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. Patients who are or will be pregnant
    6. Children and adolescents receiving aspirin or salicylates
    7. Nursing home/long-term care facility residents

8. Native American/Alaska Natives
9. Morbidly obese persons (body mass index [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[5]

Question 5: What is the 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?

In the past, both trivalent (covering influenza A (H1N1), influenza A (H3N2), and influenza B/Victoria) and quadrivalent influenza vaccines (adding influenza B/Yamataga) were available in the United States. Since the 2024-2025 influenza season, the World Health Organization (WHO) has recommended transitioning away from quadrivalent vaccines as influenza B/Yamataga has not been detected in annual influenza surveillance since March 2020. Currently, all available influenza vaccines in the USA are trivalent.[6]

For adults over age 65, high-dose or regular-dose adjuvanted influenza vaccination is recommended.[5] Adjuvanted vaccination includes the same amount of antigen as the regular trivalent vaccine but includes an adjuvant to stimulate a stronger immune response. High-dose influenza vaccines contain 4 times the amount of influenza antigen as regular vaccines. These vaccines stimulate a stronger immune response, and lead to more side effects after vaccination (such as headache, myalgias, injection site pain, etc.), but also stimulate more effective immune responses in older adults, leading to fewer influenza related hospitalizations and complications.[7,8] For patients younger than 65, non-adjuvanted regular dose trivalent vaccines are recommended.[5]

There are currently multiple available influenza vaccine formulations in the United States: inactivated (killed) influenza vaccines (egg based vs. cell culture based), recombinant hemagglutinin influenza vaccines, and live attenuated influenza vaccines available as nasal sprays. The live attenuated vaccines have more contraindications than their counterparts; live attenuated vaccines are contraindicated in immunocompromised individuals or caregivers of immunocompromised individuals, pregnant persons, CSF leak, or cochlear implants (Figure 3).[5]

Figure 3. Influenza Vaccinations available in the United States for 2025-2026 season[5]

TABLE 2. Contraindications and precautions for the use of influenza vaccines — United States, 2025–26 influenza season*

Vaccine type	Contraindications	Precautions
Egg-based IIV3s	• History of severe allergic reaction (e.g., anaphylaxis) to any component of the vaccine† or to a previous dose of any influenza vaccine (i.e., any egg-based IIV, ccIIV, RIV, or LAIV)§	• Moderate or severe acute illness with or without fever • History of Guillain-Barré syndrome within 6 wks of receipt of influenza vaccine
ccIIV3	• History of severe allergic reaction (e.g., anaphylaxis) to a previous dose of any ccIIV or any component of ccIIV3§	• Moderate or severe acute illness with or without fever • History of Guillain-Barré syndrome within 6 wks of receipt of influenza vaccine • History of severe allergic reaction to a previous dose of any other influenza vaccine (i.e., any egg-based IIV, RIV, or LAIV)¶
RIV3	• History of severe allergic reaction (e.g., anaphylaxis) to a previous dose of any RIV or any component of RIV3§	• Moderate or severe acute illness with or without fever • History of Guillain-Barré syndrome within 6 wks of receipt of influenza vaccine • History of severe allergic reaction to a previous dose of any other influenza vaccine (i.e., any egg-based IIV, ccIIV, or LAIV)¶
LAIV3	• History of severe allergic reaction (e.g., anaphylaxis) to any component of the vaccine† or to a previous dose of any influenza vaccine (i.e., any egg-based IIV, ccIIV, RIV, or LAIV)§ • Concomitant aspirin- or salicylate-containing therapy in children and adolescents§ • Children aged 2 through 4 yrs who have received a diagnosis of asthma or whose parents or caregivers report that a health care provider has told them during the preceding 12 mos that their child had wheezing or asthma or whose medical record indicates a wheezing episode has occurred during the preceding 12 mos • Children and adults who are immunocompromised due to any cause, including but not limited to immunosuppression caused by medications, congenital or acquired immunodeficiency states, HIV infection, anatomic asplenia, or functional asplenia (e.g., due to sickle cell anemia) • Close contacts and caregivers of severely immunosuppressed persons who require a protected environment • Pregnancy • Persons with active communication between the CSF and the oropharynx, nasopharynx, nose, or ear, or any other cranial CSF leak • Persons with cochlear implants** • Receipt of the influenza antiviral medications oseltamivir or zanamivir within the previous 48 hours; receipt of peramivir within the previous 5 days; or receipt of baloxavir within the previous 17 days††	• Moderate or severe acute illness with or without fever • History of Guillain-Barré syndrome within 6 wks of receipt of influenza vaccine • Asthma in persons aged ≥5 yrs • Other underlying medical conditions that might predispose to complications after wild-type influenza infection (e.g., chronic pulmonary, cardiovascular [except isolated hypertension], renal, hepatic, neurologic, hematologic, or metabolic disorders [including diabetes mellitus])

Figure from Prevention and Control of Seasonal Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices - United States, 2025-26 Influenza Season by Grohskopf et al.

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

According to the most recent ACIP influenza guidelines (2025), egg allergy alone does not necessitate any difference in vaccination recommendation, regardless of the severity of the egg allergy. Any influenza vaccine, including egg-based vaccines, can be used.[5] This is based on a

review of available data that demonstrated administration of seasonal influenza vaccines to persons with egg allergies resulted in no reported instances of anaphylaxis.[9]

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 type B (Hib),** and **N. meningitidis**. Ideally, these patients are vaccinated > 2 weeks prior to splenectomy; if not possible, they can be vaccinated as soon as they are stable after the procedure. In Mrs. Smith's case, we need to confirm that she received this series of vaccines.[10]

For *S. pneumoniae*, asplenic individuals should receive either a single dose of PCV20, PCV21, or PCV15 followed by PPSV23 >1 year later (may consider >8 weeks later)**.** Americans over the age of 5 years old are almost entirely immune to Hib. Nevertheless, all patients >15 months who are undergoing splenectomy and who are not immunized should receive one dose of Hib vaccine.

The ACIP recommends vaccination against *N. meningitidis* with meningococcal quadrivalent conjugate vaccine that protects against serotype A, C, W, and Y (MenACWY) as well as a univalent vaccination against serotype B for patients >2 years of age. MenACWY vaccination requires two doses >8 weeks apart. Serotype B vaccination is administered at 0, 1, 3, and 6 months. Both require boosters periodically.[10]

Also, asplenic individuals are at risk for fulminant sepsis from *Capnocytophaga canimorsus*, severe babesiosis, and should <u>not</u> receive the live active influenza vaccination. They CAN receive other live vaccinations.[11]

Question 8: Mrs. Smith tells you she is about to become a grandmother. In addition to what has already been discussed, what other vaccination might she consider?

In addition to the previously discussed influenza vaccination, you may recommend a tetanus, diphteria, pertussis (TDaP) vaccine. Babies are at risk for serious complications from influenza and pertussis. They are not eligible for influenza vaccination until 6 months of age and are not eligible for pertussis vaccination until 2 months of age. 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. This should be repeated every 10 years.[12]

Question 9: What about the COVID-19 vaccine?

COVID-19 vaccination is recommended for all people 6 months of age and older. At the time of this writing in the Spring 2026, the recommendations for ideal protection depend on whether the patient is considered immunocompetent, or moderately to severely immunosuppressed. According to the CDC, examples of patients who may be considered moderately to severely immunosuppressed include patients who fit the following descriptions:

- Active treatment for solid tumor and hematologic malignancies

- Hematologic malignancies associated with poor responses to COVID-19 vaccines regardless of current treatment status (e.g., chronic lymphocytic leukemia, non-Hodgkin lymphoma, multiple myeloma, acute leukemia)
- Receipt of solid-organ transplant or an islet transplant and taking immunosuppressive therapy
- Receipt of chimeric antigen receptor (CAR)-T-cell therapy or hematopoietic cell transplant (HCT) (within 2 years of transplantation or taking immunosuppressive therapy)
- Moderate or severe primary immunodeficiency (e.g., common variable immunodeficiency disease, severe combined immunodeficiency, DiGeorge syndrome, Wiskott-Aldrich syndrome)
- Advanced HIV infection (people with HIV and CD4 cell counts less than 200/mm^3, history of an AIDS-defining illness without immune reconstitution, or clinical manifestations of symptomatic HIV) or untreated HIV infectionActive treatment with high-dose corticosteroids (i.e., ≥20 mg prednisone or equivalent per day when administered for 2 or more weeks), alkylating agents, antimetabolites, transplant-related immunosuppressive drugs, cancer chemotherapeutic agents classified as severely immunosuppressive, tumor necrosis factor (TNF) blockers, and other biologic agents that are immunosuppressive or immunomodulatory (e.g., B-cell-depleting agents)[13]

This list is not exhaustive, and a thoughtful approach should be taken when classifying an individual patient. Additional resources to help classify patients' degree of immunosuppression include ACIP's General Best Practice Guidelines for Immunizations,[14] the CDC Yellow Book,[15] and the Infectious Diseases Society of America policy statement, 2013 IDSA Clinical Practice Guideline for Vaccination of the Immunocompromised Host.[16]

For patients who are not moderately or severely immunocompromised, similar to this patient, the recommended dosing schedule is as summarized in the table below:

Table. COVID-19 Vaccine Dosing Schedule (2025-2026)[13]

Age Group	Vaccination History	Doses	Interval
12-64 years	Unvaccinated	1	Day 0
	Previously Vaccinated	1	≥8 weeks after last dose (Moderna mNexspike: ≥3 months*)
65+ years	Unvaccinated	2	Dose 1: Day 0; Dose 2: 6 months after Dose 1 (min 2 months; mNexspike: min 3 months*)
	Previously Vaccinated	2	Dose 1: ≥8 weeks after last dose (mNexspike: ≥3 months*); Dose 2: same as above

**Moderna (mNexspike): Recommended 3 months after last dose; doses ≥2 months apart should not be repeated.*
Figured reproduced from 2025–2026 COVID-19 Vaccination Guidance Centers for Disease Control and Prevention 2025

These recommendations are likely to evolve as more is learned about the optimal boosting strategy or as vaccines for variants undergo further study. As of Spring 2026, all people 65 and older are recommended to have 1 additional dose of a COVID-19 vaccine (Moderna, Pfizer-BioNTech, or Novavax).[13]

A person is considered fully vaccinated against COVID-19 ≥2 weeks after receipt of the second dose in a 2-dose series (Pfizer-BioNTech, Moderna, or Novavax). Immunity wanes with time.

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

The 2025-2026 formulation for all available COVID-19 vaccines (Moderna, Novavax, and Pfizer-BioNTech) are monovalent vaccines based on the Omicron JN.1-lineage of SARS-CoV-2. The vaccines based on the original strains of SARS-CoV-2 should no longer be used.[17]

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. Novavax is also based on the spike protein, but it is a protein subunit vaccine. It is composed of recombinant, purified spike protein and an adjuvant derived from saponin extracts of the soap bark tree. The Janssen vaccine, which is no longer recommended in the United States, 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.[17]

All three of the currently approved vaccines reported efficacy of 95-100% for preventing severe COVID-19 disease in their original formulations. Preclinical evidence was used to support the updated formulations, which are based on more recently circulating strains of COVID-19.[17]

Question 11: Mrs. Smith asks if she should eventually receive the respiratory syncytial virus (RSV) vaccine as well? What should you consider when discussing this vaccine with her?

Consideration of who should receive the RSV vaccine requires determination of which patients are most at risk for severe disease. Risk factors for severe RSV disease include cardiopulmonary disease (asthma, COPD, CHF, CAD), kidney disorders, liver disorders, neuromuscular disorders, hematologic disorders, diabetes mellitus, immunocompromise, frailty, advanced age (especially >75), severe obesity with BMI ≥40, and long-term care residents.[18] Studies of these vaccines reported a reduction in symptomatic lower respiratory tract RSV disease by approximately 80% in the first season after vaccination, and 50-75% in the second season after vaccination.[19,20] Given this, the CDC recommends RSV vaccination for adults older than 75 years of age as well as patients aged 50-74 with medical conditions that increase their risk of severe RSV infection.[18] Additionally, RSV vaccination in pregnant patients has been shown to decrease medically attended RSV infections in infants up to 6 months and is therefore recommended as part of the vaccine schedule in pregnant adults.[21]

RSV vaccines currently approved in the United States include an adjuvated monovalent vaccine, a bivalent vaccine, and an mRNA vaccine. All vaccines are approved for adults 50 and older, however only the bivalent and mRNA vaccines are currently approved for adults aged 18-50. For pregnant patients, only the bivalent vaccine is currently approved.[22]

Question 12: She also asks you about vaccine co-administration. What do you tell her regarding recommendations for receiving more than one vaccine at a time?

According to the CDC, the COVID-19 vaccine may be co-administered with other vaccines, including influenza and RSV vaccines. Data on coadministration with pneumococcal vaccines is emerging, and coadministration is not discouraged. Influenza and pneumococcal vaccinations remain effective when given together, without an increase in adverse reactions.[23]

PCV and PPSV vaccines should not be given together. When both are given (e.g., PCV15 then PPSV23), the PPSV23 should be given 1+ years after PCV. An alternative is a single dose of PCV-20.[3]

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