immunizations 411
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webinar series

WHICH PNEUMOCOCCAL VACCINE SHOULD YOU BE ADMINISTERING?

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DEPARTMENT OF FAMILY & COMMUNITY MEDICINE

ABOUT DR. SAVOY

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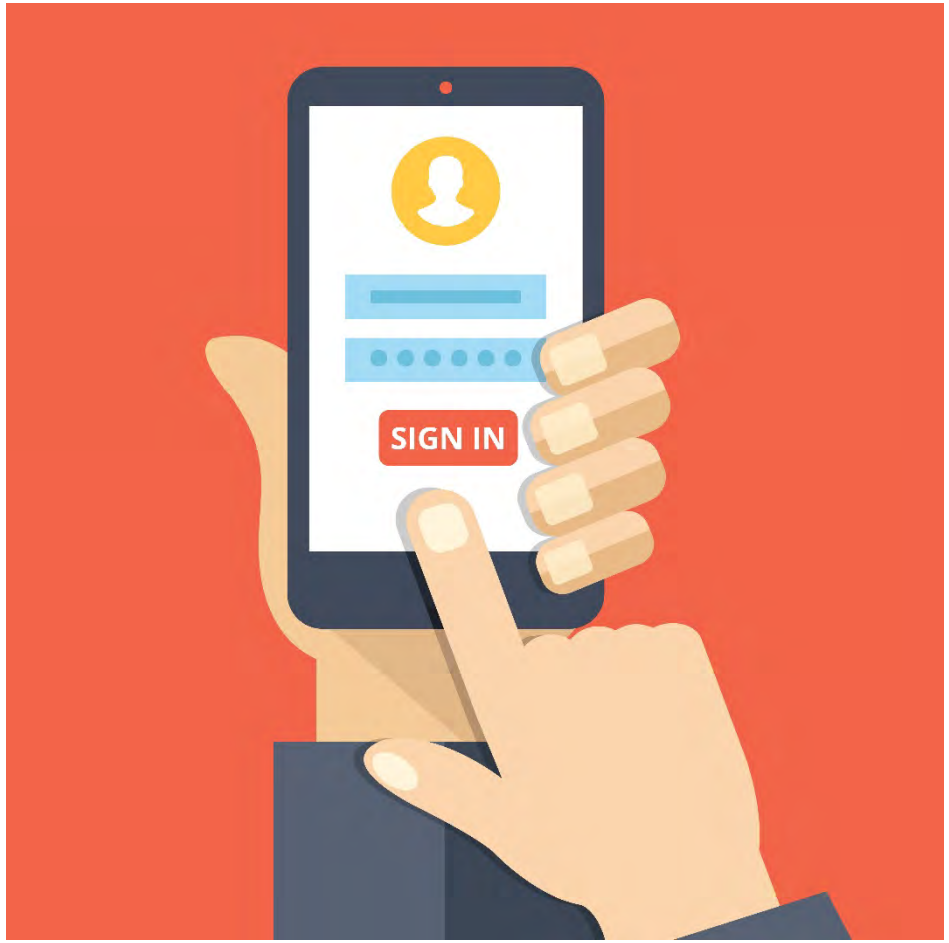
- Chair, American Academy of Family Physicians Subcommittee on Clinical Preventive Services
- AAFP Liaison to the Advisory Committee on Immunization Practices

SPEAKER DISCLOSURE

- Dr. Savoy does not have any relevant financial disclosures.

- After attending this webinar, participants should be able to:
  - Briefly explain the epidemiology of pneumococcal disease in adults
  - Identify the available pneumonia vaccines available
  - Choose the correct pneumonia vaccine for a particular adult patient

AN OPPORTUNITY TO INTERACT



- To participate in the polls:
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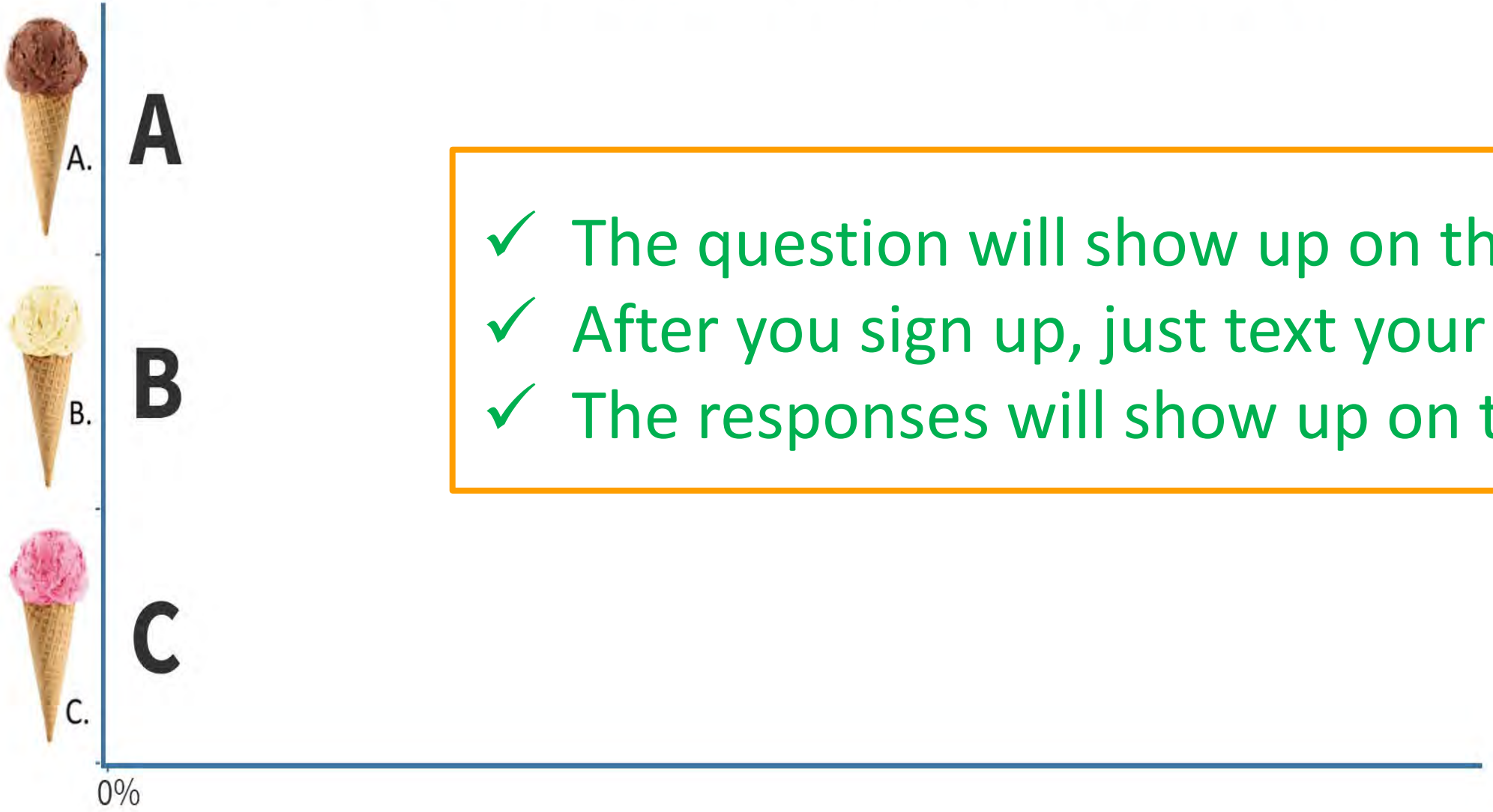
What is you favorite ice cream flavor?

Respond at **PollEv.com/drsavoy** Text **DRSAVOY** to **22333** once to join, then **A, B, or C**



- ✓ The question will show up on the screen.
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What is you favorite ice cream flavor?

A.

B.

0%

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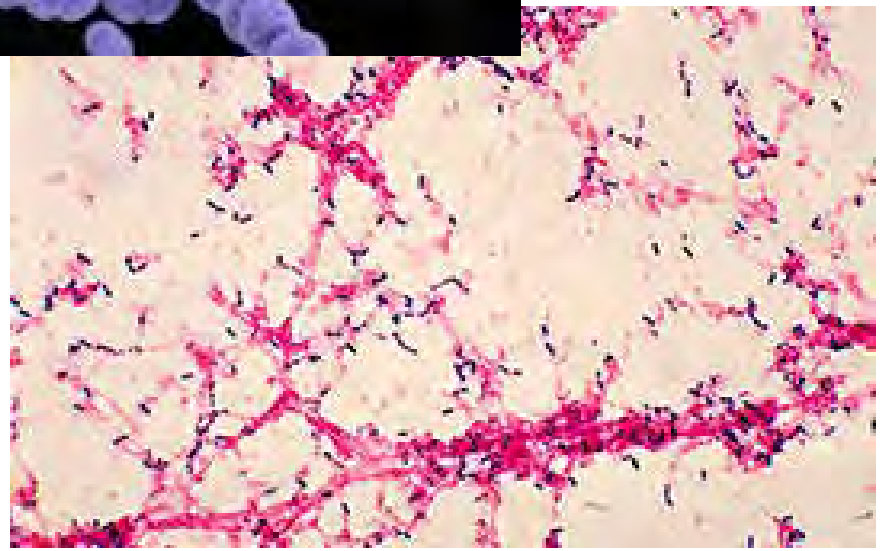
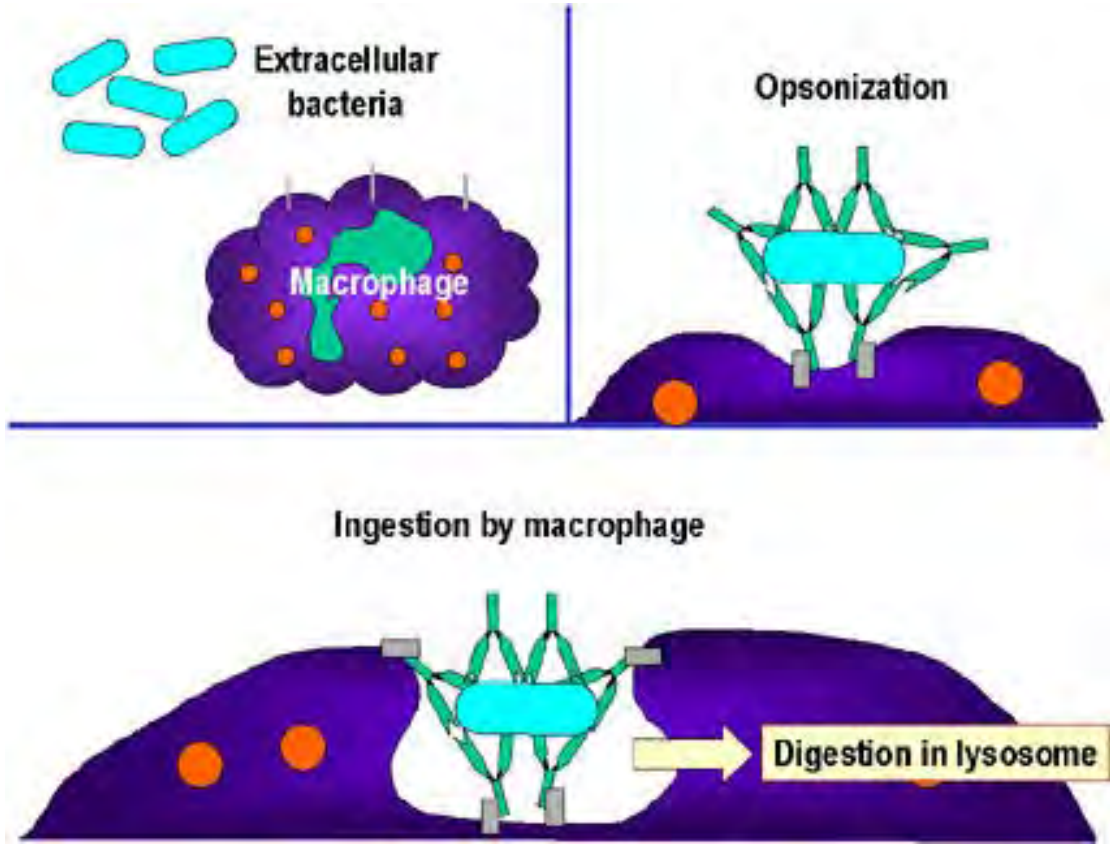
STREPTOCOCCUS PNEUMONIAE (PNEUMOCOCCUS)



- Lancet-shaped, gram-positive, facultative anaerobic bacteria
- Over 90 known serotypes
  - 10 most common serotypes account for ~ 62% of invasive disease worldwide
- Common inhabitants of the respiratory tract
- May be isolated from the nasopharynx of 5-90% of healthy persons
  - Varies based on the population and setting

STREPTOCOCCUS PNEUMONIAE (PNEUMOCOCCUS) CONT.

- Capsular polysaccharides are the primary basis for the pathogenicity of the organism.
- Type-specific antibody to capsular polysaccharide is protective.
- These antibodies and complement interact to opsonize pneumococci, which facilitates phagocytosis and clearance of the organism

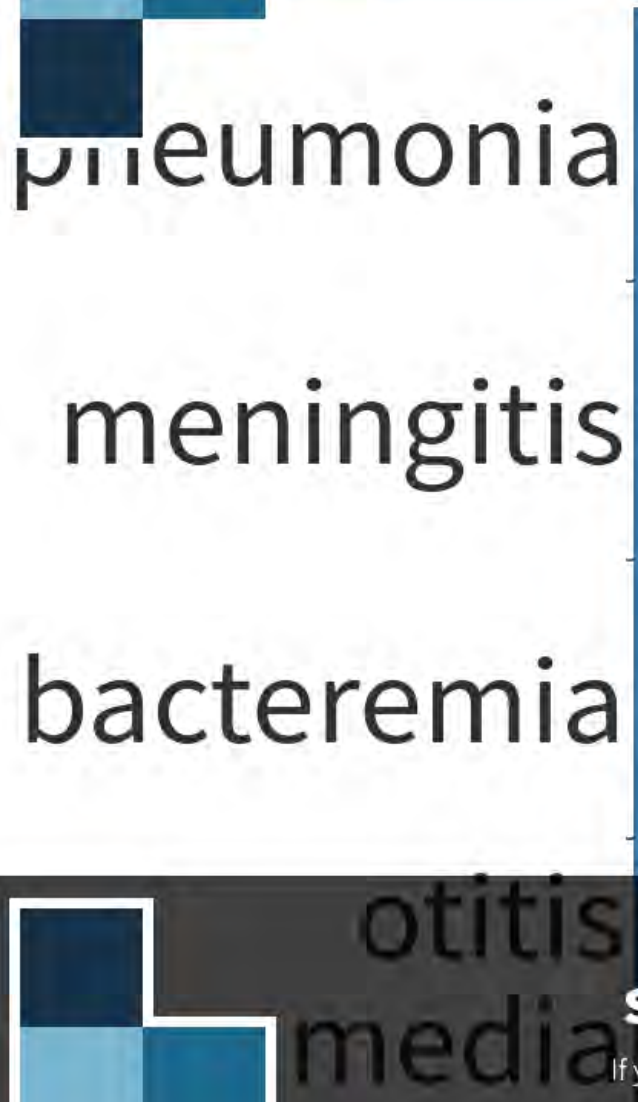


http://www.microbiologybook.org/bowers/immune%20cells.htm

STREPTOCOCCUS PNEUMONIAE (PNEUMOCOCCUS) CONT.

- Louis Pasteur first isolated pneumococcus in 1881 from the saliva of a patient with rabies
- Friedlander and Talamon first made the association between the pneumococcus and lobar pneumonia in 1883
- Earliest vaccine development was in 1911, but delayed once antibiotics were identified
- First pneumococcal vaccine was licensed in the United States in 1977.
- The first conjugate pneumococcal vaccine was licensed in 2000

st common clinical presentation of pneumococcal disease among a



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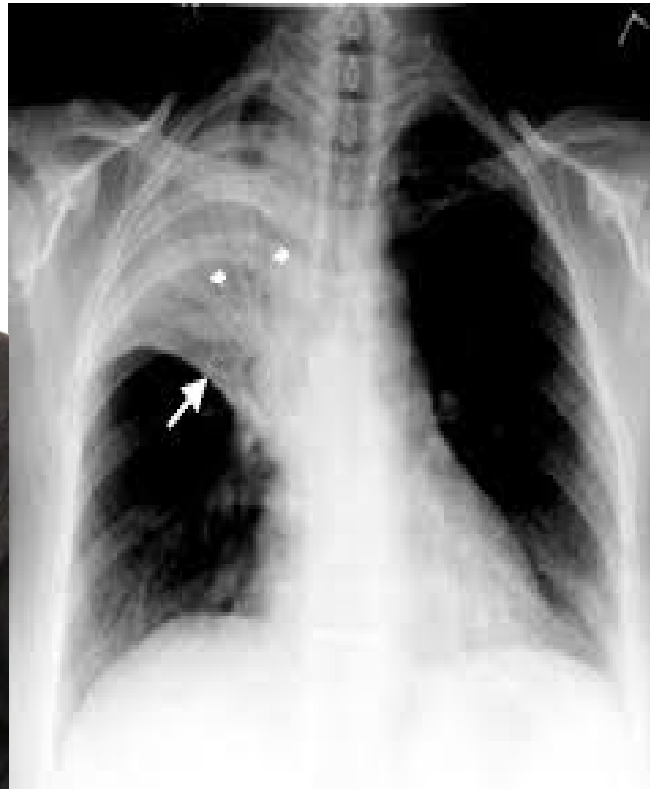
PNEUMOCOCCAL PNEUMONIA

- The incubation period of pneumococcal pneumonia is short, about 1 to 3 days.
- Symptoms include:
  - Abrupt onset of fever
  - Chills or rigors
  - Pleuritic chest pain
  - Productive cough
  - Dyspnea, tachypnea, hypoxia
  - Tachycardia, malaise, weakness



PNEUMOCOCCAL PNEUMONIA CONT.

- Estimated 400,000 hospitalizations per year in the United States
- Up to 36% of adult community-acquired pneumonias
- Common bacterial complication of influenza
- Case-fatality rate 5%–7%, higher in elderly
- 25-30% of patients with pneumococcal pneumonia also experience pneumococcal bacteremia

- Other complications:
  - empyema (i.e., infection of the pleural space)
  - pericarditis (inflammation of the sac surrounding the heart)
  - endobronchial obstruction, with atelectasis and lung abscess formation

PNEUMOCOCCAL BACTEREMIA *(WITHOUT PNA)*

- More than 12,000 cases per year in the United States
- Case-fatality rate ~20%; up to 60% among the elderly
- Asplenic patients at largest rick for fulminant disease

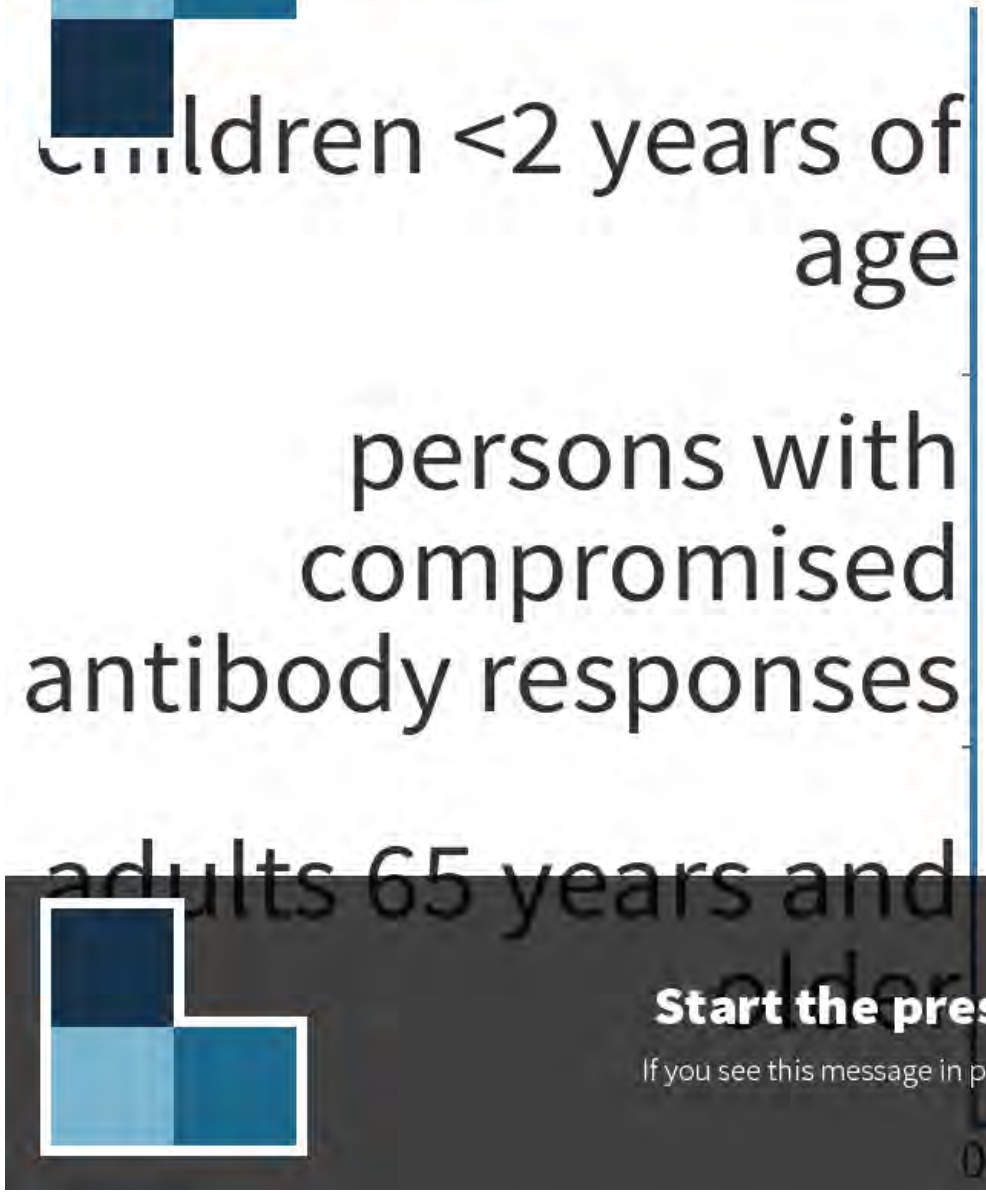
PNEUMOCOCCAL MENINGITIS

- Cause over 50% of all cases of bacterial meningitis in the United States
- Estimated 3,000–6,000 cases per year in the United States
- Case-fatality rate 8% among children
- Case-fatality rate 22% among adults
- Neurologic sequelae common among survivors

CONDITIONS THAT INCREASE RISK FOR INVASIVE PNEUMOCOCCAL DISEASE

- Decreased immune function — including hematologic cancer and HIV infection
- Asplenia (functional or anatomic)
- Chronic heart, pulmonary (including asthma in adults), liver or renal disease
- Cigarette smoking (in adults)
- Cerebrospinal fluid (CSF) leak
- Cochlear implant

The highest mortality rate for invasive pneumococcal disease is in:



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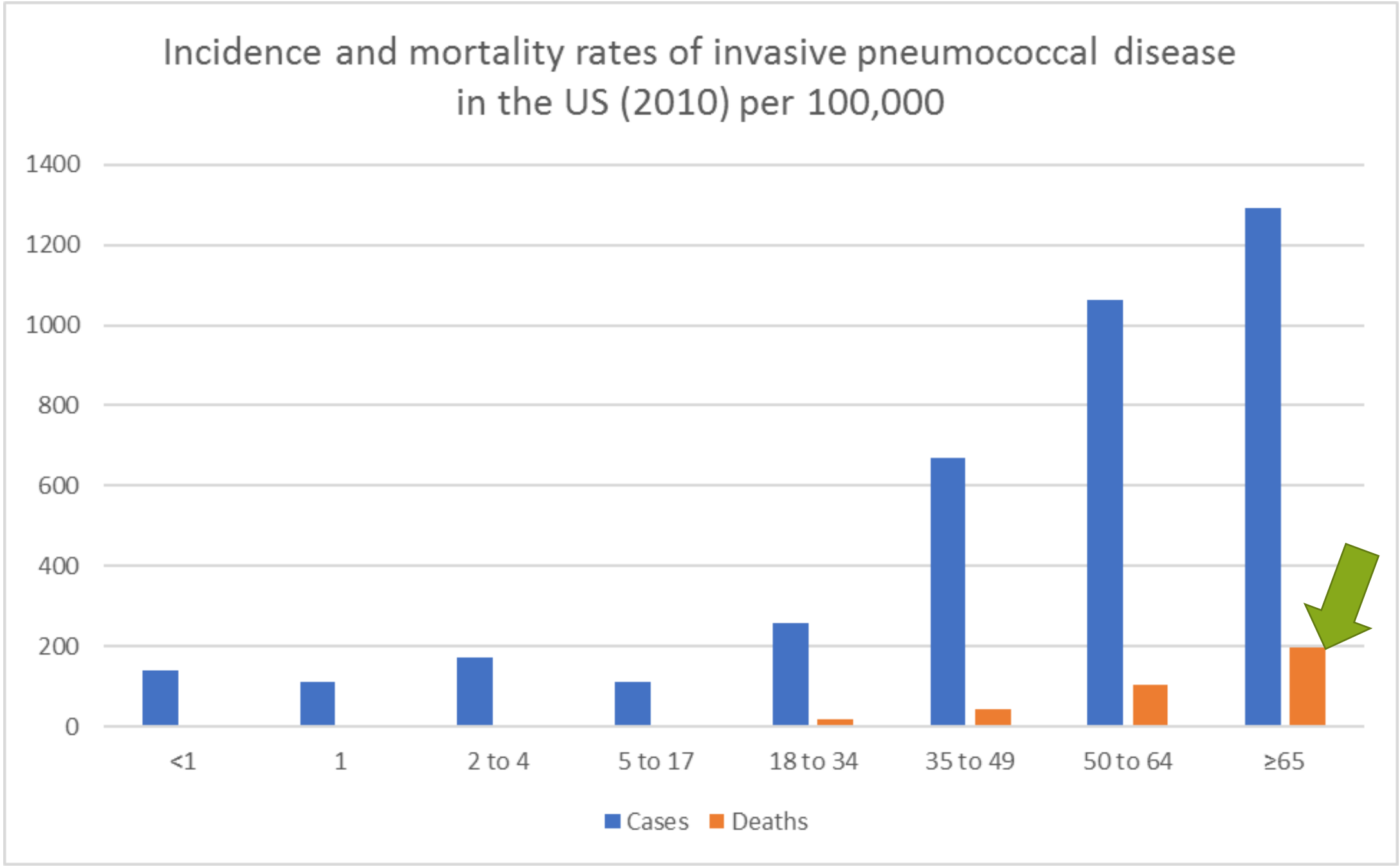


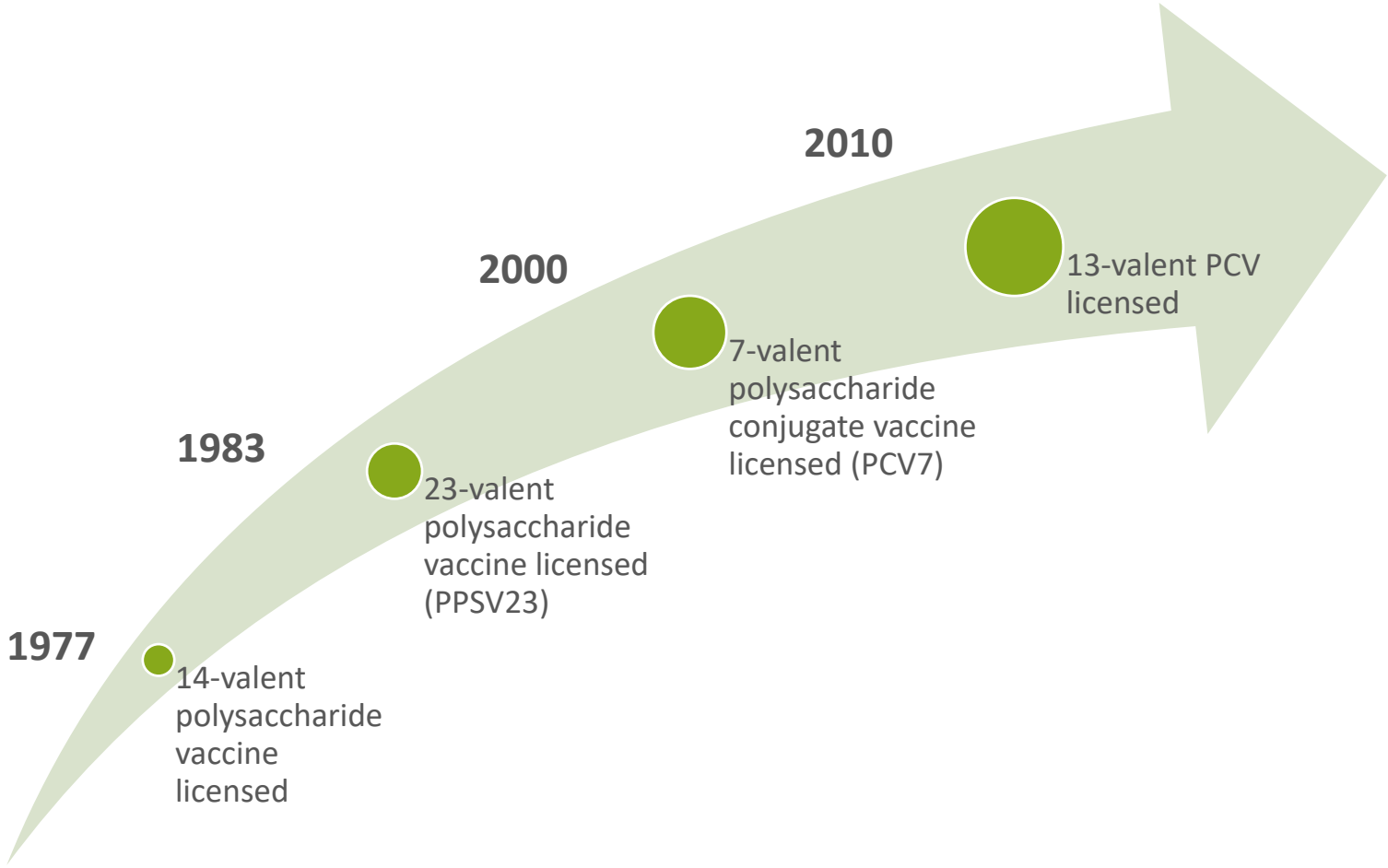
Centers for Disease Control and Prevention. Active Bacterial Core Surveillance (ABCs) report, Emerging Infections Program Network Streptococcus pneumoniae, 2010. Available at: http://www.cdc.gov/abcs/reports-findings/survreports/spneu10-orig.pdf

PNEUMONIA IN MISSOURI

U.S. LEADING CAUSES OF DEATH, 2012	TOTAL DEATHS	DEATH RATE***	STATE RANK*	U.S. RATE**
1. Heart Disease ★	13,742	193.4	10th	170.5
2. Cancer ★	12,919	182.3	11th	166.5
3. Chronic Lower Respiratory Diseases ★	3,650	51.7	11th (tie)	41.5
4. Stroke	2,989	42.2	13th	36.9
5. Accidents	3,002	47.8	13th	39.1
6. Alzheimer's Disease	1,863	25.9	24th	23.8
7. Diabetes ★	1,377	19.6	30th (tie)	21.2
8. Influenza/Pneumonia	1,213	17.0	13th	14.4
9. Kidney Disease ★	1,259	17.8	9th	13.1
10. Suicide	914	14.9	18th	12.6

★ = people who should have gotten immunization too

US LICENSED PNEUMOCOCCAL VACCINES



ABOUT THE VACCINES

PNEUMOCOCCAL POLYSACCHARIDE VACCINE

- Composed of purified preparations of pneumococcal capsular polysaccharide
- PPSV23 contains polysaccharide antigen from 23 types of pneumococcal bacteria that cause 60-76% of invasive disease
- Available in the US as Pneumovax 23 (Merck)
  - contains 25 mcg of each antigen per dose and contains 0.25% phenol as a preservative
  - single-dose vial or syringe, and in a 5-dose vial
  - given by injection and may be administered either intramuscularly or subcutaneously

PNEUMOCOCCAL CONJUGATE VACCINE

- Composed of purified capsular polysaccharide from 13 types of pneumococcus conjugated to nontoxic diphtheria toxin (CRM197)
- Available in the US as Prevnar 13 (Wyeth/Pfizer)
  - contains approximately 2.2 µg of polysaccharide from each of 12 serotypes and approximately 4.4 µg of polysaccharide from serotype 6B; the total concentration of CRM197 is approximately 34 µg.
  - Contains 0.02% polysorbate 80 (P80), 0.125 mg of aluminum as aluminum phosphate (AlPO4) adjuvant, 5mL of succinate buffer, and no thimerosal preservative.
- Prevnar 13 is a suspension for intramuscular injection available in 0.5 mL single-dose pre-filled syringes.

HOW EFFECTIVE ARE THE VACCINES?

PNEUMOCOCCAL POLYSACCHARIDE VACCINE

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

PPSV23 = Widest range of coverage

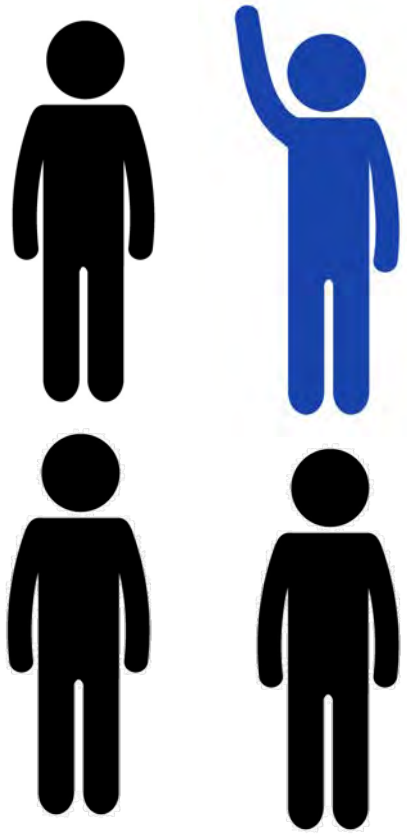
PNEUMOCOCCAL CONJUGATE VACCINE

- More than 90% effective against invasive disease caused by vaccine serotypes in children
- 45% effective against vaccine-type non-bacteremic pneumococcal pneumonia in adults older than 65 years
- 75% effective against vaccine-type invasive disease in adults older than 65 years

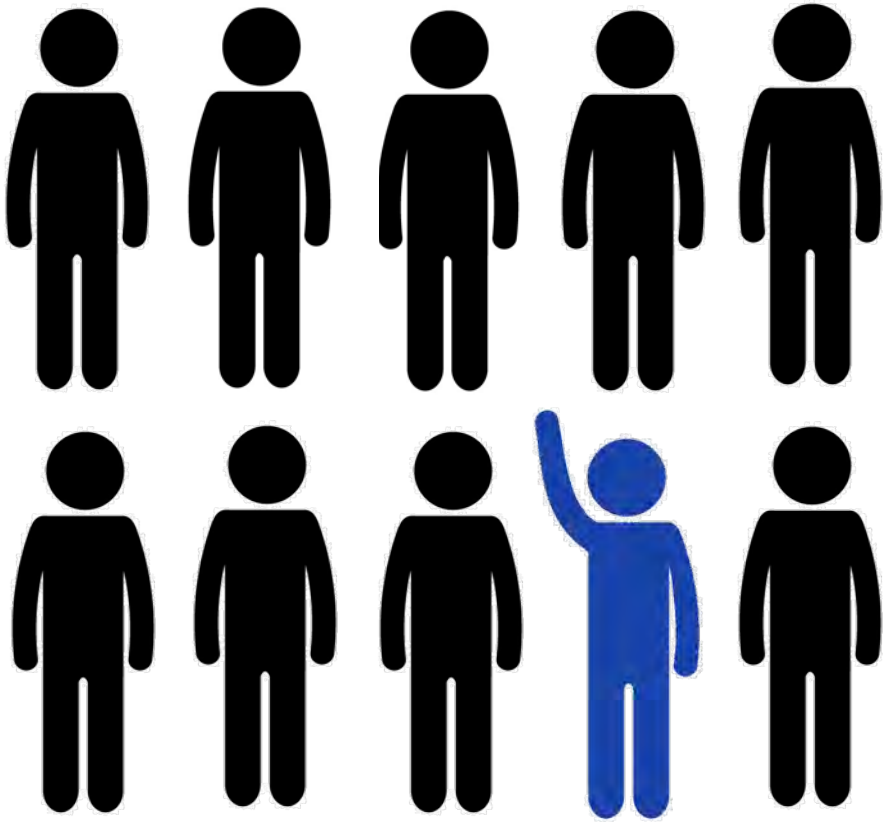
PCV13 = Best immunogenicity

GIVING ADULTS ≥65 YEARS PCV13, PREVENTS:

- Invasive Pneumococcal Disease

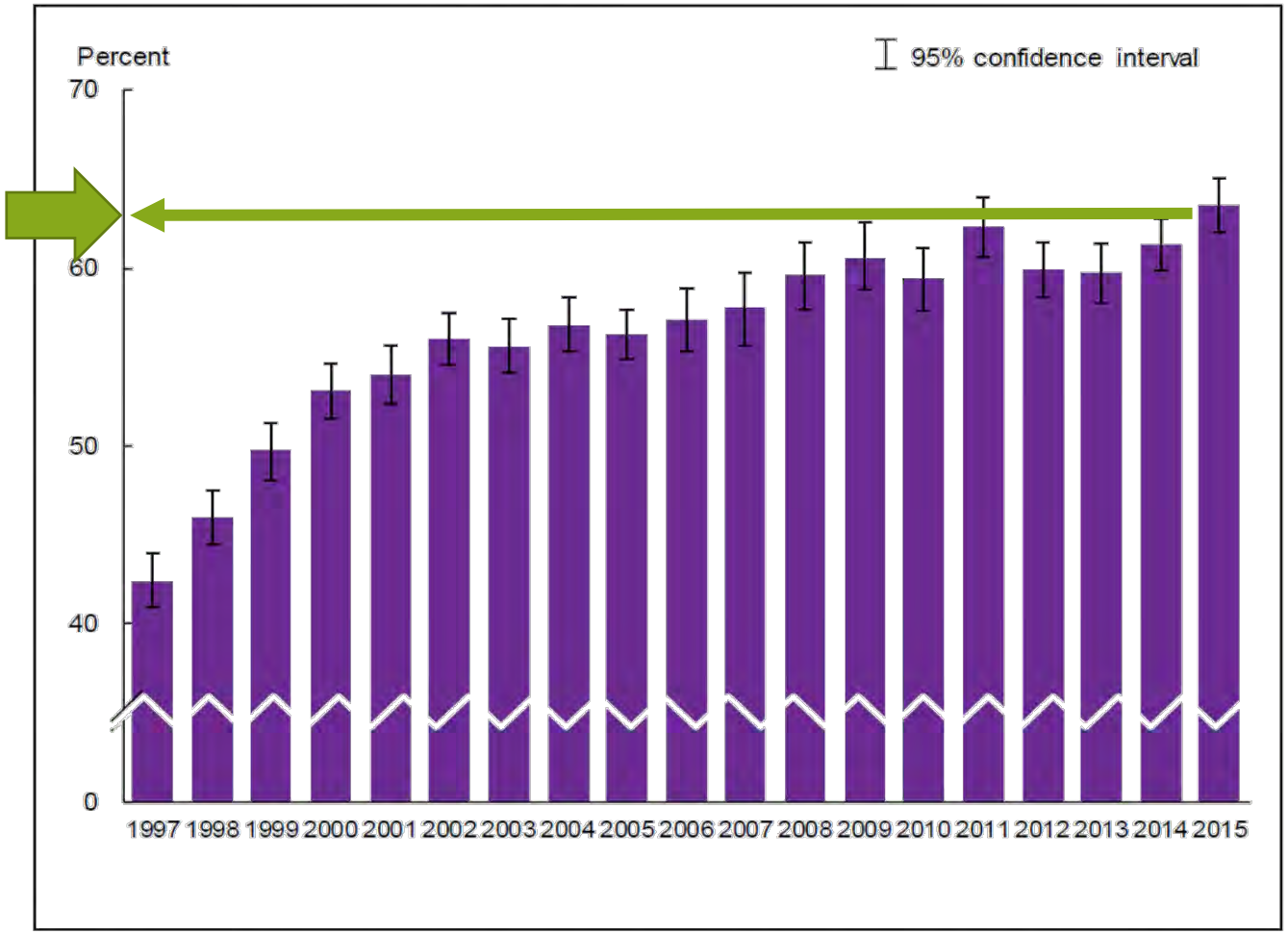


- Community Acquired Pneumonia



Receipt of pneumococcal vaccination

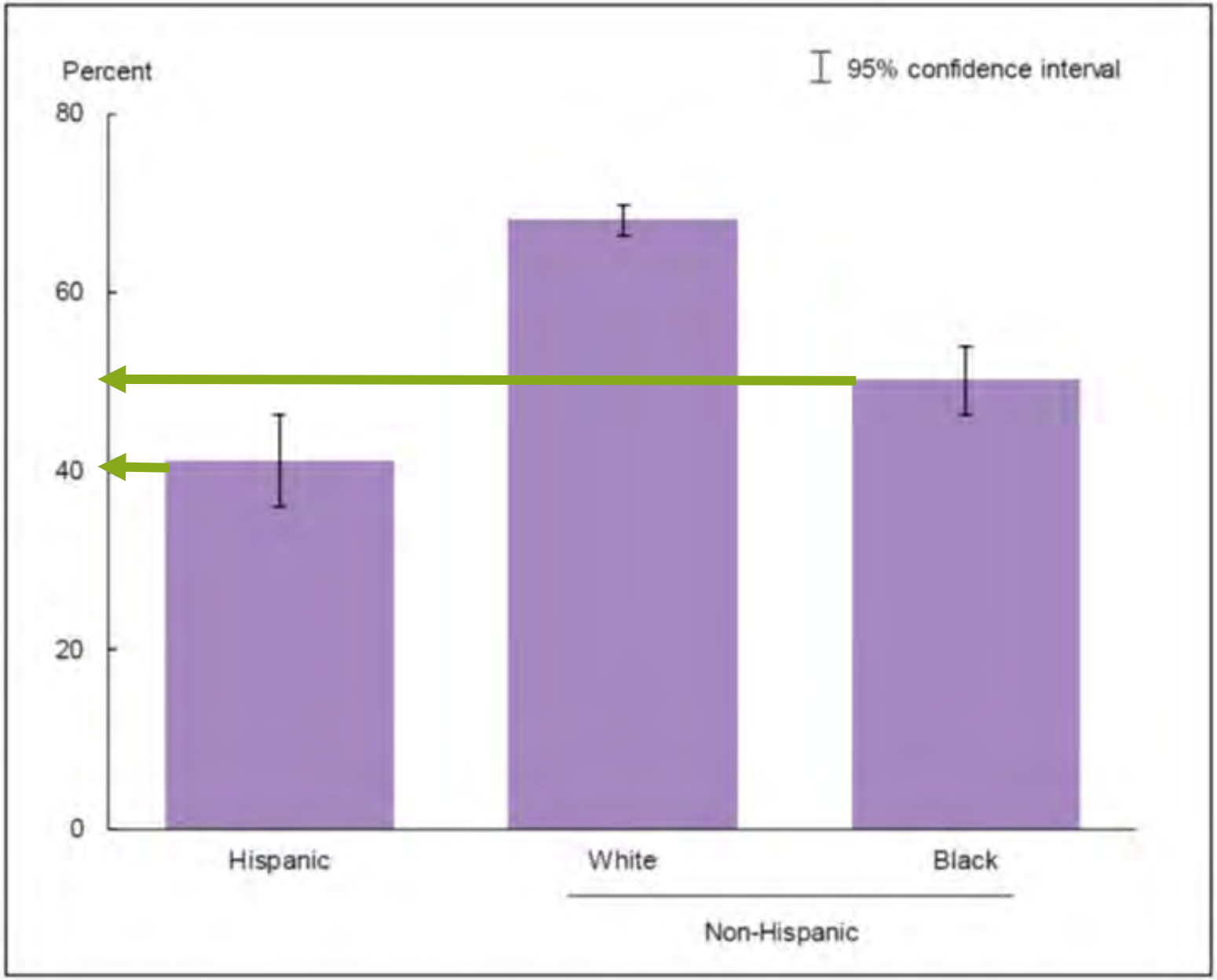
Figure 5.1. Percentage of adults aged 65 and over who had ever received a pneumococcal vaccination: United States, 1997–2015



NOTES: Data are based on household interviews of a sample of the civilian noninstitutionalized population. The analyses exclude those with unknown pneumococcal vaccination status (about 5% of respondents each year). Advisory Committee on Immunization Practices recommendations regarding who should receive pneumococcal vaccination have changed over the years, and changes in coverage estimates may reflect changes in recommendations. Of particular note, beginning in September 2014, all adults aged 65 and over are recommended to receive both the 13-valent pneumococcal conjugate vaccine (PCV13) and the 23-valent pneumococcal polysaccharide vaccine (PPSV23) in series (9-11). See Technical Notes for more details.

DATA SOURCE: NCHS, National Health Interview Survey, 1997–2015, Sample Adult Core component.

AND YET, UNDER 65% OF ADULTS ≥65 YRS HAVE EVER RECEIVED A PNEUMOCOCCAL VACCINE (LET ALONE BOTH)



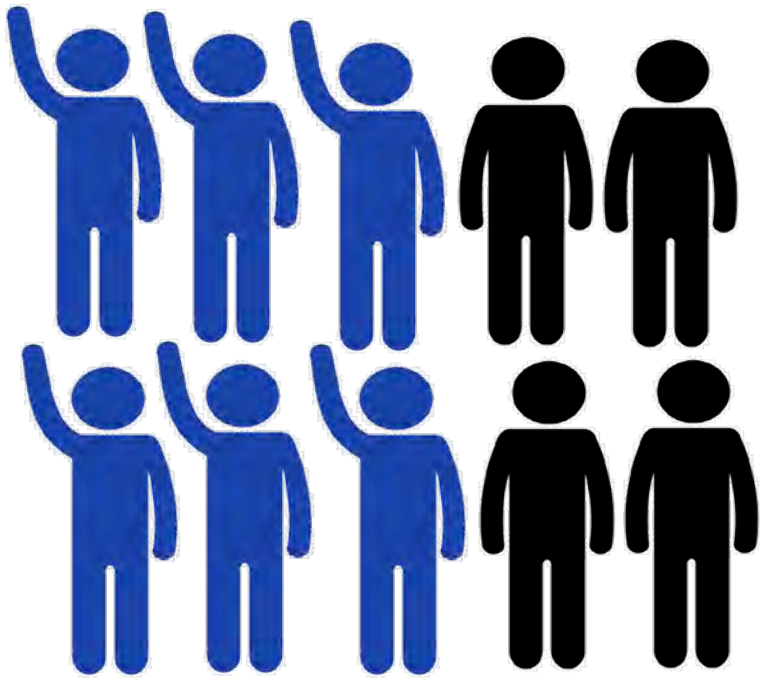
NOTES: Data are based on household interviews of a sample of the civilian noninstitutionalized population. The analyses exclude the 4.0% of adults aged 65 and over with unknown pneumococcal vaccination status. Advisory Committee on Immunization Practices recommendations regarding who should receive pneumococcal vaccination have changed over the years, and changes in coverage estimates may reflect changes in recommendations. Of particular note, beginning in September 2014, all adults aged 65 and over are recommended to receive both the 13-

RATES ARE WORSE FOR OUR MINORITY PATIENTS!

RAISE YOUR HAND IF YOU ARE NOT PROTECTED…

NON-HISPANIC

HISPANIC



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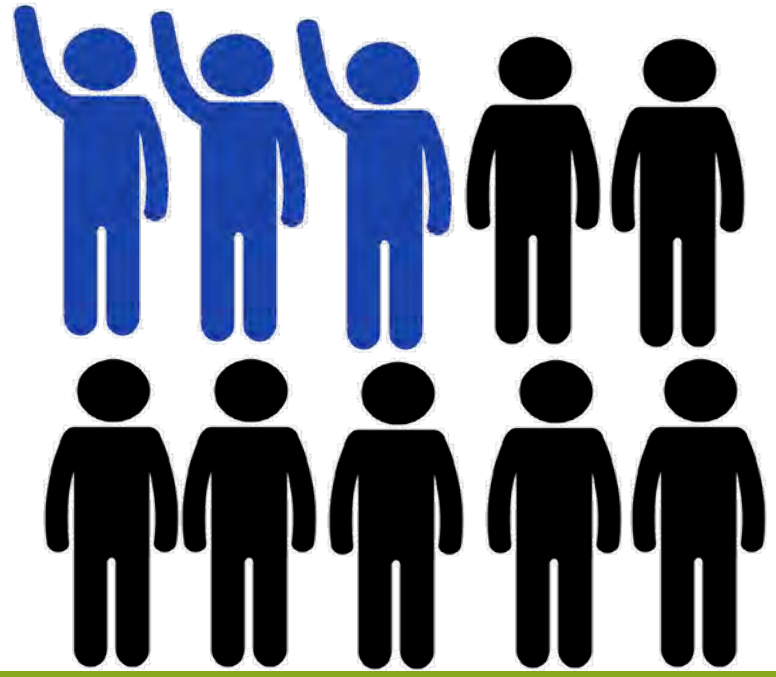

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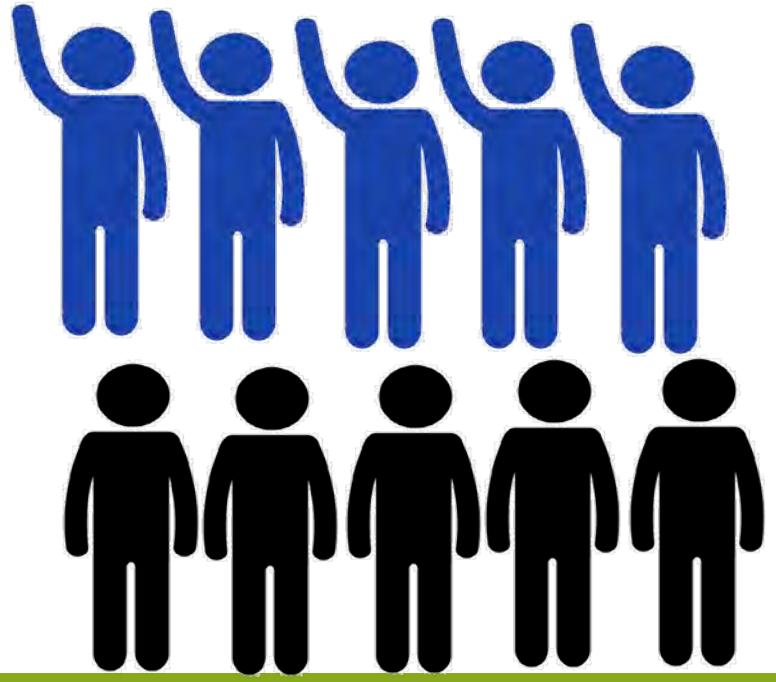


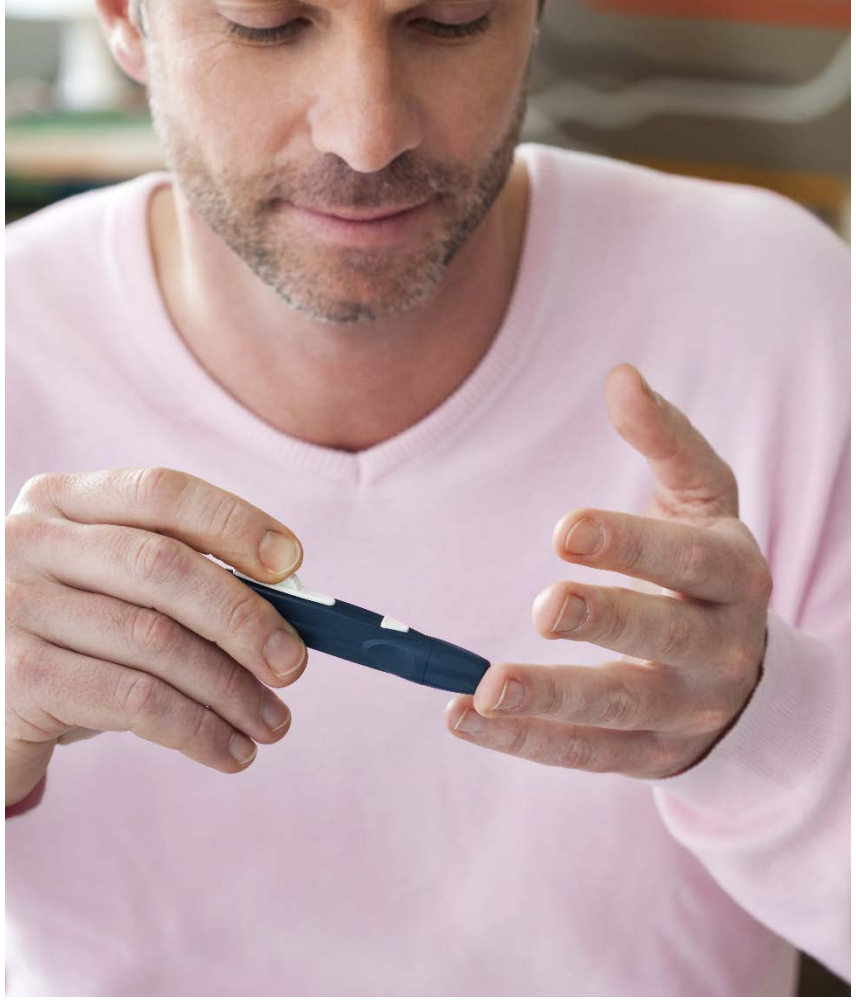


SO, WHO NEEDS WHICH VACCINES?

MS. JOHNSON

- 65 y/o
- Here for a “check- up”
- No complaints
- Non-smoker
- PMH significant for obesity (BMI=32)
- Medications: none
- Immunization hx: She has never gotten a “pneumonia vaccine” but does get a flu shot every year

Which would you give Ms. Johnson today?

Pneumovax 23 (PPSV 23)

Prevnar 13 (PCV13)

Neither

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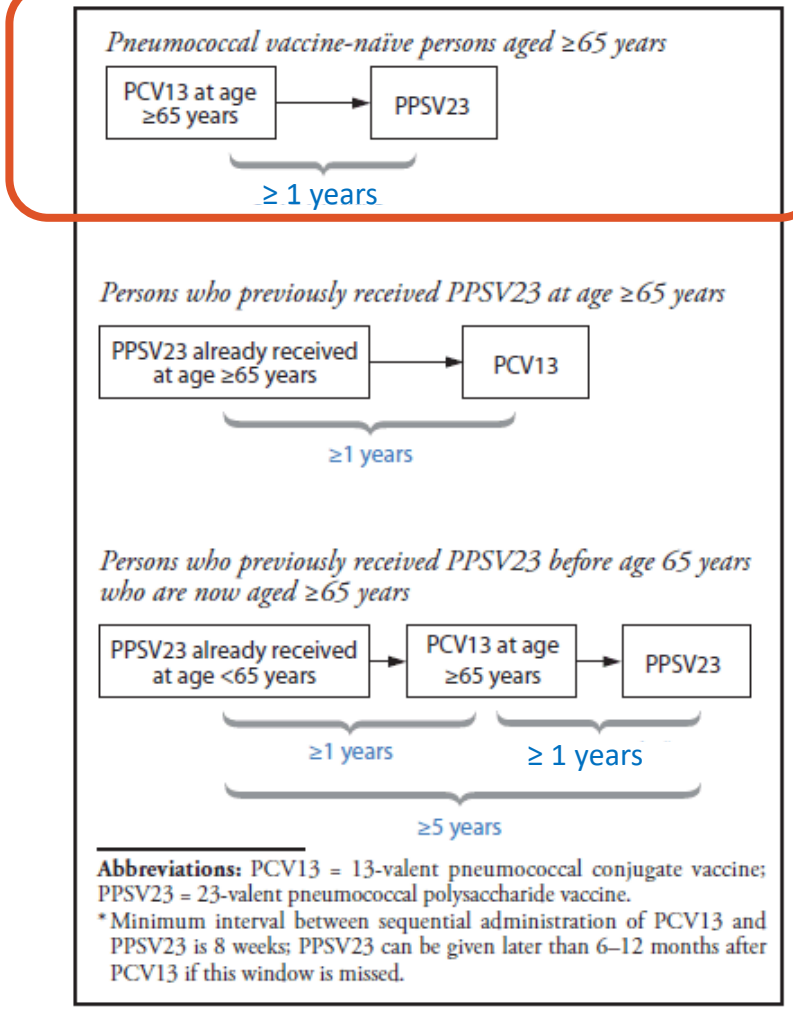
ACIP RECOMMENDATION:

- Both PCV13 and PPSV23 should be routinely administered in series to all adults aged ≥65 years. (Category A)

- The two vaccines should not be coadministered, and the minimum acceptable interval between PCV13 and PPSV23 is 8 weeks. The recommended interval is ≥1 year. (https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6434a4.htm) If a dose of PPSV23 is inadvertently given earlier than the recommended interval, the dose need not be repeated.

MS. JOHNSON



- She is 65 y/o and vaccine naive.
- She should get a Prevnar 13 today.

Pneumococcal vaccine-naïve persons aged ≥65 years

PCV13 at age ≥65 years → PPSV23

≥1 years

MS. SMITH

- 68 y/o
- Here for her Medicare annual wellness visit
- Smokes 1 ppd for 50 years
- PMH significant for COPD, HTN
- Medications: inhalers, HCTZ/metoprolol
- Immunization hx: Was given Pneumovax 23 at 65 y/o, gets influenza vaccine every year

Does Mrs. Smith need a pneumonia vaccine today?

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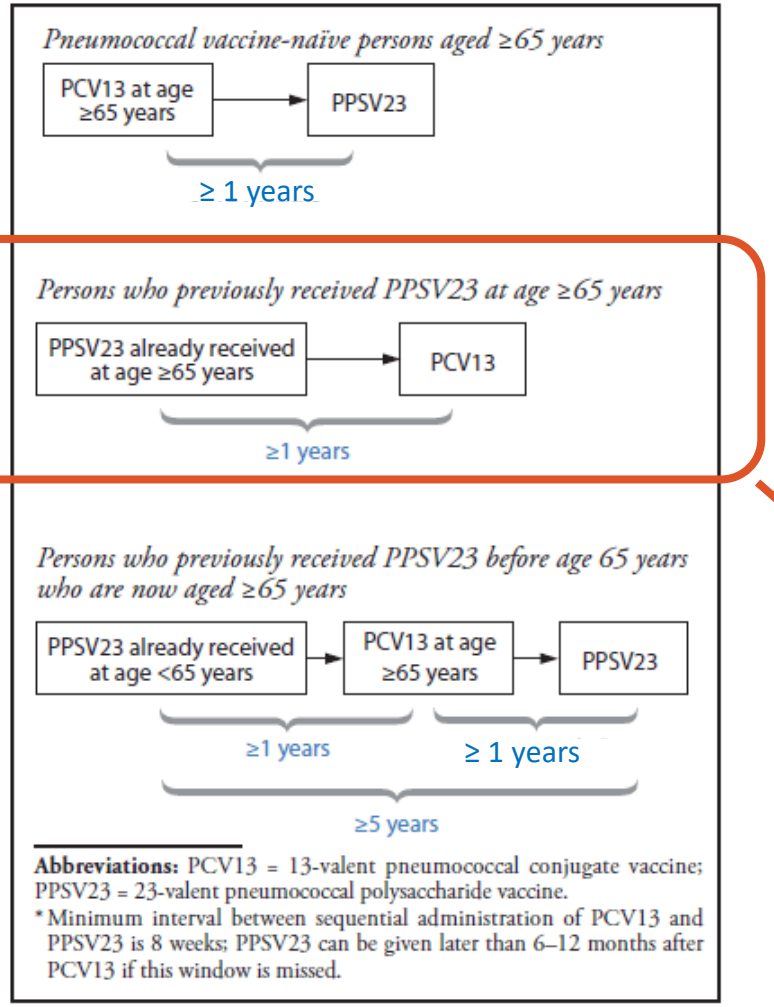
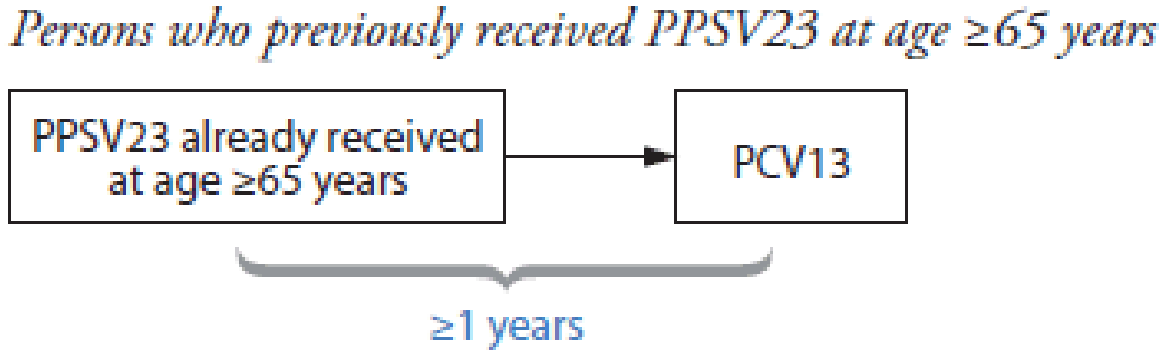
MS. SMITH

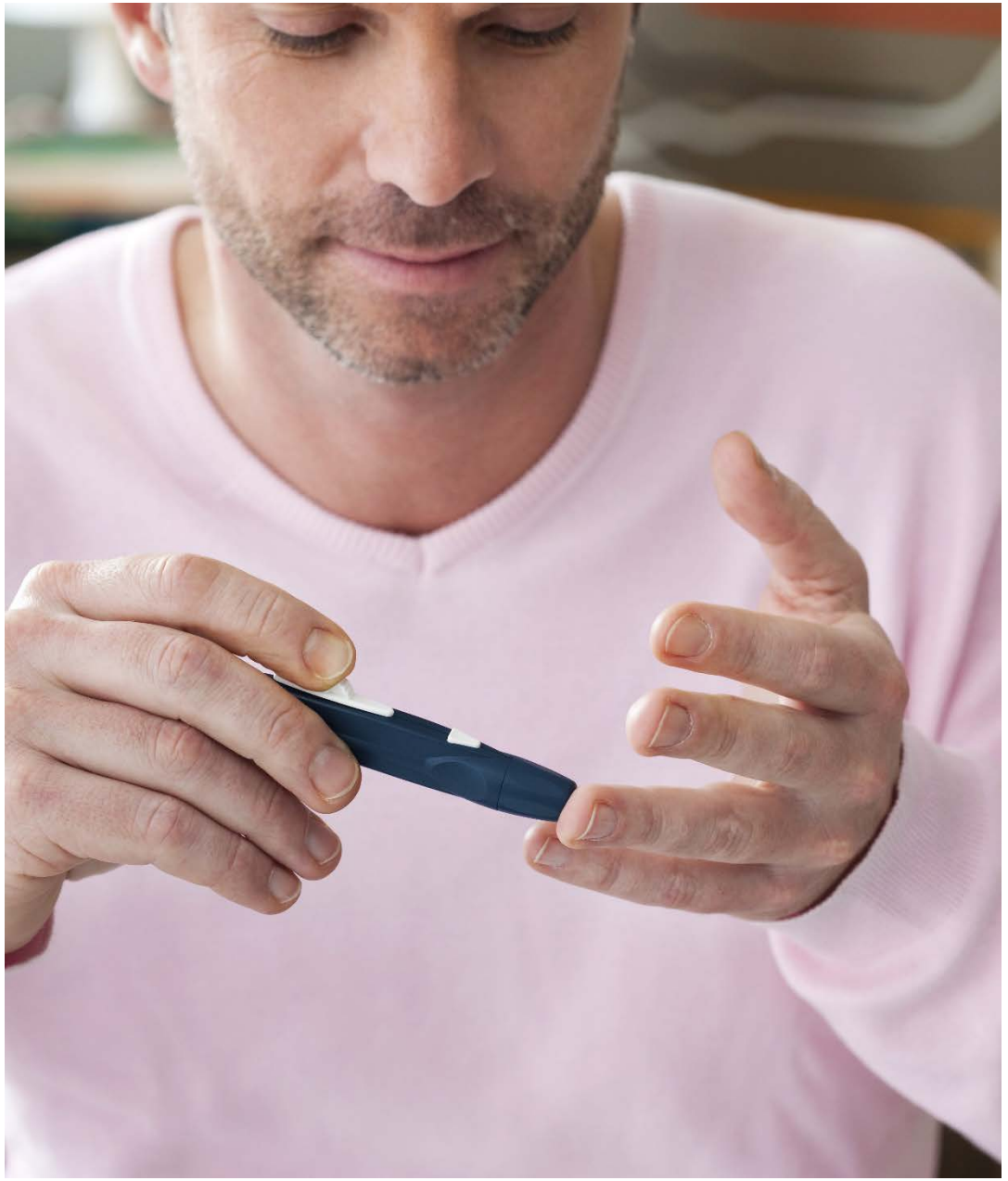


- She is 68 y/o and got PPSV23 at 65 y/o.
- It is over 1 year since PPSV23 so **she should get PCV 13 today**.



MR. JONES

- 46 y/o
- Here for diabetes follow-up
- Non-smoker
- PMH significant for DM, ty1
- Medications: insulin, statin, ace-inh
- Immunization hx: gets influenza vaccine every year, has never had any “pneumonia” vaccine



Which vaccine should Mr. Jones get today?

None

Prevnar 13 (PCV13)

Pneumovax 23 (PPSV23)

0%

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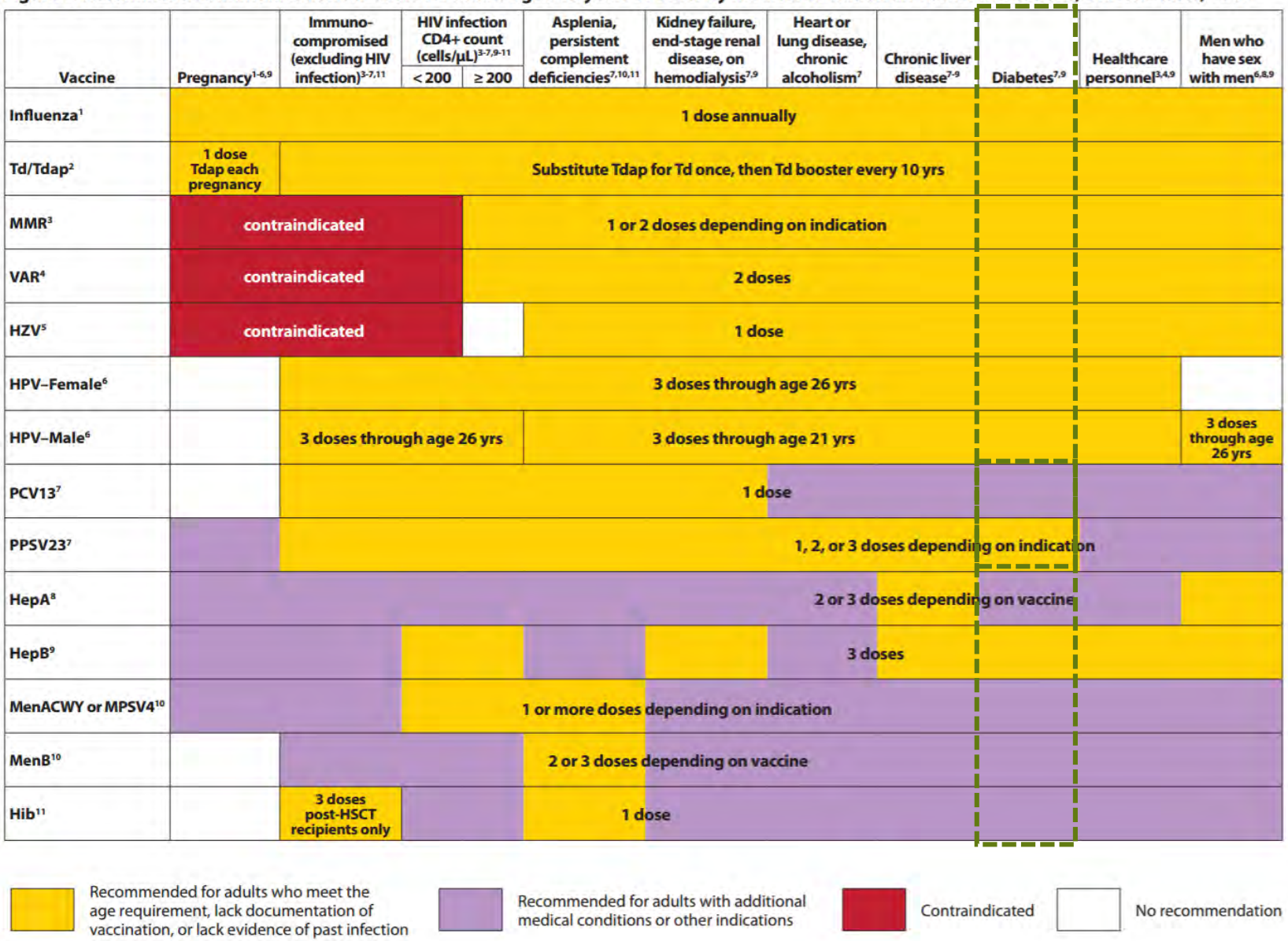
Figure 2. Recommended immunization schedule for adults aged 19 years or older by medical condition and other indications, United States, 2017



- Adults aged 19 through 64 years with chronic heart disease including congestive heart failure and cardiomyopathies (excluding hypertension); chronic lung disease including chronic obstructive lung disease, emphysema, and asthma; chronic liver disease including cirrhosis; alcoholism; or diabetes mellitus; or who smoke cigarettes **should receive PPSV23**.
- At age 65 years or older, they should receive PCV13 and another dose of PPSV23 at least 1 year after PCV13 and at least 5 years after the most recent dose of PPSV23.

MR. JONES

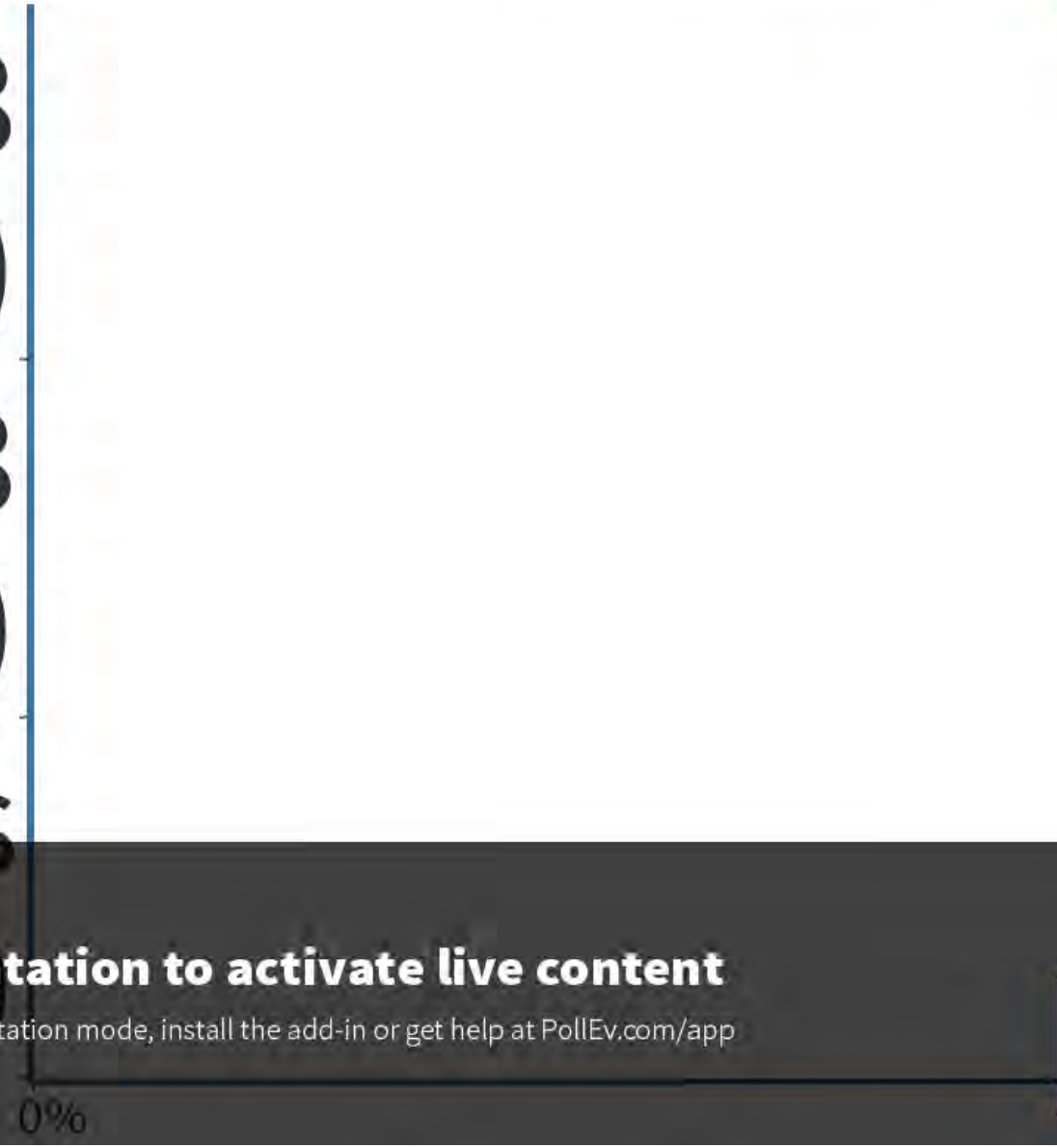
- He has diabetes but no other immunosuppressing illnesses.
- He should get Pneumovax 23 (PPSV23) today.

When Mr. Jones turns 65, which vaccine should he get?

Prevnar 13 (PCV13)

Pneumovax 23 (PPSV 23)

Neither (he is up to date)



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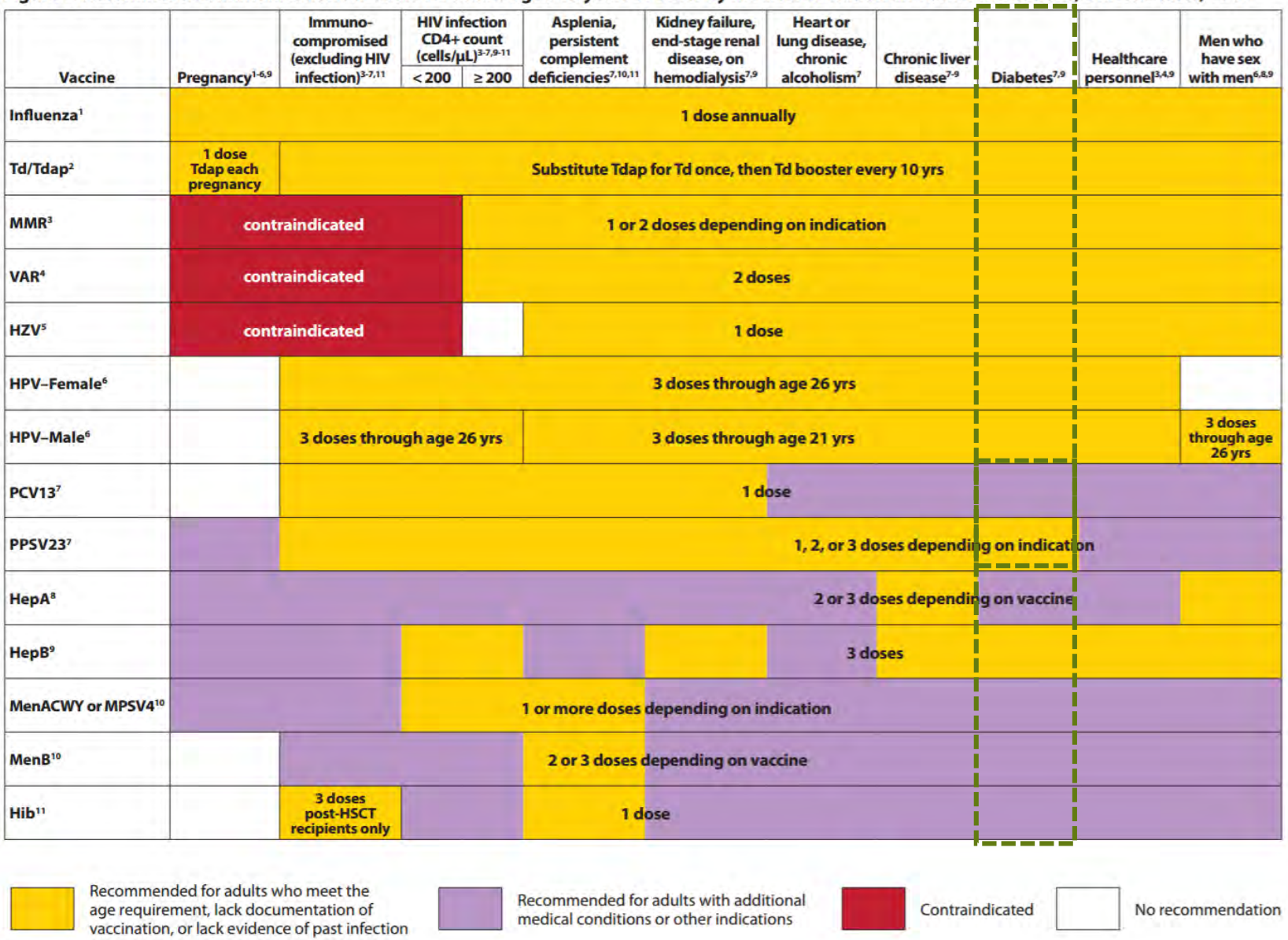
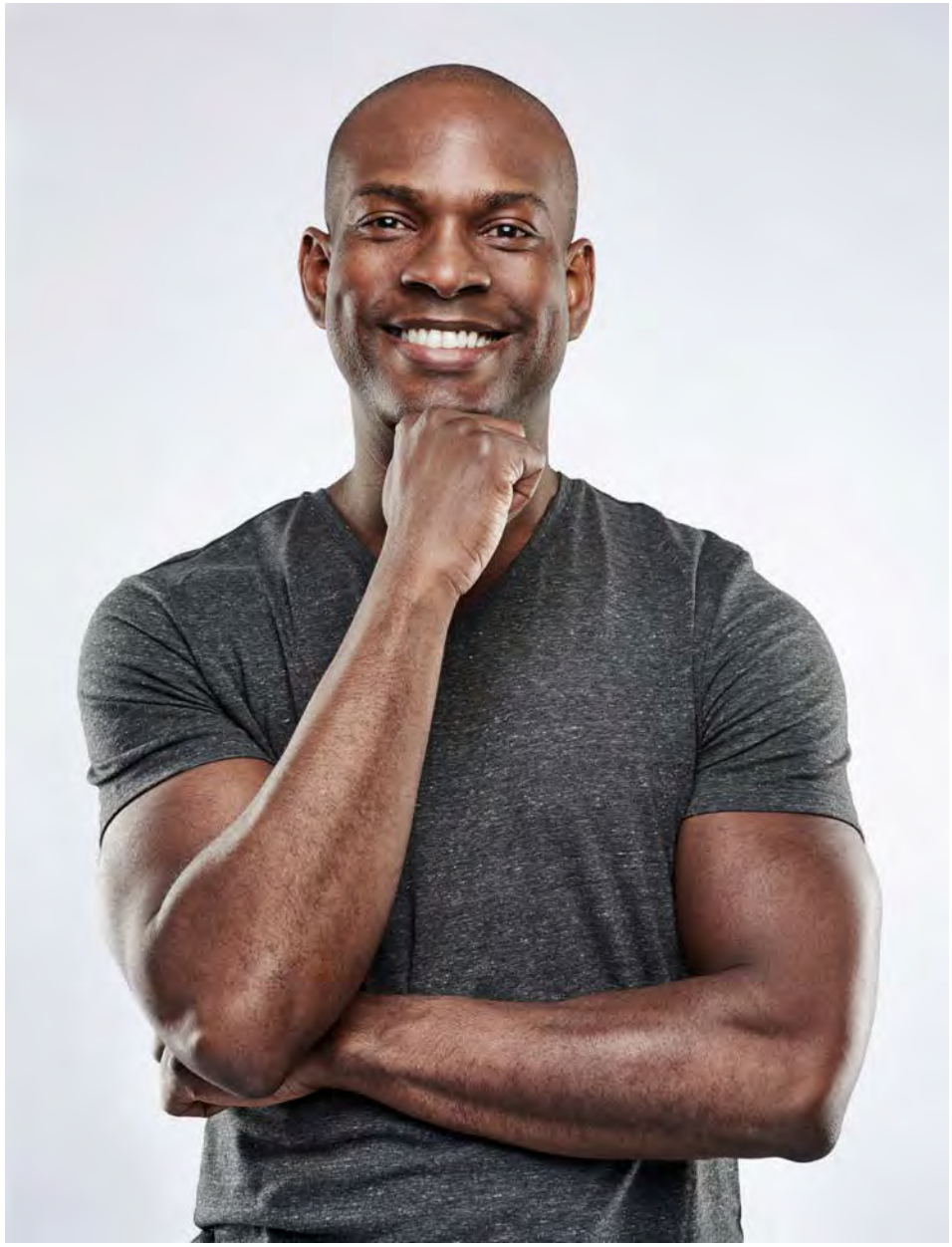


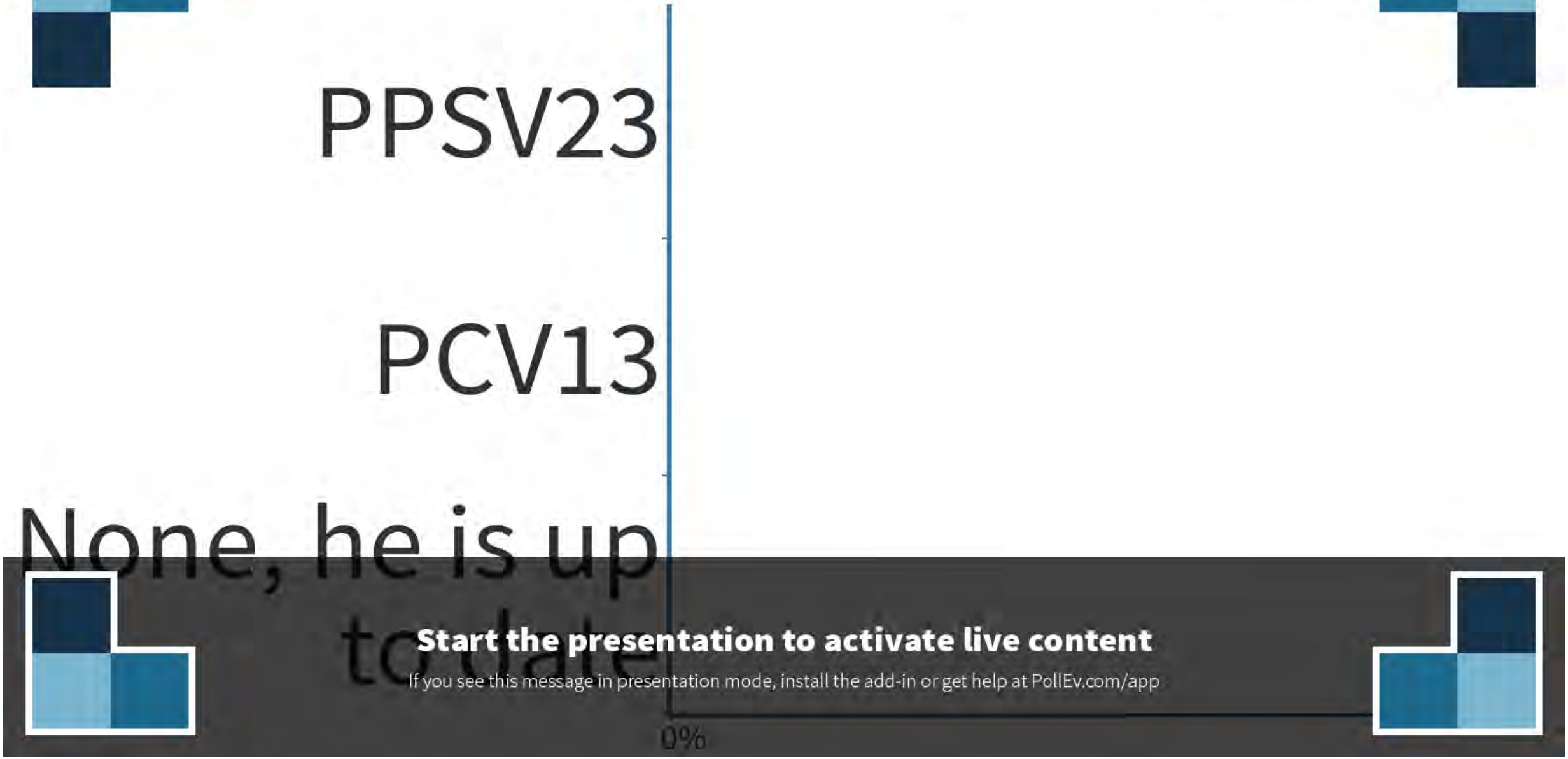
- Adults aged 19 through 64 years with chronic heart disease including congestive heart failure and cardiomyopathies (excluding hypertension); chronic lung disease including chronic obstructive lung disease, emphysema, and asthma; chronic liver disease including cirrhosis; alcoholism; or diabetes mellitus; or who smoke cigarettes should receive PPSV23.
- **<u>At age 65 years or older, they should receive PCV13</u> and another dose of PPSV23 at least 1 year after PCV13 and at least 5 years after the most recent dose of PPSV23**.

MR. PHILLIPS

- 32 y/o
- Here for follow-up
- Non-smoker
- PMH significant for sickle cell disease, has spleen removed at 22
- Medications: folic acid
- Immunization hx: gets influenza vaccine every year, “got 2 pneumonia shots” after his surgery



What immunization should Mr Phillips receive today?



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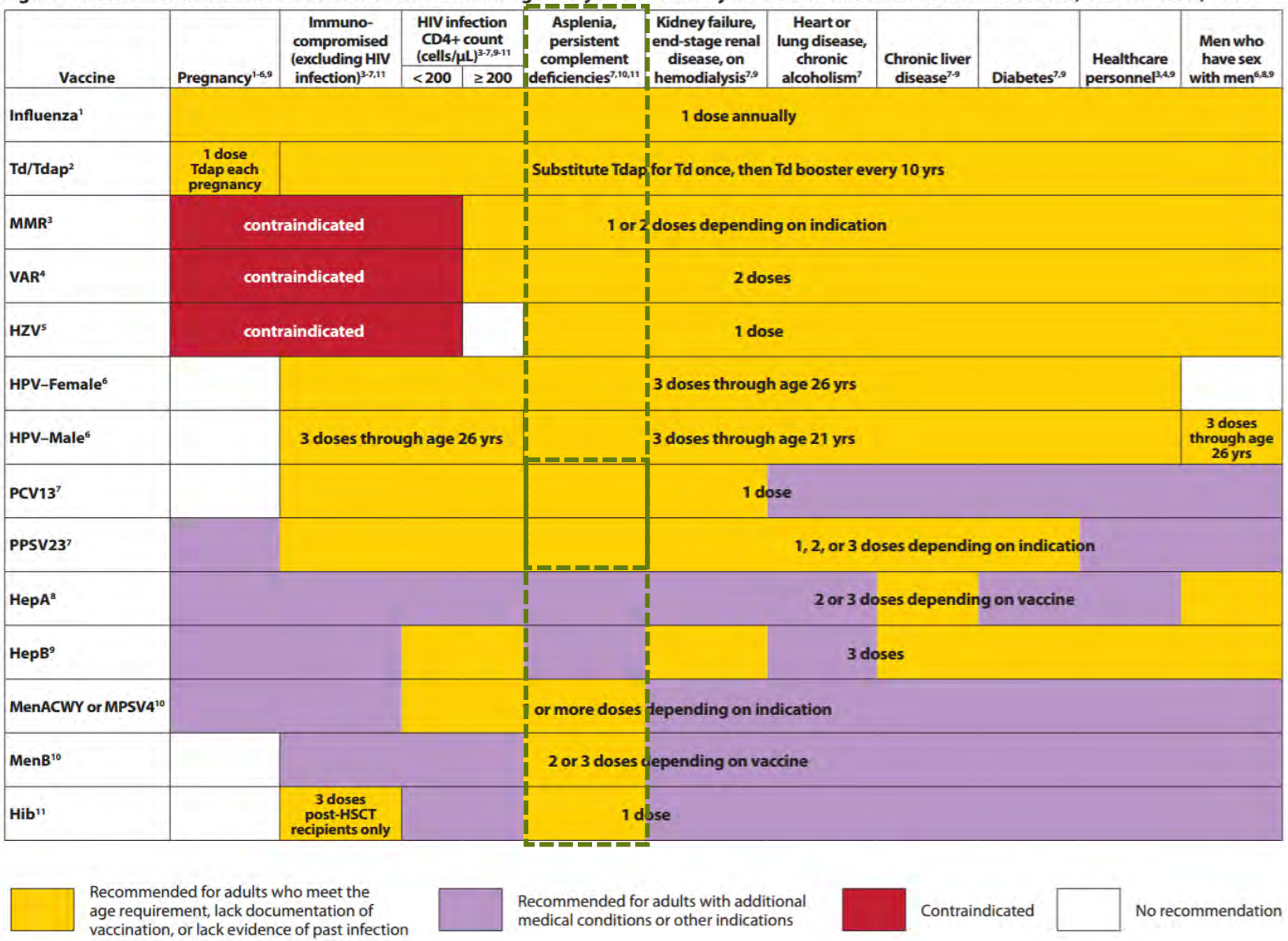

- Adults aged 19 years or older with immunocompromising conditions or **anatomical or functional asplenia** (described below) should receive **PCV13 and a dose of PPSV23 at least 8 weeks after PCV13, followed by a second dose of PPSV23 at least 5 years after the first dose of PPSV23**.
- If the most recent dose of PPSV23 was administered before age 65 years, at age 65 years or older, administer another dose of PPSV23 at least 8 weeks after PCV13 and at least 5 years after the most recent dose of PPSV23.

MR. PHILLIPS

PCV13

8 weeks

PPSV23

5 years

PPSV23

- Has asplenia
- Sounds like he was given the PCV and PPSV23 after his surgery BUT he didn't get the PPSV23 booster at 27 years old (5 years later)
- **<u>Give PPSV 23 today</u>**

What immunization(s) does Mr. Phillips need once he gets to 65?

..one- he is all done!

Just a PPSV23

A PCV13 at 65

PPSV23 at 66

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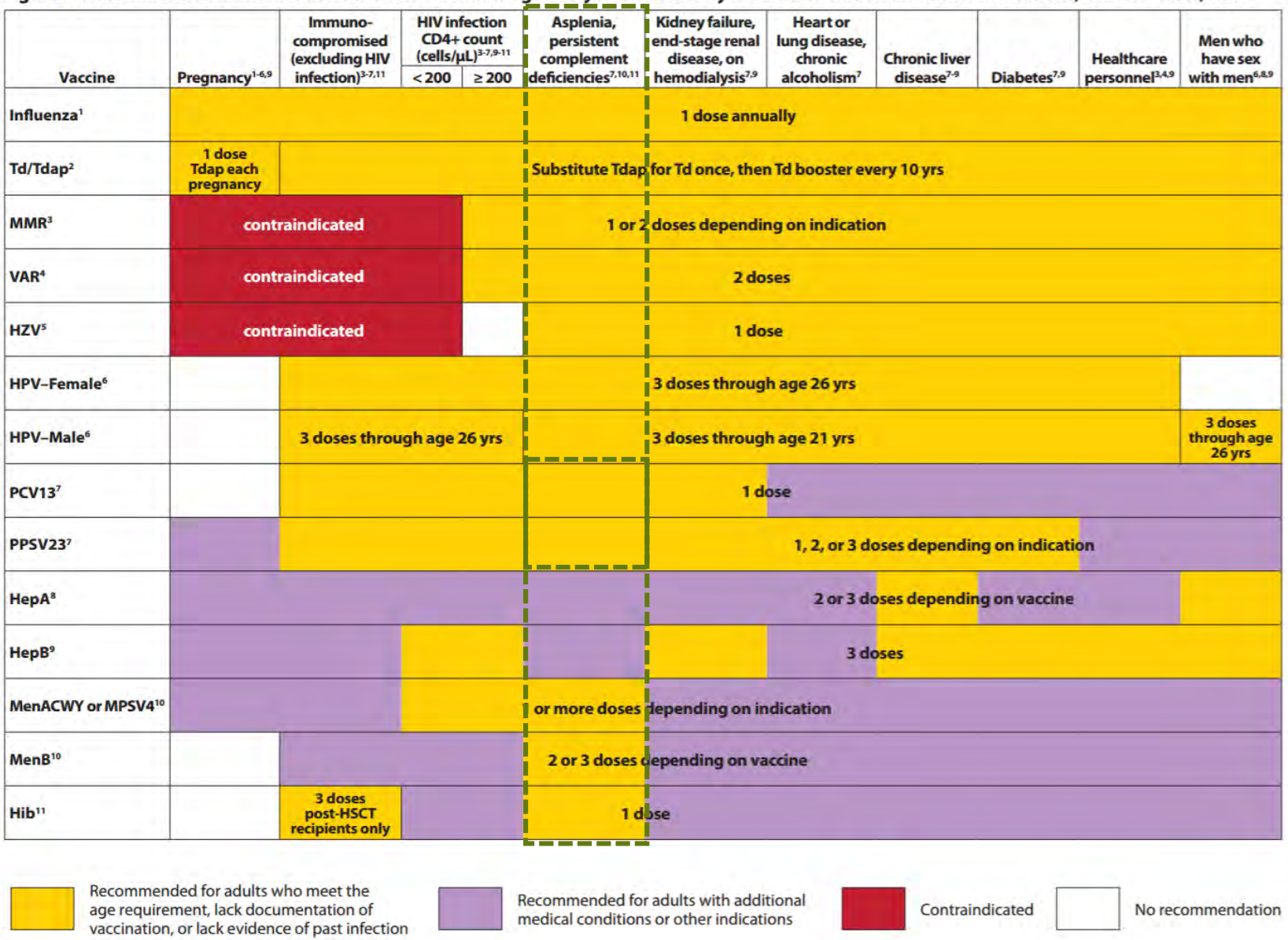

- Adults aged 19 years or older with immunocompromising conditions or anatomical or functional asplenia (described below) should receive PCV13 and a dose of PPSV23 at least 8 weeks after PCV13, followed by a second dose of PPSV23 at least 5 years after the first dose of PPSV23.
- If the most recent dose of PPSV23 was administered before age 65 years, at age 65 years or older, **administer another dose of PPSV23** at least 8 weeks after PCV13 and at least 5 years after the most recent dose of PPSV23.

MR. PHILLIPS

- Has asplenia
- Was given the PCV and PPSV23 after his surgery and the PPSV23 booster
- **So needs PPSV23 only at age 65**

MR. PHILLIPS

- Oh, by the way… My parents are turning 65 this year and I wanted to get them their flu shot on the same day as the pneumonia one, but I read on Facebook that you can't get both on the same day, is that true?

the Philips parents get PCV13 and Influenza vaccine at the same vi

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YES, YOU CAN GIVE BOTH ON THE SAME DAY

- **Concomitant administration of PCV13 and trivalent inactivated influenza vaccine (TIV) has been demonstrated to be immunogenic and safe.**
- PCV13 can be co-administered with TIV in an adult immunization program.
- However, a randomized double-blind trial found slightly lower pneumococcal serotype–specific geometric mean concentrations and lower proportion achieving at least a fourfold rise in hemagglutination inhibition assay titer for one of three influenza subtypes (influenza A[H3N2]) with PCV13 plus TIV compared with PCV13 alone or TIV alone among adults aged ≥65 years.
  - **One of the 3 didn't make as much antibody as the others when given on the same day, but it was a small effect and not enough to change the recommendation**
- Currently, **no data are available on co-administration with other vaccines** (e.g., tetanus, diphtheria, and acellular pertussis vaccine or zoster vaccine) among adults.

WHAT ABOUT ZOSTER VACCINE?

- PPSV23
  - Merck package insert: In a randomized clinical study, a reduced immune response to Zostavax as measured by gpELISA was observed in individuals who received concurrent administration of Pneumovax 23 and Zostavax compared with individuals who received these vaccines 4 weeks apart.
  - Consider administration of the two vaccines separated by at least 4 weeks.
- PCV13
  - There is no data about giving PCV13 and Zostavax on the same day.

http://www.fda.gov/Safety/MedWatch/SafetyInformation/ucm200862.htm

WHAT ABOUT ZOSTER VACCINE?

"In December 2009 Merck revised the package insert for herpes zoster vaccine (HZV) to advise that HZV and 23-valent pneumococcal polysaccharide vaccine (PPSV) should not be administered concurrently. This recommendation was based on a Merck study that showed the average titer against varicella zoster virus (VZV) was lower in persons who received zoster and PPSV at the same visit compared to persons who received these vaccines 4 weeks apart. However, the clinical relevance of this observation is unknown because there is no evidence to indicate that antibody titers against VZV are a measure of protection against HZ (results were additionally confounded by unexplained differences across comparison group in the baseline VZV antibody titers). Antibody levels to PPSV serotypes 3, 14, 19A, and 22F were assessed during this study and were unaffected by simultaneous administration, though significance of this observation is also unknown. Finally, the safety profile of HZV is unaffected by simultaneous administration of PPSV. Consequently, to avoid introducing barriers to patients and providers who are interested in these two important vaccines, **CDC has not changed its recommendation for either vaccine, and continues to recommend that HZV and PPSV be administered at the same visit if the person is eligible for both vaccines**."

TAKE HOME POINTS

- Adults ≥ 65 years old need PCV13 AND PPSV23.
- Give PCV 13 first if vaccine naiive and then give PPSV 23 1 year later.
- Adults 19-64 years with immunosuppression, asplenia or other chronic medical conditions may need PCV13 and/or PPSV23.
  - Often the answer is yes to PPSV23
  - Sometimes the answer is no to PCV13
  - Don’t try to guess– check the ACIP schedule!

Figure 2. Recommended immunization schedule for adults aged 19 years or older by medical condition and other indications, United States, 2017

Vaccine	Pregnancy[1-6,9]	Immuno-compromised (excluding HIV infection)[3-7,11]	HIV infection CD4+ count (cells/µL)[3-7,9-11]		Asplenia, persistent complement deficiencies[7,10,11]	Kidney failure, end-stage renal disease, on hemodialysis[7,9]	Heart or lung disease, chronic alcoholism[7]	Chronic liver disease[7-9]	Diabetes[7,9]	Healthcare personnel[3,4,9]	Men who have sex with men[6,8,9]
			< 200	≥ 200							
PCV13[7]		1 dose									
PPSV23[7]		1, 2, or 3 doses depending on indication									

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

Recommended for adults with additional medical conditions or other indications

Contraindicated

No recommendation

https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf

*PORTIONS OF TABLE EXCLUDED FOR CLARITY

Adult Pneumococcal Vaccination Table

The Advisory Committee on Immunization Practices (ACIP) recommends all adults 65 years of age and older receive both PCV13 and PPSV23 pneumococcal vaccinations. ACIP also recommends adults 19 through 64 years of age who have underlying medical conditions receive pneumococcal vaccination with PCV13, PPSV23, or both. A second dose of PPSV23 before age 65 is not recommended for adults with Cerebral Spinal Fluid Leaks or adults with cochlear implants.

RISK GROUP	UNDERLYING MEDICAL CONDITION	PCV13	PPSV23	
		RECOMMENDED	RECOMMENDED	REVACCINATION AT 5 YEARS AFTER FIRST DOSE
Immunocompetent persons	Chronic heart disease: *congestive heart failure and cardiomyopathies*		✓	
	Chronic lung disease: *chronic obstructive lung disease, emphysema, and asthma*		✓	
	Diabetes mellitus		✓	
	Cerebral Spinal Fluid Leaks	✓	✓	
	Cochlear implants	✓	✓	
	Alcoholism		✓	
	Chronic liver disease		✓	
	Cigarette smoking		✓	
Persons with functional or anatomic asplenia	Sickle cell disease/other hemoglobinopathies	✓	✓	✓
	Congenital or acquired asplenia	✓	✓	✓
Immunocompromised persons	Congenital or acquired immunodeficiencies: *includes B-humoral or T-lymphocyte deficiency; complement deficiencies sC1,C2,C3 and C4 deficiencies; and phagocytic disorders, excluding chronic granulomatous disease*	✓	✓	✓
	HIV infection	✓	✓	✓
	Chronic renal failure	✓	✓	✓
	Nephrotic syndrome	✓	✓	✓
	Leukemia	✓	✓	✓
	Lymphoma	✓	✓	✓
	Hodgkin disease	✓	✓	✓
	Generalized malignancy	✓	✓	✓
	Iatrogenic immunosuppression: *diseases requiring treatment with immunosuppressive drugs, long-term systemic corticosteroids, and radiation therapy*	✓	✓	✓
	Solid organ transplant	✓	✓	✓
	Multiple myeloma	✓	✓	✓

623 (6-15)

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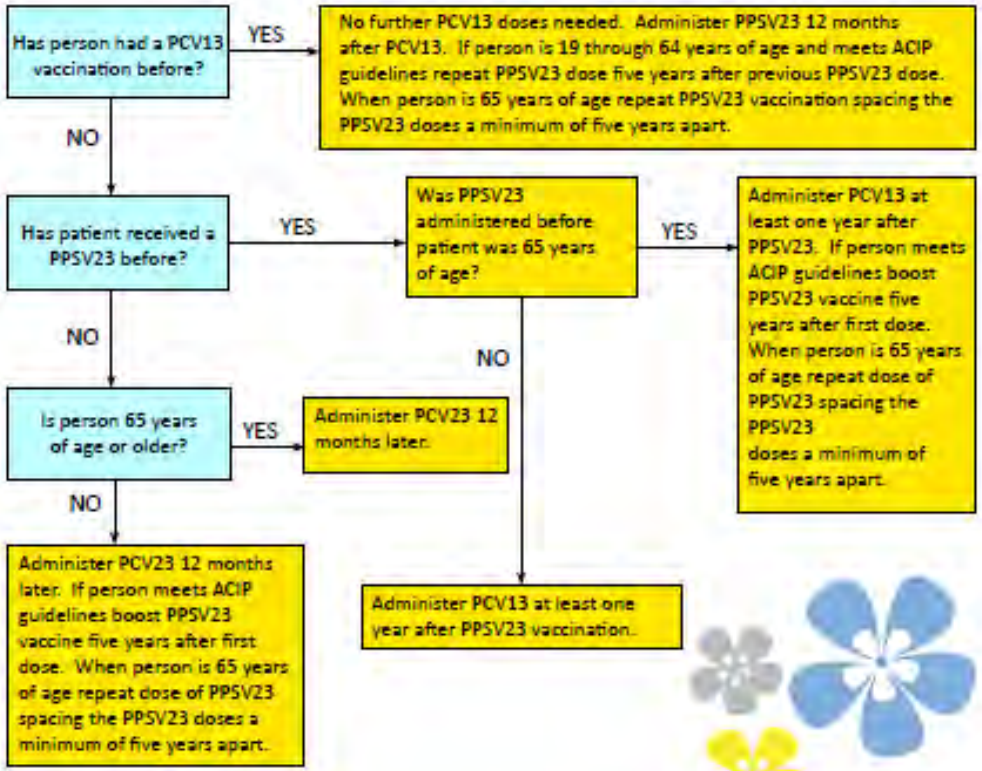

Source: Centers for Disease Control and Prevention. For more information visit www.cdc.gov/vaccines/vpd-vac/pneumo/vac-PCV13-adults.htm.

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ANY QUESTIONS?