



# Pneumococcal Disease and Pneumococcal Vaccines

## **Pink Book Web-on-Demand Series** **October 11, 2022**

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**Medical Officer**

**NCIRD, CDC**

# Learning Objectives

- Describe the Advisory Committee on Immunization Practices General Best Practice Guidelines on Immunization.
- Describe an emerging immunization issue.
- For each vaccine-preventable disease, identify those for whom routine immunization is recommended.
- For each vaccine-preventable disease, describe characteristics of the vaccine used to prevent the disease.
- Locate current immunization resources to increase knowledge of team's role in program implementation for improved team performance.
- Implement disease detection and prevention health care services (e.g., smoking cessation, weight reduction, diabetes screening, blood pressure screening, immunization services) to prevent health problems and maintain health.

# Continuing Education Information

- CE credit, go to: <https://tceols.cdc.gov/>
- Search course number: **WD4564-101122**
- CE credit expires: **July 1, 2024**
- CE instructions are available on the **Pink Book Web-on-Demand Series** web page
- Questions and additional help with the online CE system, e-mail [CE@cdc.gov](mailto:CE@cdc.gov)

The screenshot shows the TCEO website interface. At the top, there is a blue header with the text "Training and Continuing Education Online (TCEO)". Below this is the TCEO logo, which consists of the letters "TCEO" in a bold, blue font with a green circular arrow icon to the right. Underneath the logo, the text "TRAINING AND CONTINUING EDUCATION ONLINE" is displayed in a smaller, blue font. On the left side, there is a vertical navigation menu with several blue buttons: "TCEO Home", "Search Courses", "Create Account", "9 Simple Steps to Earn CE", "Frequently Asked Questions", and "Contact TCEO". The main content area on the right has a white background and contains the following sections:

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Below the text, there is a row of four small images: a woman smiling at a child, a man in a suit looking thoughtful, a doctor in a white coat holding a dog, and a woman sitting at a desk working on a laptop.

At the bottom of the page, there is a "Welcome to TCEO" message and a short paragraph: "Training and Continuing Education Online (TCEO) is a system that provides access to CDC educational activities for continuing education (CE). Use TCEO to search for CE opportunities, complete course..."

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# Disclosure Statements

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**Pneumococcal  
Disease**

# Pneumococcal Disease



Otitis media  
Middle ear infection  
**(Major)**



Bacteremia  
Bloodstream infection  
**(Major)**



Sinusitis  
Sinus infection



Meningitis  
An infection of the lining of the  
brain and spinal cord  
**(Major)**



Pneumonia  
Lung infection  
**(Major)**

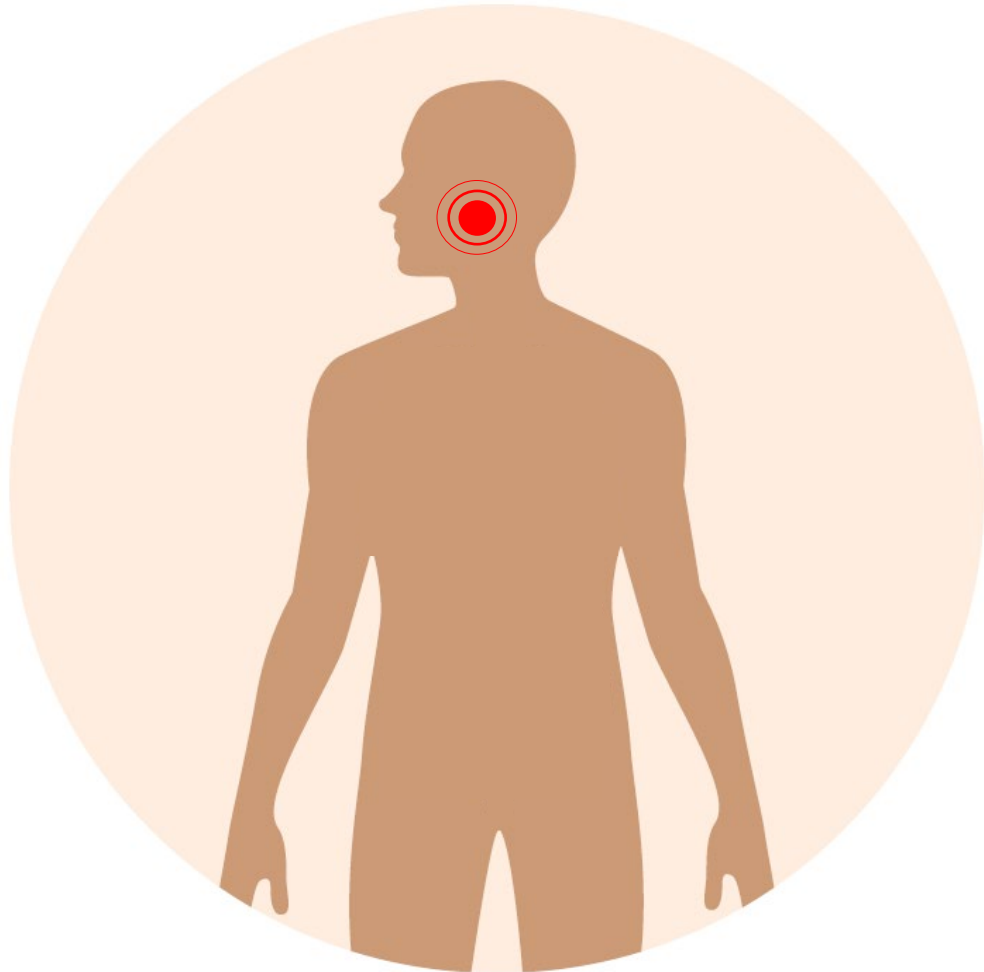
# *Streptococcus pneumoniae*

- Gram-positive bacteria
- 100 known serotypes
- Polysaccharide capsule important virulence factor
- Type-specific antibody is protective
- Limited cross-reactivity



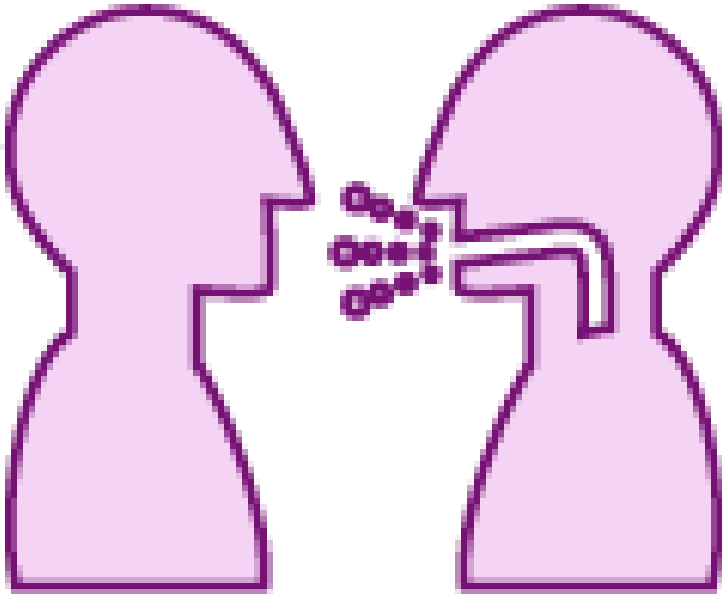


# *Transmission of Streptococcus pneumoniae*



- Common inhabitant of the respiratory tract
- Asymptomatic carriage varies by age
  - School-age children 20% to 60%
  - Adults 5% to 10%
- Children have longer carriage than in adults

# *Transmission of Streptococcus pneumoniae*



- Person to person spread by respiratory droplet contact
- Viral upper respiratory infection can predispose to transmission
- Unknown period of communicability

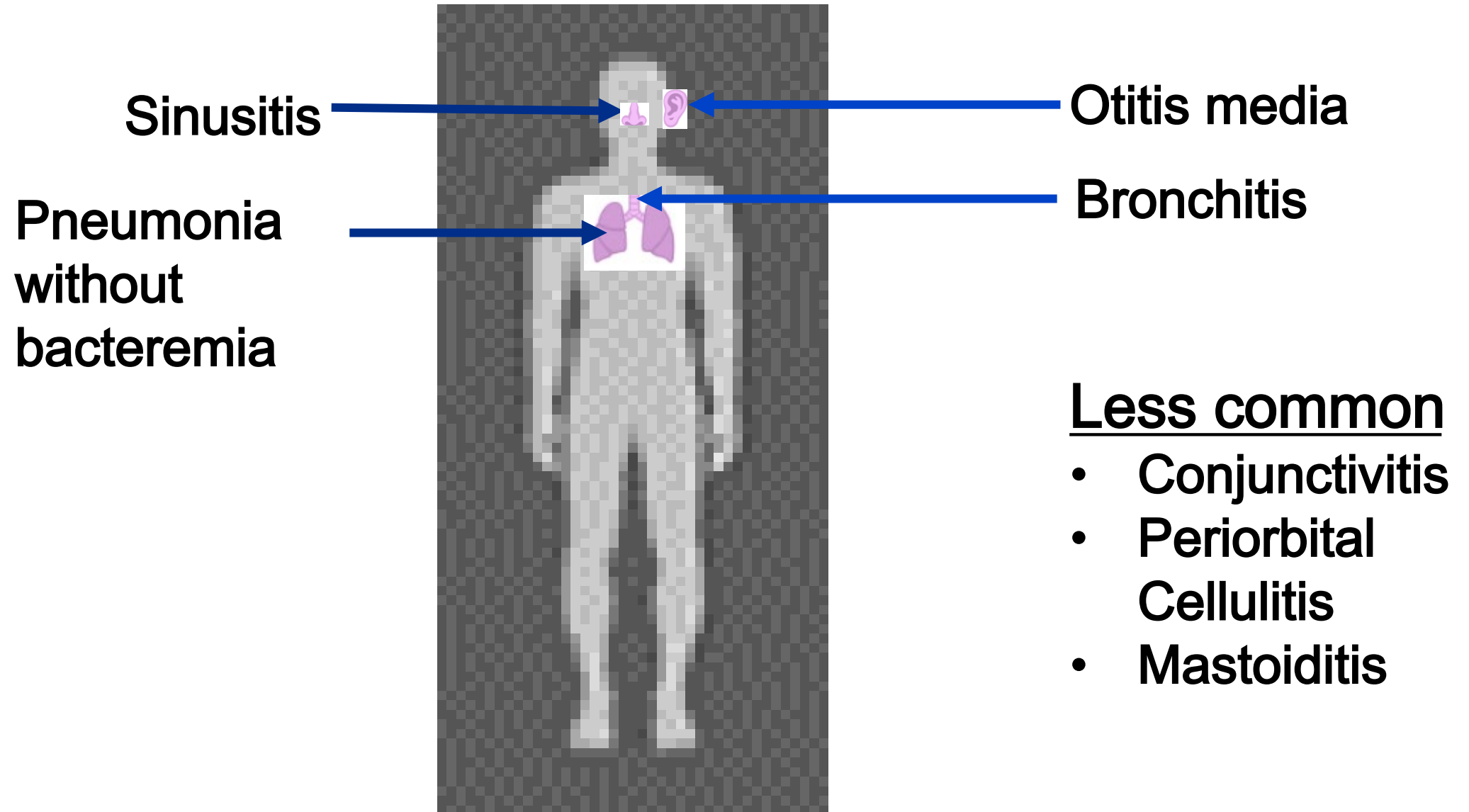
# *Transmission of Streptococcus pneumoniae*



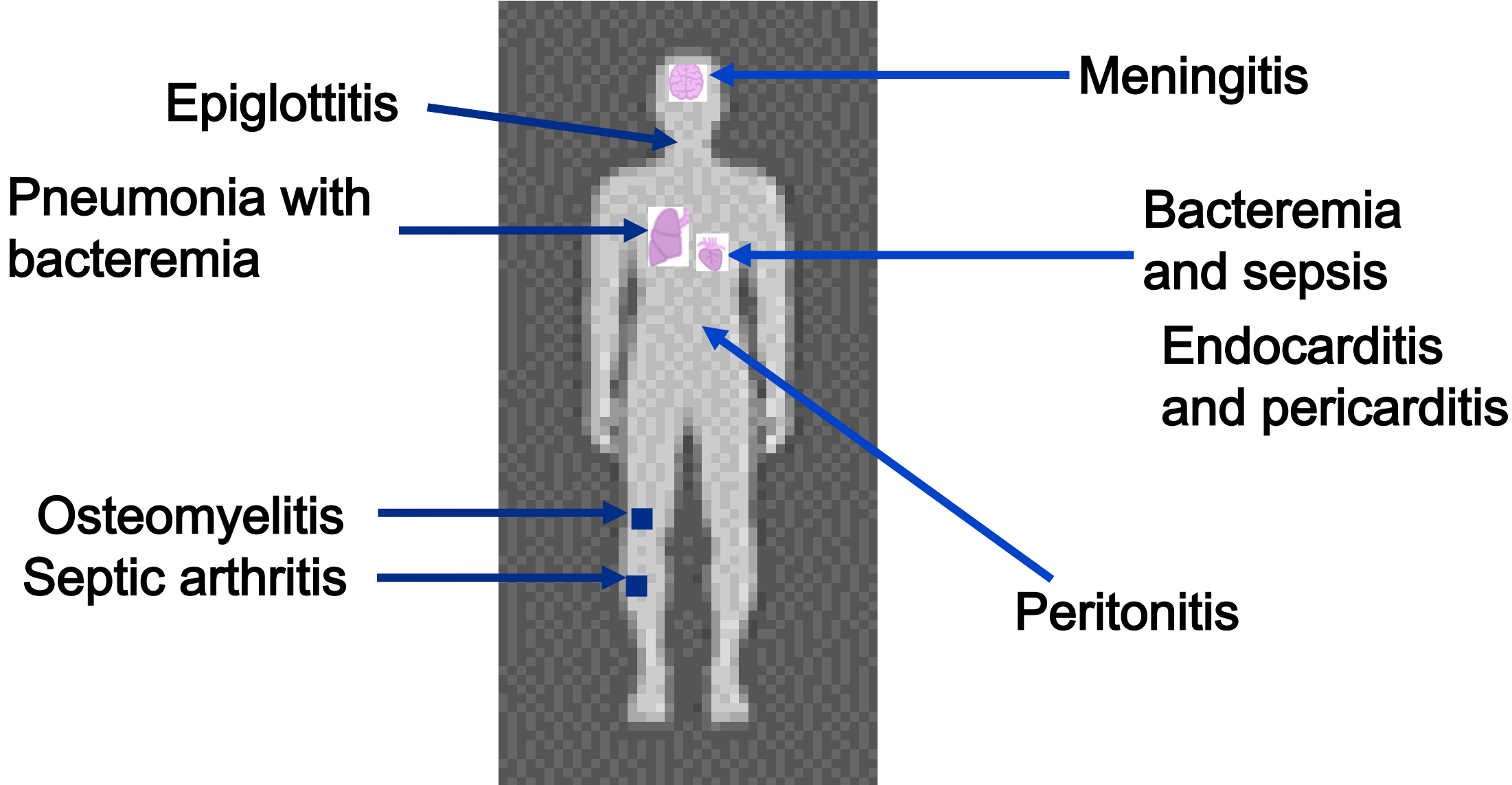
**Can occur throughout the year but the incidence is highest in the winter and early spring**



# Clinical Manifestations of Pneumococcal Disease: **NON-INVASIVE**



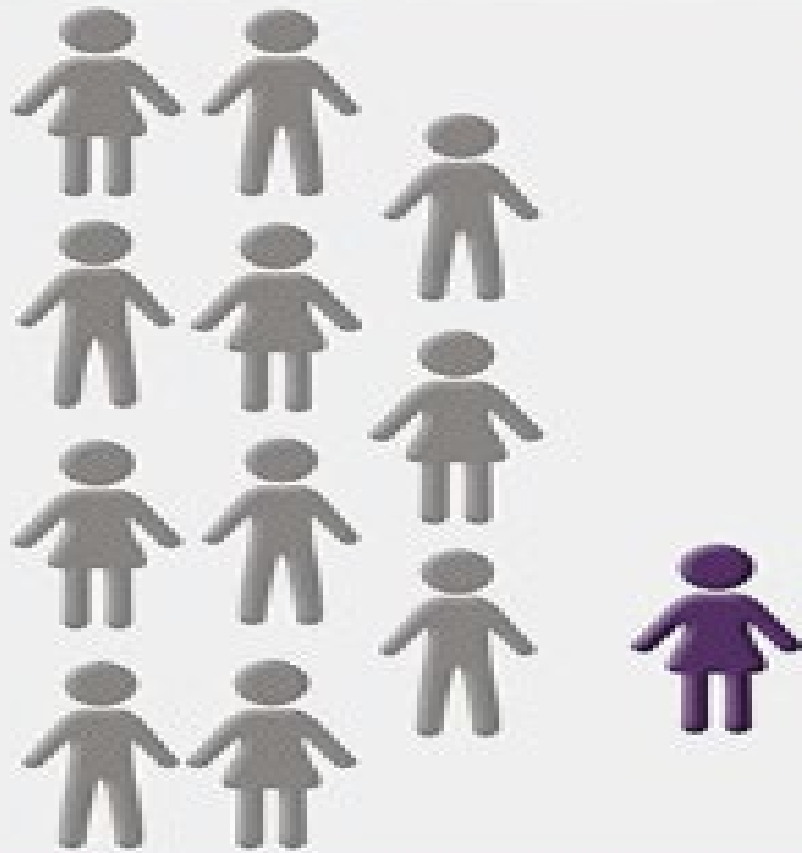
# Clinical Manifestations of Pneumococcal Disease: **INVASIVE**



Invasive disease: isolation of pneumococcus from blood or another normally sterile sites

# For those who get it, pneumococcal meningitis

**kills**

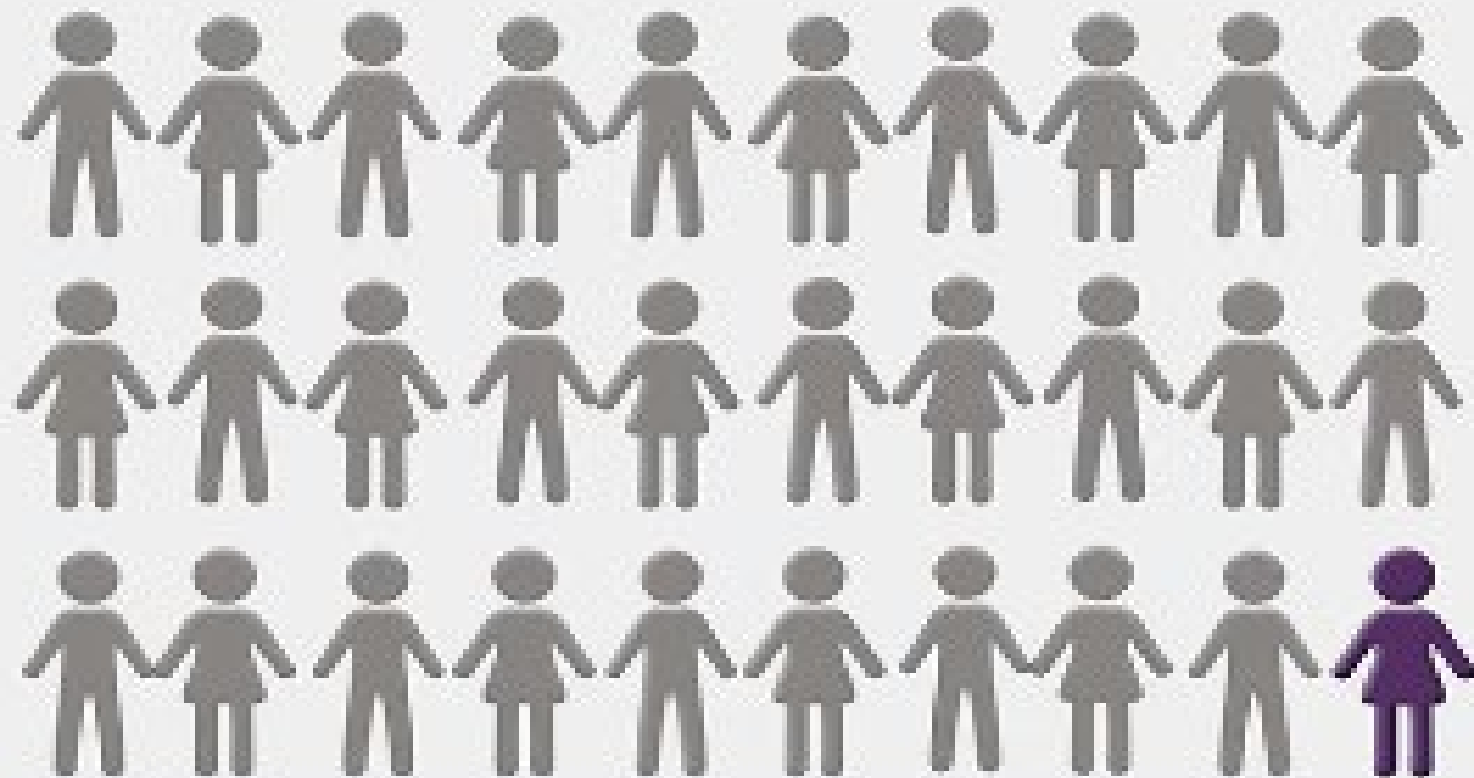


**1 in 12 Children**

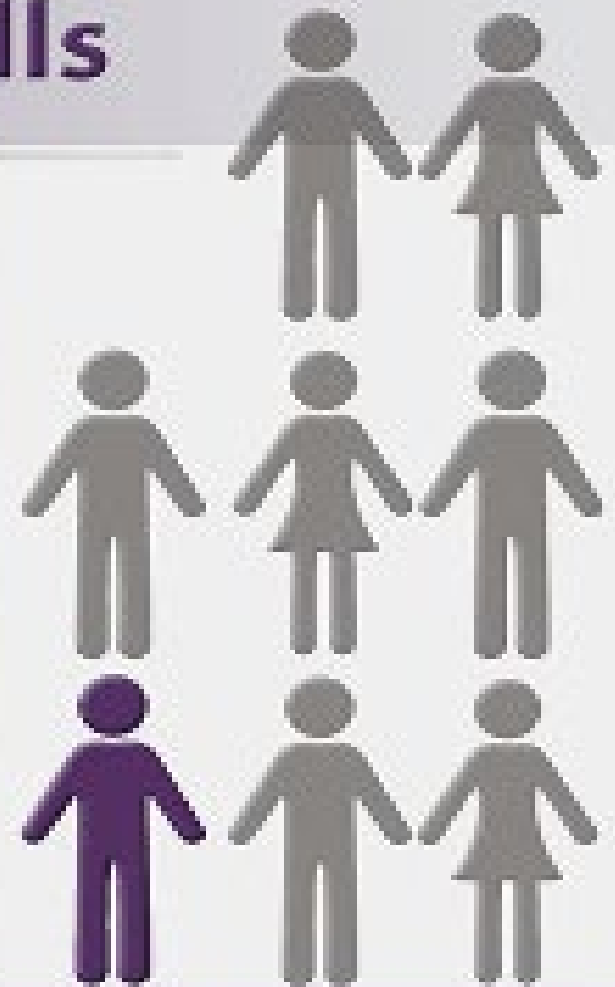


**1 in 6 Adults**

**For those who get it,  
pneumococcal bacteremia kills**



**1 in 30 Children**



**1 in 8 Adults**

# Risk Factors for Invasive Pneumococcal Disease

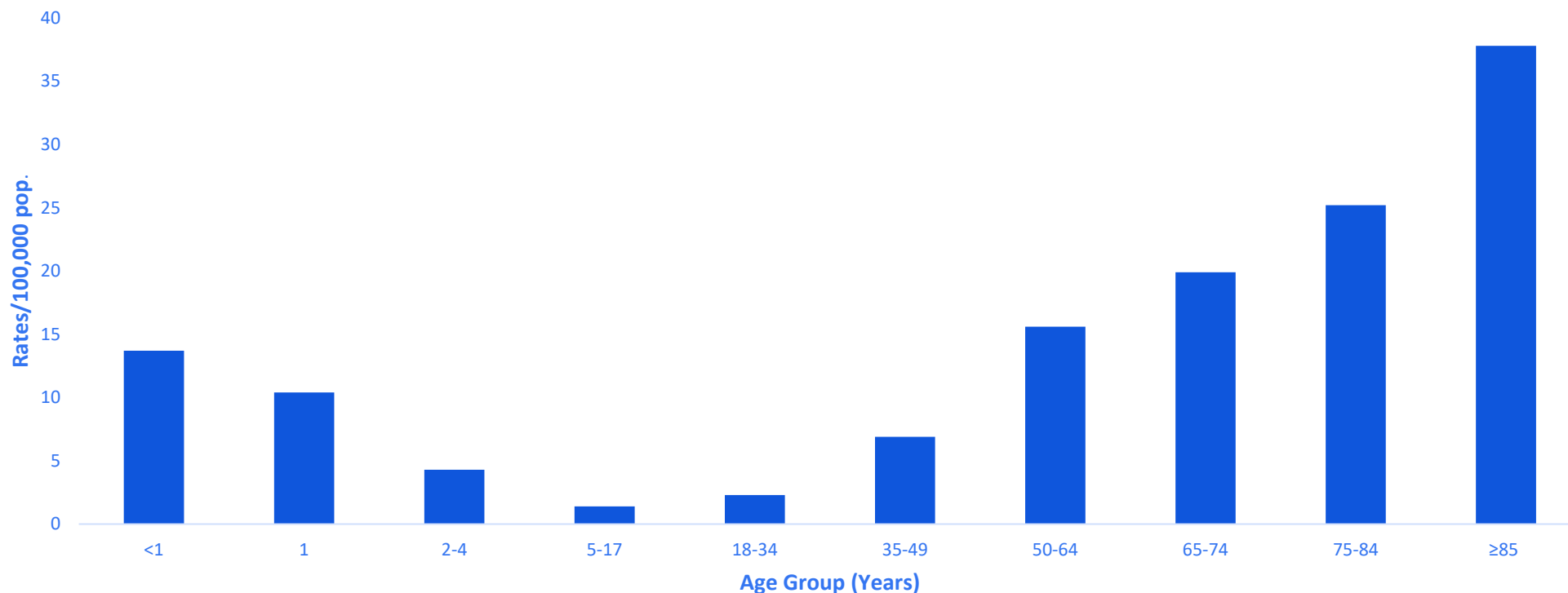
**AGE**

**Underlying  
medical or  
other conditions**



# Risk Factors for Invasive Pneumococcal Disease: **Age**

Invasive pneumococcal Disease by age group-2019\*.



\*CDC Active Bacterial Core surveillance 2019 report:

[https://www.cdc.gov/abcs/downloads/SPN\\_Surveillance\\_Report\\_2019.pdf](https://www.cdc.gov/abcs/downloads/SPN_Surveillance_Report_2019.pdf)

# Risk Factors for Invasive Pneumococcal Disease: **underlying conditions**

**Non-  
immunocompromising  
conditions**

**Immunocompromising  
conditions**

# Risk Factors for Invasive Pneumococcal Disease: **underlying conditions**

## Non-immunocompromising conditions

- Chronic heart disease
- Chronic lung disease
- Diabetes mellitus
- Cerebrospinal fluid leak
- Cochlear implant
- For 19 years and older: chronic liver disease, alcoholism, and cigarette smoking.

1. <https://www.cdc.gov/mmwr/volumes/71/wr/mm7104a1.htm>

2. <https://www.cdc.gov/mmwr/volumes/71/wr/mm7137a3.htm>

# Risk Factors for Invasive Pneumococcal Disease: **underlying conditions**

## Immunocompromising conditions

- Chronic renal failure or nephrotic syndrome
- Asplenia/splenic dysfunction (congenital or acquired)
- Immunodeficiency (congenital or acquired)
- Hemoglobinopathies e.g., sickle cell disease
- Immunosuppressive therapy
- HIV infection
- Solid organ transplant

1. <https://www.cdc.gov/mmwr/volumes/71/wr/mm7104a1.htm>

2. <https://www.cdc.gov/mmwr/volumes/71/wr/mm7137a3.htm>

## Knowledge Check

- Pneumonia, meningitis, and bacteremia are major clinical syndromes of pneumococcal disease.
  - A. True
  - B. False

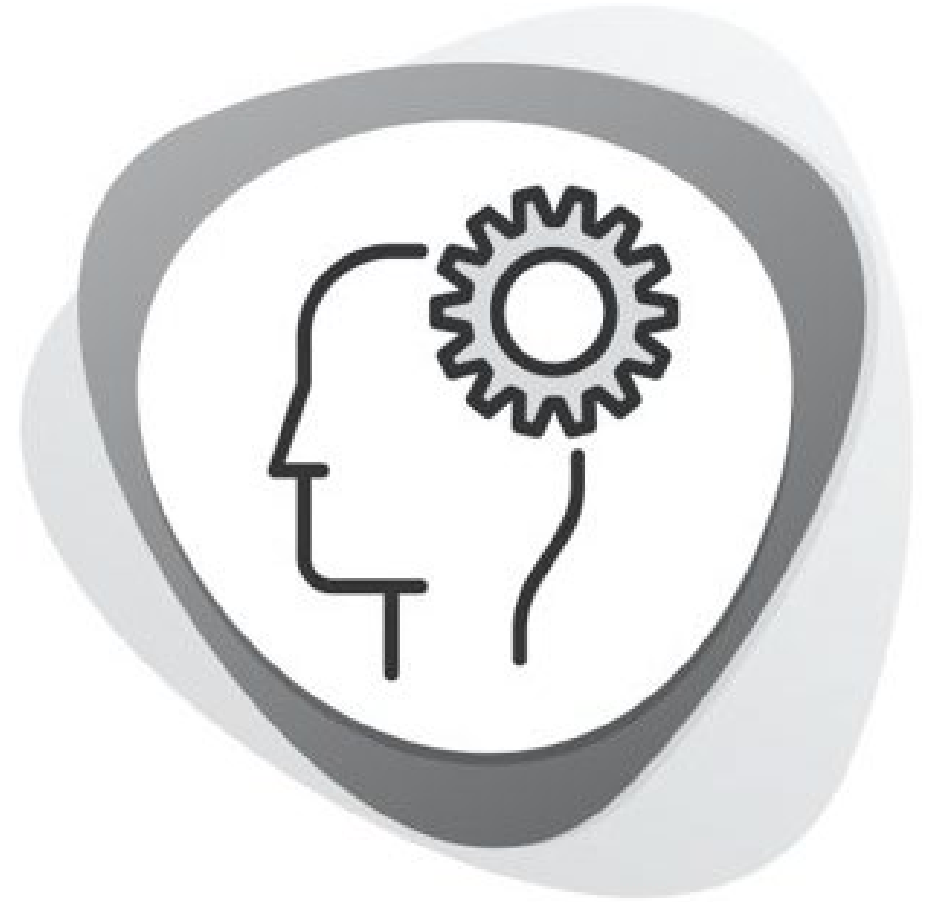


# Knowledge Check

- Pneumonia, meningitis, and bacteremia are major clinical syndromes of pneumococcal disease.

A. True

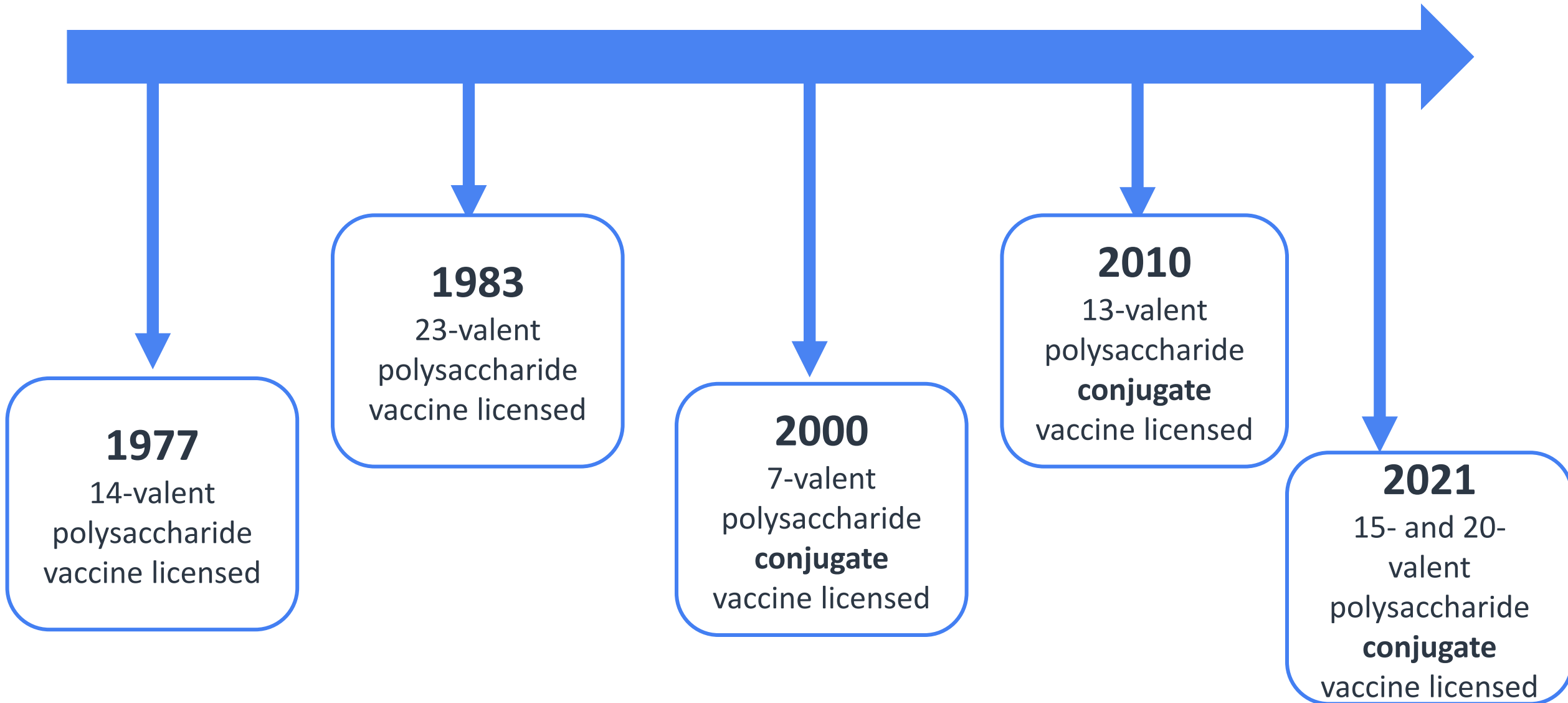
~~B. False~~



2

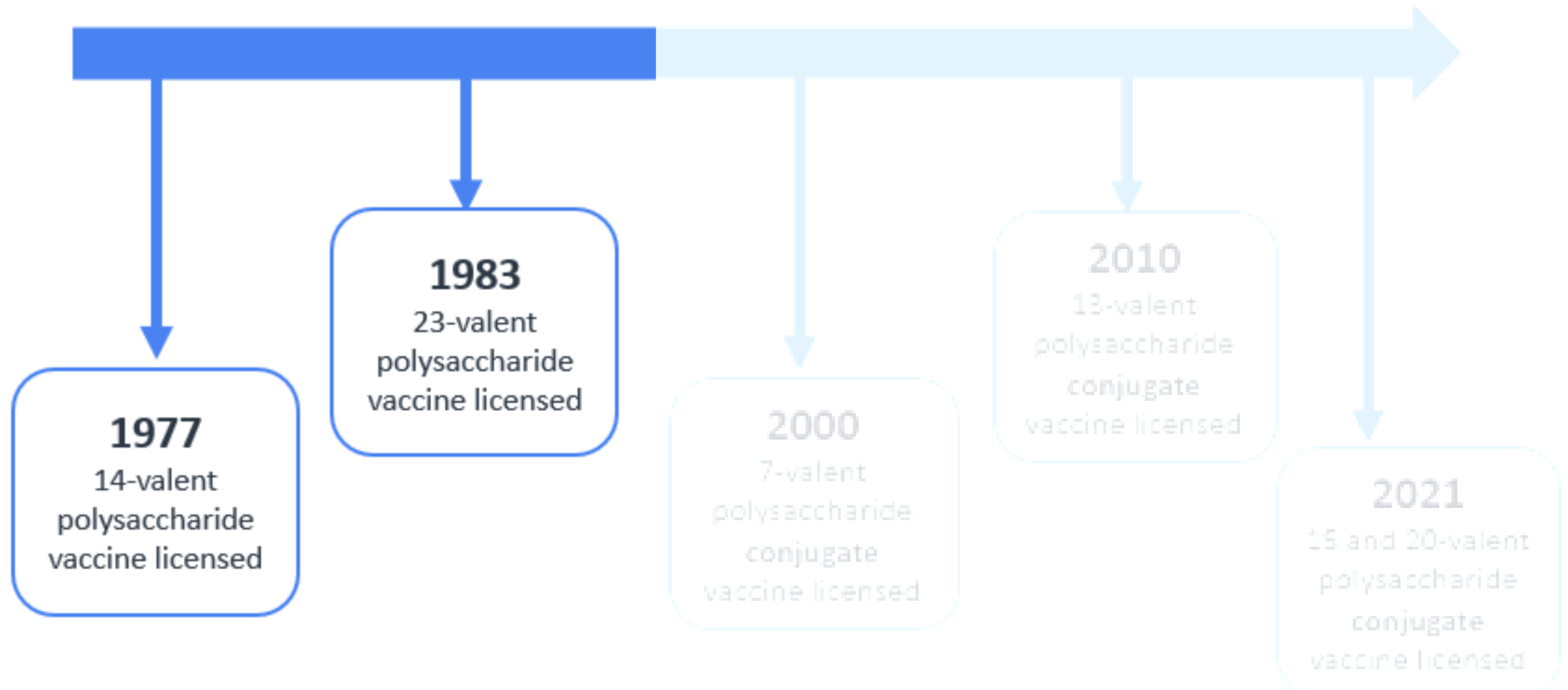
**Pneumococcal  
Vaccines**

# Milestones in Pneumococcal Vaccine Development in United States

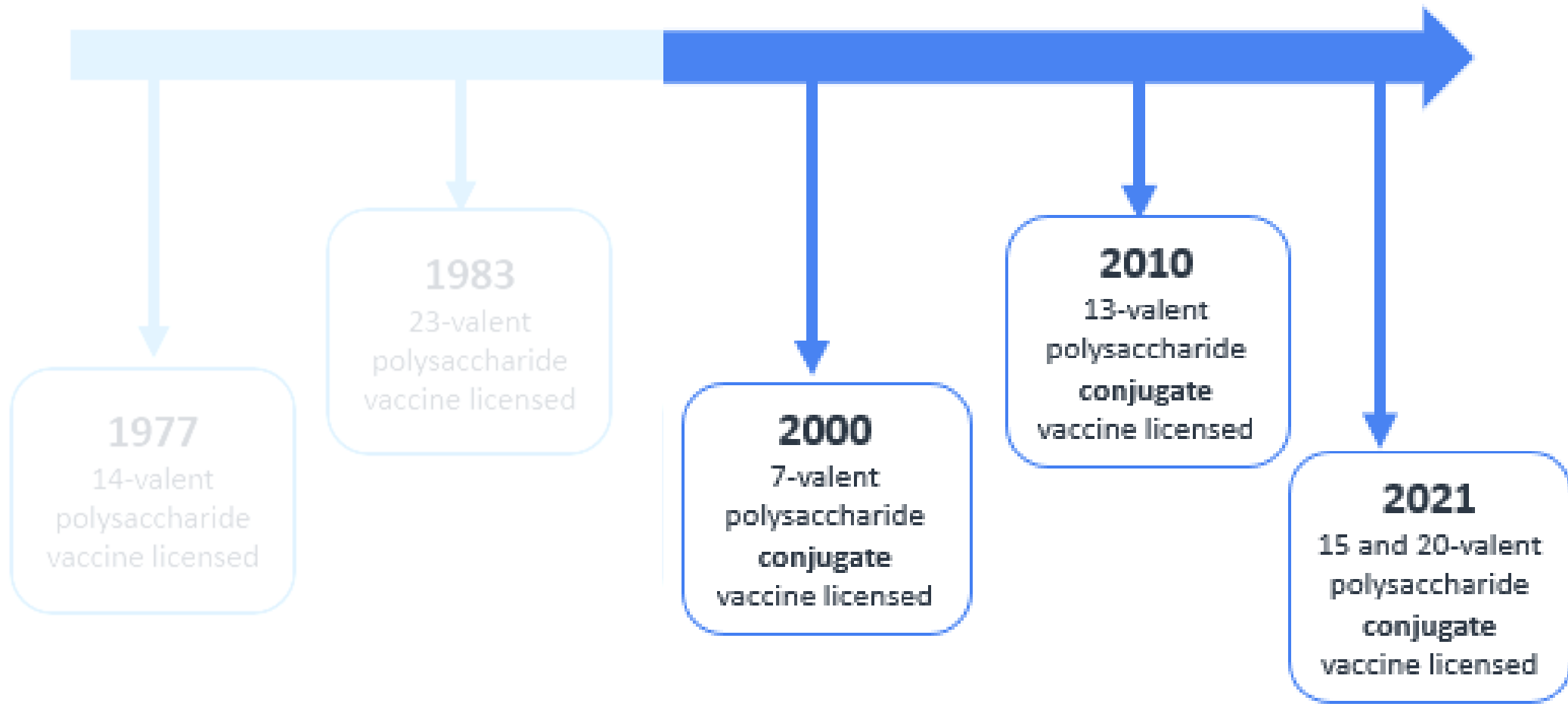




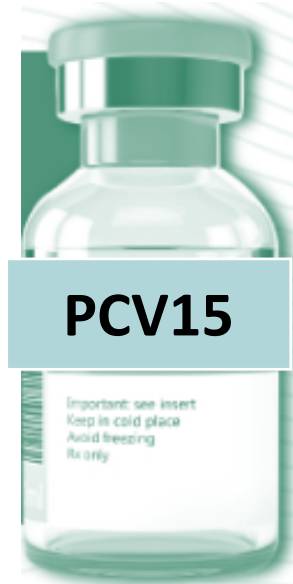
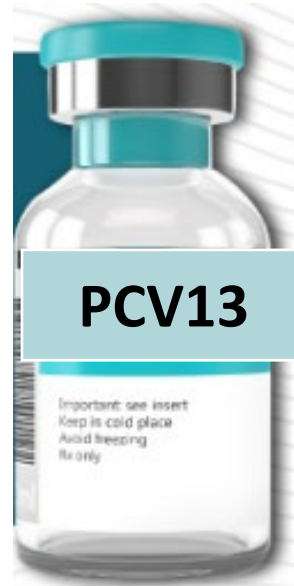
# Milestones in Pneumococcal Vaccine Development in United States



# Milestones in Pneumococcal Vaccine Development in United States



# Pneumococcal Vaccine Products



# Serotypes in Pneumococcal Vaccine Products

	1	3	4	5	6A	6B	7 F	9V	14	18 C	19 A	19 F	23 F	22 F	33 F	8	10 A	11 A	12 F	15 B	2	9N	17 F	20	
PCV13	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow												
PCV15	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Green										
PCV20	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Green	Blue	Blue	Blue	Blue	Blue	Blue				
PPSV23	Yellow	Yellow	Yellow	Yellow	White	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Green	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange

- **PCV15 non-PCV13:** includes serotypes **22F** and **33F**
- **PCV20 non-PCV13:** includes serotypes **22F, 33F, 8, 10A, 11A, 12F, and 15B**
- **PPSV23 non-PCV20:** includes serotypes **2, 9N, 17F, and 20**

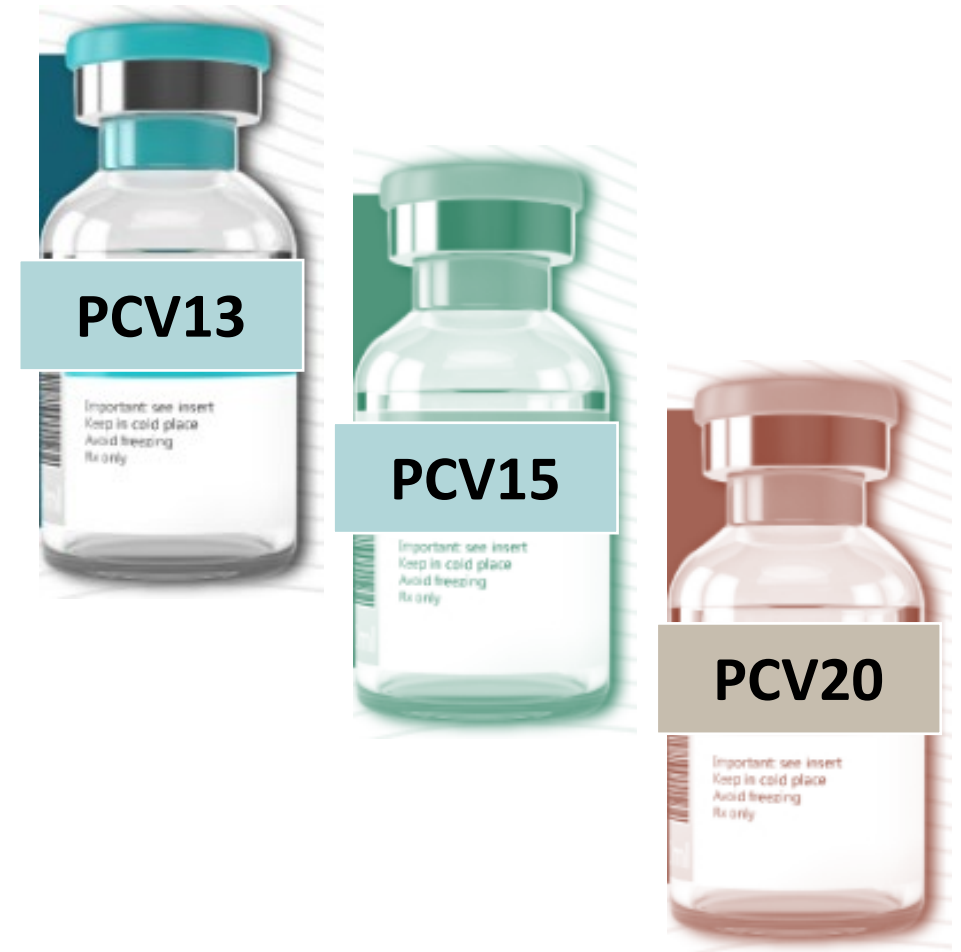
# 23-valent Pneumococcal Polysaccharide Vaccine (PPSV23)



- Non-live vaccine
- Purified capsular polysaccharide antigen from 23 serotypes
- Contains phenol as a preservative
- No antibiotic or adjuvant
- Licensed for adults 50 years and older; children  $\geq 2$  years who are at increased risk
- Intramuscular or subcutaneous injection

# Pneumococcal Conjugate Vaccines

- Non-live vaccine
- Purified capsular polysaccharide antigens linked to CRM197 protein
- No preservative or antibiotics
- Aluminum phosphate adjuvant
- Intramuscular injection



# Vaccine Effectiveness of PPSV23

- 60%–70% effective against invasive disease caused by serotypes in the vaccine
- Reduced effectiveness in immunocompromised persons
- No consensus regarding the ability of PPSV23 to prevent non-bacteremic pneumococcal pneumonia.

# Immunogenicity and Efficacy of PCV

- Highly immunogenic in infants and young children, including those with risk factors for invasive diseases
- PCV7 was 97% effective against invasive disease caused by vaccine serotypes (presumably PCV13 as well)
- Routine PCV7 and PCV13 in children shown to reduced pneumococcal carriage and transmission of vaccine serotypes lowering invasive disease incidence among unvaccinated persons of all ages



## Knowledge Check

- Which of the following is NOT a pneumococcal conjugate vaccine?
  - A. PCV13
  - B. PPSV23
  - C. PCV20
  - D. All of the above



## Knowledge Check

- Which of the following is NOT a pneumococcal conjugate vaccine?

~~A. PCV13~~

**B. PPSV23**

~~C. PCV20~~

~~D. All of the above~~



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**Clinical  
Considerations**

# Pneumococcal Vaccination Schedule: Children and Adolescents

Recommendations for routine vaccination in children and adolescents (age 18 years and younger) are found in the [Recommended Child and Adolescent Immunization Schedule for ages 18 years or younger](#).

**Table 1** Recommended Child and Adolescent Immunization Schedule for ages 18 years or younger, United States, 2022

These recommendations must be read with the notes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars. To determine minimum intervals between doses, see the catch-up schedule (Table 2).

Vaccine	Birth	1 mo	2 mos	4 mos	6 mos	9 mos	12 mos	15 mos	18 mos	19–23 mos	2–3 yrs	4–6 yrs	7–10 yrs	11–12 yrs	13–15 yrs	16 yrs	17–18 yrs
Hepatitis B (HepB)	1 <sup>st</sup> dose	← 2 <sup>nd</sup> dose →							← 3 <sup>rd</sup> dose →								
Rotavirus (RV): RV1 (2-dose series), RV5 (3-dose series)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	See Notes												
Diphtheria, tetanus, acellular pertussis (DTaP <7 yrs)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	3 <sup>rd</sup> dose				← 4 <sup>th</sup> dose →			5 <sup>th</sup> dose					
Haemophilus influenzae type b (Hib)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	See Notes			← 3 <sup>rd</sup> or 4 <sup>th</sup> dose, See Notes →									
Pneumococcal conjugate (PCV13)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	3 <sup>rd</sup> dose			← 4 <sup>th</sup> dose →									
Inactivated poliovirus (IPV <18 yrs)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose					← 3 <sup>rd</sup> dose →			4 <sup>th</sup> dose					
Influenza (IIV4) OR Influenza (LAIV4)										Annual vaccination 1 or 2 doses			Annual vaccination 1 dose only				
Measles, mumps, rubella (MMR)					See Notes			← 1 <sup>st</sup> dose →				2 <sup>nd</sup> dose					
Varicella (VAR)								← 1 <sup>st</sup> dose →				2 <sup>nd</sup> dose					
Hepatitis A (HepA)					See Notes			2-dose series, See Notes									
Tetanus, diphtheria, acellular pertussis (Tdap ≥7 yrs)														1 dose			
Human papillomavirus (HPV)														See Notes			
Meningococcal (MenACWY-D ≥9 mos, MenACWY-CRM ≥2 mos, MenACWY-TT ≥2 years)										See Notes				1 <sup>st</sup> dose		2 <sup>nd</sup> dose	
Meningococcal B (MenB-4C, MenB-FHbp)															See Notes		
Pneumococcal polysaccharide (PPSV23)															See Notes		
Dengue (DEN4CYD; 9–16 yrs)																	Seropositive in endemic areas only (See Notes)

  Range of recommended ages for all children   
   Range of recommended ages for catch-up vaccination   
   Range of recommended ages for certain high-risk groups   
   Recommended vaccination can begin in this age group   
   Recommended vaccination based on shared clinical decision-making   
   No recommendation/ not applicable

# PCV Recommendations for Children and Adolescents

**Table 1** Recommended Child and Adolescent Immunization Schedule for ages 18 years or younger, United States, 2022

These recommendations must be read with the notes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars. To determine minimum intervals between doses, see the catch-up schedule (Table 2).

Vaccine	Birth	1 mo	2 mos	4 mos	6 mos	9 mos	12 mos	15 mos	18 mos	19–23 mos	2–3 yrs	4–6 yrs	7–10 yrs	11–12 yrs	13–15 yrs	16 yrs	17–18 yrs
Pneumococcal conjugate			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	3 <sup>rd</sup> dose		← 4 <sup>th</sup> dose →										

- Can use either PCV13 or PCV15 interchangeably
- PCV20 not recommended
- Routine vaccination: age 2, 4, 6, booster at 12-15 months
- Catch-up vaccination through age 4 years for healthy children
- Risk- based vaccination for age 5–18 years
- Has completed series with PCV13: no additional PCV15

# PCV Catch-up Vaccination for Children and Adolescents

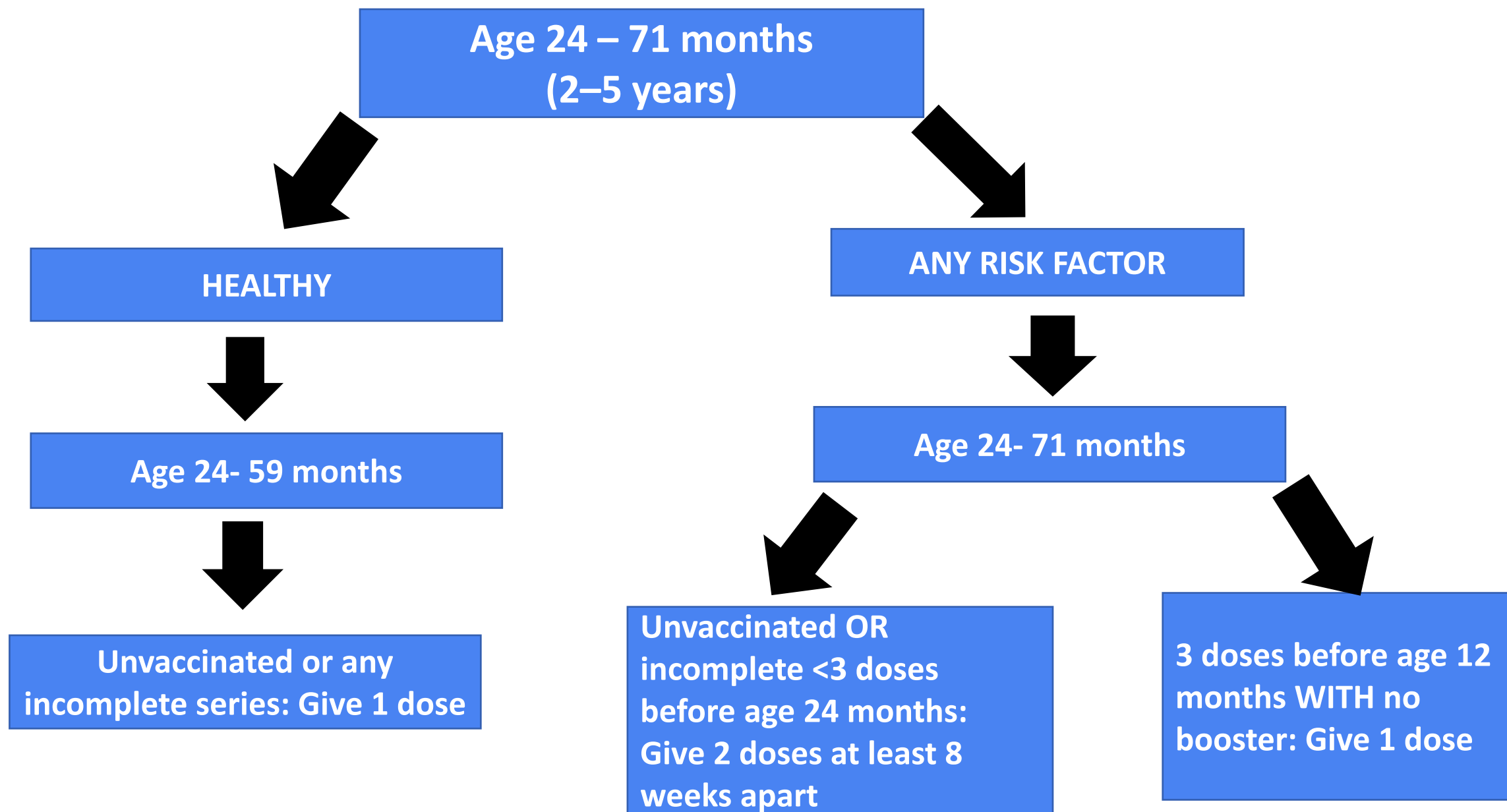
- Catch up vaccination up to 5<sup>th</sup> birthday for healthy children
- Aged <24 months who have received  $\geq 1$  dose of PCV should complete the vaccination series.
- Fewer doses if series started at age 7 months or older

**Table 2** Recommended Catch-up Immunization Schedule for Children and Adolescents Who Start Late or Who Are More than 1 Month Behind, United States, 2022

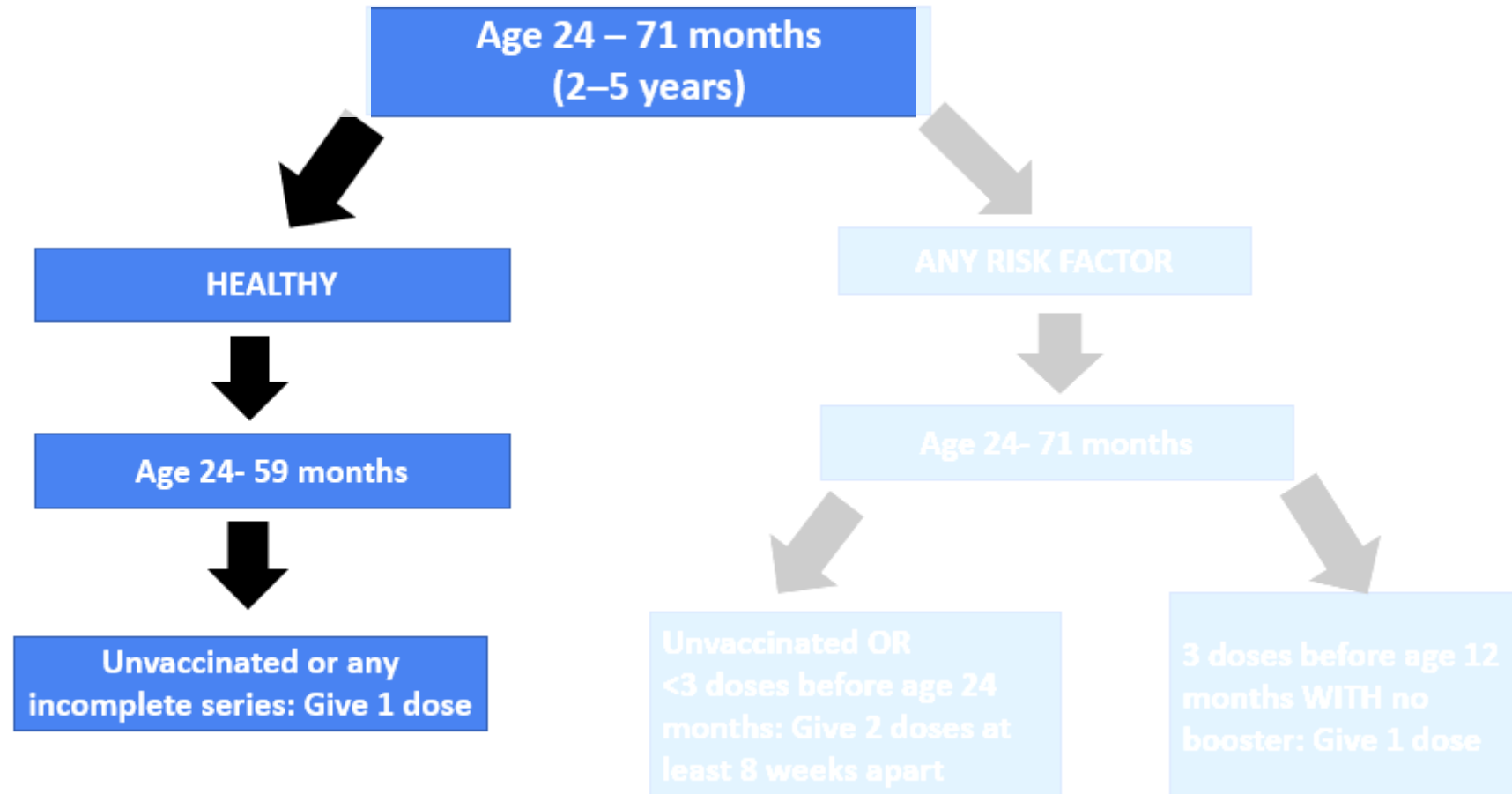
The table below provides catch-up schedules and minimum intervals between doses for children whose vaccinations have been delayed. A vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Use the section appropriate for the child's age. **Always use this table in conjunction with Table 1 and the Notes that follow.**

Vaccine	Minimum Age for Dose 1	Children age 4 months through 6 years			
		Dose 1 to Dose 2	Dose 2 to Dose 3	Minimum Interval Between Doses	
Hepatitis B	Birth	4 weeks	8 weeks <i>and at least 16 weeks after first dose</i> minimum age for the final dose is 24 weeks		
Rotavirus	6 weeks Maximum age for first dose is 14 weeks, 6 days.	4 weeks	4 weeks maximum age for final dose is 8 months, 0 days		
Diphtheria, tetanus, and acellular pertussis	6 weeks	4 weeks	4 weeks	6 months	6 months
<i>Haemophilus influenzae</i> type b	6 weeks	No further doses needed if first dose was administered at age 15 months or older. 4 weeks if first dose was administered before the 1 <sup>st</sup> birthday. 8 weeks (as final dose) if first dose was administered at age 12 through 14 months.	No further doses needed if previous dose was administered at age 15 months or older 4 weeks if current age is younger than 12 months <i>and</i> first dose was administered at younger than age 7 months <i>and</i> at least 1 previous dose was PRP-T (ActHib <sup>®</sup> , Pentacel <sup>®</sup> , Hibberx <sup>®</sup> ), Vaxelis <sup>®</sup> or unknown 8 weeks <i>and</i> age 12 through 59 months (as final dose) if current age is younger than 12 months <i>and</i> first dose was administered at age 7 through 11 months; OR if current age is 12 through 59 months <i>and</i> first dose was administered before the 1 <sup>st</sup> birthday <i>and</i> second dose was administered at younger than 15 months; OR if both doses were PerdayHIB <sup>®</sup> and were administered before the 1 <sup>st</sup> birthday.	8 weeks (as final dose) This dose only necessary for children age 12 through 59 months who received 3 doses before the 1 <sup>st</sup> birthday.	
Pneumococcal conjugate	6 weeks	No further doses needed for healthy children if first dose was administered at age 24 months or older 4 weeks if first dose was administered before the 1 <sup>st</sup> birthday 8 weeks (as final dose for healthy children) if first dose was administered at the 1 <sup>st</sup> birthday or after	No further doses needed for healthy children if previous dose was administered at age 24 months or older 4 weeks if current age is younger than 12 months and previous dose was administered at <7 months old 8 weeks (as final dose for healthy children) if previous dose was administered between 7–11 months (wait until at least 12 months old); OR if current age is 12 months or older and at least 1 dose was administered before age 12 months	8 weeks (as final dose) This dose only necessary for children age 12 through 59 months who received 3 doses before age 12 months or for children at high risk who received 3 doses at any age.	
Inactivated poliovirus	6 weeks	4 weeks	4 weeks if current age is <4 years 6 months (as final dose) if current age is 4 years or older	6 months (minimum age 4 years for final dose)	
Measles, mumps, rubella	12 months	4 weeks			
Varicella	12 months	3 months			
Hepatitis A	12 months	6 months			
Meningococcal ACWY	2 months MenACWY-CRM 9 months MenACWY-D 2 years MenACWY-TT	8 weeks	See Notes	See Notes	
Children and adolescents age 7 through 18 years					
Meningococcal ACWY	Not applicable (N/A)	8 weeks			
Tetanus, diphtheria; tetanus, diphtheria, and acellular pertussis	7 years	4 weeks	4 weeks if first dose of DTap/DT was administered before the 1 <sup>st</sup> birthday 6 months (as final dose) if first dose of DTap/DT or Tdap/Td was administered at or after the 1 <sup>st</sup> birthday	6 months if first dose of DTap/DT was administered before the 1 <sup>st</sup> birthday	
Human papillomavirus	9 years	Routine dosing intervals are recommended.			
Hepatitis A	N/A	6 months			
Hepatitis B	N/A	4 weeks	8 weeks <i>and</i> at least 16 weeks after first dose		
Inactivated poliovirus	N/A	4 weeks	6 months A fourth dose is not necessary if the third dose was administered at age 4 years or older and at least 6 months after the previous dose.	A fourth dose of IPV is indicated if all previous doses were administered at <4 years or if the third dose was administered <6 months after the second dose.	
Measles, mumps, rubella	N/A	4 weeks			
Varicella	N/A	3 months if younger than age 13 years. 4 weeks if age 13 years or older			
Dengue	9 years	6 months	6 months		

# PCV Catch-up Vaccination for Children Aged 24–71 months

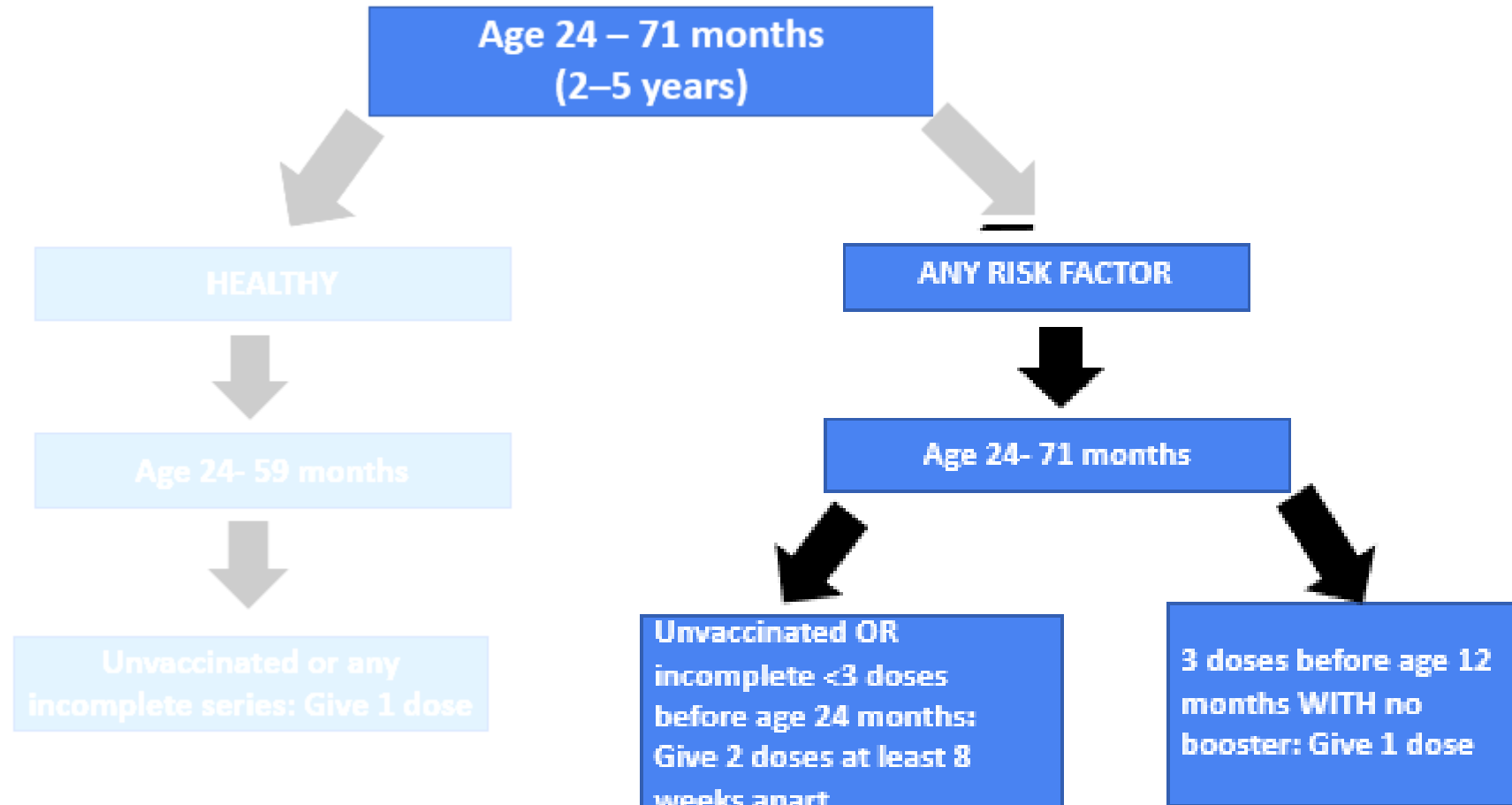


# PCV Catch-up Vaccination for Children Aged 24–71 months





# PCV Catch-up Vaccination for Children Aged 24–71 months



# PCV Vaccination: Aged 6–18 years

- Risk-based recommendation
- Chronic heart disease, chronic lung disease, or diabetes mellitus
  - PCV not recommended
- Immunocompromising condition, cochlear implant, or cerebrospinal fluid leak
  - No previous PCV13 or PCV15: Give 1 dose of PCV13 or PCV15
    - › regardless of whether the child has previously received PPSV23 or PCV7

# PPSV23 Recommendations for Children and Adolescents

**Table 1** Recommended Child and Adolescent Immunization Schedule for ages 18 years or younger, United States, 2022

These recommendations must be read with the notes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars. To determine minimum intervals between doses, see the catch-up schedule (Table 2).

Vaccine	Birth	1 mo	2 mos	4 mos	6 mos	9 mos	12 mos	15 mos	18 mos	19–23 mos	2–3 yrs	4–6 yrs	7–10 yrs	11–12 yrs	13–15 yrs	16 yrs	17–18 yrs	
Pneumococcal polysaccharide (PPSV23)																		See Notes

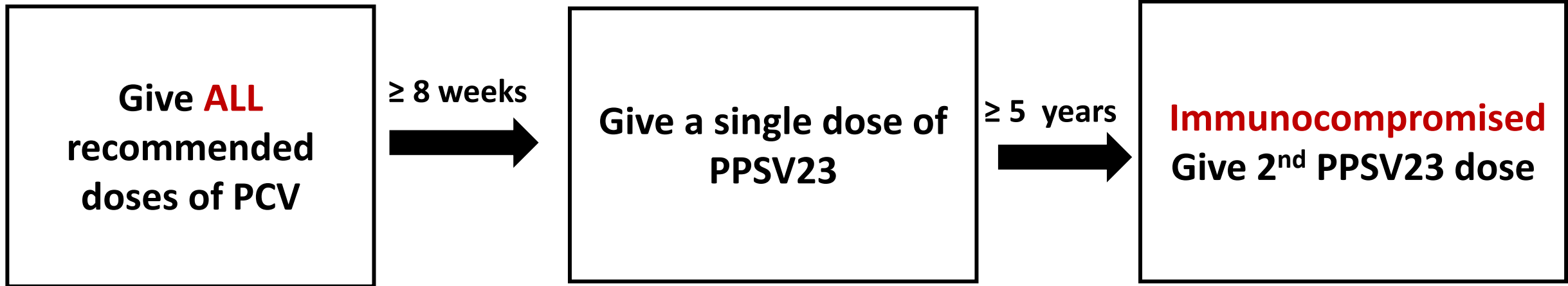
Risk- based vaccination for age 2 years and older

# PPSV23 Recommendations for Children and Adolescents

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Pneumococcal polysaccharide (PPSV23)																		See Notes



# Pneumococcal Vaccination Schedule: Children and Adolescents

TABLE 3. Risk-based pneumococcal vaccine recommendations for children and adolescents with underlying medical conditions that increase the risk of pneumococcal disease — United States, 2022

Risk group/Condition	PCV* for children aged <6 yrs	PCV* for persons aged 6–18 yrs	PPSV23 for children aged ≥2 yrs	
	Recommended	Recommended	Recommended	Single revaccination 5 yrs after first dose
<b>Immunocompetent children</b>				
Chronic heart disease <sup>†</sup>	Y	N	Y	N
Chronic lung disease <sup>§</sup>	Y	N	Y	N
Diabetes mellitus	Y	N	Y	N
Cerebrospinal fluid leak	Y	Y	Y	N
Cochlear implant	Y	Y	Y	N
<b>Children with immunocompromising conditions</b>				
Chronic renal failure or nephrotic syndrome	Y	Y	Y	Y
Congenital or acquired asplenia, or splenic dysfunction	Y	Y	Y	Y
Congenital or acquired immunodeficiency <sup>¶</sup>	Y	Y	Y	Y
Diseases and conditions treated with immunosuppressive drugs or radiation therapy <sup>**</sup>	Y	Y	Y	Y
HIV infection	Y	Y	Y	Y
Sickle cell disease or other hemoglobinopathies	Y	Y	Y	Y
Solid organ transplant	Y	Y	Y	Y

**Abbreviations:** N = no; PCV = pneumococcal conjugate vaccine; PCV13 = 13-valent PCV; PCV15 = 15-valent PCV; PPSV23 = 23-valent pneumococcal polysaccharide vaccine; Y = yes.

\* Either PCV13 or PCV15 can be used.

<sup>†</sup> Recommendations are of particular importance for children with cyanotic congenital heart disease and cardiac failure.

<sup>§</sup> Including asthma if treated with high-dose oral corticosteroid therapy.

<sup>¶</sup> Includes B-(humoral) or T-lymphocyte deficiency; complement deficiencies, particularly C1, C2, C3, and C4 deficiency; and phagocytic disorders (excluding chronic granulomatous disease).

<sup>\*\*</sup> Including malignant neoplasms, leukemias, lymphomas, and Hodgkin disease.

## Knowledge Check

- PCV13 and PCV15 can be used interchangeably in children and adolescents aged 18 years and younger

- A. True
- B. False



## Knowledge Check

- PCV13 and PCV15 can be used interchangeably in children and adolescents aged 18 years and younger?

A. True

~~B. False~~



# Pneumococcal Vaccination Schedule: Adults

Recommendations for routine vaccination for adults (age 19 years and older) are found in the [Adult Immunization Schedule by Vaccine and Age Group | CDC](#)

**Table 1** Recommended Adult Immunization Schedule by Age Group, United States, 2022

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
Influenza inactivated (IIV4) or Influenza recombinant (RIV4) or Influenza live, attenuated (LAIV4)	1 dose annually			
Tetanus, diphtheria, pertussis (Tdap or Td)	1 dose Tdap each pregnancy; 1 dose Td/Tdap for wound management (see notes)			
Measles, mumps, rubella (MMR)	1 dose Tdap, then Td or Tdap booster every 10 years			
Varicella (VAR)	1 or 2 doses depending on indication (if born in 1957 or later)			
Zoster recombinant (RZV)	2 doses (if born in 1980 or later)		2 doses	
Zoster recombinant (RZV)	2 doses for immunocompromising conditions (see notes)		2 doses	
Human papillomavirus (HPV)	2 or 3 doses depending on age at initial vaccination or condition	27 through 45 years		
<b>Pneumococcal (PCV15, PCV20, PPSV23)</b>	1 dose PCV15 followed by PPSV23 OR 1 dose PCV20 (see notes)			1 dose PCV15 followed by PPSV23 OR 1 dose PCV20
Hepatitis A (HepA)	2 or 3 doses depending on vaccine			
Hepatitis B (HepB)	2, 3, or 4 doses depending on vaccine or condition			
Meningococcal A, C, W, Y (MenACWY)	1 or 2 doses depending on indication, see notes for booster recommendations			
Meningococcal B (MenB)	19 through 23 years	2 or 3 doses depending on vaccine and indication, see notes for booster recommendations		
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



# Pneumococcal Vaccination Recommendations for Adults

**Table 1** Recommended Adult Immunization Schedule by Age Group, United States, 2022

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
Pneumococcal (PCV15, PCV20, PPSV23)	1 dose PCV15 followed by PPSV23 OR 1 dose PCV20 (see notes)			1 dose PCV15 followed by PPSV23 OR 1 dose PCV20

- PCV15 or PCV20 recommended
  - PCV13 not recommended
- Routine vaccination: age 65 years and older
- Risk- based vaccination for age 19 – 64 years

# Pneumococcal Vaccination Recommendations for Adults: Unvaccinated

**Table 1** Recommended Adult Immunization Schedule by Age Group, United States, 2022

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
Pneumococcal (PCV15, PCV20, PPSV23)		1 dose PCV15 followed by PPSV23 OR 1 dose PCV20 (see notes)		1 dose PCV15 followed by PPSV23 OR 1 dose PCV20

- Unvaccinated or unknown PCV status
  - 1 dose of either PCV15 or PCV20
    - › No preference
  - If PCV15 is used, give 1 dose PPSV23 at least 1 year later
    - › May consider at least 8 weeks if immunocompromising condition, cerebrospinal fluid leak, or cochlear implant

# Pneumococcal Vaccination Recommendations for Adults: Unvaccinated

**Table 1** Recommended Adult Immunization Schedule by Age Group, United States, 2022

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
Pneumococcal (PCV15, PCV20, PPSV23)		1 dose PCV15 followed by PPSV23 OR 1 dose PCV20 (see notes)		1 dose PCV15 followed by PPSV23 OR 1 dose PCV20

- Unvaccinated or unknown PCV status
  - 1 dose of either PCV15 or PCV20
    - › No preference
  - If PCV15 is used, give 1 dose PPSV23 at least 1 year later
    - › May consider at least 8 weeks if immunocompromising condition, cerebrospinal fluid leak, or cochlear implant

# Pneumococcal Vaccination Recommendations for Adults: **Vaccinated**

**Table 1** Recommended Adult Immunization Schedule by Age Group, United States, 2022

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
Pneumococcal (PCV15, PCV20, PPSV23)		1 dose PCV15 followed by PPSV23 OR 1 dose PCV20 (see notes)		1 dose PCV15 followed by PPSV23 OR 1 dose PCV20

- **Previous PPSV23 only:** may give PCV15 or PCV20 at least 1 year later
- **Previous PCV13**
  - Complete recommended PPSV23 series
  - PPSV23 unavailable: 1 dose PCV20

**UPDATE COMING**

# Pneumococcal Vaccination Recommendations for Adults: **Vaccinated**

**Table 1** Recommended Adult Immunization Schedule by Age Group, United States, 2022

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
Pneumococcal (PCV15, PCV20, PPSV23)		1 dose PCV15 followed by PPSV23 OR 1 dose PCV20 (see notes)		1 dose PCV15 followed by PPSV23 OR 1 dose PCV20

- **Previous PPSV23 only:** may give PCV15 or PCV20 at least 1 year later

- Previous PCV13

- Complete recommended PPSV23 series
- PPSV23 unavailable: 1 dose PCV20

**UPDATE COMING**

# Pneumococcal Vaccination Recommendations for Adults: Vaccinated

**Table 1** Recommended Adult Immunization Schedule by Age Group, United States, 2022

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
Pneumococcal (PCV15, PCV20, PPSV23)		1 dose PCV15 followed by PPSV23 OR 1 dose PCV20 (see notes)		1 dose PCV15 followed by PPSV23 OR 1 dose PCV20

- Previous PPSV23 only: may give PCV15 or PCV20 at least 1 year later
- **Previous PCV13**
  - Complete recommended PPSV23 series
  - PPSV23 unavailable: 1 dose PCV20

**UPDATE COMING**

## Other Considerations for Pneumococcal Vaccines

### ■ Co-administration of vaccines

- PCV and PPSV23 should not be administered during the same clinic visit
  - › Administer PCV first
- PCV and MenACWY-D
  - › HIV or asplenia: do not administer on same clinic day
  - › Administer PCV first
  - › MenACWY-D at least 4 weeks later

### ■ Planned procedures (e.g., splenectomy, cochlear implant, immunocompromising therapy)

- Completed PCV or PPSV23 at least 2 weeks before procedure

# Other Considerations for Pneumococcal Vaccines

## ■ Co-administration of vaccines

- PCV and PPSV23 should not be administered during the same clinic visit
  - › Administer PCV first
- PCV and MenACWY-D
  - › HIV or asplenia: do not administer on same clinic day
  - › Administer PCV first
  - › MenACWY-D at least 4 weeks later

## ■ Planned procedures (e.g., splenectomy, cochlear implant, immunocompromising therapy)

- Completed PCV or PPSV23 at least 2 weeks before procedure



# Other Considerations for Pneumococcal Vaccines

## ■ Co-administration of vaccines

- PCV and PPSV23 should not be administered during the same clinic visit
  - › Administer PCV13 first
- PCV and MenACWY-D
  - › HIV or asplenia: do not administer on same clinic day
  - › Administer PCV first
  - › MenACWY-D at least 4 weeks later

## ■ Planned procedures (e.g., splenectomy, cochlear implant, immunocompromising therapy)

- Completed PCV or PPSV23 at least 2 weeks before procedure

## Knowledge Check

- Which of the following pneumococcal vaccine is recommended for use in persons aged 19 years and older with indications for pneumococcal vaccination?
  - A. PCV15
  - B. PCV20
  - C. PPSV23
  - D. All of the above



## Knowledge Check

- Which of the following pneumococcal vaccine is recommended for use in persons aged 19 years and older with indications for pneumococcal vaccination?

~~A. PCV15~~

~~B. PCV20~~

~~C. PPSV23~~

**D. All of the above**



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**Safety**

# Adverse Reactions after PPSV23 Vaccination

- **Local Reactions**

- › Pain, erythema, and swelling

- **Systemic reactions**

- › Fatigue, headache, and generalized muscle pain
- › More frequent after 2<sup>nd</sup> dose than 1<sup>st</sup> dose in 65 years and older

- **Clinically important reactions (severe or serious)**

- › Rarely, anaphylactic reaction

# Adverse Reactions after PCV Vaccination

- **Local Reactions**

- › Pain, tenderness, erythema, and swelling

- **Systemic reactions**

- › Fatigue, headache, decreased appetite, muscle pain, fever and irritability

- **Clinically important reactions (severe or serious)**

- › Rarely, anaphylactic reaction

# Contraindications and Precautions: PCV

Vaccine	Contraindications	Precautions
PCV	<ul style="list-style-type: none"><li>• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component</li><li>• Severe allergic reaction (e.g., anaphylaxis) to any diphtheria-toxoid– containing vaccine or its component</li></ul>	<ul style="list-style-type: none"><li>• Moderate or severe acute illness with or without fever</li></ul>
PPSV23	<ul style="list-style-type: none"><li>• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component</li></ul>	<ul style="list-style-type: none"><li>• Moderate or severe acute illness with or without fever</li></ul>

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**Storage  
& Handling**



# Vaccine Storage and Handling

- Store PCV and PPSV23 vaccines in a refrigerator between 2°C–8°C (36°F–46°F)
- Store:
  - In the original packaging with the lids closed
  - In a clearly labeled bin and/or area of the storage unit—not next to each other
- Do not freeze the vaccine

## PCV13 (Prennar 13)

**Ages:** All children 6 weeks through 5 years

**Certain high-risk groups** 6 years through 18 years who have never received PCV13 or received an incomplete PCV13 series

**Route:** Intramuscular (IM) injection

## PCV15 (Vaxneuvance)

**Ages:** Adults 65 years and older

**Certain high-risk groups** 19 – 64 years with certain medical conditions or risk factors

**Route:** Intramuscular (IM) injection

## PPSV23 (Pneumovax 23)

**Ages:** Adults 65 years and older who received PCV13 or PCV15

**Certain high-risk groups** 2 years through 64 years with certain medical conditions or risk factors who received PCV13 or PCV15

**Route:** Intramuscular (IM) injection OR  
Subcutaneous (subcut) injection

## PCV20 (Prennar 20)

**Ages:** Adults 65 years and older

**Certain high-risk groups** 19 – 64 years with certain medical conditions or risk factors

**Route:** Intramuscular (IM) injection

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**Resources**

## Vaccines and Preventable Diseases

[Vaccines & Preventable Diseases Home](#) > [Vaccines by Disease](#) > [Pneumococcal](#)



[Vaccines & Preventable Diseases Home](#)

### Vaccines by Disease

- Chickenpox (Varicella) +
- Dengue +
- Diphtheria +
- Flu (Influenza) +
- Hepatitis A +
- Hepatitis B +
- Hib +
- Human Papillomavirus (HPV) +
- Measles +
- Meningococcal +
- Mumps +
- Pneumococcal** -
- What Everyone Should Know For Healthcare Professionals
- Polio +
- Rotavirus +
- Rubella +

# Pneumococcal Vaccination: Information for Healthcare Professionals

Pneumococcal vaccines help protect against some of the more than 100 serotypes of pneumococcal bacteria. Pneumococcal disease contributes to the U.S. burden of pneumonia, meningitis, bacteremia, sinusitis, and otitis media.

[Pneumococcal Vaccine Recommendations](#)

[About Pneumococcal Vaccines](#)

[Storage and Handling for Pneumococcal Vaccines](#)

[Administering Pneumococcal Vaccines](#)

[Pneumococcal Vaccine Resources](#)

### You Call the Shots



[You Call the Shots](#) is an interactive, web-based immunization training course. It consists of a series of modules that discuss vaccine-preventable diseases and explain the latest recommendations for vaccine use. Each module provides learning opportunities, self-test practice questions, reference and resource materials, and an extensive glossary.

### Pink Book

The "Pink Book" contains the most comprehensive information on routinely used vaccines and the



# PneumoRecs VaxAdvisor

 Centers for Disease Control and Prevention  
CDC 24/7: Saving Lives, Protecting People™

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## Pneumococcal Vaccine Recommendations

PneumoRecs  
VaxAdvisor

### PneumoRecs VaxAdvisor

Tool to help determine which pneumococcal vaccines children and adults need.




[PneumoRecsVaxAdvisor \(cdc.gov\)](https://www.cdc.gov/pneumo-recs-vaxadvisor)

Vaccines & Preventable Diseases  
Home

#### Vaccines by Disease

Chickenpox (Varicella)	+
Dengue	+
Diphtheria	+
Flu (Influenza)	+
Hepatitis A	+
Hepatitis B	+
Hib	+
Human Papillomavirus (HPV)	+
Measles	+
Meningococcal	+
Mumps	+
Pneumococcal	-
What Everyone Should Know For Healthcare Professionals	
Polio	+
Rotavirus	+
Rubella	+
Shingles	+
Tetanus	+

## PneumoRecs VaxAdvisor Mobile App for Vaccine Providers

 The PneumoRecs VaxAdvisor Mobile App was updated on February 9, 2022, to reflect CDC's new adult pneumococcal vaccination recommendations.

The *PneumoRecs VaxAdvisor* mobile app helps vaccination providers quickly and easily determine which pneumococcal vaccines a patient needs and when. The app incorporates recommendations for all ages so internists, family physicians, pediatricians, and pharmacists alike will find the tool beneficial.

Users simply:

- Enter a patient's age.
- Note if the patient has specific underlying medical conditions.
- Answer questions about the patient's pneumococcal vaccination history.

Then the app provides patient-specific guidance consistent with the immunization schedule recommended by the U.S. Advisory Committee on Immunization Practices (ACIP).

### Download the App Today

Download *PneumoRecs VaxAdvisor* for free:

- [iOS devices](#)
- [Android devices](#)

**Updates:** CDC will release guideline changes and enhancements to the app itself through app updates.

### Web Access Tool

Access the [desktop version](#) of *PneumoRecs VaxAdvisor* to use the tool without a device that supports the app.



PneumoRecs VaxAdvisor is available for download on iOS and Android mobile devices.

[PneumoRecs VaxAdvisor: Vaccine Provider App | CDC](#)

# PCV Catch-up Vaccination for Children and Adolescents

## Catch-Up Guidance for Healthy<sup>1</sup> Children 4 Months through 4 Years of Age

### Pneumococcal Conjugate Vaccine: PCV

The table below provides guidance for children whose vaccinations have been delayed. Start with the child's age and information on previous doses (previous doses must be documented and must meet minimum age requirements and minimum intervals between doses). Use this table in conjunction with table 2 of the Recommended Child and Adolescent Immunization Schedule for Ages 18 Years or Younger, found at [www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html](http://www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html).

IF current age is	AND # of previous doses is	AND		THEN	Next dose due
4 through 6 months	0 or unknown	→	→	Give Dose 1 today	Give Dose 2 at least 4 weeks after Dose 1
	1	→	It has been at least 4 weeks since Dose 1	Give Dose 2 today	Give Dose 3 at least 4 weeks after Dose 2
		→	It has <b>not</b> been at least 4 weeks since Dose 1	No dose today	Give Dose 2 at least 4 weeks after Dose 1
	2	→	It has been at least 4 weeks since Dose 2	Give Dose 3 today	Give Dose 4 ( <b>Final Dose</b> ) at 12 months of age or older
		→	It has <b>not</b> been at least 4 weeks since Dose 2	No dose today	Give Dose 3 at least 4 weeks after Dose 2
		0	→	→	Give Dose 1 today

# Pneumococcal Vaccine Timing for Adults

Make sure your patients are up to date with pneumococcal vaccination.

## CDC recommends pneumococcal vaccination for

- Adults 65 years old and older
- Adults 19 through 64 years old with certain underlying medical conditions or other risk factors:
  - Alcoholism
  - Cerebrospinal fluid leak
  - Chronic heart/liver/lung disease
  - Chronic renal failure\*
  - Cigarette smoking
  - Cochlear implant
  - Congenital or acquired asplenia\*
  - Congenital or acquired immunodeficiencies\*
  - Diabetes
  - Generalized malignancy\*
  - HIV infection\*
  - Hodgkin disease\*
  - Iatrogenic immunosuppression\*
  - Leukemia\*
  - Lymphoma\*
  - Multiple myeloma\*
  - Nephrotic syndrome\*
  - Sickle cell disease or other hemoglobinopathies\*
  - Solid organ transplants\*

\* Considered an immunocompromising condition

## Pneumococcal vaccines

- PCV13:** 13-valent pneumococcal conjugate vaccine (Pevnar13®)
- PCV15:** 15-valent pneumococcal conjugate vaccine (Vaxneuvance™)
- PCV20:** 20-valent pneumococcal conjugate vaccine (Pevnar20®)
- PPSV23:** 23-valent pneumococcal polysaccharide vaccine (Pneumovax®)

For those who have never received a pneumococcal vaccine or those with unknown vaccination history

Administer one dose of PCV15 or PCV20.

If **PCV20** is used, their pneumococcal vaccinations are complete.

PCV20

If **PCV15** is used, follow with one dose of PPSV23.

- The recommended interval is at least 1 year.
- The minimum interval is 8 weeks and can be considered in adults with an immunocompromising condition\*, cochlear implant, or cerebrospinal fluid leak.
- Their pneumococcal vaccinations are complete.

PCV15

At least 1 year apart  
(8 weeks can be considered)

PPSV23

For those who previously received PPSV23 but who have not received any pneumococcal conjugate vaccine (e.g., PCV13, PCV15, PCV20)

You may administer one dose of PCV15 or PCV20.

Regardless of which vaccine is used (PCV15 or PCV20):

- The minimum interval is at least 1 year.
- Their pneumococcal vaccinations are complete.

PPSV23

At least 1 year apart

PCV15 or PCV20

# Pneumococcal Vaccination Resources

1. [ACIP Pneumococcal Vaccine Recommendations | CDC](#)
2. [Adult Immunization Schedule by Vaccine and Age Group | CDC](#)
3. [Birth-18 Years Immunization Schedule | CDC](#)
4. [Pneumococcal Vaccination: For Providers | CDC](#)
5. [Pneumococcal Vaccination: Who and When to Vaccinate | CDC](#)
6. [Pneumococcal Vaccine Timing for Adults-April 1, 2022 \(cdc.gov\)](#)



# Continuing Education Information

- CE credit, go to: <https://tceols.cdc.gov/>
- Search course number: WD4564-101122
- CE credit expires: July 1, 2024
- CE instructions are available on the Pink Book Web-on-Demand Series web page
- Questions and additional help with the online CE system, e-mail [CE@cdc.gov](mailto:CE@cdc.gov)

The screenshot shows the TCEO website interface. At the top, there is a blue header with the text "Training and Continuing Education Online (TCEO)". Below this is the TCEO logo, which consists of the letters "TCEO" in a bold, blue font, with a green circular arrow icon to the right. Underneath the logo, the text "TRAINING AND CONTINUING EDUCATION ONLINE" is displayed in a smaller, blue font. A navigation menu is located on the left side of the page, with a blue background and white text. The menu items are: "TCEO Home", "Search Courses", "Create Account", "9 Simple Steps to Earn CE", "Frequently Asked Questions", and "Contact TCEO". The main content area on the right has a white background and a blue header. It contains three sections: "New to TCEO?" with a link to "Create Account", "Already have a TCEO account from the previous system?" with instructions on how to sign in, and "Not sure how to get started?" with a link to "9 Simple Steps". Below the text is a row of four small images: a woman smiling at a child, a man in a suit looking at a screen, a doctor holding a dog, and a woman working at a computer. At the bottom of the page, there is a "Welcome to TCEO" message and a short paragraph describing the system.

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To move your account to the new system please sign in above using your existing TCEO username and password. Once signed in, follow the prompts to verify and update your account. After your account is verified, you will use this email address and password to sign in.

**Not sure how to get started?**  
Follow these [9 Simple Steps](#) to earn continuing education for the courses you have taken or conferences you have attended!

Welcome to TCEO

Training and Continuing Education Online (TCEO) is a system that provides access to CDC educational activities for continuing education (CE). Use TCEO to search for CE opportunities, complete course



# E-mail Your Immunization Questions to Us

- [NIPINFO@cdc.gov](mailto:NIPINFO@cdc.gov)



**Thank You From Atlanta!**

