

# UNDERSTANDING PNEUMOCOCCAL VACCINATIONS

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# Understanding Pneumococcal Vaccinations

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# Disclosures

- No financial disclosures
- UNC REX Healthcare Infection Control Officer
- University of New England (this project was completed at UNC SPICE - MPH practicum)

# Objectives

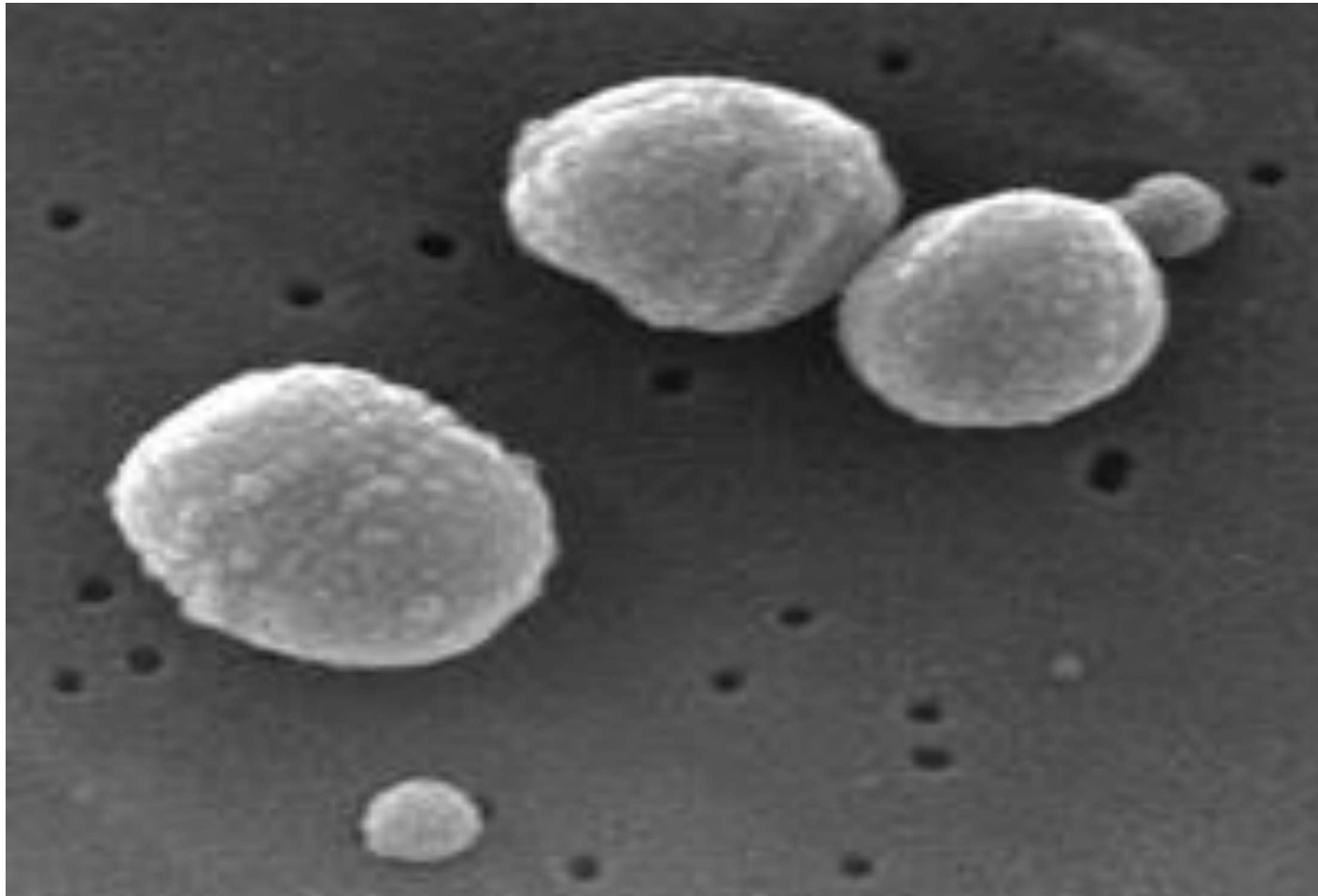
Participants will be able to:

- Describe the causative agent for pneumococcus associated diseases.
- Identify the groups at highest risk for pneumococcal disease.
- Understand for whom pneumococcal immunization is recommended.
- Locate resources relevant to current pneumococcal immunization practice.

# Pneumococcal Disease

- Pneumococcal disease is caused by the bacterium *Streptococcus pneumoniae*.
- To date, 92 serotypes have been documented.
- Most *S. pneumoniae* serotypes have been shown to cause serious disease.

# Electron Micrograph of *Streptococcus pneumoniae*



# Pneumococcal Disease

## Key Facts

- Pneumococcal infections can range from ear and sinus infections to pneumonia, meningitis and bloodstream infections.
- Pneumococcal disease is common in young children, but older adults are at greatest risk of serious illness and death.
- There are two kinds of vaccines that help prevent pneumococcal disease.

# Transmission

- Pneumococci bacteria commonly inhabit the upper respiratory tract without causing illness.
- 5% to 90% of healthy persons are carriers of pneumococci bacteria.
- The duration of carriage varies and is generally longer in children than adults.
- *S. pneumoniae* transmission occurs when a carrier spreads the bacteria in respiratory droplets created during coughing and sneezing.

# Transmission (continued)

- *S. pneumoniae* can invade the body and cause serious illnesses, especially if there is an immunocompromising or other predisposing condition.
- The 3 major clinical syndromes caused by *S. pneumoniae* are: **Pneumonia, Bacteremia, and Pneumococcal meningitis.**

# Pneumonia Risk

- Pneumococcal pneumonia is the most common clinical presentation of pneumococcal disease among adults, with pneumococci accounting for up to 36% of adult community-acquired pneumonia.
- People are more likely to get pneumonia if they smoke or have underlying medical conditions, like diabetes or heart disease.
- Individuals can lower their chances of pneumonia by taking good care of their medical problems, quitting smoking, and getting vaccinated when indicated.

# Knockout Pneumonia Campaign in North Carolina

source: The North Carolina Quality Center

## PNEUMONIA FACTS

- **North Carolina is ranked 49 of 50 states** for its pneumonia mortality rate, with 73% of hospitals below the CMS national benchmark.
- More than half of all N.C. hospitals are above the national benchmark for 30-day pneumonia readmission rates.
- Pneumonia is most often acquired in the community, outside of the hospital setting.
- CDC recommends pneumococcal vaccination for all adults 65 years or older. According to 2016 data from the Behavioral Risk Factor Surveillance System, only 23% of N.C. Medicare beneficiaries 65 years old or older report they have received the CDC-recommended regimen of both PPSV23 and PCV13 pneumococcal vaccinations.

# Bacteremia Risk

- More than 12,000 cases of pneumococcal bacteremia occur each year **without pneumonia**.
- The overall case-fatality rate for bacteremia is about 20%, but may be as high as 60% among elderly patients.
- Symptoms of pneumococcal bacteremia may include fever, chills, and a low level of alertness.

# Pneumococcal Meningitis Risk

- Pneumococci cause over 50% of all cases of bacterial meningitis in the United States.
- An estimated 3,000 to 6,000 cases of pneumococcal meningitis occur each year.
- Some patients with pneumococcal meningitis will also develop pneumonia.
- The case-fatality rate of pneumococcal meningitis is about 8% among children and 22% among adults.

# Pneumococcal Vaccines

- Pneumococcal vaccines protect against pneumococcal disease, including infections in the lungs and bloodstream.
- CDC's Advisory Committee on Immunization Practices (ACIP) recommends pneumococcal vaccine for all adults over 65 years old, and for adults younger than 65 years who have certain chronic health conditions.

# Pneumococcal Vaccination Health Priority

- One recent 2017 study ‘Pneumococcal Vaccination Guidance for Nursing Home Residents: Recommendations from AMDA’s (The Society for Post-Acute and Long-Term Care Medicine) Infection Advisory Committee’ states...

“Pneumococcal vaccination is a national health priority in older adults in the long-term care settings.”

# Vaccine Screening in the Elderly Population

Vaccine screening may at times be challenging in the elderly population due to certain health ailments, cognitive abilities, or lack of health records.

One recent 2018 study ‘One size does not fit all’ from the Australasian Journal of Ageing discusses:

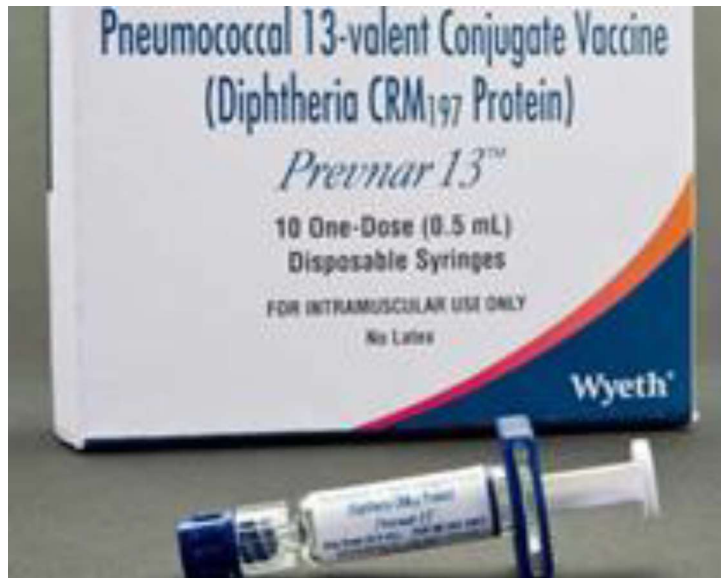
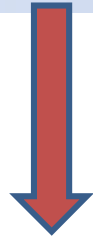
- Different types of barriers do exist in the elderly population
- We should always remember and strive to have “Respectful communication” and “support for individual needs and preferences” in the elderly population.

# Vaccine Types

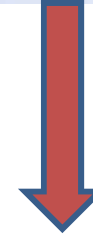
There are two kinds of pneumococcal vaccines available in the United States.

1. **Pneumococcal conjugate** vaccine (PCV13, Prevnar13<sup>®</sup>)
2. **Pneumococcal polysaccharide** vaccine (PPSV23, Pneumovax<sup>®</sup>23)

# Conjugate Vaccine & Polysaccharide Vaccine



Source: Centers for Disease Control and Prevention



Source: Merck & Co., Inc.

# Contraindications/Precautions.

Who Should Not Get These Vaccines?

Because of age, health conditions, or allergies some people should not get certain vaccines or should wait before getting them.

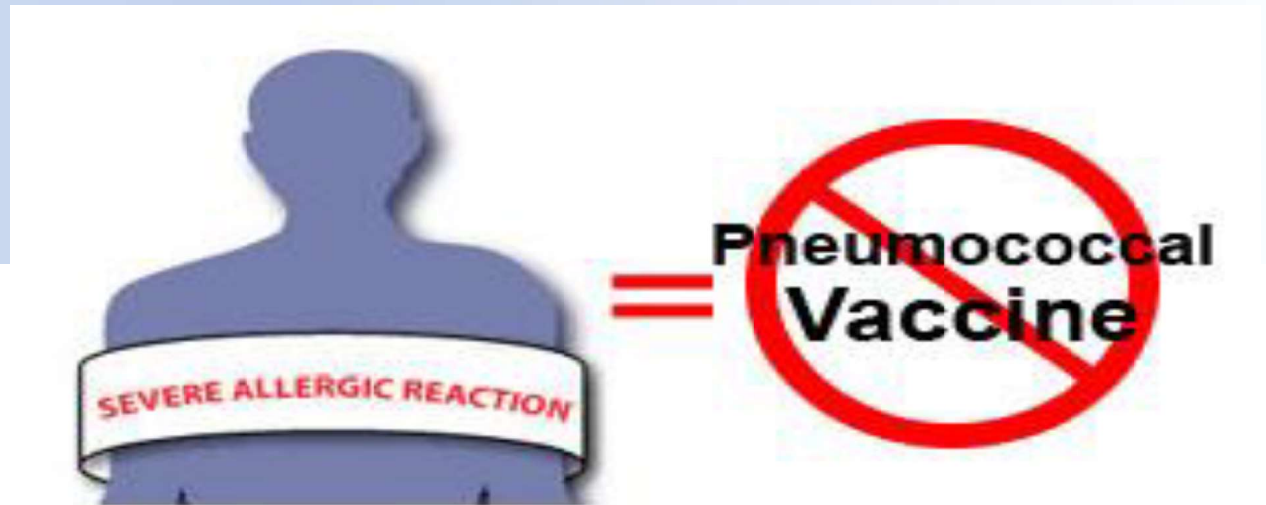
# Pregnancy



Source:  
CDC/Health  
Soft, Inc.

- Check with OB first.
- The safety of PPSV23 for pregnant women has not been studied.
- Women who are at high risk of pneumococcal disease and who are candidates for pneumococcal vaccine should be vaccinated before pregnancy, if possible.
- The Advisory Committee on Immunization Practices (ACIP) has not published pregnancy recommendations for PCV13 at this time.

# ✓ Allergies Check



CDC Picture Source: HealthSoft.Inc

- When screening persons for pneumococcal vaccine, don't forget to ask about allergies.
- Do not give PCV13 or PPSV23 to anyone who has had a prior severe allergic reaction to that vaccine or any of its components.

**Warning-** PCV13 includes nontoxic diphtheria toxin and is contraindicated for anyone with a history of severe allergic reaction to diphtheria-containing vaccine).

# Acute illness ➡ Provider's Input

- Pneumococcal vaccine should be delayed when moderate or severe illness is present. However, pneumococcal vaccine can be given when a person:
  - ✓ Has a mild illness.
  - ✓ Is in the convalescent phase of an acute illness.
  - ✓ Is taking antibiotics (but is not moderately or severely ill).

You may administer pneumococcal vaccines, if the provider deems the benefits of vaccination to outweigh the risks, to:

- A person who has a moderate or severe acute illness with or without fever.

# Vaccine Information Statements (VIS)

- After screening a person and determining that pneumococcal vaccination (with PCV13 or PPSV23) is appropriate, you need to educate the person about the vaccine, its risks and benefits, and what to do if he or she experiences a vaccine-related adverse event.
- This information is found on the VIS statement.

# Example (VIS) Front

## VACCINE INFORMATION STATEMENT

### Pneumococcal Conjugate Vaccine (PCV13)

#### What You Need to Know

More Vaccine Information Statements are available in Spanish and other languages. See [www.imz.vaccine.gov](http://www.imz.vaccine.gov).

Hasse de informac  n sobre vacunas esta disponible en espa  ol y en otros idiomas. Visite [www.vaccine.gov](http://www.vaccine.gov).

#### 1 Why get vaccinated?

Vaccination can protect both children and adults from **pneumococcal disease**.

Pneumococcal disease is caused by bacteria that can spread from person to person through close contact. It can cause ear infections, and it can also lead to more serious infections of the:

- Lungs (pneumonia),
- Blood (bacteremia), and
- Covering of the brain and spinal cord (meningitis).

Pneumococcal pneumonia is most common among adults. Pneumococcal meningitis can cause deafness and brain damage, and it kills about 1 child in 10 who get it.

Anyone can get pneumococcal disease, but children under 2 years of age and adults 65 years and older, people with certain medical conditions, and cigarette smokers are at the highest risk.

Before there was a vaccine, the United States saw:

- more than 700 cases of meningitis,
- about 13,000 blood infections,
- about 5 million ear infections, and
- about 200 deaths

in children under 5 each year from pneumococcal disease. Since vaccine became available, severe pneumococcal disease in these children has fallen by 88%.

About 18,000 older adults die of pneumococcal disease each year in the United States.

Treatment of pneumococcal infections with penicillin and other drugs is not as effective as it used to be, because some strains of the disease have become resistant to these drugs. This makes prevention of the disease, through vaccination, even more important.

#### 2 PCV13 vaccine

Pneumococcal conjugate vaccine (called PCV13) protects against 13 types of pneumococcal bacteria.

PCV13 is routinely given to children at 2, 4, 6, and 12–15 months of age. It is also recommended for children and adults 2 to 64 years of age with certain health conditions, and for all adults 65 years of age and older. Your doctor can give you details.

#### 3 Some people should not get this vaccine

Anyone who has ever had a life-threatening allergic reaction to a dose of this vaccine, to an earlier pneumococcal vaccine called PCV7, or to any vaccine containing diphtheria toxoid (for example, DTaP), should not get PCV13.

Anyone with a severe allergy to any component of PCV13 should not get the vaccine. *Tell your doctor if the person being vaccinated has any severe allergies.*

If the person scheduled for vaccination is not feeling well, your healthcare provider might decide to reschedule the shot on another day.

#### 4 Risks of a vaccine reaction

With any medicine, including vaccines, there is a chance of reactions. These are usually mild and go away on their own, but serious reactions are also possible.

Problems reported following PCV13 varied by age and dose in the series. The most common problems reported among children were:

- About half became drowsy after the shot, had a temporary loss of appetite, or had redness or tenderness where the shot was given.
- About 1 out of 3 had swelling where the shot was given.
- About 1 out of 3 had a mild fever, and about 1 in 20 had a fever over 102.2°F.
- Up to about 8 out of 10 became fussy or irritable.

Adults have reported pain, redness, and swelling where the shot was given; also mild fever, fatigue, headache, chills, or muscle pain.

Young children who get PCV13 along with inactivated flu vaccine at the same time may be at increased risk for seizures caused by fever. Ask your doctor for more information.

# Example VIS (Back)

## Problems that could happen after any vaccine:

- People sometimes faint after a medical procedure, including vaccination. Sitting or lying down for about 15 minutes can help prevent fainting, and injuries caused by a fall. Tell your doctor if you feel dizzy, or have vision changes or ringing in the ears.
- Some older children and adults get severe pain in the shoulder and have difficulty moving the arm where a shot was given. This happens very rarely.
- Any medication can cause a severe allergic reaction. Such reactions from a vaccine are very rare, estimated at about 1 in a million doses, and would happen within a few minutes to a few hours after the vaccination.

As with any medicine, there is a very small chance of a vaccine causing a serious injury or death.

The safety of vaccines is always being monitored. For more information, visit: [www.cdc.gov/vaccinesafety/](http://www.cdc.gov/vaccinesafety/)

## 5 What if there is a serious reaction?

### What should I look for?

- Look for anything that concerns you, such as signs of a severe allergic reaction, very high fever, or unusual behavior.

Signs of a severe allergic reaction can include hives, swelling of the face and throat, difficulty breathing, a fast heartbeat, dizziness, and weakness—usually within a few minutes to a few hours after the vaccination.

### What should I do?

- If you think it is a severe allergic reaction or other emergency that can't wait, call 9-1-1 or get the person to the nearest hospital. Otherwise, call your doctor.

Reactions should be reported to the Vaccine Adverse Event Reporting System (VAERS). Your doctor should file this report, or you can do it yourself through the VAERS web site at [www.vaers.hhs.gov](http://www.vaers.hhs.gov), or by calling 1-800-822-7967.

*VAERS does not give medical advice.*

## 6 The National Vaccine Injury Compensation Program

The National Vaccine Injury Compensation Program (VICP) is a federal program that was created to compensate people who may have been injured by certain vaccines.

Persons who believe they may have been injured by a vaccine can learn about the program and about filing a claim by calling 1-800-338-2382 or visiting the VICP website at [www.hrsa.gov/vaccinecompensation](http://www.hrsa.gov/vaccinecompensation). There is a time limit to file a claim for compensation.

## 7 How can I learn more?

- Ask your healthcare provider. He or she can give you the vaccine package insert or suggest other sources of information.
- Call your local or state health department.
- Contact the Centers for Disease Control and Prevention (CDC):
  - Call 1-800-232-4636 (1-800-CDC-INFO) or
  - Visit CDC's website at [www.cdc.gov/vaccines](http://www.cdc.gov/vaccines)



# Vaccine Information Statements for PCV13 and PPSV23

- PCV13 vaccine:

<https://www.cdc.gov/vaccines/hcp/vis/vis-statements/pcv13.pdf>

- PPSV23 vaccine:

<https://www.cdc.gov/vaccines/hcp/vis/vis-statements/ppv.pdf>

- VIS are also available in other languages found at:  
<http://www.immunize.org/vis/>

# VIS (continued)

- Provide a Vaccine Information Statement (VIS) before administering each dose of PCV13 or PPSV23 vaccine.
- Provide the person with an opportunity to read the VIS and ask questions.
- Document in the person's health record that you provided the VIS and the edition date of the VIS.

# Vaccine Administration (adults)

**PCV13** is administered as a 0.5 mL dose via the intramuscular route using an appropriate needle length.

- The preferred injection site in adults is the deltoid muscle.



**PPSV23** is administered as a 0.5 mL dose via the intramuscular route or the subcutaneous route.

- For an intramuscular injection, an appropriate needle length should be used and the preferred site in adults is the deltoid muscle.
- For subcutaneous injection, a 5/8 inch, 23- to 25-gauge needle should be used and the subcutaneous injection site is the posterior triceps area of the upper arm.



# Indications for Vaccination

**Warning:** Do not administer PCV13 and PPSV23 at the same time.

- The number of doses, order of the doses, and intervals between doses vary depending on medical status, age, and pneumococcal vaccination history.

# Pneumococcal Vaccine Timing for Adults

- Excellent resource alert! - An easy to read CDC chart (including additional scenarios) found at:

<https://www.cdc.gov/vaccines/vpd/pneumo/downloads/pneumo-vaccine-timing.pdf>

# CDC-Pneumococcal Vaccine Timing for Adults 65 or older

## Pneumococcal Vaccine Timing for Adults

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

Two pneumococcal vaccines are recommended for adults:

- 13-valent pneumococcal conjugate vaccine (PCV13, Prevnar13®)
- 23-valent pneumococcal polysaccharide vaccine (PPSV23, Pneumovax®23)

PCV13 and PPSV23 should not be administered during the same office visit.

When both are indicated, PCV13 should be given before PPSV23 whenever possible.

If either vaccine is inadvertently given earlier than the recommended window, do not repeat the dose.

### One dose of PCV13 is recommended for adults:

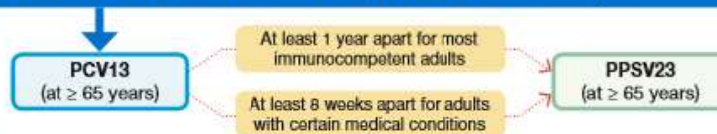
- 65 years or older who have not previously received PCV13.
- 19 years or older with certain medical conditions and who have not previously received PCV13. See Table 1 for specific guidance.

### One dose of PPSV23 is recommended for adults:

- 65 years or older, regardless of previous history of vaccination with pneumococcal vaccines.
  - Once a dose of PPSV23 is given at age 65 years or older, no additional doses of PPSV23 should be administered.
- 19 through 64 years with certain medical conditions.
  - A second dose may be indicated depending on the medical condition. See Table 1 for specific guidance.

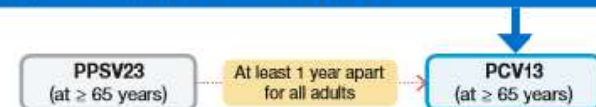
## Pneumococcal vaccine timing for adults 65 years or older

For those who have not received any pneumococcal vaccines, or those with unknown vaccination history



- Administer 1 dose of PCV13.
- Administer 1 dose of PPSV23 **at least 1 year** later for most immunocompetent adults or **at least 8 weeks** later for adults with immunocompromising conditions, cerebrospinal fluid leaks, or cochlear implants. See Table 1 for specific guidance.

For those who have previously received 1 dose of PPSV23 at ≥ 65 years and no doses of PCV13



- Administer 1 dose of PCV13 **at least 1 year** after the dose of PPSV23 for all adults, regardless of medical conditions.

# CDC-Medical conditions/indications for PCV13 and PPSV23 for adults

Table 1. Medical conditions or other indications for administration of PCV13 and PPSV23 for adults

Medical indication	Underlying medical condition	PCV13 for ≥ 19 years	PPSV23* for 19 through 64 years		PCV13 at ≥ 65 years	PPSV23 at ≥ 65 years
		Recommended	Recommended	Revaccination	Recommended	Recommended
None	None of the below				✓	✓ ≥ 1 year after PCV13
Immunocompetent persons	Alcoholism					
	Chronic heart disease†					
	Chronic liver disease		✓		✓	✓ ≥ 1 year after PCV13 ≥ 5 years after any PPSV23 at < 65 years
	Chronic lung disease§					
	Cigarette smoking					
	Diabetes mellitus					
	Cochlear implants	✓	✓ ≥ 8 weeks after PCV13		✓ If no previous PCV13 vaccination	✓ ≥ 8 weeks after PCV13 ≥ 5 years after any PPSV23 at < 65 years
Persons with functional or anatomic asplenia	CSF leaks					
	Congenital or acquired asplenia	✓	✓ ≥ 8 weeks after PCV13	✓ ≥ 5 years after first dose PPSV23	✓ If no previous PCV13 vaccination	✓ ≥ 8 weeks after PCV13 ≥ 5 years after any PPSV23 at < 65 years
Immunocompromised persons	Sickle cell disease/other hemoglobinopathies					
	Chronic renal failure					
	Congenital or acquired immunodeficiencies¶					
	Generalized malignancy					
	HIV infection					
	Hodgkin disease		✓	✓	✓	✓ ≥ 8 weeks after PCV13 ≥ 5 years after any PPSV23 at < 65 years
	Iatrogenic immunosuppression‡	✓	≥ 8 weeks after PCV13	≥ 5 years after first dose PPSV23	If no previous PCV13 vaccination	
	Leukemia					
	Lymphoma					
	Multiple myeloma					
	Nephrotic syndrome					
	Solid organ transplant					

\*This PPSV23 column only refers to adults 19 through 64 years of age. All adults 65 years of age or older should receive one dose of PPSV23 5 or more years after any prior dose of PPSV23, regardless of previous history of vaccination with pneumococcal vaccine. No additional doses of PPSV23 should be administered following the dose administered at 65 years of age or older.

†Including congestive heart failure and cardiomyopathies

§Including chronic obstructive pulmonary disease, emphysema, and asthma

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

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

# Adverse Vaccine Reactions

- The most common adverse events following pneumococcal vaccine are local reactions (pain, swelling, or erythema).
- These reactions usually persist for less than 48 hours



Source: CDC/HealthSoft, Inc.

# Serious Allergic Reactions

- Serious allergic reaction (anaphylaxis) is extremely rare from pneumococcal vaccinations.
- Anaphylactic reactions usually occur immediately after vaccination.
- **This is a medical emergency!** If a severe allergic reaction occurs, follow recommended emergency procedures at your location.
- Persons who have severe allergic reactions to either PPSV23 or PCV13 vaccine should not receive that vaccine again.

# Vaccine Storage and Handling

- Proper vaccine storage and handling practices play an important role in protecting individuals and communities from vaccine-preventable diseases.
- Store pneumococcal vaccines in the original packaging.

# Proper Temperature/Expiration date

- Store pneumococcal vaccines in refrigeration unit between 2°C and 8°C (36°F and 46°F).
- Do not use pneumococcal vaccine beyond the **expiration date** printed on the label.
- Do not freeze vaccine or diluents.
- If the vaccine has been exposed to inappropriate conditions/temperatures or handled improperly:
  - Store the vaccine at the appropriate temperature
  - Isolate from other vaccines
  - Mark “Do NOT Use”
  - Consult the vaccine manufacturer and/or your state or local immunization program for guidance

# Disposal

- Discard vaccine vials and syringes using proper medical waste disposal procedures.
- Sharps container must be secure, puncture resistant, leak proof, and properly labeled.



# Test your knowledge #1

- Which vaccine is indicated for a healthy 60-year-old man who smokes cigarettes?
- A. PCV13
  - B. PPSV23
  - C. Both PCV13 and PPSV23
  - D. Neither vaccine is recommended

# Answer #1

## B. PPSV23

- PPSV23 is recommended for adults 19 through 64 years of age who smoke cigarettes.
- PCV13 would only be indicated if the man was immunocompromised or asplenic, or had sickle cell disease, another hemaglobinopathy, a cerebrospinal fluid leak, or a cochlear implant.

# Test your knowledge #2

- Which vaccine is indicated for a 19-year-old woman with symptomatic HIV who has never received pneumococcal vaccine?
  - A. PCV13
  - B. PPSV23
  - C. Both PCV13 and PPSV23
  - D. Neither vaccine is recommended

# Answer #2

## C. Both PCV13 and PPSV23

- PCV13 is recommended for persons of any age with HIV infection. PPSV23 should be administered 8 weeks or more after PCV13.
- A second dose of PPSV23 should be given 5 or more years after the first PPSV23 dose. No further PPSV23 doses are indicated before 65 years of age.

# Test your knowledge #3

- Which vaccine is indicated now for a 38-year-old woman who received a cochlear implant and a dose of PPSV23 at 36 years of age?
- A. PCV13
  - B. PPSV23
  - C. Both PCV13 and PPSV23
  - D. Neither vaccine is recommended

# Answer #3

## A. PCV13

- A single dose of PCV13 should be administered now since more than a year has elapsed since the dose of PPSV23.
- This woman does not need a second dose of PPSV23 now, but she will need a dose at 65 years of age.

# Test your knowledge #4

- Which vaccine is indicated for a 28-year-old woman who has been diagnosed with breast cancer and will be undergoing surgery, followed by radiation and chemotherapy in a few weeks?
- A. PCV13
  - B. PPSV23
  - C. Both PCV13 and PPSV23
  - D. Neither vaccine is recommended

# Answer #4

## C. Both PCV13 and PPSV23

- Both PCV13 and PPSV23 are recommended for adults 19 years and older with immunocompromising conditions, including those resulting from cancer or cancer chemotherapy.
- A dose of PCV13 should be administered first, followed by a dose of PPSV23 8 weeks later.
- When possible, administer these vaccines at least 2 weeks before a patient starts chemotherapy or other therapies that can suppress the immune system.

# Test your knowledge #5

- Which vaccine is indicated for a healthy 66-year-old man?
- A. PCV13
  - B. PPSV23
  - C. Both PCV13 and PPSV23
  - D. Neither vaccine is recommended

# Answer #5

## C. Both PCV13 and PPSV23

- Both PCV13 and PPSV23 are recommended for healthy adults aged 65 years and older who have not received pneumococcal vaccine previously.
- A single dose of PCV13 should be administered first, followed by a single dose of PPSV23 at least 1 year after the PCV13 dose.

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# ADDITIONAL RESOURCES

- Statewide Program for Infection Control & Epidemiology (SPICE)
  - <https://spice.unc.edu/>
- Infection Management & Antibiotic Stewardship (UNC)
  - <https://nursinghomeinfections.unc.edu/>
- Centers for Disease Control & Prevention (CDC)
  - <https://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html>
- Agency for Healthcare Research & Quality (AHRQ)
  - <https://www.ahrq.gov/nhguide/index.html>
- Minnesota Department of Health (MDH)
  - <http://www.health.state.mn.us/divs/idepc/dtopics/antibioticresistance/asp/Itc/index.html>