



THE OMNICARE

HealthLine

Focus on Pneumococcal Vaccines

- by Allen Lefkowitz

S*treptococcus pneumoniae* (aka pneumococcus) can cause serious and sometimes life-threatening infections. As outlined in the figure below, pneumococcal infections can range from basic ear and sinus infections to more serious infections such as pneumonia, bloodstream infections, and central nervous system infections (e.g., meningitis). More than 90 types of *Streptococcus pneumoniae* have been discovered; however, 10 of these are believed to be responsible for nearly two-thirds of invasive pneumococcal disease.

According to the CDC, “Vaccines are the best way to prevent pneumococcal disease”

In addition to ear and sinus infections, Pneumococcus can cause:		
Meningitis		
3,000 to 6,000 cases annually		Mortality rate: 8% children, 22% adults
Bacteremia		
More than 12,000 cases annually		Mortality rate: 20% (up to 60% in the elderly)
Pneumonia		
Cause of 36% of adult community-acquired pneumonia (CAP) cases	400,000 hospitalizations annually	Mortality rate: 5-7% (rate may be higher in the elderly)
Mortality is highest among the elderly and those with underlying high risk medical conditions		

According to the Centers for Disease Control and Prevention (CDC), “Pneumococcal disease, whether or not resistant to antibiotics, is a major public health problem.” It is estimated that 30% of severe cases of pneumococcal infections are due to strains of *S. pneumoniae* that are fully resistant to one or more clinically relevant antibiotics. Cases of resistant pneumococcal pneumonia result in approximately 19,000 additional hospitalizations each year.

Beyond the mortality associated with pneumococcal disease, disabilities such as deafness, brain damage, or paralysis of arms and/or legs are possible. In 1980 influenza and pneumonia were the 4th leading causes of death in the United States, but continued vaccine development and the introduction of routine pneumococcal vaccination for children produced a significant reduction in pneumococcal disease such that influenza and pneumonia have declined to the 8th leading cause of death.

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In addition to advanced age (particularly age \geq 80 years), significant risk factors for pneumococcal disease include:

- residing in a nursing home
- asplenia
- chronic heart disease
- smoking
- stroke
- chronic obstructive pulmonary disease
- diabetes
- immunodeficiency or use of immunosuppressants (e.g., prednisone \geq 20 mg daily)

Available Pneumococcal Vaccines

In addition to promoting good hand hygiene, good oral hygiene, and smoking cessation, the CDC states that “Vaccines are the best way to prevent pneumococcal disease.” Research continues to develop a better pneumococcal vaccine and/or an oral vaccine, but two distinct pneumococcal vaccines are available currently. Pneumococcal vaccines are considered 60-75% effective against invasive pneumococcal disease in immunocompetent elderly.

While a pneumococcal polysaccharide vaccine containing 23 antigens [Pneumovax, (PPSV23)] was first approved in 1983, the first pneumococcal conjugate vaccine [Prevnar, (PCV7)] was approved in 2000. However, in 2010 PCV7 was replaced with a formulation containing 13 antigens [Prevnar 13 (PCV13)]. Up to 50% and 90% of all invasive pneumococcal disease cases in the elderly are caused by strains that are covered by PCV13 and PPSV23, respectively.

Beyond the number of antigens contained in each vaccine, polysaccharide vaccines and conjugate vaccines differ significantly in their immunological response. While capsular polysaccharide vaccines (e.g., PPSV23) do not induce a T cell immune response, conjugated vaccines (e.g., PCV13) do produce a T cell response, and therefore stimulate antibody response as well as priming the immune system for a memory response. For this reason, even though PPSV23 provides protection against 10 additional strains, PCV13 may be more effective against the strains these two vaccines have in common.

Prior to late 2014 and in the absence of other high risk conditions, PPSV23 was the only pneumococcal vaccine routinely recommended for adults aged 65 years and older. Research about the use of PCV7 in children from 2000 through 2009 demonstrated 47,000

fewer hospitalizations per year in children; however, an even more significant finding was that childhood pneumococcal vaccination, possibly through “herd immunity”, resulted in 73,000 fewer hospitalizations per year for individuals who are 85 years of age and older. Additionally, the Community-Acquired Pneumonia Immunization Trial in Adults (CAPiTA) showed that PCV13 was 75% effective against invasive pneumococcal infections caused by strains within the vaccine and was 45.6% effective in preventing pneumococcal pneumonia.

As a result of these findings, in August 2014, the Advisory Committee on Immunization Practices (ACIP) began to recommend the additional routine use of PCV13 in older adults. ACIP recommended that for immunocompetent adults 65 years and older who had not received either pneumococcal vaccine previously, PCV13 should be administered first followed by a dose of PPSV23 “6-12 months later”. But for those who had previously received PPSV23, vaccination with PCV13 should wait at least 1 year following the last dose of PPSV23. In order to simplify their recommendation and to align with Centers for Medicare and Medicaid Services (CMS) coverage regulations, in September 2015 ACIP published a change in their recommendation about the interval of time between vaccination with PCV13 and PPSV23. Since that time ACIP has recommended that regardless of the order in which they are given, pneumococcal vaccines should be given “at least 1 year” apart.

Although determining which pneumococcal vaccine(s) an individual has received can be challenging, in cases where it is not known, it is considered best to vaccinate. However, with regard to PPSV23, revaccination (i.e., a second dose of PPSV23) is a practice that is generally not routinely supported by the CDC except in a couple of scenarios:

- A one-time revaccination is warranted if the individual was less than 65 years old when they received the first vaccination, and they are now 65 years or older and it has been at least 5 years since the first vaccination.
- Children and adults younger than 64 who are at high risk of serious pneumococcal disease (e.g., asplenia, chronic renal failure) or are immunocompromised such that their antibody titers are anticipated to rapidly decline, should receive a second dose at least 5 years after the first vaccination.

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The table below provides a summary of individuals that should receive PCV13 and/or PPSV23.

Condition	PCV13	PPSV23	PPSV23 revaccination 5 years after first dose
Age 65 Years and Older	X	X	
Resides in LTC Facility		X	
Chronic Heart Disease (e.g., heart failure)		X	
Chronic Lung Disease		X	
Diabetes		X	
Cerebrospinal Fluid Leak	X	X	
Cochlear Implant	X	X	
Alcoholism/Liver Disease		X	
Cigarette Smoking		X	
Asplenia (e.g., sickle cell)	X	X	X
HIV Infection	X	X	X
Chronic Renal Failure	X	X	X
Malignancies (e.g., leukemia)	X	X	X
Iatrogenic Immunosuppression (e.g., corticosteroids, radiation)	X	X	X
Post-organ Transplant	X	X	X

Similar to PPSV23, adults who received PCV13 most commonly reported pain, redness, and swelling at the injection site (>50% of patients), limitation of movement of the injected arm, fatigue, headache, chills, decreased appetite, generalized muscle pain, and joint pain. While co-administration with the annual influenza vaccine is often encouraged, adverse events are generally greater than if they are administered at different times. Unless otherwise inappropriate, acetaminophen or ibuprofen can be used to ease joint pain and to reduce fever associated with vaccination.

With regard to precautions it should be noted that if a resident has evidence of a moderate or severe illness, vaccination should be delayed until their symptoms resolve. If a female resident of childbearing age is pregnant, pneumococcal vaccines should generally be avoided. And if a resident is allergic to diphtheria-containing vaccines, PCV13 should be avoided as the antigens are linked to a non-toxic diphtheria protein.

Utilization of Pneumococcal Vaccines

In 1989, only 14% of older adults were vaccinated with PPSV23. According to the most recent CDC data from 2015, 63.6% of older Americans have received at least **one pneumonia shot**. In a recently published study examining vaccination trends in U.S. nursing homes between 2006 and 2014, researchers found that only 78.4% of nursing home residents were vaccinated with

pneumococcal vaccine in 2014. When more closely examining the unvaccinated residents, it was found that 73% were due to the resident or their responsible party declining vaccination; however, for 16% there was no documented evidence that they were ever offered the vaccine. In addition to improving documentation that each and every resident is evaluated and offered appropriate pneumococcal vaccinations, efforts should be made to better educate patients and their representatives about their benefits.

These ideas are supported by tag F883 (previously F334) in Appendix PP of the State Operations Manual – Influenza and pneumococcal immunizations, which states facilities must continue to have policies and procedures in place that ensure each resident or their representative not only has an opportunity to refuse immunization, but also, each resident or their representative must receive education about the benefits and potential side effects of the immunization. Also, unlike with other vaccinations, F883 says that self-reported history of vaccination is only permissible for influenza or PPSV23 (unless state laws have more stringent requirements related to documentation). However, the allowance of self-reporting is not currently acceptable for PCV13, meaning that facilities must obtain written, dated records for evidence of vaccination.



Safe and Proper Administration of Intramuscular Vaccines: Part 2

- by Allen Lefkovitz

This month’s medication safety article is part 2 to last month’s article overviewing the safe and proper administration of intramuscular (IM) vaccines. As stated last month, three general principles that can help guide the provision of safe IM vaccinations can be summarized under the categories of Size, Site, and Technique. While Size and Site were covered in September, overall Technique will be covered this month. Guidance in both articles should be adjusted by the healthcare professional based upon the specific situation and patient criteria.

#3: Technique

Proper technique is summarized in the figure below and spans both before and after the injection is given.

PREPARE	INJECT	COMPLETE
<ul style="list-style-type: none"> • The patient should be seated • The vaccine administrator should be seated or kneeling • Uncover the area, locating the thickest part of the deltoid • Wearing gloves, wipe with alcohol and let dry • Encourage patient to relax 	<ul style="list-style-type: none"> • Insert the needle at a 90° angle to the skin in a smooth, controlled motion • Depress the plunger • Withdraw the needle swiftly, or • If using a retractable needle, activate the device while in the patient’s arm 	<ul style="list-style-type: none"> • Activate the safety device immediately • Immediately dispose of the needle and syringe in the sharps container, without crossing your body • Press cotton or gauze and tape to patient • Deglove and wash hands



The Clinical Capsule

Medications Associated with Taste Disturbances*

- by Allen Lefkovitz

Taste disturbance is an adverse effect that significantly impacts quality of life and can cause/worsen weight loss, malnutrition, and mood disturbances. Some commonly utilized medications that can be associated with taste disturbance are outlined below.

Bitter Taste	Metallic Taste	Sweet Taste
Acetazolamide	Allopurinol	Captopril
Amphetamines	Captopril	Fluorouracil
Carbamazepine	Clarithromycin	Nifedipine
Dorzolamide	Eszopiclone	
Fluorouracil	Lithium	Salty Taste
Isosorbide	Metformin	Captopril
Metolazone	Methocarbamol	Chlorhexidine
Procainamide	Metronidazole	Lithium
Risperidone	Nifedipine	Nifedipine
Sulindac	Phenytoin	
	Propafenone	
	Sulindac	
	Tetracycline	

*This is not an all-inclusive list of medications associated with taste disturbances.



Vabomere™ for Injection

- by Dave Pregizer

Brand Name (Generic Name)	Vabomere™ [VA boh mear] (meropenem and vaborbactam) [mer oh PEN em and va bor BAK tam]
How Supplied	2 gram single-dose vials for injection containing meropenem 1 gram and vaborbactam 1 gram as sterile powder for constitution.
Therapeutic Class	Combination carbapenem antibacterial with a beta-lactamase inhibitor.
Approved Indication	Treatment of complicated urinary tract infections including pyelonephritis caused by designated susceptible bacteria in patients 18 years and older.
Usual Dosing	4 grams IV infusion every 8 hours over 3 hours for up to 14 days for patients with an estimated glomerular filtration rate (eGFR) \geq 50 mL/min/1.73m ² .
Select Drug Interactions	Administration with valproic acid or divalproex sodium results in a reduction in valproic acid concentrations. Administration with probenecid is not recommended as it increases plasma concentrations of meropenem.
Most Common Side Effects	Headache, phlebitis/infusion site reactions, and diarrhea
Miscellaneous	Dosage adjustment is recommended with renal impairment. No dosage adjustment necessary with hepatic impairment. Only compatible with 0.9% Sodium Chloride
Website	www.vabomere.com



NEW Generic Medications

Generic Name	Brand Name	Date Generic Available
Lanthanum Carbonate 500 mg, 750 mg, 1000 mg Chewable Tablets	Fosrenol® Chewable Tablet	8/30/17
Sevelamer 800 mg Tablets	Renvela® Tablet	8/21/17
Prasugrel 5 mg and 10 mg Tablets	Effient® Tablets	8/15/17

HealthLine Quiz

– by Steve Law

1. **Which statement about pneumococcal disease is FALSE:**
 - a. Meningitis may be caused by a pneumococcal infection
 - b. A significant risk factor for pneumococcal disease is a person residing in a nursing home
 - c. It is the 4th leading cause of death in the United State
 - d. An estimated 30% of severe cases of pneumococcal infections are due to strains of *S. pneumoniae* that are fully resistant to one or more clinically relevant antibiotics
2. **If an adult is 65 years and older and has not received either pneumococcal vaccine previously, the PPSV23 vaccine should be administered before the PCV13 vaccine:**
 - a. True b. False
3. **According to F883, nursing home residents can self-report that they have received the PCV13 vaccine:**
 - a. True b. False
4. **The proper technique to administer an injection intramuscularly, is to insert the needle at a 45 degree angle to the skin:**
 - a. True b. False
5. **Which statement concerning medications causing taste disturbances is TRUE:**
 - a. Lithium can cause a sweet taste
 - b. Metformin can cause a salty taste
 - c. Risperidone can cause a metallic taste
 - d. Acetazolamide can cause a bitter taste
5. **Which statement is FALSE about the new medication, Vabomere™:**
 - a. It is administered as an IV infusion
 - b. It is indicated for the treatment of complicated urinary tract infections
 - c. Dosage adjustment is needed in patients with hepatic impairment
 - d. Valproic acid concentrations may decrease in patients taking Vabomere™

***Please note, the HealthLine Quiz is designed to help readers retain information that is relevant to their care setting. It is not an approved source of continuing education credits for healthcare professionals.**

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Falak Thaker, PharmD, BSc

Contributing Authors for This Issue

Allen L. Lefkowitz, PharmD, BCGP, FASCP
Senior Clinical Advisor, Clinical Geriatrics, CVS Health
David Pregizer, RPh
Consultant Pharmacist, HCR-Manorcare
Steve Law, PharmD, BCGP
Clinical Services Manager for Indiana; Omnicare Pharmacies in Indiana

Answers to the HealthLine Quiz: 1) C 2) B 3) B 4) B 5) D 6) C