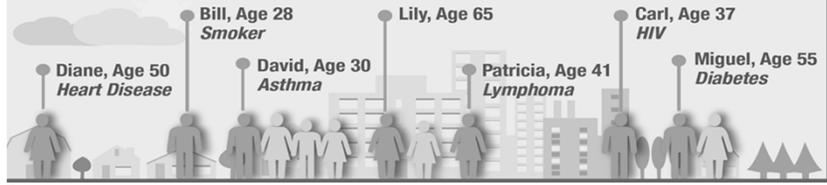


What do they all have in common?



Streptococcus *Pneumoniae* Update

2015 Regional Workshops
Laura L Baus, MHA, MSHS
Assessment Coordinator

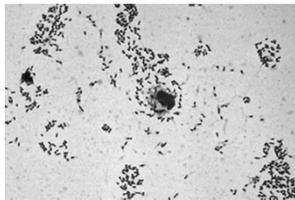
Objectives

- Identify who requires PCV13 and PPSV23 vaccines and the proper spacing of the two vaccines.

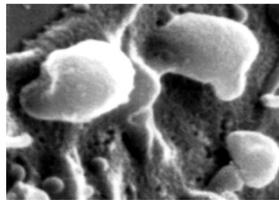


Overview

- Pathogenicity of pneumococci
- Pneumococcal disease
- New adult pneumococcal vaccination schedule



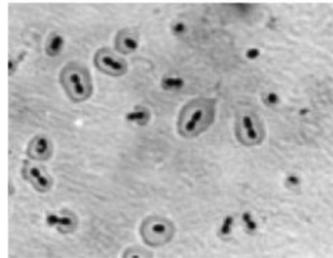
CSF showing meningitis *S.pneumoniae*



Pneumococcus cell adhering to human lung. Courtesy of Elaine Tuomanen, MD. UpToDate®

Pathogenicity

- Source of infection
 - Endogenous- from the colonized area
 - Exogenous- patients or carriers
- Mode of infection
 - Inhalation of respiratory droplets
- Temporal pattern
 - Winter and early spring



Quellung test showing capsular swelling

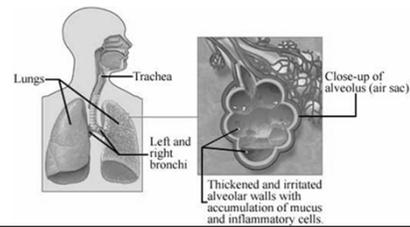
Virulence Factors

Capsule Polysaccharide

- Completely envelops the pneumococcal cells
- Interferes with phagocytosis
- Prohibits the activation of alternative complement pathway
- 90 different capsule types have been identified

Virulence Factors

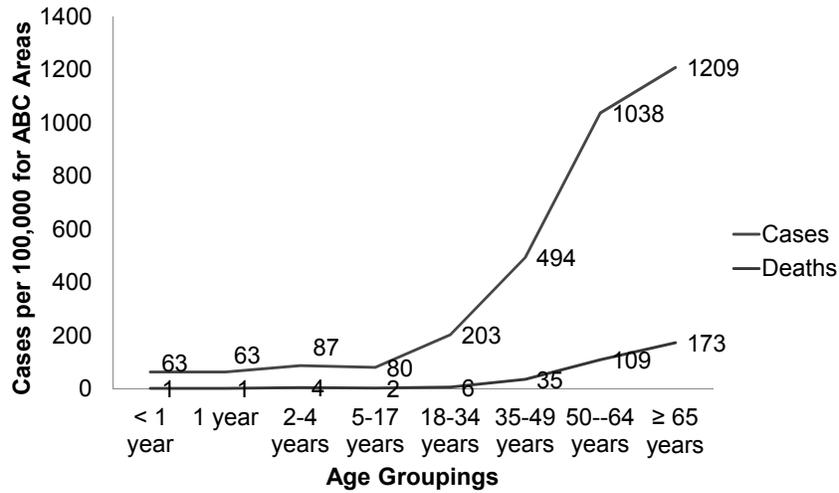
- Pneumococcal Surface Protein A
 - Protective antigen
 - Blocks recruitment of complement C3
- Pneumolysin
 - Released by bacteria
 - Inhibits and decreases effectiveness of WBC
 - Creating a strong inflammatory response by the host



Factors predisposing to pneumococcal disease

- Age
- Chronic illnesses
- Functional or anatomical asplenia
- Immunodeficiency
- Environmental factors

Active Bacterial Core Surveillance Report Emerging Infections Program Network *Streptococcus pneumoniae*, 2013 - provisional



Pneumococcal Disease

- Second most common cause of vaccine preventable death in the US
- Major clinical syndromes include
 - Pneumonia
 - Bacteremia
 - Meningitis

Pneumococcal Pneumonia

- Estimated 175,000 hospitalizations in U.S.
- Up to 36% of adult-community acquired pneumonia and 50% of hospital acquired pneumonia
- Common complication (bacterial) of influenza and measles
- Case fatality rate 5-7%, much higher in elderly



1 in every 20 adults who gets pneumococcal pneumonia die.

Pneumococcal Bacteremia

- More than 50,000 cases per year in the United States
- Rates higher among elderly and very young infants
- Case-fatality rate ~20%; up to 60% among the elderly



2 out of every 10 adults who get bacteremia die

Pneumococcal Meningitis

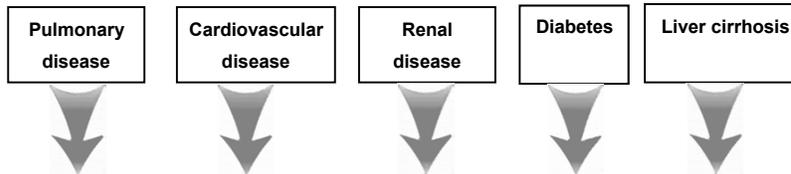
- Estimated 3,000–6,000 cases per year in the United States
- Case-fatality rate ~30%, up to 80% in the elderly
- Neurologic sequelae common among survivors
- Increased risk in persons with cochlear implant



3 out of every 10 adults who get meningitis die.

Factors predisposing to pneumococcal disease

Focus on Chronic illnesses



RISK OF DECOMPENSATION OF THE UNDERLYING DISEASE AND INCREASED RISK OF SEVERE PNEUMOCOCCAL DISEASE

CDC. Recommendations of the ACIP. Prevention of pneumococcal disease. MMWR 1997; 46 (N° RR-8): 1-24

Infections have a role on exacerbations in COPD patients

- Bacterial infection is a factor in 70 - 75% of exacerbations ⁽¹⁾
 - up to 60% caused by *S.pneumoniae*, *H. influenzae* or *M. catarrhalis*
- The presence of an upper respiratory tract infection leads to:⁽²⁾
 - more severe exacerbation
 - longer symptom recovery time at exacerbation

(1) Hunter M and King D. COPD: Management of acute exacerbations and chronic stable disease. American Family Physician 2001; Vol 6; number 4; 603-612
(2) Jadwiga A. Wedzicha. Role of viruses in exacerbations of Chronic Obstructive Pulmonary Disease. Proc Am Thorac Soc. Vol 1., 2004, pp 115-120.

Chronic Kidney Disease Carries a Big Risk for Pneumococcal Disease

- Pneumonia remains a major cause of morbidity and mortality in patients with renal disease
- Rates of pneumonia during the first year of hemodialysis have increased gradually from 24.8 admissions/100 patient-years at risk in 1991 to 30.6 admissions/100 patient-years at risk in 2001.
- *S pneumoniae* is responsible for up to 53% of reported pneumonia cases in dialysis patients.
- Mortality rates after pneumonia in dialysis patients: up to 14- to 16-fold greater mortality compared with the general population

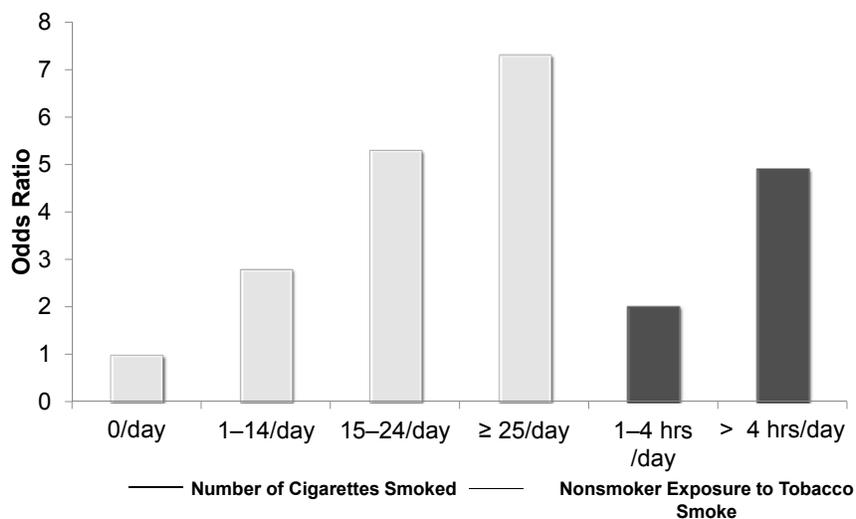
The Use of Vaccines in Adult Patients With Renal Disease *Am J Kidney Dis* 46:997-1011.

The Value of Pneumococcal Vaccination in Chronic Kidney Disease

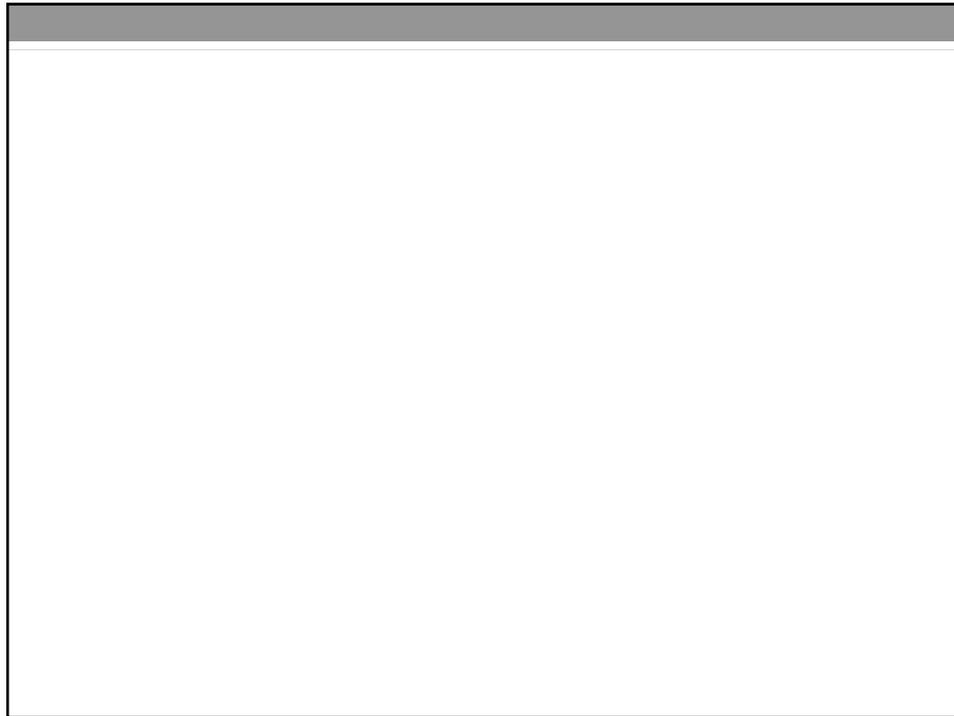
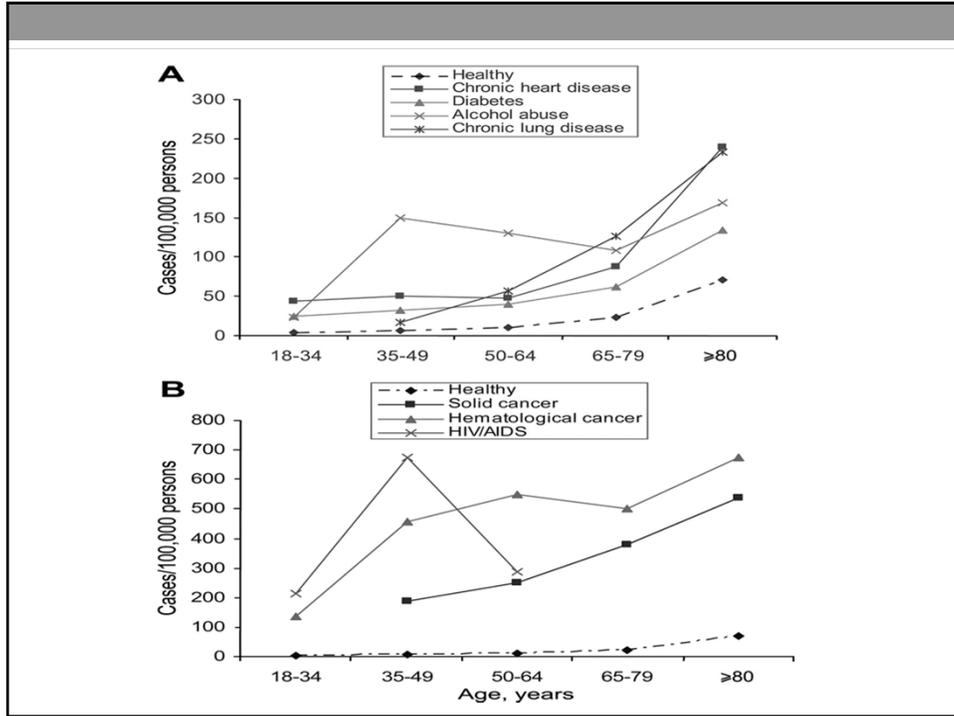
- Infectious disease is the second most common cause of death in late-stage chronic kidney disease (CKD/ ESRD) patients.
- Centers with vaccination protocols have demonstrated reduced infection rates and resultant decreased morbidity and mortality.
- It could be extrapolated from this that widespread vaccination would reduce the total cost of ESRD patient care, and potentially improve patient well-being.
- Vaccination appears to be underutilized in CKD patients, and it is a readily available intervention to improve outcomes.

Kausz A; Pahari D Semin Dial 2004 Jan-Feb;17(1):9-11

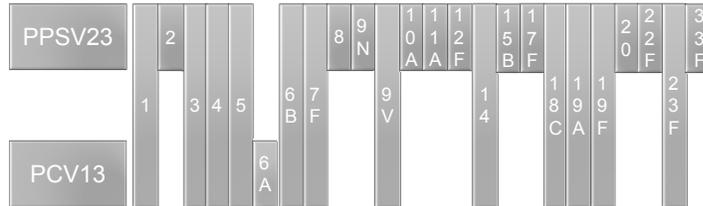
Cigarette Smoking and Risk of Invasive Pneumococcal Disease



Nuorti JP, et al. *N Engl J Med.* 2000;342:681-689.



Serotypes in PPSV23 and PCV 13



Serotype unique to PCV13 
 Serotype shared by both 
 Serotype unique to PPSV23 

WANTED

The following are at HIGH RISK for PNEUMOCOCCAL DISEASE:



- Those ≥ 65 Years of Age
- Persons 19-64 years with asthma or smokes cigarettes
- Persons 19-64 with chronic illnesses
- Persons 19-64 who are immunosuppressed

Pneumococcal Vaccination Recommendations in 2015 Adult Schedule

- **Adults ≥65 years**
 - Have not received PCV13 or PPSV23, or unknown history PCV13 → PPSV23¹
 - Have not received PCV13 but received PPSV23 at ≥65y PCV13³
 - Have not received PCV13 but received ≥1 PPSV23 at <65y PCV13³ → PPSV23^{1,4}
 - Have received PCV13 but not PPSV23 at <65y PPSV23¹
 - Have received PCV13 and ≥1 PPSV23 at <65y PPSV23^{1,4}
- **Adults 19–64 years immunocompromised, asplenia**
 - Have not received PCV13 or PPSV23, or unknown history PCV13 → PPSV23² → PPSV23⁴
 - Have not received PCV13 but received 1 dose PPSV23 PCV13³ → PPSV23^{2,4}
 - Have not received PCV13 but received 2 doses PPSV23 PCV13³
 - Have received PCV13 but not PPSV23 PPSV23² → PPSV23⁴
 - Have received PCV13 and 1 dose PPSV23 PPSV23⁴
- **Adults 19–64 years**
 - CSF leaks, cochlear implants PCV13 → PPSV23²
 - Chronic health conditions, smoke cigarettes or reside in long-term facilities PPSV23

¹ 6-12 mos after PCV13
² ≥8wks after PCV13
³ ≥1 yr after most recent PPSV23
⁴ ≥5yrs after most recent PPSV23

Pneumococcal Vaccination Recommendations in 2015 Adult Schedule

- **Adults ≥65 years**
 - Have not received PCV13 or PPSV23, or unknown history PCV13 → PPSV23¹
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 - Have not received PCV13 but received ≥1 PPSV23 at <65y PCV13³ → PPSV23^{1,4}
 - Have received PCV13 but not PPSV23 at <65y PPSV23¹
 - Have received PCV13 and ≥1 PPSV23 at <65y PPSV23^{1,4}

¹ 6-12 mos after PCV13
² ≥8wks after PCV13
³ ≥1 yr after most recent PPSV23
⁴ ≥5yrs after most recent PPSV23

Pneumococcal Vaccination Recommendations in 2015 Adult Schedule

• Adults 19–64 years immunocompromised, asplenia

- | | |
|---|---|
| • Have not received PCV13 or PPSV23, or unknown history | PCV13 → PPSV23 ² → PPSV23 ⁴ |
| • Have not received PCV13 but received 1 dose PPSV23 | PCV13 ³ → PPSV23 ^{2,4} |
| • Have not received PCV13 but received 2 doses PPSV23 | PCV13 ³ |
| • Have received PCV13 but not PPSV23 | PPSV23 ² → PPSV23 ⁴ |
| • Have received PCV13 and 1 dose PPSV23 | PPSV23 ⁴ |

¹ 6-12 mos after PCV13
² ≥8wks after PCV13
³ ≥1 yr after most recent PPSV23
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Pneumococcal Vaccination Recommendations in 2015 Adult Schedule

• Adults 19–64 years

- | | |
|--|-----------------------------|
| • CSF leaks, cochlear implants | PCV13 → PPSV23 ² |
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or reside in long-term facilities | PPSV23 |

¹ 6-12 mos after PCV13
² ≥8wks after PCV13
³ ≥1 yr after most recent PPSV23
⁴ ≥5yrs after most recent PPSV23

Indications for the administration of the 13-valent pneumococcal conjugate vaccine (PCV13) and the 23-valent pneumococcal polysaccharide vaccine (PPSV23) for adults in the United States

Risk group	Underlying condition	PPSV23		
		PCV13 Recommended	Recommended	Revaccination
Immunocompetent persons	Chronic heart disease*		X	
	Chronic lung disease*		X	
	Diabetes mellitus		X	
	Cerebrospinal fluid leak	X	X	
	Cochlear implant	X	X	
	Alcoholism		X	
	Chronic liver disease, cirrhosis		X	
	Cigarette smoking		X	
	Age ≥65	X	X	Δ
	Sickle cell disease/other hemoglobinopathy	X	X	X*
Persons with functional or anatomic asplenia	Congenital or acquired asplenia	X	X	X*
	Congenital or acquired immunodeficiency†	X	X	X*
Immunocompromised persons	Human immunodeficiency virus infection	X	X	X*
	Chronic renal failure	X	X	X*
	Nephrotic syndrome	X	X	X*
	Leukemia	X	X	X*
	Lymphoma	X	X	X*
	Hodgkin disease	X	X	X*
	Generalized malignancy	X	X	X*
	Iatrogenic immunosuppression‡	X	X	X*
	Solid organ transplant	X	X	X*
	Multiple myeloma	X	X	X*

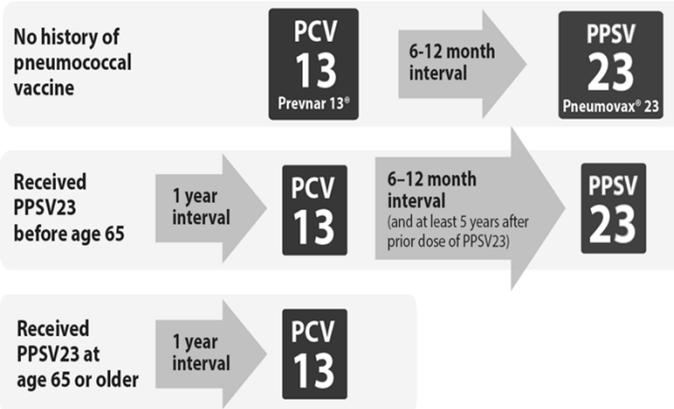
* Including congestive heart failure and cardiomyopathies, excluding hypertension.
 † Including chronic obstructive pulmonary disease, emphysema, and asthma.
 Δ All adults aged ≥65 years should receive a dose of PPSV23 even if they were vaccinated when they were less than 65 years of age; however, a minimum interval of five years between PPSV23 doses should be maintained. Those who are receiving PPSV23 for the first time at or after age 65 should receive only a single dose (and do not require revaccination).
 ‡ Patients <65 years of age who have functional or anatomic asplenia or who are immunocompromised should be revaccinated one time five years after the initial dose, and again at or after age 65 (and at least five years after the previous dose).
 § 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 glucocorticoids and radiation therapy.

Adapted from:
 1. Tomczyk S, Bennett NM, Stoecker C, et al. Use of 13-valent pneumococcal conjugate vaccine and 23-valent pneumococcal polysaccharide vaccine among adults aged ≥65 years: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Morb Mortal Wkly Rep* 2014; 63:822.
 2. Centers for Disease Control and Prevention. Use of 13-valent pneumococcal conjugate vaccine and 23-valent pneumococcal polysaccharide vaccine for adults with immunocompromising conditions: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Morb Mortal Wkly Rep* 2012; 61:1816.
 3. Centers for Disease Control and Prevention (CDC). Advisory Committee on Immunization Practices. Updated recommendations for prevention of invasive pneumococcal disease among adults using the 23-valent pneumococcal polysaccharide vaccine (PPSV23). *MMWR Morb Mortal Wkly Rep* 2010; 59:1102.
 4. Tomblin M, Chiller T, Einsele H, et al. Guidelines for preventing infectious complications among hematopoietic cell transplantation recipients: a global perspective. *Biol Blood Marrow Transplant* 2009; 15:1143.

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Age 65 Years or Older

• If PCV13 was given before age 65 years, no additional PCV13 is needed.



Age 19-64 Years with Underlying Conditions

Smoker, Long-term facility resident, or Chronic conditions:

- heart disease (excluding hypertension)
- lung disease (including asthma)
- liver disease (including cirrhosis)
- diabetes
- alcoholism

PPSV 23

Immunocompromised (including HIV infection),
Chronic renal failure, Nephrotic syndrome, or Asplenia

PCV 13

8 week interval

PPSV 23

5 year interval

PPSV 23

CSF leaks or Cochlear implants

PCV 13

8 week interval

PPSV 23



• DO NOT administer PCV13 and PPSV23 at the same visit.

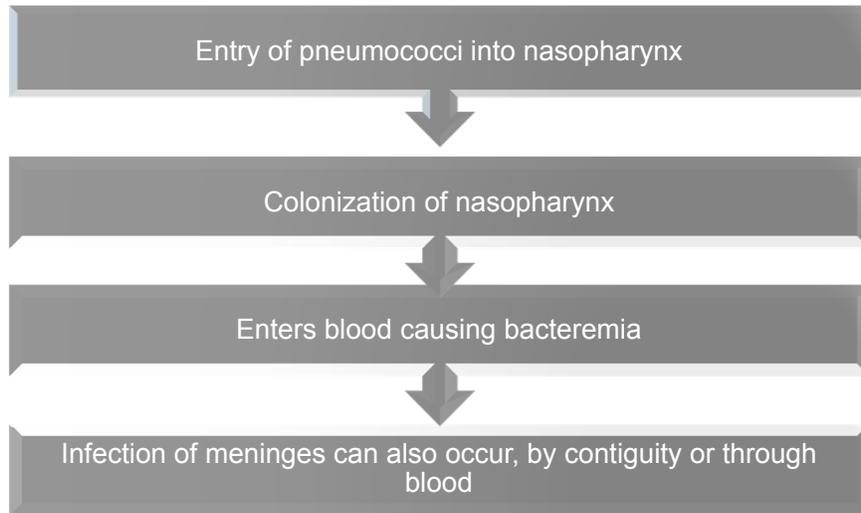
California Department of Public Health, Immunization Branch www.EZIZ.org
This publication was supported by Grant Number H23/CCH922507 from the Centers for Disease Control and Prevention (CDC)

IMM-1152 (1/15)

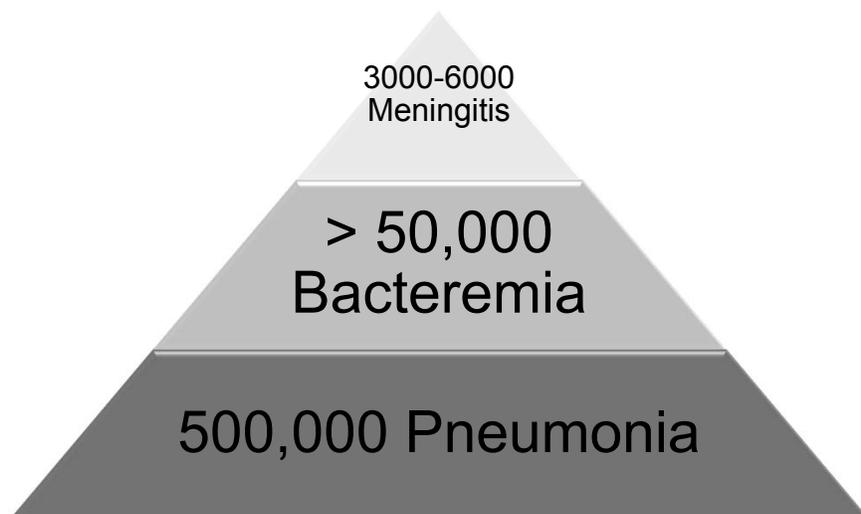
Summary of presentation



Mechanism of Pathogenesis



Cases of Invasive Pneumococcal Disease



Pneumococcal Recommendations General Information

- Timing of PCV13 dependent on age and health conditions
- No additional doses of PPSV23 indicated for adults who received PPSV23 at or after age 65 years
- When both PCV13 and PPSV23 are indicated, administer PCV13 first; PCV13 and PPSV23 should not be administered during same visit

Pneumococcal Recommendations General Information

- For adults with incomplete or unknown pneumococcal vaccination history, administer PCV13 and PPSV23 as indicated (but not during the same visit)
- Note PPSV23 should be administered 6-12 months after PCV13 for adults 65 years or older; but for adults aged 19-64 years with immunocompromising conditions, anatomical or functional asplenia, or cerebrospinal fluid leak or cochlear implant, PPSV23 should be administered at least 8 weeks after PCV13

Joke slide

Montana Street Gangs. They will mess you up!

Questions?



