

Guide to Empirical Choice of Antimicrobial Agent for Treating Adult Patients With Community-Acquired Pneumonia (CAP) or Health Care–Acquired Pneumonia (HCAP)

PATIENT CHARACTERISTICS	PREFERRED TREATMENT OPTIONS
Outpatient Previously Healthy	
No recent antibiotic therapy	Macrolide, ³ or doxycycline (100 mg 2 times/day)
Recent antibiotic therapy ^b	A respiratory fluoroquinolone ^c alone, an advanced macrolide ^d plus oral β -lactam ^e

All dosages are usual adult doses and may require adjustment in relation to renal or hepatic function, a patient's body mass index, or drug-drug interactions.

A Azithromycin, clarithromycin, or erythromycin.

B That is, the patient was given a course of antibiotic(s) for treatment of any infection within the past 3 months, excluding the current episode of infection. Such treatment is a risk factor for drug-resistant *Streptococcus pneumoniae* and possibly for infection with gram-negative bacilli. Depending on the class of antibiotics recently given, one or another of the suggested options may be selected. Recent use of a fluoroquinolone should dictate selection of a nonfluoroquinolone regimen, and vice versa.

C Moxifloxacin (400 mg once daily), gemifloxacin (320 mg once daily) or levofloxacin (750 mg once daily).

D Azithromycin (500 mg once daily), clarithromycin (250–500 mg 2 times/day), erythromycin (250–500 mg 4 times/day).

eHigh-dose amoxicillin (1 g, 3 times/day), high-dose amoxicillin-clavulanate (2 g, 2 times/day), cefpodoxime (200 mg, 2

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Comorbidities (COPD, Diabetes, Renal Failure or Congestive Heart Failure, or Malignancy)

No recent antibiotic therapy	An advanced macrolide plus oral β -lactam or a respiratory fluoroquinolone
Recent antibiotic therapy	A respiratory fluoroquinolone alone or an advanced macrolide plus a β -lactam
Suspected aspiration with infection	Amoxicillin-clavulanate or clindamycin (600 mg IV q8h or 300 mg PO q6h)
Influenza with bacterial superinfection	Vancomycin, linezolid, or other coverage for MRSA or CA-MRSA [†]

F Vancomycin dosing should target a vancomycin trough level of 15 to 20 $\mu\text{g/mL}$; linezolid, 600 mg 2 times/day.

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Inpatient *Medical Ward*

No recent antibiotic therapy

A respiratory fluoroquinolone alone or an advanced macrolide plus an intravenous β -lactam⁹

Recent antibiotic therapy

An advanced macrolide plus an intravenous β -lactam, or a respiratory fluoroquinolone alone (regimen selected will depend on nature of recent antibiotic therapy)

Intensive Care Unit (ICU)

G Cefotaxime (1–2 g IV q4–8h), ceftriaxone (1 g IV daily), ampicillin (1–2 g IV q4–6h), ampicillin-sulbactam (1.5–3 g IV q6h) or ertapenem (1 g IV daily).

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Intensive Care Unit (ICU)

<i>Pseudomonas</i> infection is not a concern	A β -lactam ^g plus either an advanced macrolide or a respiratory fluoroquinolone
<i>Pseudomonas</i> infection is not a concern, but patient has a β -lactam allergy	A respiratory fluoroquinolone, with or without clindamycin
<i>Pseudomonas</i> infection is a concern ^h (cystic fibrosis, impaired host defenses)	Either (1) an antipseudomonal β -lactam ⁱ plus ciprofloxacin (400 mg IV q8h or 750 mg PO q12h), or (2) an antipseudomonal agent plus an aminoglycoside ^j plus a respiratory fluoroquinolone or a macrolide
<i>Pseudomonas</i> infection is a concern but the patient has a β -lactam allergy	Aztreonam (2 g IV q8h) plus aminoglycoside plus a respiratory fluoroquinolone

hRisk factors for *Pseudomonas* infection include severe structural lung disease (e.g., bronchiectasis) and recent antibiotic therapy, health care–associated exposures or stay in hospital (especially in the ICU). For patients with CAP in the ICU, coverage for *S. pneumoniae* and *Legionella* species must always be considered.

iPiperacillin-tazobactam (3.375 g IV q6h), imipenem (500–1000 mg IV q6h), meropenem (1–2 g IV q8h), ceftazidime (2 g IV q6–8h), or cefepime (1–2 g IV q8h) are excellent β -lactams and are adequate for most *S. pneumoniae* and *Haemophilus influenzae* infections. They may be preferred when there is concern for relatively unusual CAP pathogens, such as *Pseudomonas aeruginosa*, *Klebsiella* species, and other gram-negative bacteria.

jData suggest that older adults receiving aminoglycosides have worse outcomes. Traditionally dosed aminoglycosides should achieve peak levels of at least 8 μ g/mL for gentamicin or tobramycin, and 25–35 μ g/mL for amikacin, and troughs less than 2 μ g/mL for gentamicin and tobramycin and less than 10 μ g/mL for amikacin. Once-daily dosing for gentamicin or tobramycin is 5–7 mg/kg IV with trough target <2 μ g/mL, and 15–20 mg/kg IV for amikacin with trough target <4 μ g/mL.

Health Care–Associated Pneumonia^k

Either (1) an antipseudomonal β -lactam plus ciprofloxacin or levofloxacin, or (2) an antipseudomonal agent plus an aminoglycoside plus a respiratory fluoroquinolone or a macrolide plus vancomycin or linezolid (for MRSA coverage)

K Pneumonia developing in patients who have been hospitalized for 2 or more days within 90 days of developing infection; patients attending hospital or hemodialysis clinics; patients receiving intravenous antibiotic therapy, wound care or chemotherapy at home within 30 days of developing infection; and residents of long-term care facilities or nursing homes.

CA-MRSA, Community-associated methicillin-resistant Staphylococcus aureus; CAP, community-acquired pneumonia; COPD, chronic obstructive pulmonary disease.

Modified from Mandell LA, Wunderink RG, Anzueto A, Bartlett JG, Campbell GD, Dean NC, et al. Infectious Diseases Society of America/American Thoracic Society consensus guidelines on the management of community-acquired pneumonia in adults. Clin Infect Dis. 2007;44(suppl 2):S27–S72.

Timing of Antibiotics

- there is clear evidence that delays in antibiotic therapy can affect
- the outcome of patients with both pneumonia and sepsis
- The IDSA/ATS guidelines currently recommend that antibiotic therapy for pneumonia should be started as soon as the diagnosis is considered
- Likely.

Duration of Treatment and Use of Clinical Practice Guidelines

TABLE 67.7 Evidence of Clinical Stability or Improvement

Temperature $\leq 37.8^{\circ}\text{C}$

Pulse ≤ 100 beats/min

Respiratory rate ≤ 24 breaths/min

Systolic blood pressure ≥ 90 mm Hg

Arterial oxygen saturation $\geq 90\%$ or $\text{Po}_2 \geq 60$ mm Hg on room air

Ability to maintain oral intake

Normal mental status

- With age, presence of underlying comorbidities including immune compromise, and more virulent pathogens, clinical stability may be delayed, and therefore duration of antibiotic therapy may be lengthened.
- Currently for adult patients with CAP the IDSA/ ATS guidelines recommend a minimum of at least 5 days of antibiotic therapy, with the patient being afebrile for between 48 and 72 hours, and lacking no more than one sign of clinical stability.
- Similarly, the BTS guidelines recommend 7 days of appropriate antibiotic therapy for patients with low- or moderate-severity CAP treated either as outpatients or inpatients.

Longer therapy should be considered for patients who have high severity disease, bacteremic *S. aureus pneumonia*, or *cavitary* disease. The use of inpatient critical

Once the patient has been discharged, outpatient follow-up should

be coordinated, because most patients with CAP will have some related residual symptoms, including fever, cough, shortness of breath, chest pain, sputum production, fatigue, or gastrointestinal symptoms.'

Comorbidities, particularly cardiopulmonary or neurologic disease, are the most frequent reason for subsequent early readmission among patients who achieve clinical stability.

پیشگیری

Indications for Adult Pneumococcal Vaccination

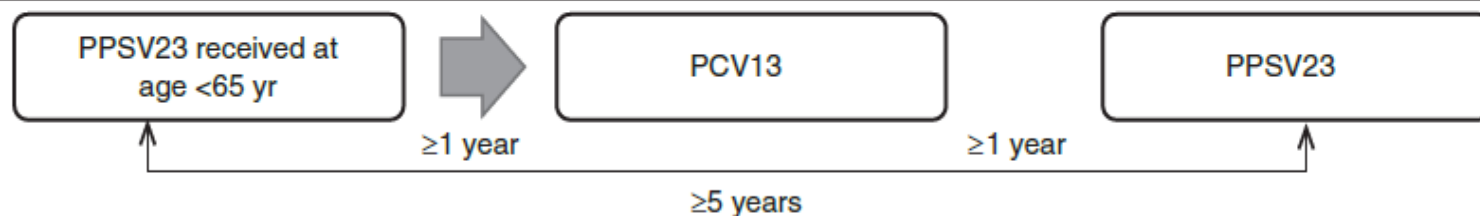
Indications:

PPSV-23 Alone	Both PCV-13 and PPSV-23
Patients 19-64 years with ≥ 1 chronic condition below:	All patients ≥ 65 years
Cigarette smoking	Patients 19-64 years with ≥ 1 Immunocompromising condition below:
Chronic heart disease (CHF, cardiomyopathy)	Cerebrospinal fluid leak
Chronic lung disease (asthma, COPD)	Cochlear implant
Diabetes mellitus	Congenital or acquired immunodeficiency
Alcoholism	HIV infection
Chronic liver disease (cirrhosis)	Functional or anatomic asplenia
Reside in nursing home or long-term care facility	Chronic renal failure or nephronic syndrome
	Malignancy
	Solid organ transplant
	Immunosuppression (glucocorticoids, radiation)

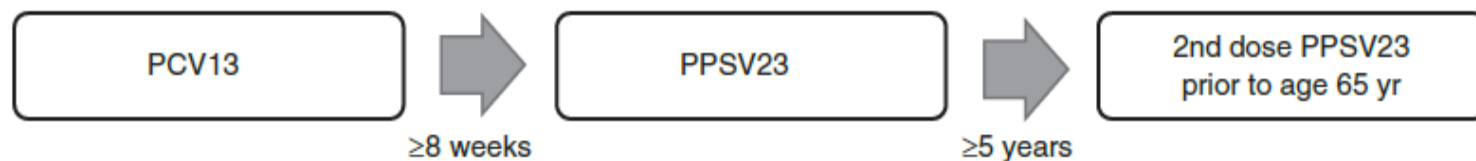
Persons who previously received PPSV23 at age ≥ 65 years



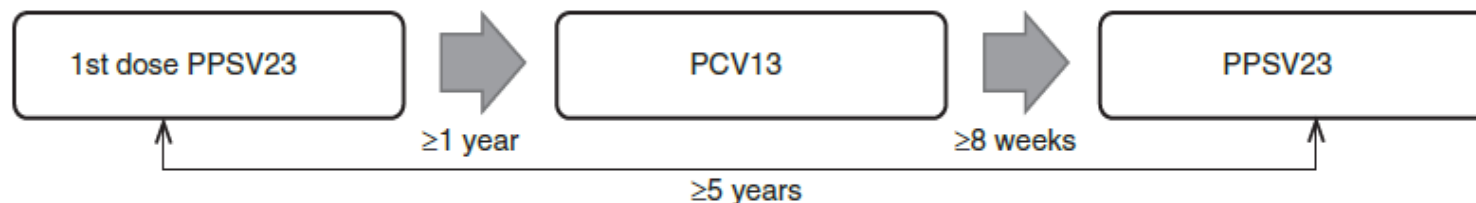
Persons who previously received PPSV-23 before age 65 years who are now age ≥ 65 years



Pneumococcal vaccine-naïve persons aged 19-64 years with ≥ 1 Immunocompromising condition



Persons aged 19-64 years with ≥ 1 Immunocompromising condition who previously received PPSV-23



Pneumococcal vaccine-naïve persons aged 19-64 years with ≥ 1 chronic conditions

