

Community-acquired pneumonia:

Follow the guidelines to better outcomes

COMMUNITY-ACQUIRED PNEUMONIA (CAP) targets the vulnerable: It's most prevalent in the young—those under age 1—and old—those over age 70. Of course, CAP can and does affect people of all ages, so no matter where you work—a physician's office, clinic, emergency department (ED), acute-care hospital, or long-term care facility—you should be prepared to care for a patient with CAP. And to make sure your care is evidence-based and up-to-date, you should follow the recommendations in the national guidelines approved by the Infectious Diseases Society of America and the American Thoracic Society. In this article, you'll find the key recommendations you need. (See *Defining levels of evidence and recommendations*.)

Defining CAP

Let's start with what CAP is and what it isn't. When pneumonia develops in a person who has little or no contact with healthcare facilities, the condition is called community-acquired pneumonia, or CAP. When pneumonia develops in a person receiving care in a facility, such as a long-term care facility, dialysis center, pain clinic, or out-patient chemotherapy center, the condition is called healthcare-associated pneumonia.

Recognizing the signs and symptoms

The signs and symptoms of CAP

Base your patient care on the latest evidence-based recommendations for managing community-acquired pneumonia.

By Susan B. Fowler, PhD, RN, CNRN, FAHA

vary by age and pathogen. An infant may show only nonspecific irritability or restlessness. An elderly person may be confused and obtunded. Infants, young children, and the elderly usually have a dry cough, but older children and adults typically have a productive one. In many infants with CAP, you may also note nasal flaring, accessory-muscle use, and cyanosis.

Assess your patient's vital signs

and note any current illnesses. Your nursing diagnoses will typically include *Ineffective breathing pattern*, *Ineffective airway clearance*, *Impaired gas exchange*, *Alteration in comfort*, *Deficient fluid volume*, and *Altered level of consciousness*.

When to use diagnostic tests

Using diagnostic tests—laboratory tests and X-rays—remains controversial. The most common CAP pathogen is *Streptococcus pneumoniae*, so in most cases, a blood culture won't lead to better antibiotic selection or a better outcome. The strongest indication for a blood culture is severe CAP because *S. pneumoniae* probably isn't the cause. A blood culture is also indicated for patients who have host defects or an inability to clear bacteria, such as those with cancer, liver disease, inactive spleens, or complement deficiencies. (See *When to use blood and sputum cultures*.)

A sputum specimen for Gram stain and culture is also recommended only for certain patients, such as those requiring admission to an intensive care unit (ICU). A positive Gram stain leads to a positive culture. As with blood culture results, sputum culture results are helpful when CAP is severe and likely results from an uncommon cause.

CE: 1.6 contact hours

CE
Rx

Rx: 0.75 contact hour

LEARNING OBJECTIVES

1. Recall the diagnostic tests used for community-acquired pneumonia (CAP).
2. Describe the medical management of patients with CAP.
3. Discuss the nursing care of patients with CAP.
4. State steps for preventing CAP.

Defining levels of evidence and recommendations

Level of evidence	Definition
Level I (high)	<ul style="list-style-type: none"> Evidence from well-conducted, randomized, controlled trials
Level II (moderate)	<ul style="list-style-type: none"> Evidence from well-designed, controlled trials without randomization Includes analysis (systematic reviews) of disease patterns and microbial causes in large case series
Level III (low)	<ul style="list-style-type: none"> Evidence from case studies and expert opinion May come from antibiotic susceptibility data with clinical observations
Recommendation	Implication
Strongly recommended	Most patients should receive intervention.
Moderately or weakly recommended	A majority of practitioners may follow the recommendation, but many may not.

Adapted from Mandell LA, Wunderink RG, Anzueto A, 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(52):S27-S72.

Patients should have a chest X-ray (moderate recommendation, **Level III** evidence).

A question of severity

Knowing the severity of a patient's illness aids in the decision about where to treat him (**Level I** evidence). The severity level also suggests a prognosis. If a patient's severity level is low, treatment as an outpatient may be appropriate and safe. But ultimately, making site-of-treatment decisions requires clinical judgment.

Two tools you can use to determine severity are the CURB-65 criteria and the Pneumonia Severity Index (PSI). CURB-65 is easier to remember, but hasn't been as extensively studied.

Each CURB-65 criterion is one point, for a maximum score of 5:

- **C**onfusion (new disorientation to person, time, or place)
- **U**rea greater than 7 mmol/L (blood urea nitrogen greater than 20 mg/dL)
- **R**espiratory rate of 30 or more breaths/minute
- **B**lood pressure less than 90 mm Hg or diastolic blood pressure 60 mm Hg or less
- **65** or older.

The PSI is a more extensive tool

that includes more than 20 variables. It classifies a patient in one of five risk classes. A risk class I patient can take oral antibiotics at home. A patient in risk class II or III may receive I.V. antibiotics at home or treatment and monitoring for 24 hours in the

hospital. A risk class IV or V patient receives treatment in the hospital.

Managing CAP

The Infectious Diseases Society of America/American Thoracic Society consensus guidelines on the man-

When to use blood and sputum cultures

Most patients with community-acquired pneumonia won't require blood or sputum cultures. This table shows the exceptions.

Indication	Blood culture	Sputum culture
Active alcohol abuse	✓	✓
Asplenia (anatomic or functional)	✓	
Chronic severe liver disease	✓	
Failure of outpatient antibiotic therapy		✓
Intensive care unit admission	✓	✓
Leukopenia	✓	
Pleural effusion	✓	✓
Positive <i>Legionella</i> urinary antigen test result		✓
Positive pneumococcal urinary antigen test result	✓	✓
Pulmonary cavitary infiltrates	✓	✓
Severe obstructive and structural lung disease		✓

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Antibiotic recommendations for CAP

The guidelines for managing CAP in adults recommend antibiotic therapies based on the treatment setting and other variables.

Outpatient treatment

Previously healthy patients who haven't used antimicrobials in the last 3 months and aren't at risk for drug-resistant *Streptococcus pneumoniae* infection should receive one of these regimens:

- a macrolide (azithromycin, clarithromycin, or erythromycin). Strong recommendation, **Level I** evidence.
- doxycycline. Weak recommendation, **Level III** evidence.

Patients who have conditions such as diabetes mellitus, alcoholism, malignancies, asplenia, immunosuppressive conditions, or chronic heart, lung, liver, or renal disease; those taking immunosuppressants; those who have taken antimicrobials in the last 3 months; and those at risk for drug-resistant *S. pneumoniae* infection should receive one of these regimens:

- a respiratory fluoroquinolone (moxifloxacin, gemifloxacin, or levofloxacin). Strong recommendation, **Level I** evidence.
- a beta-lactam (*preferred*—high-dose amoxicillin or amoxicillin/clavulanate; *alternatives*—ceftriaxone, cefpodoxime, and cefuroxime) and a macrolide (*alternative*—doxycycline). Strong recommendation, **Level II** evidence.

If the patient has taken an antimicrobial in the last 3 months, use an alternative from a different class.

For patients with or without comorbidities who are in regions with an infection rate greater than 25% and who have high-level macrolide-resistant *S. pneumoniae*, defined as a minimum inhibitory concentration greater than or equal to 16 mcg/mL, the prescriber can consider one of these regimens:

- a respiratory fluoroquinolone (moxifloxacin, gemifloxacin, or levofloxacin). Moderate recommendation, **Level III** evidence.
- a beta-lactam (*preferred*—high-dose amoxicillin or amoxicillin/clavulanate; *alternatives*—ceftriaxone, cefpodoxime, and cefuroxime) and a macrolide (*alternative*—doxycycline). Moderate recommendation, **Level III** evidence.

Inpatient treatment

Patients who aren't treated in the intensive care unit (ICU) and aren't allergic to penicillin should receive one of these regimens:

- a respiratory fluoroquinolone. Strong recommendation, **Level I** evidence.

- a beta-lactam (*preferred*—cefotaxime, ceftriaxone, or ampicillin; *for selected patients*—ertapenem) and a macrolide (*alternative*—doxycycline). Strong recommendation, **Level I** evidence.

Patients who aren't treated in the ICU and who are allergic to penicillin should receive:

- a respiratory fluoroquinolone.

Patients who are treated in the ICU and who aren't allergic to penicillin should receive one of these regimens:

- a beta-lactam (cefotaxime, ceftriaxone, or ampicillin/sulbactam) and azithromycin. **Level II** evidence.
- a beta-lactam (cefotaxime, ceftriaxone, or ampicillin/sulbactam) and a respiratory fluoroquinolone. Strong recommendation, **Level I** evidence.

Patients treated in the ICU who are allergic to penicillin should receive:

- a respiratory fluoroquinolone and aztreonam.

Special concerns

If a pseudomonal infection is a consideration, the patient should receive one of these regimens:

- an antipneumococcal, antipseudomonal beta-lactam (piperacillin/tazobactam, ceftazidime, imipenem, or meropenem) and ciprofloxacin or levofloxacin. Moderate recommendation, **Level III** evidence.
- an antipseudomonal beta-lactam (piperacillin/tazobactam, ceftazidime, imipenem, or meropenem), an aminoglycoside, and azithromycin. Moderate recommendation, **Level III** evidence.
- an antipseudomonal beta-lactam (piperacillin/tazobactam, ceftazidime, imipenem, or meropenem), an aminoglycoside, and an antipneumococcal fluoroquinolone. Moderate recommendation, **Level III** evidence.

A patient who is allergic to penicillin should receive aztreonam instead of a beta-lactam.

If community-acquired methicillin-resistant *Staphylococcus aureus* (MRSA) is a consideration, the prescriber should add one of these drugs to the regimen:

- vancomycin. Moderate recommendation, **Level III** evidence.
- linezolid. Moderate recommendation, **Level III** evidence.

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agement of CAP in adults provide a comprehensive approach to care. Using these evidence-based guidelines makes a difference in outcomes—shortening the time needed before switching from I.V. to oral antibiotics, the time needed to achieve clinical stability, and the length of stay.

Standing orders or admission packets for CAP should include the guidelines and be readily available in the ED. Because the guidelines are multi-

disciplinary, they should be clearly visible in the patient's medical record for all clinicians to use and address daily. The guidelines provide an ideal tool during "hands off" communication, such as shift-to-shift reporting. Use these guidelines during patient and family teaching and incorporate appropriate components into the discharge instructions for home use.

The goals of treatment for CAP include curing the infection, prevent-

ing death, alleviating the symptoms, returning the patient to normal activities, and preventing recurrence. Treatment focuses on antibiotics, vaccinations, and smoking cessation.

Starting antibiotic therapy

Antibiotics remain the mainstay of CAP treatment. (See *Antibiotic recommendations for CAP*.) The prescriber selects the specific antibiotics based on the patient and the



Determining clinical stability

The decision to switch a patient from I.V. to oral antibiotics depends on his clinical stability. Use these criteria:

- Temperature less than or equal to 100° F (37.8° C)
- Heart rate less than or equal to 100 beats/minute
- Respiratory rate less than or equal to 24 breaths/minute
- Systolic blood pressure greater than or equal to 90 mm Hg
- Arterial oxygen saturation greater than or equal to 90% or partial pressure of oxygen greater than or equal to 60 mm Hg on room air
- Ability to maintain oral intake
- Normal mental status

Adapted from Mandell LA, Wunderink RG, Anzueto A, 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(S2):S27-S72.

pathogen. For a patient who comes to the ED, the guidelines moderately recommend (**Level III** evidence) the first dose of antibiotic within 4 hours of arrival. The timing of this dose is critical and is reflected in national quality indicators.

The main cause of CAP requiring hospitalization is *S. pneumoniae*. Severe CAP often results from *Legionella pneumophila*. Previously healthy outpatients will be prescribed a macrolide (strong recommendation, **Level I** evidence) or doxycycline (weak recommendation, **Level III** evidence). Outpatients with comorbidities require a respiratory fluoroquinolone (strong recommendation, **Level I** evidence) or a beta-lactam plus a macrolide (strong recommendation, **Level I** evidence). Sometimes, the combination of CAP and comorbidities requires inpatient care. For example, patients with conditions that affect the respiratory system—such as asthma, chronic obstructive pulmonary disease, or heart failure—may struggle to maintain adequate oxygenation and require hospitalization to stabilize the disease states.

Inpatients who are not critically ill should receive the same antibiotics as outpatients with comorbidities. Treatment of severe cases requiring management in the ICU includes a beta-lactam and either azithromycin (**Level II** evidence) or a fluoroquinolone (**Level I** evidence). ICU patients are often evaluated for risk factors for pseudomonal infection and given more potent antibiotics, as appropriate.

Nurse's role

Nurses play a key role in patient recovery from CAP. Administering antibiotics as prescribed helps ensure positive patient responses. Once every shift and before administering antibiotics, check the I.V. site for patency and integrity. Monitor the patient's response to antibiotic therapy by checking temperature, oxygen saturation, respiratory rate, and adventitious breath sounds.

To improve a patient's respiratory status, nurses and respiratory therapists work together. Respiratory therapists give drugs used to break up congestion, facilitate secretion removal, and ensure adequate oxygenation. To reduce the spread of respiratory infections from patients with a cough in outpatient settings and EDs, use respiratory hygiene measures, such as hand hygiene and masks or tissues (strong recommendation, **Level III** evidence). For hospitalized patients, infection-control measures depend on the pathogen.

Assisting with and encouraging patient mobility improves respiratory function, including chest expansion and airway clearance, and aids other body systems. Discomfort may adversely affect a patient's respiratory status, so assess the patient for pain and intervene, as appropriate. Throughout treatment, teach the patient strategies for avoiding a recurrence as well as the importance of adhering to prescribed regimens and following up after discharge.

Switching to oral antibiotics

The switch from I.V. to oral antibiotics depends on the patient's clinical stability, which includes hemodynamic stability, clinical improvement, ability to ingest oral drugs, and normal GI function (moderately recommended, **Level II** evidence). (See *Determining clinical stability*.) With nonsevere

CAP, the switch typically takes place after 2 or 3 days. Clinical guidelines may outline other indicators, such as being afebrile or having a consistently improving fever over a 24-hour period and having a normalizing white blood cell count. Keep in mind that an early transition to the oral route has been linked to increased survival in retrospective investigations. Also, some studies suggest that, in immunocompetent patients, oral antibiotics are as effective as I.V. antibiotics.

Level II evidence supports a moderate recommendation for discontinuing antibiotic therapy after at least 5 days, if the patient has been afebrile for 48 to 72 hours and has no signs of CAP-associated instability. As many as 15% of CAP patients don't respond to the first antibiotic.

Preventing CAP

To prevent CAP, anyone age 50 and older who is at risk for influenza complications should receive an influenza vaccine (strong recommendation, **Level I** evidence), according to the Centers for Disease Control and Prevention. Persons age 65 and older and those with selected high-risk concurrent diseases should receive the pneumococcal vaccine (**Level II** evidence), according to the Infectious Diseases Society of America and the American Thoracic Society. A systematic review concludes that these vaccines decrease mortality. Usually, de-

veloping an adequate response to the vaccines takes about 2 weeks.

When a patient is admitted for CAP, assess his vaccination status. If the patient doesn't have the appropriate vaccination, document this fact, so he receives a vaccine at discharge. The computer system should trigger an automatic order for the discharge vaccine. Also, the medication administration system should have a safeguard, so vaccine orders aren't automatically eliminated after a period of time and are maintained throughout patient transfers in a facility. Computerized pop-ups can remind staff that the patient will receive a vaccine at discharge. On some nursing units, the system generates a daily list of patients who need a vaccine. A nurse, sometimes the charge nurse, monitors the list.

Smoking cessation should be a goal for all patients who smoke, not only those hospitalized with CAP (weak recommendation, **Level III** evidence). Achieving this goal involves withdrawal from nicotine addiction and a change in habits. To help a patient quit, use a combination of approaches: nicotine replacement therapy, bupropion (Zyban), a prospective program to change habits, and emotional support.

Push for evidence-based practice

Agencies such as the Centers for Medicare & Medicaid Services (CMS) and the Joint Commission re-

quire adherence to evidence-based practice. The CMS links following standard treatment guidelines for CAP to receiving reimbursement. This incentive and the Joint Commission's choice of CAP guidelines as a core measure of quality performance have provided motivation for hospitals to consistently meet these standards. Some states, such as New Jersey, publish results of hospitals' compliance with these measures and make them available to the public. To check a hospital's score for CAP measures, visit www.hospitalcompare.hhs.gov.

These national and state agencies are monitoring measures used to diagnose, manage, and prevent CAP, including oxygen therapy, blood cultures before antibiotic therapy (if appropriate), antibiotic selection, timing of antibiotic therapy, pneumococcal and influenza vaccination, and smoking cessation counseling. As a result, compliance rates for these measures have risen sharply. This trend is encouraging, but it's not the whole story. Data must be accurate and transparent to ensure that the public and healthcare leaders are not misled. To be meaningful, data must correlate with clinical outcomes. Teaching patients about smoking cessation isn't enough. We need to determine if they are quitting and how quitting affects their health.

Today, national standards and reporting processes are driving forces in the quest for quality care for pa-

tients with CAP. To participate in the quest and achieve better outcomes, use the latest, evidence-based guidelines for all your CAP patients, young and old. ★

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