Quick Recertification Series

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CAP IN ADULTS

GENERAL FEATURES

- Community-acquired pneumonia (CAP) is an acute infection of the pulmonary parenchyma occurring in a patient not hospitalized or residing in a long-term-care facility within 14 days before onset of symptoms.
- Host defense mechanisms are diminished by disease (viral upper respiratory tract infections) or habits (smoking or alcohol abuse).
- The causative organism is not identified in 50% of cases.
- Causative pathogens include
  - *Streptococcus pneumoniae:* Most common causative pathogen (30%-60% of all cases)
    - A particularly important cause of pneumonia in the elderly and patients requiring hospitalization
  - *Hemophilus influenzae:* Second most common bacterial cause (10% of cases)
    - Of particular importance in patients with chronic obstructive pulmonary disease (COPD)
  - *Mycoplasma pneumoniae:* Most frequent atypical pathogen, accounting for 1% to 10% of cases
    - More often seen in young adults
  - *Chlamydophila* (formerly *Chlamydia*) *pneumoniae:* Atypical pathogen recognized as a frequent cause of hospital-acquired pneumonia
  - *Legionella pneumophilia:* Opportunistic bacterium that infects patients with renal failure, COPD, and organ-transplant recipients.
    - Infection results in severe illness; patients decline rapidly and often require hospitalization.

CLINICAL ASSESSEMENT

- History and physical examination
  - Patients are usually in their mid-50s and 60s with one or more chronic diseases (COPD, diabetes mellitus, as well as cardiovascular or neurologic conditions).
  - Typical bacterial pneumonias are likely to induce a productive cough with large amounts of sputum.
  - Viral pneumonias and *M pneumoniae* and *C pneumoniae* infections induce a severe, hacking cough that rarely produces sputum
  - Patients infected with *Legionella* species may have either a mucopurulent or nonproductive cough.
  - Dyspnea is reported, and one-third of patients will have pleurisy.
  - 80% of patients will have fever, with half experiencing chills. High fever is characteristic of *Legionella* species.
  - Other findings are rales (crackles) and rhonchi, tachypnea, bronchial breath sounds, and tachycardia.
  - Consolidation signs are possible (increased fremitus, egophony, percussion dullness).
- More difficult to diagnose in the elderly because fever or cough is less frequent and dyspnea not evident.
  - Confusion or falls are presenting symptoms.
- Atypical pathogens often have associated extrapulmonary symptoms.
  - *Legionella* species: diarrhea and abdominal pain accompanied by CNS symptoms, particularly confusion
  - *M pneumoniae:* diarrhea associated with coryza, myringitis, and pharyngitis
  - *C pneumoniae:* pharyngitis and sinusitis
- Onset of symptoms in viral pneumonia is less abrupt and is associated with myalgias and flulike symptoms.
  - Respiratory viruses rarely cause frank pneumonia, except in children.
  - Influenza is the most common viral cause of pneumonia in adults.

DIAGNOSIS

- Chest radiography essential for patients with significant, productive cough or other symptoms suggestive of pneumonia
  - Any pneumonia may produce any image on radiography, including an initially normal radiograph.
- Routine diagnostic tests (sputum Gram's stain and culture) are not necessary for treatment in the outpatient setting.
- Sputum Gram's stain and culture should be obtained for hospitalized patients, particularly those in the ICU, before initiating antibiotic therapy.
  - Acceptable sputum sample: >25 neutrophils and <10 squamous epithelial cells per low-power field
  - Therapy should not be delayed beyond 6 hours by attempts to obtain an adequate sputum sample.
  - Obtain an endotracheal aspirate from intubated patients.
- Urinary antigen tests for *Legionella* species and *S pneumoniae* should be obtained for severely ill patients, particularly those in the ICU.
- In CAP caused by *Legionella* species, *M pneumoniae, C pneumoniae,* serologic studies are available but are mainly of epidemiologic use.

SITE OF CARE

- 90% of patients with CAP are treated as outpatients.
- Severity of illness drives all other treatment decisions.
- Severity-of-illness scores will both predict increased mortality risk for patients with high scores and avoid unnecessary hospitalization for patients with low scores.
- Scoring systems are generally used to determine need for hospitalization:
  - CURB-65: Evaluate the patient for confusion, uremia, respiratory rate (>30 breaths/min), BP (90/60 mm Hg or lower), and age older than 65 years. Criteria totals drive treatment setting.
    - 0-1: outpatient treatment
    - 2: hospitalize on general medical floor
    - 3-5: ICU admission

- Pneumonia Severity Index: Class system based on
  - Demographic factors (age, gender, nursing-home resident)
  - Comorbid conditions (heart failure, neoplastic disease, cerebrovascular disease, renal disease, liver disease)
  - Physical examination findings (altered mental state, tachycardia, tachypnea, hypotension, fever)
  - Diagnostic test findings (acidotic state, hyperglycemia, hyponatremia, anemia, elevated BUN, low Po_2, pleural effusion)
- Class I patients (lowest risk) are typically younger than 50 years, with no coexisting conditions or abnormalities listed above.
- Classes II to V are determined by tabulating points assigned to each risk factor (see "Scoring system for prediction model" and "Stratification of risk score for prediction model" at www.ahrq.gov/clinic/pneuclin.htm).
  - Class II (<1% of cases) can be safely treated as an outpatient
  - Class III (1%-4% of cases) requires brief inpatient observation
  - Class IV (4%-10% of cases) and class V (>10% of cases) need hospitalization.

TREATMENT

- Antibiotics should be started as soon as possible after diagnosis; delays of >8 hours increase mortality.
- Empiric regimens adequately treat infections caused by most of the CAP pathogens.
- Use prevalence of drug resistance in the community as a guide, particularly for *S pneumoniae* strains.
- Outpatient treatment
  - Patients with no medical conditions and no risk for drug resistance: a macrolide or, if allergic, doxycycline
  - Patients with comorbidities, antibiotic treatment in the past 3 months, or risk for drug resistance: respiratory fluoroquinolone or, if allergic, beta-lactam plus a macrolide
- Inpatient treatment (non-ICU)
  - Respiratory fluoroquinolone or beta-lactam plus a macrolide
- ICU treatment
  - Monotherapy is *not* acceptable.
  - Beta-lactam plus either azithromycin or a fluoroquinolone
- Subjective response should be seen in 1 to 3 days with defervescence and improvement in respiratory symptoms and oxygen saturation.
- If treated with IV antibiotics, switch to oral therapy as soon as fever subsides (usually after 3 days).
  - Oral administration of the same drug as IV therapy or one closely related is preferred
- Antibiotics should be continued for 5 days or more and for a minimum of 72 hours after the patient is afebrile.
- Treatment for 14 days is indicated for infections caused by *Legionella* species, *M pneumoniae, C pneumoniae.*

PREVENTION AND PATIENT EDUCATION

- Patients who smoke should be counseled on the risks of pneumonia and offered appropriate smoking cessation strategies.
- All persons 65 years or older should receive the pneumococcal vaccine.
- All persons 50 years or older should be vaccinated annually against influenza. JAAPA

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QUESTIONS & ANSWERS

1. A 70-year-old patient with chronic obstructive pulmonary disease, renal failure, and diabetes is admitted to the ICU after presenting with severe pneumonia, including high fever and confusion. In addition to the basic initial workup for patients in such settings, which of the following diagnostic tests would be most useful?

a. CBC to detect viral pneumonia
b. Urine antigen test to detect *Legionella pneumophila*
c. Serologic testing for *Mycoplasma pneumoniae*
d. Viral culture for influenza

Answer: b

Explanation: Urinary antigen tests for *Legionella* species and *Streptococcus pneumoniae* should be obtained for severely ill patients with community-acquired pneumonia (CAP), particularly those admitted to the ICU.

2. When considering the treatment for CAP in a variety of settings, which treatment regimen is correct?

a. Monotherapy with a respiratory fluoroquinolone in the outpatient setting for patients younger than 50 years with no comorbidities
b. Monotherapy with a third-generation cephalosporin for the hospitalized patient in the ICU
c. Monotherapy with a newer macrolide in the outpatient setting for patients older than 65 years with comorbidities
d. Dual therapy with a beta-lactam plus either a respiratory fluoroquinolone or azithromycin for the patient in the ICU

Answer: d

Explanation: When patients are affected by pneumonia severe enough for them to be admitted to the ICU, monotherapy is *not* acceptable. Fluoroquinolones are generally reserved for patients hospitalized on a general ward or treated as outpatients and for the elderly who have comorbidities.