

Community- Acquired Pneumonia

Presenter:

Khalil Mahmoodi, MD

Geriatric Medicine Residence

Professor:

Fatemeh Alsadat Mirzadeh
Geriatrician

Assistance professor of TUMS

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Case introduction

1. Patient Demographics

- **Age:** 66 years old
- **Gender:** Male
- **Underlying Condition:** Chronic Obstructive Pulmonary Disease (COPD)

2. Presenting Symptoms

- **Duration:** 2-day history
- **Symptoms:**
 - Fever
 - Dyspnea (shortness of breath)
 - Cough productive of green, purulent sputum
- **Notable History:**
 - Increasing dyspnea for 3 days before fever onset
 - One episode of acute exacerbation of COPD 6 months prior

Case introduction

3. Physical Examination Findings

- **General Condition:** Mild respiratory distress and confusion (disorientation to time)
- **Vital Signs:**
 - Temperature: 38.6°C (fever)
 - Heart Rate: 100 beats per minute (tachycardia)
 - Blood Pressure: 140/85 mmHg
 - Respiratory Rate: 24 breaths per minute (tachypnea)
 - Oxygen Saturation: 92% on ambient air
- **Lung Auscultation:** Coarse rhonchi over the right mid lung field

**How would you further evaluate
and treat this patient?**

4. Diagnostic Imaging

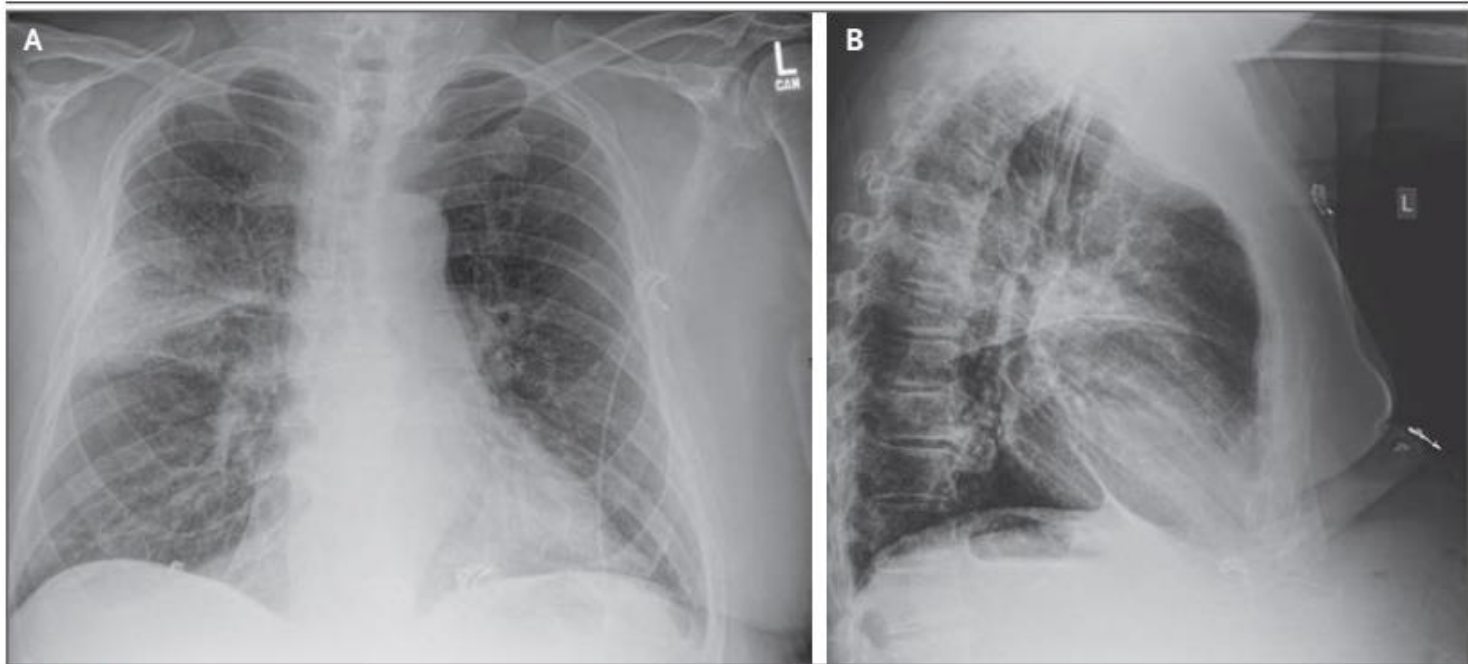


Figure 1. Chest Radiographs.

5. Laboratory Findings

- **White Cell Count:** 14,000 per cubic millimeter
- **Platelet Count:** 159,000 per cubic millimeter
- **Serum Sodium:** 136 mmol per liter
- **Blood Urea Nitrogen:** 19 mg per deciliter
- **Creatinine:** 1.1 mg per deciliter
- **Procalcitonin:** 5.4 ng per milliliter

6. Microbiological Findings

Multiplex Viral Panel

- Positive for respiratory syncytial virus (RSV)

Risk Factors of Community-acquired Pneumonia

1. Demographic Factors

- **Advanced Age**

2. Chronic Health Conditions

- **Chronic Lung Disease**
- **Chronic Heart Disease**
- **Cardiovascular Disease**
- **Diabetes Mellitus**

3. Nutritional Factors

- **Malnutrition**

Risk Factors of Community-acquired Pneumonia

4. Infectious Factors

- **Viral Respiratory Tract Infections**

5. Immunocompromising Conditions

- **Chemotherapy**
- **HIV/AIDS**
- **Organ Transplant**

6. Lifestyle Factors

- **Smoking**
- **Excessive Alcohol Consumption**

CAP

DIAGNOSIS AND EVALUATION

1. Imaging Studies

- **Chest Radiograph (X-ray)**
- **Computed Tomography (CT)**

2. Clinical Symptoms

- **Key Symptoms of CAP:**
 - **Fever:** Often present
 - **Cough:** Typically productive, may produce purulent or discolored sputum.
 - **Dyspnea:** Shortness of breath that may worsen with exertion.
 - **Chest Pain:** Often pleuritic in nature (worsens with deep breathing or coughing).

CAP

DIAGNOSIS AND EVALUATION

3. Physical Examination Findings

- Rales (Crackles)
- Rhonchi
- Egophony

4. Laboratory Abnormalities

- **Inflammatory Markers:**
- **Leukocytosis**
- **Elevated Procalcitonin**
- **Other Tests**
- Blood cultures, sputum cultures, and rapid viral testing

Procalcitonin?

- **Role of Procalcitonin:**
 - Procalcitonin testing can enhance clinical judgment in diagnosing and managing bacterial community-acquired pneumonia (CAP).
 - Its synthesis is stimulated by specific cytokines in response to bacterial infections.
- **Procalcitonin Levels:**
 - **Elevated Levels:** Typically found in bacterial CAP.
 - **Low Levels:** Generally observed in viral CAP.

Procalcitonin?

- **Clinical Utility:**
 - Procalcitonin levels decline rapidly with the resolution of bacterial infections, aiding in decisions to discontinue antimicrobial treatment.
- **Limitations:**
 - Procalcitonin is not a definitive diagnostic marker:
 - **False Positives:** Can occur in conditions like hemorrhagic shock or kidney injury.
 - **Normal Levels:** Some bacterial infections (e.g., mycoplasma) may present with normal procalcitonin levels.

Site of Care

- **CURB-65 Scale Overview:**
 - Ranges from **0 to 5**.
 - Each criterion scores **1 point** for the following:
 - **New-onset confusion**
 - **Blood urea nitrogen (BUN) > 19 mg/dL**
 - **Respiratory rate > 30 breaths/min**
 - **Systolic blood pressure < 90 mm Hg or diastolic blood pressure < 60 mm Hg**
 - **Age \geq 65 years**

Treatment Recommendations Based on CURB-65 Scores

- Score 0 or 1: Outpatient treatment is recommended.
- Score 2: Consider a short hospital stay or close observation.
- Score 3 to 5: Hospitalization is recommended.
- ICU Care Indications:
 - Based on additional criteria such as:
 - Need for mechanical ventilation
 - Presence of shock
- Considerations for Immunocompromised Patients:
 - Severity score thresholds for treatment are not defined.
 - Admission decisions should be guided by clinical judgment.

Treatment of CAP in Patients Under 65

- **Patient Criteria:**
 - **Age:** Younger than 65 years
 - **Health Status:** Otherwise healthy
 - **Antibiotic History:** Not recently treated with antibiotics

Recommended Oral Antibiotic Options (based on recent ATS–IDSA guidelines):

Amoxicillin:

- Dosage: 1 g three times daily

Doxycycline:

- Dosage: 100 mg twice daily

Macrolides:

- **Azithromycin:**
 - Day 1: 500 mg
 - Days 2-5: 250 mg daily
- **Clarithromycin:**
 - Dosage: 500 mg twice daily (or extended release: 1000 mg daily)

Treatment in Specific Patients

- **Indications for Broader Spectrum Antibiotics:**
 - Patients who:
 1. Have taken antibiotics within the past **3 months**.
 2. Have serious coexisting conditions, such as:
 - Chronic heart disease
 - Chronic lung disease
 - Chronic kidney disease
 - Chronic liver disease
 - Diabetes mellitus
 - Alcohol dependence
 3. Are **smokers**.

Treatment in Specific Patients

- **Recommended Antibiotic Options:**
 - **Amoxicillin-Clavulanate:**
 - Dosage: **875 mg orally twice daily** (or extended-release **2 g twice daily**)
 - **Macrolide (preferred) or Doxycycline:**
 - Macrolide options include azithromycin or clarithromycin.

Treatment in Specific Patients

- **Alternative for Beta-Lactam Hypersensitivity:**
 - For patients who cannot take beta-lactam antibiotics due to hypersensitivity or adverse effects:
 - **Respiratory Fluoroquinolone:**
 - Levofloxacin: 750 mg daily
 - Moxifloxacin: 400 mg daily

Glucocorticoids?

- **Evidence of Benefit:**
 - Recent studies indicate a **survival benefit** for certain patient groups:
 - **Patients with Severe CAP:** Those admitted to the ICU and requiring mechanical ventilation.
 - **High-Risk Patients:** Individuals at significant risk for respiratory failure.
- **Recommended Treatment Protocol:**
 - **Hydrocortisone:**
 - Initial Dose: **200 mg daily**
 - Followed by a **tapering schedule** as the patient's condition improves.
- *Glucocorticoid therapy should be **avoided** in patients with **influenza** or **aspergillus pneumonia**.*

Duration of Therapy

- **General Treatment Duration:**
 - **Minimum Duration:** Typically, treatment should continue for at least **5 days**.
 - **Stability Criteria:** Patients should remain **afebrile** and in a **clinically stable condition** for at least **48 hours** before considering discontinuation of therapy.
 - **Shorter Duration:** In certain cases, a treatment duration of **3 days** may be adequate for patients who are completely stable.

Duration of Therapy

- **Extended Treatment Indications:**
 - **Immunocompromised Patients**
 - **Specific Pathogens:** Infections caused by certain pathogens, such as **Pseudomonas aeruginosa**
 - **Complications:** Conditions like **empyema**
- **Role of Procalcitonin:**
 - **Adjunct Tool:** Serial procalcitonin levels can be used alongside clinical judgment to help guide the decision to discontinue antibiotic therapy.

Hospital Discharge

- **Criteria for Discharge:**
 - **Clinical Stability:** The patient must be in a clinically stable condition.
 - **Ability to Take Oral Medications:** The patient should be able to tolerate and take oral medications.
 - **Safe Environment:** There must be a safe environment for continued care at home.
- **Switch to Oral Therapy:**
 - Discharge is appropriate when a switch to oral therapy is not necessary, and early discharge is encouraged to:
 - Reduce unnecessary hospital costs.
 - Minimize risks associated with prolonged hospitalization.

Follow-up

- **Communication and Coordination:**
 - **Primary Care Clinician:** Effective communication with the patient's primary care provider for early outpatient follow-up is essential to reduce the likelihood of readmission.
- **Follow-Up Imaging:**
 - A follow-up chest radiograph is indicated in only a minority of patients, particularly those at risk for lung cancer, such as:
 - Older patients.
 - Patients with a significant smoking history.
 - Patients with persistent symptoms.

Prevention

- **Lifestyle Modifications:**
 - **Smoking:** Patients should be encouraged to quit smoking, as it significantly impacts respiratory health and increases the risk of pneumonia.
 - **Excessive Alcohol Consumption:** Addressing and reducing excessive alcohol intake is essential for overall health and recovery.

Prevention

- **Vaccination Recommendations:**
 - Vaccines should be administered according to the current **Advisory Committee on Immunization Practices (ACIP)** recommendations, including:
 - **Influenza Vaccine:** Annual vaccination to reduce the risk of influenza-related complications.
 - **COVID-19 Vaccine:** Vaccination to protect against COVID-19, particularly in at-risk populations.
 - **Streptococcus pneumonia Vaccine:** Vaccination to prevent pneumococcal infections, which can lead to pneumonia.

Young Adults vs. Older adults

1. Etiology (Causes)

Young Adults	Older adults
Streptococcus pneumoniae, Mycoplasma pneumoniae, Chlamydia pneumoniae viral pathogens (e.g., influenza, COVID-19).	Streptococcus pneumoniae, Haemophilus influenza, Gram-negative bacilli (e.g., Escherichia coli, Klebsiella pneumoniae)
Less frequently associated with atypical pathogens or resistant organisms.	Increased risk of infections from multi-drug resistant organisms due to <u>prior antibiotic use</u> or <u>healthcare exposure</u> .

Young Adults vs. Older adults

2. Clinical Presentation

Young Adults	Older adults
Symptoms often include cough, fever, chest pain, and shortness of breath.	Symptoms may be atypical or less pronounced; for example, they may present with confusion, delirium, or weakness rather than classic respiratory symptoms.
May present with more typical symptoms and often have a quicker onset.	Fever may be absent or lower than expected due to altered immune responses.

Young Adults vs. Older adults

3. Comorbidities

- **Young Adults:**
 - Generally have fewer comorbid conditions; however, those with underlying health issues (e.g., asthma, diabetes) may experience more severe illness.
- **Older Adults:**
 - More likely to have multiple comorbidities (e.g., chronic obstructive pulmonary disease (COPD), heart disease, diabetes), which can complicate the course of pneumonia and increase the risk of complications.

Young Adults vs. Older adults

- **4. Severity and Outcomes**
- **Young Adults:**
 - Typically have a **better prognosis** and lower rates of complications and mortality.
 - Hospitalization rates are lower compared to older adults.
- **Older Adults:**
 - **Higher risk** of severe illness, complications (e.g., respiratory failure, sepsis), and increased mortality rates.
 - More likely to require **hospitalization** and **intensive care**.

Young Adults vs. Older adults

5. Treatment Considerations

Young Adults:

Generally respond well to outpatient treatment with standard antibiotics.

Less likely to require hospitalization

Older Adults:

May require broader-spectrum antibiotics due to the risk of resistant organisms.

Hospitalization is often necessary for monitoring and managing complications.

6. Vaccination Status

Young Adults:

- Vaccination rates for pneumococcal and influenza vaccines may be lower, and education on the importance of these vaccines is crucial.

Older Adults:

- Vaccination against **influenza**, **COVID-19**, and **pneumococcus** is highly recommended and often emphasized due to their increased risk of severe disease.

ANY QUESTION?