Pneumonia in Older Adults

Description/Etiology

Pneumonia is inflammation of the lung parenchyma that is usually caused by an infectious agent. In older adults, pneumonia can occur as a primary diagnosis or as a complication of a chronic disease and is associated with a higher mortality rate compared with pneumonia in younger adults. Older adults are particularly susceptible to pneumonia because of waning immunity and age-related anatomic and physiologic changes that make the lungs more vulnerable to infection.

Pneumonia is often categorized as community-associated pneumonia (CAP), hospital-acquired pneumonia (HAP), healthcare-associated pneumonia (HCAP), and ventilator-associated pneumonia (VAP). As the population of individuals infected with pneumonia becomes more diverse, more categories are being created such as nursing home-associated pneumonia (NHAP). Many hospitals currently treat HCAP with the same protocols as CAP. However, evidence shows that CAP and HCAP differ greatly; occasionally, HCAP is even more similar to HAP and VAP than to CAP.

CAP is pneumonia that is acquired outside of hospitals or long-term care facilities. *Streptococcus pneumoniae* is the most common bacterial cause of CAP pneumonia in older adults; other common causes of CAP include *Haemophilus influenzae* and *Moraxella catarrhalis*. Less common causes of CAP in the elderly include *Mycoplasma pneumoniae*, *Legionella pneumophila*, and *Chlamydia pneumoniae*.

HAP is pneumonia that develops 48 or more hours after patient admission to an inpatient facility (e.g., hospital, long-term care facility, skilled nursing facility) or > 48 hours after patient intubation. HAP is usually caused by gram-negative bacteria. The stomach serves as a reservoir of gram negative bacteria (e.g., *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*) that can ascend and contaminate the respiratory tract. Organisms that normally colonize the oral and nasal pharynx can also cause HAP. The most common causes of HAP associated with mechanical ventilation (i.e., ventilator-associated pneumonia [VAP]) include *P. aeruginosa*, *Staphylococcus aureus*, *Stenotrophomonas maltophilia*, and *Acinetobacter*. Common viral pathogens that cause pneumonia in older adults include influenza, parainfluenza, respiratory syncytial virus (RSV), rhinoviruses, and adenoviruses. *Candida albicans* is a common opportunistic fungal pathogen that causes pneumonia in older adults. Older adults with dysphagia related to stroke, dementia, and/or poor oral hygiene are at risk for aspiration pneumonia, which occurs when inhaled food, liquid, gastric contents, or exogenous chemicals weaken lung defenses and cause inflammatory changes that allow bacterial overgrowth.

Treatment for pneumonia in older adults involves the use of antibiotics or antivirals and, depending on the severity of pneumonia progression (e.g., respiratory failure develops in some cases of severe pneumonia), tracheal intubation and mechanical ventilation. Common complications of pneumonia in older adults include respiratory failure, bronchiectasis, systemic inflammatory response syndrome (SIRS), gram-negative septic shock, and disseminated infections that cause meningitis, endocarditis, or septic arthritis. Prognosis is generally good for patients who have normal lung function and adequate host defenses; prognosis is poor for older adults of advanced age and those with multilobar disease, severe hypoxemia, bacteremia, or extrapulmonary complications.
Facts and Figures
Pneumonia is a frequent hospital diagnosis in patients who are ≥ 65 years of age in the United States; > 900,000 cases of CAP occur in this age group each year. The incidence of CAP requiring hospitalization is 24.8:10,000 overall, 63:10,000 in persons who are 65–79 years of age and 164.3:10,000 in persons who are ≥ 80 years of age (Jain et al., 2015). About 5% of adults who are over 85 years of age develop a new case of pneumonia each year. In Japan, 96% of pneumonia-related deaths were people over 65 years old. VAP rates range from 1–4 cases per 1,000 ventilator days in industrialized countries to 13 per 1,000 in developing countries.

Risk Factors
Risk factors for pneumonia in older adults include advanced age, alcoholism, malnutrition, dysfunctional spleen, pre-existing lung disease, cardiac disease, multiple medical comorbidities (e.g., cancer, septic shock, sickle cell anemia, diabetes mellitus, liver disease, kidney disease), immunosuppression, colonization of the oropharynx by gram-negative bacteria, bedridden status, male sex, burn injury, inhalation injury, ICU admission, sputum suctioning, skilled nursing facility residence, cigarette smoking, and altered mental status. Malnutrition and use of solid fuel heating (e.g., coal- or wood-burning stoves) in the home can exacerbate pneumonia in older adults. Risk factors for aspiration pneumonia include depressed consciousness, swallowing disorders (e.g., following stroke or in patients with Parkinson disease), and having a nasogastric or tracheal tube. Patients with poor ADL skills have a higher incidence of pneumonia because of their lack of ability to keep their oral cavities clean. Patients taking acid-suppressivemedications such as proton pump inhibitors (PPIs) are more likely to develop HAP than patients who do not take them (5% vs 2%). Patients with CAP who are pre-treated with antibiotics prior to admission into a hospital have a higher death-rate than those who were not treated prior to admission.

Signs and Symptoms/Clinical Presentation
The clinical manifestations of pneumonia in older adults can be subtle and nonspecific, including confusion, drowsiness, nausea, and headache. Signs and symptoms can also include fever, chills, sharp pleuritic chest pain, tachycardia, tachypnea, dry or productive cough, dyspnea, vomiting, fatigue, myalgia, hypoxia, excessive sweating, and abdominal pain. Some older adults with pneumonia fall or develop confusion but are otherwise asymptomatic.

Assessment
› Physical Findings of Particular Interest
  • Patients often have a weak or nonproductive cough, temperature < 95 °F (35 °C) or > 104 °F (40 °C), decreased blood pressure < 90 mm Hg systolic, rapid heart rate (e.g., > 125 beats/minute), rapid breathing (e.g., 30 breaths/minute), decreased breath sounds, hypoxemia, dullness to percussion, friction rub, altered mental status, and/or cyanosis
  • Decreased tactile fremitus (i.e., vibration of chest wall) and dullness on chest percussion are signs of pleural effusion or empyema
› Laboratory Tests That Can Be Ordered
  • CBC might indicate anemia, increased WBC with a left shift (i.e., increased immature leukocytes in peripheral blood, especially neutrophil band cells, which most often occurs in patients with active infection or severe illness that is characterized by hypoxia or shock), and increased erythrocyte sedimentation rate (ESR), which indicates inflammation and possible infection
  • Elevated C-reactive protein and procalcitonin levels suggest CAP of bacterial origin
  • Direct fluorescent antibody testing of sputum can assist with identifying atypical pathogens (e.g., Legionella)
  • Viral serologic tests showing increased IgM titers (i.e., greater than 4-fold from baseline) indicate acute disease
  • Rapid antigen tests of sputum or nasal secretions can be used to diagnose influenza
  • Cytologic evaluation can show intranuclear inclusions in cells infected with a DNA virus (e.g., adenoviruses); cytoplasmic inclusions are present in cells infected with an RNA virus (e.g., influenza type A virus)
  • Serum chemistry testing might show decreased sodium and phosphate and increased glucose levels
  • Liver function tests might be abnormal, indicating possible liver damage; BUN and creatinine levels can be abnormal, indicating kidney dysfunction; results of liver and kidney tests help determine the severity of infection
  • Cold agglutinin titers in blood can be increased, indicating infection with M. pneumoniae
  • Analysis of sputum, serum, and pleural fluid cultures and Gram stains and smears will identify the specific organism and determine sensitivity to antibiotics
• Polymerase chain reaction (PCR) assay or culture can be performed to detect mycoplasma, direct antigen immunofluorescent staining can be performed to detect *L. pneumophila*, and immunofluorescence can be performed to detect *C. pneumoniae* in infected individuals
• ABG analysis might indicate acidosis, decreased PaO2, and increased PaCO2

**Other Diagnostic Tests/Studies**
• Pulse oximetry might show decreased oxygen saturation
• Chest X-ray with lateral decubitus views might show pleural effusion, consolidation, bronchopneumonia, multilobar infiltrates, pneumothorax, empyema, and/or abscesses
  – Chest X-ray can assist with differentiation of viral pneumonia from nonviral pneumonia
  - Viral pneumonia shows few or no infiltrates. If present, they are almost always bilateral, perihilar, symmetric, and interstitial
  - Bacterial pneumonia will show focal segmental or lobar distributions with or without pleural effusions
• Ultrasound can confirm and locate pleural effusions
• Fiberoptic bronchoscopy, bronchoalveolar lavage, or transtracheal aspiration can be performed to obtain biopsy and secretion samples for analysis and culture
• Assessment tools (e.g., Pneumonia Severity Index [PSI], CURB-65 [derived from *c* onfusion, *u*rea, *r* espiratory rate, *b* lood pressure, and age greater than 65 years]) can be administered to estimate mortality risk in patients with CAP and evaluate severity of illness

**Treatment Goals**

**Promote Optimum Physiologic Status and Reduce Risk for Complications**
• Assess patient status, including for respiratory distress, and assist with resuscitation as appropriate
• Frequently monitor vital signs, intake and output, daily weight, electrolytes, sputum production, breath sounds, pulse oximetry, ABG values, and cardiac, respiratory, fluid, and nutritional status; frequently assess for pain and complications and treat, as ordered
• Maintain supplemental oxygen, if prescribed, and request referral for respiratory therapy, as appropriate
• Administer prescribed medications, which can include azithromycin or clarithromycin for bacterial pneumonia in patients with no comorbid conditions, a fluoroquinolone (e.g., levofLOXacin, ciprofloxacin) alone or with a beta-lactam (e.g., cefpodoxime, cefotaxime, cefuroxime, or amoxicillin), doxycycline or a macrolide (e.g., clarithromycin or azithromycin) for bacterial pneumonia in patients with comorbid conditions, erythromycin or clarithromycin for *M. pneumoniae*, and antivirals (e.g., amantadine, ganciclovir, acyclovir, rimantadine, or neuraminidase inhibitory agents [e.g., oseltamivir or zanamivir]) for patients with viral pneumonia
  – Monitor treatment efficacy and for adverse drug effects

**Provide Supportive Care, Promote Emotional Well-Being, and Educate**
• Reposition frequently to avoid skin breakdown, assess **fall risk**, and follow facility protocols to maintain patient safety (e.g., airway, circulation, and prevention of injury)
• Provide a quiet environment and frequent rest periods between scheduled tests/procedures. Assess patient/family member anxiety level, coping ability, and for knowledge deficits regarding pneumonia; provide emotional support and educate about pneumonia pathophysiology, potential complications, treatment risks and benefits, the importance of strict adherence to the prescribed treatment regimen, and individualized prognosis
• Assist with prescribed tracheal intubation and mechanical ventilation and provide oxygen for patients with progressive dyspnea and/or respiratory failure. Provide tracheobronchial suctioning, if appropriate
• Provide good oral hygiene, including brushing the teeth after each meal or cleaning dentures daily, to lessen the risk of developing aspiration pneumonia; for patients on mechanical ventilation provide oral hygiene every shift or per hospital policy
• Assist with consumption of food and water, as appropriate, including administering tube feedings if ordered
  – Elevate the patient’s head 30° for ≥ 30 minutes after tube feeding and check for residual formula every 4–6 hours
• For patients on mechanical ventilation, keep the head of bed at 30° unless contraindicated

**Food for Thought**
• The U.S. Centers for Disease Control and Prevention (CDC) recommends an annual influenza vaccine for adults who are over 65 years of age and pneumococcal vaccine at 65 years of age
• Unlike older adults, CAP in young adults is usually caused by *Mycoplasma pneumoniae*
Chest radiographs are negative in patients with asthma or in patients experiencing an exacerbation of chronic bronchitis who do not have CAP. 

*H. influenzae* and *M. catarrhalis* are commonly the cause of pneumonia in patients with COPD.

“Currant jelly” sputum—thick, bloody, mucoid sputum—is an indicator of *K. pneumonae* infection, particularly in patients who abuse alcohol.

Pneumonia may present with atypical symptoms such as altered mental state and frequent falling.

### Red Flags

- Multilobar involvement and a delay in antimicrobial therapy are associated with poor prognosis.
- Avoid indiscriminate use of antibiotics because it increases risk of resistant bacterial strains.
- Do not assume that all patients with respiratory symptoms and infiltrates have pneumonia; these patients might require treatment for noninfectious cardiac or pulmonary disorders, instead of antimicrobial therapy.

### What Do I Need to Tell the Patient/Patient’s Family?

- Educate regarding reducing risk factors for pneumonia, treatment risks and benefits, and the importance of adherence to the prescribed medication regimen and continued medical surveillance.
- Educate about the benefits of regularly performing good hygiene, receiving vaccination for influenza and the pneumococcal vaccine, and participating in a smoking cessation program, if applicable.
- Emphasize the importance of seeking immediate medical attention for new or worsening signs and symptoms, including shortness of breath, wheezing, chills, fever, or chest pain.

### References


