International Journal of Pharmacy and Pharmaceutical Research (IJPPR)
Volume 31, Issue 6, June 2025 ijppr.humanjournals.com ISSN: 2349-7203

# Pneumonia: An Overview on Its Current Perspectives and Treatment Options

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Received: 2025-04-24 Revised: 2025-05-05 Accepted: 2025-05-10

**ABSTRACT :**

Pneumonia represents a major health concern worldwide, leading to a high number of illnesses and fatalities, particularly among new-borns and youngsters, most notably in lower-income nations. Several elements contribute to the probability of developing pneumonia, including age, inadequate nutritional intake, reduced immuno, and socio-economic challenges. The disease can be triggered by various pathogens, like bacteria, viruses, and fungi. Grasping the underlying, risk elements, and treatment strategies is essential for reducing the incidence and fatalities due to pneumonia. Prompt and efficient interventions, including management of antibiotics and oxygen supplementation, are vital for improving patient outcomes. Moreover, adopting proactive measures such as improved dietary habits, developing personal hygiene, and ensuring immunization can greatly reduce the effects of pneumonia. Recognizing the causative elements, risk aspects, and therapeutic approaches is crucial in minimizing the health issues and fatality connected to this condition.

**Keywords:** Bacterial infections, Community-acquired pneumonia, Hospital-acquired pneumonia, Infection, Lung diseases, Pneumococcal disease, Respiratory tract infection, Ventilator associated pneumonia

## INTRODUCTION:

Pneumonia preserves to be a significant contributor to death and suffering globally across all age demographics, being the foremost cause of mortality among new-borns and children worldwide. It surpasses the combined death toll of malaria, tuberculosis, and HIV. A significant proportion of pneumonia-related fatalities in new-borns and youngsters occurs in low-income regions.

Pneumonia can be classified in several ways, each accompanied by different implications for the results, treatment, and expected outcomes. These classifications can be according either the infection's source or its seriousness. The phrase "Community-acquired pneumonia" (CAP) relates to pneumonia that occurs in patients who are not currently hospitalized and are not at risk for pathogens that are resistant to multiple drugs. The phrase "Hospital-acquired pneumonia" (HAP), also known as 'nosocomial pneumonia,' refers to which disease occurs in individuals who are admitted into the hospital. Additionally, ventilator-associated pneumonia frequently develops in patients receiving mechanical ventilation. For children in impoverished areas suffering from community-acquired pneumonia, the seriousness of the condition is a crucial factor in guiding treatment choices, such as decisions regarding antibiotic therapy, the need for hospitalization, and oxygen support. Pneumonia is defined as an pulmonary infection that can range from mild to severe, sometimes necessitating hospitalization. It develops when the infection leads to swelling of the air sacs in the lungs, known as alveoli, and the small airways connected to them, called bronchioles. This inflammation in pulmonary infection leads to fill with fluid or pus, making it difficult to intake sufficient oxygen[1].

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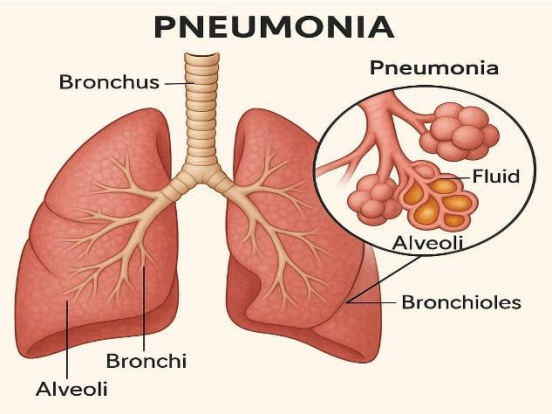



**CLASSIFICATION**:

Pneumonia can be categorized in several ways, primarily based on clinical aspects that highlight variations in the probable pathogens involved. Here is an overview of pneumonia classification.

**A. By Microbiology**:

**1.Bacterial Pneumonia:** This form of pneumonia is the most common and it is triggered by bacteria like Streptococcus pneumonia and Haemophilus influenza.

**2.Viral Pneumonia**: Commonly seen in toddlers with the age less than five, this type is frequently the leading cause in that stage children. Additionally, viral pneumonia increases the likelihood of developing bacterial pneumonia[2].

**3.Fungal Pneumonia:** Disease from fungi by present in soil or bird droppings can lead to pneumonia, particularly affecting individuals with immunocompromised responses, such as those suffering from chronic illnesses.

**4.Walking Pneumonia:** The Walking Pneumonia, known as mycoplasma pneumonia, which is frequently observed in teenagers and older children.

**B. By Location:**

**1.Community-acquired pneumonia**: This pneumonia manifests outside of hospital environments and can impact people of various ages, potentially leading to a serious infection.

**2.Hospital-acquired pneumonia:** Hospital-acquired pneumonia, commonly referred to as HAP, is characterized by the onset of pneumonia can takes place with minimum 48 hours following a patient's admission to a hospital. This condition poses a considerable difficulty in medical environments, particularly for the patients who are in a critically ill state.

**3.Ventilator-acquired pneumonia**: This infection occurs in patients who have been mechanically ventilated for greater than 48 hours in critical Care Units, including those who may have returned from a hospital stay within the past week. [3].

**EPIDEMOLOGY:**

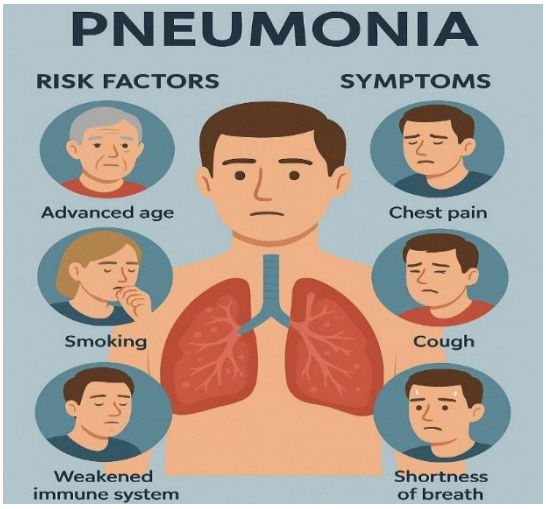
Pneumonia ranks among the most common infections affecting the lungs, with around 450 million cases reported worldwide annually. In 2010, pneumonia was responsible for nearly 1.4 million fatalities across all age groups, which represented about 7% of total deaths worldwide that year. As a result of this condition, there were 3.0 million fatalities, establishing it as the fourth most common cause of death worldwide. Pneumonia significantly contributes to infections that can result in the death of children. In 2017, more than 808,000 children under the age of five tragically lost their lives due to this disease[4].

**Ethiology:**

Pneumonia usually initiate as an infection in the upper ventilatory system which can then descend to affect the deeper regions of the lungs leads to cause pneumonitis which is an swelling of lung tissue the natural microbial community present in the upper ventilatory

tract is crucial for protecting the body from harmful pathogens while the lower ventilatory passage has its own set of protective mechanisms pneumonia may develop when infectious fluids infiltrate the lower ventilatory tract various elements contribute to the onset of pneumonia such as the strength of the pathogen the number of germs required to trigger an infection and the immune systems ability to respond effectively[5].

**CLINICAL MANIFESTATIONS:**-Fever and cough are frequent in infants with pulmonary infections like pneumonia. Signs indicating lower pulmonary tract infection include faster breathing and chest indrawing, mainly lower costal indrawing. Auscultation may show crackles or reduced air entry, but these are occasionally present. Infants with viral pneumonia, like from RSV, usually have general wheeze.




**Diagnosis**:

The medical professionals can diagnose pneumonia based on the medical records, a clinical examinations, and test outcomes. Pneumonia is difficult to diagnose due to their signs and symptoms can be similar to a common rhinitis or flu. So it takes prolong time to recognize that your situation is more Severe till it lasts longer than those different conditions.

**Diagnostic Tests**:

- Chest X-ray: This is the primary diagnostic tool for pneumonia, helping doctors to determine inflammation in the lungs.

- Blood tests: These examination can verify an infection and determine the kind of organism causing it.

- Pulse Oximetry: It helps determine the oxygen levels in blood, to detect pneumonia.

- Sputum test: Analysing a sample of mucus out of your lungs can help decide the purpose of the infection.

- Pulse Oximetry: This measures oxygen ranges in your blood, which can be suffering from pneumonia.

- Additional assessments: Based on the seriousness of signs and symptoms, extra Examinations like CT scans, pleural fluid culture, or arterial blood gas tests may be ordered[6].

**Prevention**:

Vaccines increasingly help prevent pneumonia. Hib causes pneumonia in low-income countries. Within the Gambia, the Hib conjugate vaccine confirmed 100% efficacy for Hib Pneumonia and 95% for invasive Hib disease, plus a 21% Decreases in showed pneumonia. Since 2000, immunization programs are one of the major part in many countries, mainly fewer cases of invasive Hib sickness.

Vaccinations are pivotal, including the pneumococcal vaccine, which protects against Streptococcus pneumoniae, and the influenza vaccine, which helps prevent pneumonia from the flu virus and Lifestyle modifications like regular hand washing, Ignorance of smoking, and keeping a healthy way of life are critical.

**Management:**

In children, the approach to managing community-acquired pneumonia (CAP) is based on empirical methods, where the choice of antibiotics is guided by well-researched insights into prevalent bacterial pathogens, the intensity of the pneumonia, along with any present risk factors, such as significant malnutrition. A majority of pediatric patients with community-acquired pneumonia (CAP) are able to receive treatment through oral medication.

The WHO recommends the following antibiotic therapy for pneumonia in children[7].

For pneumonia classified as 'non-severe': administer oral amoxicillin.

• In regions where HIV infection rates are elevated, provide oral amoxicillin at a minimum of 40 mg per kg for each dose, twice daily for a duration of 5 days.

• In locations with low HIV rates, the dosage is still a minimum of 40 mg per kg for each dose, twice a day, but for a shorter period of 3 days.

Provide the first dose at the clinic and guide the mother on administering the following doses at home.

In cases of 'severe' pneumonia, the recommended treatment consists of intravenous ampicillin (or benzylpenicillin) along with gentamicin.

Ampicillin should be administered at a rate of 50 mg per kg or benzylpenicillin at 50,000 units per kg, delivered either intramuscularly or intravenously, every six hours for a duration of at least five days.

**Recent Developments in Antibiotic for Pneumonia management:** In recent years, several new antibiotics effective against Gram-negative bacteria have received approval. Unlike their predecessors, these newer options exhibit fewer serious side effects. Additionally, there are new antimicrobials available for the pneumonia management, which can be detailed below.

•The drug combination of Ceftolozane and tazobactam is categorized as a cephalosporin and a beta-lactamase inhibitor. This formulation demonstrates efficacy against gram-negative bacteria, particularly focusing on Pseudomonas aeruginosa strains which show resistance to piperacillin and carbapenems[8].

•Ceftazidime paired with avibactam serves as an antibiotic that integrates a cephalosporin with a beta-lactamase inhibitor and it can demonstrated efficacy against Gram-negative bacteria, notably resistant strains of P. Aeruginosa and those producing ESBLs.

•Ceftobiprole is classified as a fifth-generation cephalosporin antibiotic that demonstrates efficacy against enterobacterales and P. Aeruginosa[9].

•The combination of sulbactam and durlobactam, which functions as a beta-lactamase inhibitor, has proven to be effective against acinetobacter baumannii, including strains resistant to carbapenems[10].

•The pairing of Meropenem and Vaborbactam serves as an antibiotic combination featuring a carbapenem alongside a beta-lactamase inhibitor effective for managing Gram-negative multidrug-resistant organisms, particularly those enterobacterales that are resistant to carbapenems.

•Imipenem in association with relebactam forms a combination antibiotic that includes a carbapenem alongside a beta-lactamase inhibitor by these formulation is effective against Gram-negative multidrug-resistant organisms, particularly carbapenem-resistant enterobacterales.

•Cefiderocol is an antibiotic from the cephalosporin class and it effective against enterobacterales that produce extended-spectrum beta-lactamases as well as non-multidrug-resistant P. Aeruginosa.

•Eravacycline, effectiveness against gram-negative bacteria, such as carbapenem-resistant enterobacteriaceae and acinetobacter baumannii[11].

**Conclusion:**

Pneumonia is a major factor contributing to illness and death among both children and adults globally. Risk factors that influence its occurrence an outcomes include age, nutrition, immunosuppression, environmental exposures and socioeconomic determinants. S.pneumoniae is the primary cause of community-acquired pneumonia, while Gram-negative bacteria, which can be resistant to multiple antibiotics, frequently cause hospital-acquired pneumonia and pneumonia in immuno suppressed patients. The diagnosis usually relies on clinical evaluations, while therapeutic approaches are primarily informed by an understanding of potential causative pathogens, along with the seriousness of the clinical presentation and the determination of established risk factors. Prompt administration of antibiotics and oxygen therapy is essential, particularly in cases of hypoxemia, as these interventions are vital for increasing patient outcomes. Preventive measures range from improved by better nutrition, hygiene, and vaccines for general causes like pneumococcal and influenza. When conducted effectively on a global scale, both preventive actions and healthcare services can significantly lower death rates and health issues.

**Acknowledgement:**

The authors are thankful to Lydia College of pharmacy , Ethakota, Ravulapalem for all the facilities provided to complete our work.

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How to cite this article:
Rama Prasanth Reddy Satti et al. Ijppr.Human, 2025; Vol. 31 (6): 208-212.

Conflict of Interest Statement: All authors have nothing else to disclose.