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Community-acquired pneumonia: Diagnostic challenges and treatment updates.

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Introduction

Community-acquired pneumonia (CAP) is defined as an acute infection of the lung parenchyma acquired outside of hospital or healthcare settings. It affects millions of people globally each year and is a major cause of hospitalization and death, particularly among the elderly and those with comorbidities. The clinical presentation of CAP can range from mild respiratory symptoms to severe illness requiring intensive care. Accurate and timely diagnosis is essential for effective management but remains complicated due to nonspecific symptoms and varied microbial causes [1].

The most common causative agents of CAP include Streptococcus pneumoniae, Haemophilus influenzae, Mycoplasma pneumoniae, Chlamydophila pneumoniae, and viruses such as influenza and respiratory syncytial virus (RSV). In recent years, Legionella pneumophila and emerging viral pathogens like SARS-CoV-2 have also gained importance. The identification of causative organisms is often limited by the lack of sensitive diagnostic tests and delayed laboratory results, leading to empiric treatment in most cases [2].

Diagnosing CAP is challenging due to overlapping symptoms with other respiratory conditions such as bronchitis, heart failure, and chronic obstructive pulmonary disease (COPD). Common symptoms like cough, fever, dyspnea, and chest pain can be nonspecific. Radiographic imaging, usually a chest X-ray, is standard for diagnosis but may not always clearly distinguish CAP from other pathologies. Additionally, sputum cultures are often unreliable due to contamination, and blood cultures yield low positivity rates in non-severe cases [3].

Newer diagnostic modalities such as nucleic acid amplification tests (NAATs), urinary antigen tests, and multiplex PCR panels have improved pathogen detection rates. Point-of-care lung ultrasound is gaining popularity as a bedside tool, especially in emergency and critical care settings. Procalcitonin levels are increasingly used to differentiate bacterial from viral infections, aiding in antibiotic stewardship. Despite these advances, access and cost limit widespread adoption, especially in low-resource settings [4].

Antibiotic resistance among common CAP pathogens is an escalating concern. Macrolide-resistant *S.* pneumoniae and beta-lactam-resistant H. influenzae are increasingly reported. Overuse and inappropriate prescribing of antibiotics have accelerated resistance, necessitating judicious use. Antimicrobial stewardship programs now emphasize de-escalation strategies, use of local antibiograms to guide therapy, and limiting duration of treatment based on clinical response and biomarkers [5].

Conclusion

Community-acquired pneumonia continues to challenge clinicians with its variable presentation, diagnostic complexities, and evolving microbial landscape. While advancements in diagnostics and therapeutics have improved outcomes, early recognition, appropriate antibiotic use, and preventive strategies remain key to effective management. Ongoing research into novel biomarkers, rapid diagnostics, and pathogen-specific treatments will further enhance care and reduce the burden of CAP in the coming years.

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