(REVIEW ARTICLE)

Characteristics of Pneumonia in Intensive Care Unit Patients: A Literature Review

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Abstract

Background: Pneumonia in the Intensive Care Unit (ICU) is a major cause of morbidity and mortality, including community-acquired pneumonia (CAP) requiring ICU admission, hospital-acquired pneumonia, and ventilator-associated pneumonia. This literature review focuses on patient characteristics and common causative pathogens.

Methods: This study is a literature review through worldwide sources within the year 2020-2025 focusing only on research articles in English. 10 articles were collected but only 4 were analysed as it adheres to the inclusion criteria

Results: Advanced age (>60) and male gender is a common characteristic of pneumonia ICU patients. The common patient profile is characterized by hypertension and diabetes mellitus. Common pathogens are *Klebsiella pneumoniae* and *Acinetobacter baumannii* that are typically found to have high levels of antibiotic resistance. Leukocyte and neutrophils are in normal rage with high procalcitonin current

Conclusion: The current summary on ICU pneumonia patients characteristics are advanced age with underlying comorbidity. Management strategies must consider the pathogens profiles guided by local antimicrobial resistance data. A key takeaway from recent research is the critical need for region-specific data to inform empiric antibiotic therapy and improve outcomes.

Keywords: Pneumonia; Critically Ill; Intensive Care Unit; Literature Review

1. Introduction

Pneumonia is an infection of the lungs in which fluid or pus fills the alveoli due to inflammation caused by pathogens such as bacteria, virus, fungi, and parasites. It still remains as a major cause of mortality and morbidity among intensive care unit patients placing a substantial burden on intensive care unit resources [1,2]. The term "ICU-acquired pneumonia" consists of several clinical entities, most notable hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP), which develops in patients after more than 48 hours of ICU admission or after mechanical ventilation respectively [3]. Whereas patients presenting with symptoms less than 48 hours after hospital admission [4] however needing intubation and mechanical ventilation is called severe community-acquired pneumonia (CAP) [5]. VAP, in particular, is the most common and fatal nosocomial infection within the ICU, making accurate diagnosis and appropriate management essential [1,6,7] as it is associated with multidrug-resistant organisms [8]. Thus it is crucial for the need of proper antimicrobial use through understanding pneumonia pathogen characteristics.

Recent global events, such as the COVID-19 pandemic, have further highlighted the unique characteristics of viral pneumonia, which can present distinctly with its bacterial counterparts, often causing severe acute respiratory distress

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syndrome (ARDS) and unique immunological responses [9, 10]. Therefore it is important to understand the characteristics of pneumonia in ICU patients to help with diagnosing, patient management, and therapy.

2. Material and methods

This study uses literature review methodology to further understand the characteristics of pneumonia in Intensive Care Unit (ICU) Patients. Compiling articles from Google Scholar, PUBMED, and ScienceDirect using the keyword "pneumonia", "critically ill patients, and "intensive care unit" between the year 2020 to 2025 to maintain relevancy. Inclusion criteria of this study are articles written in English, full-text availability, and open access. Exclusion criteria included articles not written in English and close-access. Each article will be analyzed descriptively with a focus on authors and year of publication, research location, design and methods, and brief summary of research findings.

3. Results and discussion

A total of 10 articles were found though only 4 articles have been collected, reviewed and analyzed as follows.

Table 1 Review of 4 articles results

No	Author	Research Title	Method	Result
1	Iscanli et al. (2023)	Clinical characteristics and risk factors associated with secondary bacterial pneumonia among COVID-19 patients in ICU	Single-center retrospective cohort study	Mortality rate of 53.1% Mean age of 70 Male dominates in numbers than females Hypertension as the most common comorbidity followed by diabetes mellitus *Acinetobacter baumannii* (44.8%) and *Klebsiella pneumoniae* (39.6%) as leading pathogens followed by other gram-negative bacteria and gram-positive bacteria. Normal mean leukocyte count but neutrophilia in neutrophil count High mean C-reactive protein of 36.2 and high mean procalcitonin of 0.3 Significant correlation between mortality of patients with secondary bacterial pneumonia
2	Serrano-Martínez et al. (2020)	Characteristics and results of a series of 59 patients with severe pneumonia due to COVID-29 admitted in the ICU	Retrospective, cross-sectional study	Overall mortality was 33.9% Mean age of 63 Male dominates in numbers than females Arterial hypertension as the most common comorbidity followed by diabetes mellitus No data on pathogen distribution
3	Wang et al. (2020)	Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-infected Pneumonia in Wuhan, China	Retrospective, single-center case series of the 138 consecutive hospitalized patients	4.3% mortality (ICU and non ICU) Mean age of 66 Male dominates in numbers than females Hypertension as the most common comorbidity followed by cardiovascular disease Normal mean leukocyte and neutrophil count High procalcitonin count
4	Sotianingsih (2020)	Bacterial Profile and Antibiogram of Hospital-Acquired Pneumonia and Ventilator-	Descriptive study with sample of ICU	Gram-negative bacteria has higher prevalence than gram-positive bacteria dominated by *Klebsiella pneumoniae* and followed by *Acinetobacter baumannii*

		Associated Pneumonia Patients in ICU of Raden Mattaher Hospital Jambi	pneumonia patients	

Based on reviewing those 4 articles above, most have a mean age of above 60, males dominating females in incidence number, and hypertension as the most common comorbidity. 2 of those articles also show that gram-negative bacteria commonly *Acinetobacter baumannii* and *Klebsiella pneumoniae*, dominates the gram-positive bacterias in causing pneumonia. Leukocytes show no difference while neutrophil shows abnormal count in another article. Although 2 of the articles have a low percentage of mortality rate, it is still important to stay in caution.

It is important to note that *Klebsiella pneumoniae* is known as one of the microorganisms that causes nosocomial infections especially pneumonia with a high level of antibiotic resistance, especially to the β-lactam group [14]. The cultures of said study were all resistant to Cefotaxime, Ceftazidime and were categorized as ESBL in which might affect the high mortality [14]. It is important to consider the next antibiotic treatment.

Acinetobacter baumannii live ubiquitously in nature and can be found in soils and water as well as hospital food, ventilator equipment, pillows, mattresses, tap water, and another area in the hospital [14]. Commonly found infection in the airways though generally only affects patients with low immune status [14] in which is the state of critically ill patients in the intensive care unit.

4. Conclusion

This study reviews 4 journal articles regarding the characteristics of Pneumonia in Intensive Care Unit patients. Age above 60, male, hypertension is a common patient characteristic that suffers from pneumonia in the intensive care unit with gram-negative bacteria as the most common pathogen.

Compliance with ethical standards

Disclosure of conflict of interest

There is no conflict of interest.

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