

Research Article

Impact of Comorbidities on Clinical Outcomes among Patients with Chronic Respiratory Diseases Admitted to Intensive Care Units

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ABSTRACT

Objective: To assess the impact of comorbidities on clinical outcomes among individuals with chronic respiratory diseases admitted to intensive care units (ICUs).

Methodology: It was an analytical cross-sectional study carried out in the ICU of Doctors hospital and Farooq Hospital, Lahore. A sample of 180 patients diagnosed with chronic respiratory diseases was recruited using consecutive sampling techniques. The data on comorbidities including conditions like diabetes mellitus, hypertension, cardiovascular disorders, chronic kidney disease, and obesity were gathered. Clinical outcome (ICU mortality, mechanical ventilation requirement, and length of stay in the ICU) was noted. Statistical analysis was performed using SPSS version 27, and a p-value <0.05 was considered statistically significant.

Results: 68 (37.8%) patients out of 180 patients died in the ICU. One hundred and thirty-two (132) patients had comorbidities. Death rates were also considerably greater among the patients with a variety of comorbidities ($P < 0.001$). The highest mortality rates were observed among patients with cardiovascular disease and chronic kidney disease. Mechanical ventilation was required in 110 (61.1%) patients and was significantly associated with the burden of comorbidity ($P = 0.002$).

Conclusion: Comorbidities play a significant role in clinical outcomes among patients admitted to ICU with underlying chronic respiratory diseases, with a higher mortality rate, a longer ICU stay, and an increased requirement of mechanical ventilation.

Keywords: Chronic Respiratory Disease, Comorbidities, ICU, Mortality, Mechanical Ventilation.

INTRODUCTION

Chronic respiratory conditions including chronic obstructive pulmonary disease (COPD), asthma, and interstitial lung disease represent major global health burdens and are major contributors to adverse clinical outcomes and increased risk of death worldwide [1]. The rising incidence of these disorders, especially in older patients, has led to a consequent rise in the number of ICU admissions because of acute exacerbations and respiratory failure [14,16]. The prevalence of comorbidities is high among patients with chronic respiratory diseases and consequently has a significant impact on the progression and outcome of the disease.

Comorbid conditions such as diabetes mellitus, hypertension, cardiovascular disease, and

chronic kidney disease are common and may aggravate the clinical condition of patients by reducing physiological reserve and making them more vulnerable to complications [46]. These comorbidities frequently interact with each other with a compounded adverse effect on patient health [17,18]. A number of studies have established that comorbidities have a relationship with higher mortality, the increased length of stay in the intensive care unit, and the increased requirement of the patient on the mechanical ventilation among the critically ill patients [7–9].

The risk of adverse outcomes is particularly higher in patients with multiple comorbidities, as physiological resilience is lower, and the disease burden is increased [10,12]. Thus, assessing how comorbidities affect ICU

outcomes is crucial in enhancing patient care. The present study was designed to assess the influence of comorbid conditions on clinical outcomes among individuals with chronic respiratory diseases admitted to the ICU.

METHODOLOGY

This analytical cross-sectional study was conducted in the intensive care units of Doctors Hospital and Farooq Hospital, Lahore within a period of six months, from March 2025 to August 2025. A total of 180 patients were enrolled in the study diagnosed with chronic respiratory diseases using consecutive non-probability sampling. The criteria of inclusion consisted of patients that were diagnosed with chronic respiratory disease who were admitted to the ICU due to acute exacerbation or respiratory failure. Exclusion criteria were patients with terminal illness, malignancy or incomplete medical records.

A structured proforma was used to collect the data obtained, including demographic data, respiratory disease type, and comorbid conditions, such as diabetes mellitus, hypertension, cardiovascular disease, chronic kidney disease, and obesity. Clinical outcomes such as ICU mortality, mechanical ventilation

requirement, and length of stay in the ICU were captured.

Data was analyzed using SPSS version 27. Continuous variables are expressed as mean $\pm$ standard deviation, whereas categorical variables are summarized as frequencies and percentages. Chi-square test and logistic regression analysis were used. Statistical significance was determined at a p-value threshold of 0.05.

RESULTS

A total of 180 participants were enrolled in the study. The average age of the study population was 61.7 and 13.5 years respectively with the males' comprising 62 percent of the study population.

COPD was the most common diagnosis (52%), followed by asthma (28%) and interstitial lung disease (20%). One hundred and thirty-two (132) (73.3%) patients had comorbidities. Hypertension (48%), diabetes mellitus (42%), and cardiovascular disease (30%), were the most common comorbidities.

There was a mortality rate of 68 patients (37.8%), and significantly higher rates were observed among patients with multiple comorbidities.

Table 1: Baseline Characteristics of Patients

Variable	Value
Age (years)	61.7 $\pm$ 13.5
Male	112 (62%)
COPD	94 (52%)
Asthma	50 (28%)
ILD	36 (20%)

Table 2: Comorbidities and Clinical Outcomes

Comorbidity	Mortality (%)	Mechanical Ventilation (%)	P-Value
Diabetes Mellitus	45%	68%	0.021
Hypertension	42%	64%	0.034
Cardiovascular Disease	58%	75%	<0.001
CKD	62%	78%	<0.001
Obesity	40%	60%	0.056

Table 3: Predictors of ICU Mortality (Logistic Regression)

Variable	Odds Ratio	95% CI	P-Value
Cardiovascular Disease	2.98	1.65–5.38	<0.001
CKD	3.42	1.88–6.20	<0.001
Multiple Comorbidities	2.75	1.49–5.06	0.001

Patients with cardiovascular disease and chronic kidney disease showed the highest risk of mortality.

DISCUSSION

The present study demonstrates that comorbidities play a significant role in

influencing clinical outcomes of patients with chronic respiratory diseases admitted to ICU. The observed high prevalence of comorbid

conditions is not new and is consistent with similar studies that have reported that patients with COPD and other respiratory diseases are often characterized by multiple chronic conditions [4–6]. Such comorbidities make diseases more severe and complex to treat. The results of the present study suggest that cardiovascular disease and chronic kidney disease are powerful predictors of ICU mortality, which is in line with the existing literature that shows their adverse effect on respiratory outcomes [7,8,13].

These conditions may aggravate hypoxia, worsen organ perfusion, and reduce the ability to tolerate respiratory stress, which increases risk of mortality [14,15]. Moreover, patients with multiple comorbidities demonstrated significantly poorer clinical outcomes, which is in line with earlier studies that have highlighted the cumulative effect of comorbidity burden [1719]. The fact that patients with comorbidities have an increased need for mechanical ventilation as observed in this study.

Similar findings have been documented in previous studies that were conducted in the ICUs, where comorbid conditions were found to correlate with high need of ventilatory support and long ICU stay [12,16]. The findings demonstrate the significance of early diagnosis and focused treatment of patients who are at high risk. Comprehensive evaluation and management of comorbidities may improve clinical outcomes and reduce ICU mortality [2022].

The study was conducted in selected hospitals of Lahore, which may limit the generalizability of findings to other healthcare settings. The cross-sectional study design restricts causal interpretation between comorbidities and clinical outcomes. Additionally, the study relied on hospital-based patient data and did not evaluate long-term follow-up outcomes after ICU discharge. Certain confounding factors including treatment variability and disease severity may also have influenced the results.

CONCLUSION

Comorbidities play a major role in clinical outcomes in patients with chronic respiratory diseases admitted to ICU. Multiple comorbid conditions are correlated with higher mortality, increased need for mechanical ventilation and poor prognosis. Early identification and treatment of comorbid conditions can potentially enhance patient outcomes and burden Intensive Care Units.

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