ORIGINAL ARTICLE

Understanding the Epidemiological Profile, Clinical Management and Uutcomes of Patient with Pulmonary Diseases Admitted to Intensive Care Unit: Insights from a Provincial Hospital of Nepal

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Abstract

Introduction: Respiratory diseases are a major cause of ICU admissions worldwide, contributing significantly to morbidity and mortality, particularly in low-resource settings. This study aimed to assess the epidemiological profile, clinical management, and outcomes of patients with pulmonary diseases admitted to a provincial ICU in Nepal.

Methods: A retrospective cross-sectional study was conducted at the ICU of Hetauda Hospital, Nepal. All consecutive patients admitted with respiratory diseases between November 1, 2022, and November 30, 2023, were included. Patients with incomplete records were excluded.

Results: Out of 1039 ICU admissions, 317 (30.5%) had pulmonary diseases. The majority were elderly females. AECOPD was the most common diagnosis. NIV with antibiotics was the most common treatment. Mortality rate was 4.1%. Mechanical ventilation and longer ICU stay were significantly associated with poor outcomes.

Conclusions: Respiratory diseases are a major ICU burden in Nepal. Early intervention and optimized ICU care can improve outcomes. Larger prospective studies are needed.

Keywords: Clinical outcome, Epidemiological profile, ICU, Mortality, Respiratory disease

Introduction

Respiratory diseases are a leading cause of ICU admissions globally and contribute substantially to healthcare burden, particularly in low- and middle-income countries. Conditions such as chronic obstructive pulmonary disease (COPD), pneumonia, tuberculosis, and acute respiratory failure frequently require intensive care support.[1,2] The increasing prevalence of respiratory diseases is influenced by aging populations, environmental pollution, and smoking. In Nepal, respiratory illnesses are among the top contributors to morbidity and mortality, with COPD being a major public health concern.[3,4]

Nepal, faces almost three-quarters of the death attributable to non-communicable diseases among which respiratory illness are among the top causes.[5] Despite the decreasing burden of COPD, this disease remains a major public health problem, especially in countries with a low sociodemographic index.[6] This trend was attributable for air pollution and smoking cases underscoring the need for targeted intervention such as education and awareness to reduce pollution, smoking and occupational hazards.[7,8] Despite this burden, there is limited data on the epidemiological profile and outcomes of pulmonary diseases in ICU settings in Nepal.[9] Understanding these patterns is essential for improving clinical management and resource allocation.

This study aimed to evaluate the epidemiological characteristics, treatment patterns, and clinical outcomes of patients with pulmonary diseases admitted to the ICU of a provincial hospital in Nepal.

Methods

A retrospective cross-sectional study was conducted using thirteen months of ICU data after obtaining ethical approval. Data were collected after the approval obtained from MBAHS, Institutional Review Committee (MBAHS-IRC) [Reference Number IRC-055-081-82]. Data were collected from ICU

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logbooks and patient charts at the Hetauda Hospital, Madan Bhandari Academy of Health Sciences; a level II basic ICU facility. All consecutive patients admitted to the ICU with a diagnosis of respiratory diseases between 1st Kartik, 2070 B.S to 30th Kartik, 2080 B.S were included and recorded using a structured proforma. Patients with missing medical records or incomplete key data variables were excluded from the analysis. The dependent variable was clinical outcome (discharged, transferred to ward, referred or death) while the independent variables were; socio-demographic variables, diagnosis at admission, presence of comorbid illness, frequency and category of admission, interventions and length of ICU stay. The dependent and independent variables were collected through checklist that was recorded on the ICU record book. Data were entered into the MS Excel and then exported to SPSS Version 20. Descriptive analysis was conducted to present the data in frequency and percentage while inferential statistics (chi-square test and Kruskal-Wallis test) were used to check the association between the dependent and independent variables. A p-value less than 0.05 was considered significant.

Results

Table 1: Socio-demographic and Type of admission

Characters	Domain	Frequency (n=317)	Percentage
Age	Less than10 yrs.	1	0.3
	10-20 yrs	2	0.6
	21-30 yrs	4	1.3
	31-40 yrs	9	2.8
	41-50 yrs	17	5.4
	51-60 yrs	37	11.7
	61-70 yrs	89	28.1
	71-80 yrs	121	38.2
	81-90 yrs	32	10.1
	>90 yrs	5	1.6
	Total	317	100
Sex	Male	118	37.2
	Female	199	62.8
Type of admission	Emergency	233	73.5
	Elective	84	26.5

A total of 317 patients were admitted with pulmonary disease during the 13 months of study period. There were 118 males and 199 females and the male female ratio was 1:1.6. The age of the patients varied from 5 to 98 years with mean age of 68.2 ± 13.7 years. Most common age group of pulmonary disease was between 71-80 years which accounts for 121 (38.2%) patients, whereas lest common was less than 10 years accounting for only 1 (0.3%) patient. 24.29% of the female patients were from 71 to 80 years age group Similarly, 13.88%of the male patients were from 71 to 80 years age group. There were only 5 patient of age group more than 90 years, of which 4 were male and 1 was female. Out of 317 patient 233 (73.5%) patient were admitted in ICU on emergency basis whereas 84 (26.5%) patients were admitted in ICU electively for observation only (Table 1).

Out of 1039 patients admited in ICU, 317 patient were diagnosed with pulmonary diseases(30.5%). Maximum number of patient diagnosed with pulmonary diseases were admited in ICU on Falgun 2079 whereas least number of admission were on Ashar 2080 (Figure 1).

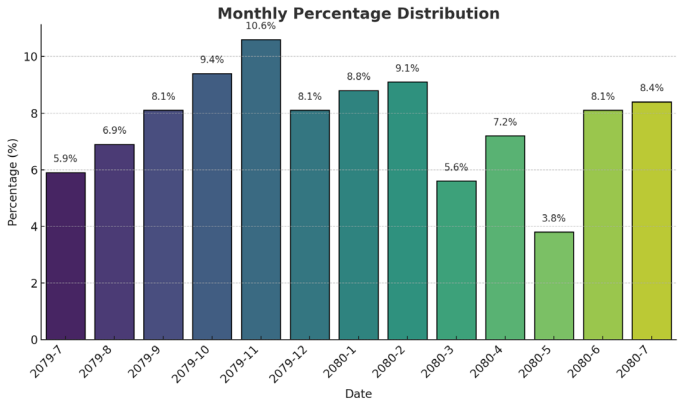

Figure 1: Frequency of admission according to Month [The month is prepared in response to Nepali date Bikram Sambat (B.S)]

Ten respiratory diseases were identified as primary causes for admission in ICU. Acute exacerbation of chronic obstructive pulmonary disease (COPD) was the most common condition for admission followed by pneumonia and tuberculosis (TB) respectively (Figure 2).

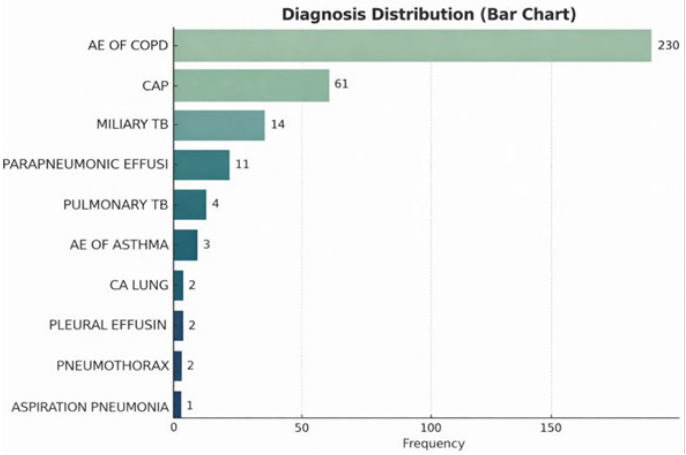

Figure 2: Diagnosis of patient with pulmonary diseases

88 (27.76%) of patients had one or mixed co-morbidities. Hypertension was the most common co-morbidity seen in 29 (9.15%) patients whereas DM was present in 13 (4.1%) patients (Figure 3).

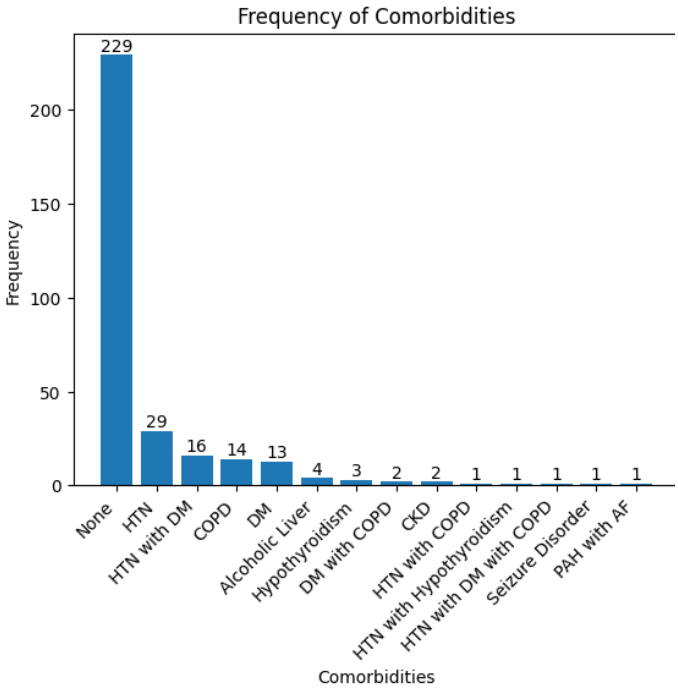

Figure 3: Comorbidities of patient with pulmonary diseases

Among all the patients, 198 (62.5 %) were treated with NIV with Antibiotic. 94 (29.7%) patients were treated with oxygen therapy with antibiotics. 9 patients were kept in mechanical ventilation along with antibiotic. 9 patients had received ATT along with oxygen therapy and two patients underwent operative procedure for placement of chest tube for management of pneumothorax (Figure 4).

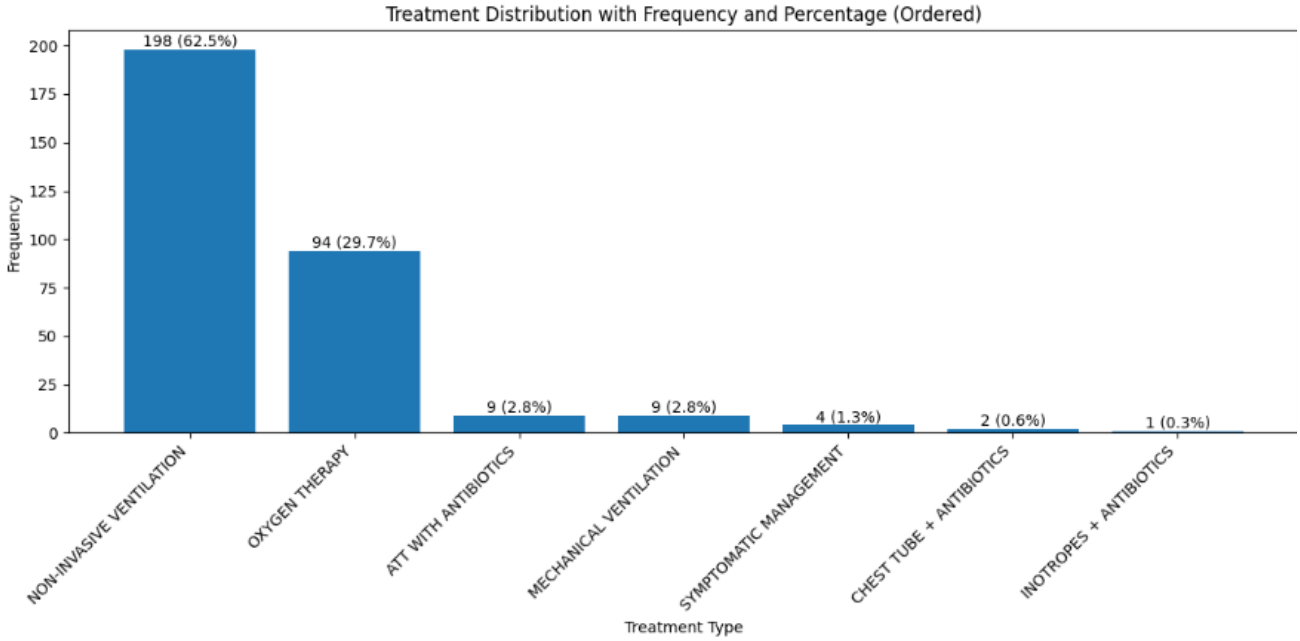

Figure 4: Treatment received by patient with pulmonary diseases

Most of the patients 118 (59%) completely recovered and were sifted to ward and later discharged from the hospital while 43 (13.6%) patients were directly discharged from ICU. Out of 317 patient 25 (7.9%) left against medical advice, 21 (6.6%) patients were discharged on patient request, 28 (8.8%) patients were referred to higher center for further management and 13 (4.1%) patients had expired at hospital (Table 2).

Table 2: Outcome of patient with pulmonary diseases.

Outcome	Frequency	Percentage
Sifted to ward	118	59
Discharge	43	13.6
Referred	28	8.8
LAMA	25	7.9
DOPR	21	6.6
Death	13	4.1
Total	317	100

Note: LAMA: Leave against medical advice, DOPR: Discharge

against Patient Request

Out of 13 patients who had expired 8 were diagnosed with AE of COPD, 3 Patient with CAP and 1 patient with Pulmonary TB and CA lung. Most of the patients who expired had no any comorbidities.

During the course of treatment 9 patient needed mechanical ventilation support among which 6 patients were diagnosed with AE of COPD, 2 patients were diagnosed with pneumonia and 1 patient was diagnosed with pulmonary TB. Out of 9 patients only one COPD patient survived and sifted to ward.

Further analysis revealed that, among those who expired, maximum number of patients were from age group of 71-80 years, female was more common than male and maximum length of stay of patient who had expired in ICU was 1 day. The mean duration of ICU stay was found to be 4.82±2.88 days.

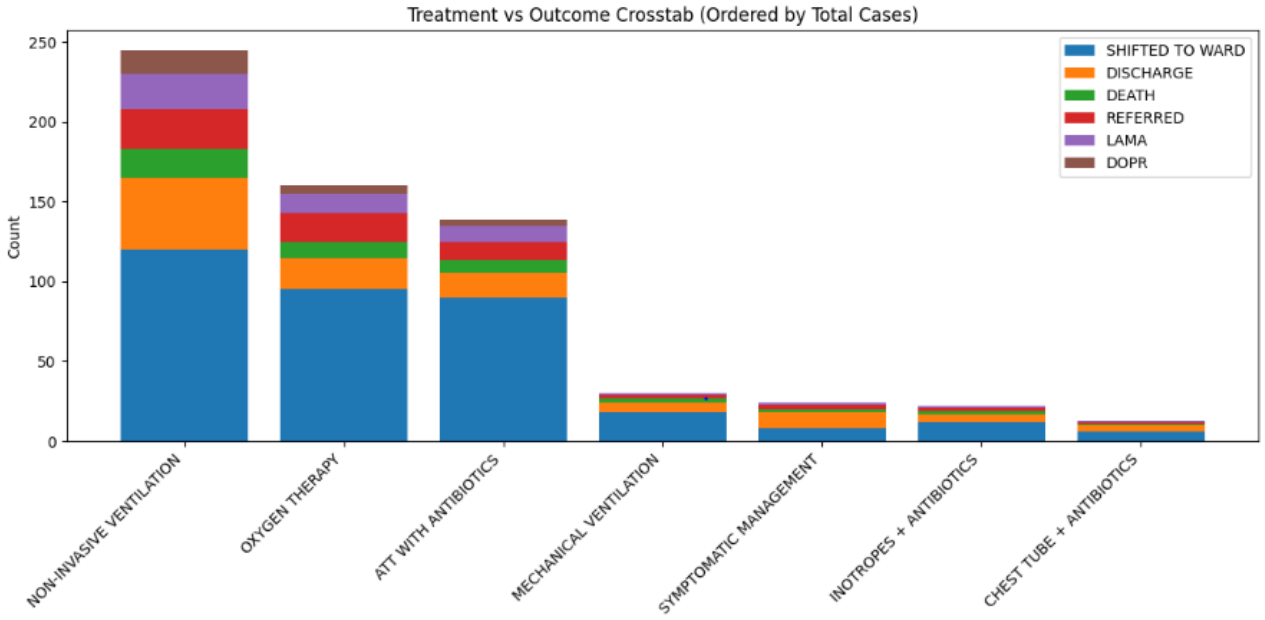

Figure 5: Treatment vs Outcome of patient with pulmonary diseases.

Based on data analysed, several important observations were made regarding the relationship between mechanical ventilation, length of stay, sex, treatment modalities, and patient outcomes. Patients who required mechanical ventilation had significantly poorer outcomes compared to those who did not require mechanical ventilation. Treatment, comorbidities and length of hospital stay was statistically significant with patient outcomes ($p<0.001$)

DISCUSSION

Respiratory diseases are well-recognized as a major cause of ICU admission, and patients requiring invasive ventilation are known to have poorer outcomes.[10–14] The findings of the present study are consistent with this evidence and further highlight the substantial burden of respiratory illnesses in critical care settings, particularly in resource-limited environments.

In this study, COPD was the leading cause of ICU admission, accounting for 72.6% of cases, followed by CAP, TB, pleural effusion, and lung cancer. This distribution is consistent with findings reported by Pant et al.[2] and Franca et al.[15], where COPD was also identified as a predominant contributor to ICU admissions. However, studies from other regions, such as that by Alamoudi et al., have reported different patterns, with bronchial asthma being the most common cause.[16] These variations suggest that regional differences in environmental exposure, healthcare access, and population characteristics significantly influence the epidemiology of respiratory ICU admissions.

The high proportion of COPD observed in our study reflects the increasing burden of chronic respiratory diseases in Nepal. National data from the Nepal Health Research Council indicate that COPD has a prevalence of 11.7% among individuals aged ≥40 years and remains a leading cause of NCD-related mortality. Established risk factors, including tobacco smoking, indoor biomass fuel exposure, and air pollution, likely contribute to this trend. Although the Global Burden of Disease Study 2019 reported a slightly lower age-standardized prevalence and a modest decline in mortality proportion, COPD continues to pose a major public health challenge in Nepal.[6] These findings underscore the need for targeted preventive strategies and improved disease control measures.

The age distribution in our cohort showed that the majority of ICU admissions occurred in elderly patients, particularly those aged 71–80 years. This contrasts with studies from India, where the mean age of ICU admission was lower.[2] The predominance of older patients in our study may be explained by increased susceptibility to severe respiratory illness, a higher prevalence of comorbidities, and potential delays in healthcare access. This highlights the importance of early diagnosis and timely referral, especially in aging populations.

Comorbid conditions such as hypertension and diabetes mellitus were frequently observed. consistent with reports of pant et.al[2]. The presence of these comorbidities may exacerbate disease severity and complicate management, thereby influencing patient outcomes. Integrated management of chronic diseases alongside acute respiratory conditions may therefore be essential in improving ICU outcomes.

The mean duration of ICU stay in this study was shorter than

that reported in some previous studies. This difference may reflect variations in disease severity, discharge practices, or resource constraints. Non-invasive ventilation combined with antibiotic therapy was commonly utilized, in line with standard management practices and findings from similar studies.[3] However, patients requiring mechanical ventilation demonstrated poorer outcomes, including higher mortality rates. This finding is consistent with international evidence[1] and likely reflects the severity of illness at the time of ICU admission rather than the intervention itself.

In terms of outcomes, the majority of patients showed clinical improvement and were transferred to the ward, while a smaller proportion required referral or experienced mortality. These findings are comparable to those reported in other studies[14,16,17], indicating a relatively consistent pattern of ICU outcomes across similar healthcare settings.

This study provides important insights into the pattern of respiratory ICU admissions in a provincial hospital in Nepal, where published data are limited. The findings highlight the significant burden of COPD and the vulnerability of elderly patients, emphasizing the need for improved preventive, diagnostic, and critical care strategies in similar settings.

However, several limitations should be acknowledged. The retrospective design may be associated with incomplete data, and the single-center setting, along with a relatively small sample size and short study duration, may limit the generalizability of the findings. Future multicenter, prospective studies are needed to validate these results and provide a more comprehensive understanding of respiratory ICU admissions in Nepal.

Despite these limitations, the study has important clinical and public health implications. Strengthening preventive strategies for COPD, improving early detection and referral systems, and optimizing ICU resource utilization are critical for improving patient outcomes. These findings may also inform planning and policy development for critical care services in similar resource-constrained settings.

Conclusions

Respiratory diseases, particularly COPD, remain a major cause of ICU admission in our setting, with significant implications for patient outcomes and resource utilization. The predominance of elderly patients and the association of invasive ventilation with poorer outcomes highlight the need for early detection and optimized management strategies. However, as this study is based on retrospective data from a single center with a relatively small sample size, the findings should be interpreted with caution. Further prospective, multicenter studies are required to provide more robust insights into the epidemiology and management of respiratory illnesses in ICU settings.

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