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Original Research Article

FREQUENCY OF ARDS IN ICU AND CAUSE-RELATED FACTORS

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Abstract: *Acute Respiratory Distress Syndrome (ARDS) is a severe condition frequently seen in ICU patients, leading to increased morbidity and mortality. Understanding its prevalence and associated risk factors can enhance early detection and improve patient outcomes.* ***Objective:*** *To determine the frequency of ARDS in ICU patients and identify factors contributing to its development.* ***Methods:*** *This cross-sectional study was conducted in the Department of Critical Care from July 2023 to June 2024 after obtaining ethical approval. A total of 76 patients admitted to the ICU were enrolled based on pre-defined criteria. Detailed histories, physical examinations, and diagnostic evaluations, including chest X-rays, CT scans, and laboratory tests, were collected from electronic health records (EHRs). Demographic data and relevant clinical variables were analyzed using SPSS version 26. Statistical tests were applied to assess associations between ARDS development and patient characteristics.* ***Results:*** *Out of 76 ICU patients, 39 met the study inclusion criteria. The mean age was 51.00 ± 15.50 years, with an average hospital stay of 9.38 ± 9.49 days. Males comprised 66.7% (n=26) and females 33.3% (n=13) of the sample. ARDS was diagnosed in 33.3% (n=13) of patients. Stratification of patients by age showed 28.2% aged 20-40 years, 46.2% aged 41-60 years, and 25.6% over 60 years. The duration of ICU stay was 53.8% for 1-5 days, 15.4% for 6-10 days, and 30.8% for more than 10 days. No statistically significant differences in ARDS prevalence were found when stratified by age, hospital stay, or gender.* ***Conclusion:*** *ARDS was identified in 33.3% of ICU patients, highlighting the critical need for early diagnosis and prompt management. The study underscores the importance of addressing predisposing factors to improve patient outcomes. Further research is needed to explore potential therapeutic interventions.*

Keywords: ARDS, ICU, Causes

Introduction

ARDS is a severe, widespread inflammatory lung injury that occurs suddenly in critically ill patients and poses a significant threat to life (1). It is marked by inadequate oxygenation, the presence of fluid in the lungs, and a rapid onset. (2, 3). At the microscopic level, this condition is linked to damage to the capillary endothelium and widespread injury to the alveoli. (4).

The frequency of ARDS in ICUs can vary, but it is estimated to affect about 10-15% of mechanically ventilated patients and around 7-10% of all ICU admissions. The incidence may differ based on the population studied, regional healthcare practices, and criteria used for diagnosis. The Berlin definition of ARDS characterizes it by its sudden onset, the presence of bilateral lung infiltrates visible on chest X-rays or CT scans that are not caused by heart failure, and a PaO2/FiO2 ratio below 300 mm Hg. (5-7). Unlike the earlier American-European Consensus definition, the Berlin definition omits the term "acute lung injury," no longer requires a wedge pressure below 18 mm Hg, and adds the condition that patients must be on positive end-expiratory pressure (PEEP) or continuous positive airway pressure (CPAP) of at least 5 cm H2O.

ARDS is associated with a variety of risk factors (8). In addition to lung infections or aspiration, other sources include conditions outside the lungs, such as sepsis, trauma, massive blood transfusion, drowning, drug overdose, fat embolism, inhalation of toxic fumes, and pancreatitis. (9). These external illnesses and injuries initiate an inflammatory response that ultimately leads to lung damage. In the United States, the incidence of ARDS is estimated to be between 64.2 and 78.9 cases per 100,000 person-years (10, 11). Of these cases, 25% are initially categorized as mild, while 75% are classified as moderate or severe. However, about one-third of the mild cases progress to a more severe stage.

ARDS is a severe condition that complicates many critical illnesses and can lead to high morbidity and mortality. By identifying how prevalent ARDS is within the ICU setting, the study aims to provide valuable insights into its burden and implications for patient management.

To determine the frequency of ARDS in ICU patients and to identify the various factors contributing to its development.

Methodology

After the approval of the hospital's ethical committee, this study was conducted in the Department of Critical care between July 2023 to June 2024. A detailed history was obtained, and a thorough physical examination was conducted. A total of 39 individuals who met the selection criteria were enrolled in the study. Data from all patients were collected from ICU medical records and electronic

health records (EHRs), as well as from chest X-rays, CT scans, and laboratory results. Demographic information such as age, sex, weight, height, smoking history, and any comorbidities were noted in a predesign questionnaire. For statistical analysis, SPSS Version 26 was used.

Results

The mean age of all enrolled patients was 51.00± 15.50 years with the mean Length of hospital stay being 9.38±9.49 days. Out of total 76 patients, 26(66.7%) were males and 13(33.3%) were females. Among these patients, 13(33.3%) were diagnosed with Acute Respiratory Distress Syndrome (ARDS), while the remaining 26(66.7%) did not develop ARDS. Age groups were distributed as follows: 11(28.2%) were aged 20-40 years, 18(46.2%) were 41-60 years, and 10(25.6%) were over 60 years. The length of hospital stay varied, with 21 patients 21(53.8%) staying for 1-5 days, 6 patients (15.4%) staying for 6-10 days, and 12 patients (30.8%) requiring a stay of more than 10 days.

The stratification of ARDS among patients based on age groups, length of hospital stay, and gender, as shown in Table 3, revealed no statistically significant differences.

Table 1: Mean age and Length of hospital stay of all enrolled patients (n=39)

Variables	Mean±SD
Age (Years)	51.00± 15.50
Length of hospital stay (days)	9.38±9.49

Table 2: Characteristics of all enrolled patients (n=39)

Variables	Frequency (%)
Gender	
Male	26(66.7%)
Female	13(33.3%)
ARDS	
Yes	13(33.3%)
No	26(66.7%)
Age Groups	
20-40 years	11(28.2%)
41-60 years	18(46.2%)
>60 years	10(25.6%)
Length of hospital stay (days)	
1-5 days	21(53.8%)
6-10 days	6(15.4%)
>10 days	12(30.8%)

Table 3: Stratification of ARDS concerning factors (n=39)

	ARDS		
	YES	NO	P-value
Variables	Frequency (%)	Frequency (%)	
Age Groups			
20-40 years	6(46.2%)	5(19.2%)	0.19
41-60 years	5(38.5%)	13(50.0%)	
>60 years	2(15.4%)	8(30.8%)	
Length of hospital stay (days)			
1-5 days	5(38.5%)	16(61.5%)	0.08
6-10 days	1(7.7%)	5(19.2%)	
>10 days	7(53.8%)	5(19.2%)	
Gender			
Male	9(69.2%)	17(65.4%)	0.81
Female	4(30.8%)	9(34.6%)	

Discussion

Acute Respiratory Distress Syndrome (ARDS) is a severe and often life-threatening condition commonly encountered in the Intensive Care Unit (ICU). The frequency of ARDS in the ICU setting varies significantly, with reported incidences ranging from 10% to 15% among critically ill patients. This variation is influenced by several factors. The main aim of the present study was to determine the frequency of ARDS in ICU patients and to identify the various factors contributing to its development. In the present study, we have found that 13 (33.3%) were diagnosed with Acute Respiratory Distress Syndrome (ARDS). This finding aligns with previous research that highlights the significant prevalence of ARDS among critically ill patients. For instance, a study by Bellani et al. (12) reported that ARDS occurred in approximately 10% of ICU admissions globally, with some variation based on regional differences and ICU settings. Additionally, another study conducted by Rubenfeld et al. (13) found that the incidence of ARDS among ICU patients in North America was around 20%, further emphasizing the substantial impact of ARDS on critically ill populations. In another study conducted by Valta et al. (14), it was reported that the frequency of ARDS was 4.9 cases per 100,000 inhabitants per year. The higher incidence observed in our study may be attributed to specific factors within our patient population, such as a higher prevalence of predisposing conditions like sepsis or pneumonia, which are well-known risk factors for ARDS. Furthermore, the variation in ARDS incidence across studies can also be influenced by differences in diagnostic criteria and the timing of diagnosis, as highlighted by Ranieri et al. (15), who revised the Berlin definition of ARDS to standardize the diagnosis and improve comparability across studies. Our results highlight the critical need for prompt diagnosis and treatment of ARDS, as delays in management are linked to higher rates of complications and death. The 33.3% incidence rate observed in our study emphasizes the necessity for continuous monitoring and adherence to

evidence-based protocols in the ICU to reduce the adverse effects of ARDS on patient outcomes.

In the present study, the stratification of ARDS among patients according to age groups, length of hospital stay, and gender, revealed no statistically significant differences. This finding is consistent with several studies that have examined similar factors about ARDS. The study by Bellani et al. (12) indicated that while the incidence of ARDS varies by region, the relationship between age and ARDS outcomes is complex and often lacks statistical significance. Their global analysis revealed that while certain age groups might have different frequencies of ARDS, the variations are not always statistically significant due to the broad range of data collected from diverse settings. Similarly, research by Ranieri et al. (15) Highlighted that while age and length of hospital stay can influence ARDS severity and outcomes, these factors do not consistently show significant differences across various studies. The Berlin Definition of ARDS, introduced by Ranieri et al. (15), emphasized the need for standardized diagnostic criteria to better assess and compare the impact of these factors on ARDS outcomes. Regarding gender differences, the study by Rubenfeld et al. (13) Found that while there might be slight variations in ARDS incidence between males and females, these differences are often not statistically significant. The results align with the findings of our study, reinforcing that gender alone may not be a strong predictor of ARDS outcomes when considered in isolation. Age, length of hospital stay, and gender are relevant factors in the management of ARDS, our study's findings align with existing literature, which suggests that these factors do not always exhibit statistically significant differences in ARDS incidence or outcomes. This underscores the importance of considering a comprehensive set of variables and standardizing diagnostic criteria to better understand and manage ARDS.

Conclusion

It was concluded that ARDS affects 33.3% of ICU patients, reflecting its significant prevalence in critical care settings. The prevalence of ARDS in the ICU highlights the urgent need for prompt diagnosis and intervention. Identifying the underlying causes is essential for preventing ARDS and enhancing outcomes for critically ill patients. Healthcare professionals should stay alert to managing predisposing conditions, fine-tuning ventilator settings, and applying evidence-based practices to minimize both the incidence and severity of ARDS in the ICU.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRB_SIHISB-13/22)

Consent for publication

Approved

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Conflict of interest

The authors declared the absence of a conflict of interest.

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Coordination of collaborative efforts.
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