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Original Article

Demographic Analysis in ICU Admitted Patients

Mohammad Niamul Kabir Khan Siddique[1*], Mohammad Jakir Hossain[2], Sharmin Ahmed[3], Mohammad Mahbub Ahsan[4], Niaz Mostafa[5]

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*Corresponding author

ABSTRACT

Background: Intensive Care Units provide care for severely ill patients who frequently possess intricate medical requirements, such as comorbidities like diabetes, multi-organ issues, and regular antibiotic use. Although crucial, information regarding the prevalence of diabetes, its effects on complications, antibiotic use, and general ICU outcomes in the broader patient populations of Bangladesh is still scarce. This research seeks to assess these elements to enhance comprehension and refine critical care strategies for high-risk patients. **Methods & Materials:** This cross-sectional study involving 582 ICU patients at Anwar Khan Modern Medical College Hospital gathered information on demographics, diagnoses, complications, treatments, antibiotic usage, and outcomes. Data were assessed using SPSS v27, and ethical consent along with patient confidentiality were upheld. **Results:** In this study (n = 582), the majority of patients were older adults (mean age 57.96 ± 17.44 years) with hypertension (62%) and diabetes (55.3%). Frequent complications encompassed respiratory failure (40.4%), AKI (32.5%), and septic shock (28.9%); 65.3% were hospitalized for 0–3 days, 57.9% survived, and 26.3% passed away, with respiratory (47.1%) and hemodynamic support (33.3%) along with common usage of carbapenems (40.5%), indicating significant severity and multi-organ involvement. **Conclusion:** Patients in the ICU were generally older and admitted due to respiratory failure, shock, or altered mental status, frequently having hypertension and diabetes. They often experienced complications involving multiple organs, needed respiratory and hemodynamic assistance, and were administered broad-spectrum antibiotics, indicating severe illness.

Keywords: *Clinical characteristics, treatment patterns, Intensive Care Units.*

1. *Assistant Professor, Consultant Department of ICU, Anwer Khan Modern Medical College Hospital, Dhaka, Bangladesh (ORCID: 0009-0003-2921-9030)*
2. *Associate Professor, Department of Cardiology, Anwer Khan Modern Medical College Hospital, Dhaka, Bangladesh (ORCID: 0009-0004-0247-9315)*
3. *Junior Consultant, Department of Cardiology, Bangladesh Specialized Hospital, Dhaka, Bangladesh (ORCID: 0000-0002-3111-0849)*
4. *Assistant Professor, Department of Medicine, Manikgonj Medical College Hospital, Manikgonj, Bangladesh (ORCID: 0000-0002-0778-478X)*
5. *Classified Specialist, Department of Medicine, Combined Military Hospital, Chattogram, Bangladesh (ORCID: 0000-0003-1100-7884)*

INTRODUCTION

Intensive Care Units (ICUs) play a vital but demanding role in contemporary healthcare systems [1]. Florence Nightingale is acknowledged for establishing the groundwork of contemporary intensive care. Intensive care medicine officially started in the 1950s during the poliomyelitis epidemic through mechanical ventilation, and ICU technology has developed over time to aid patients with critical conditions [2.3].

Patients in the ICUs are increasingly elderly, which emphasizes the necessity for healthcare professionals to undergo education specific to geriatric care, as teamwork with geriatric specialists enhances results for older individuals, particularly in acute and perioperative care environments [4]. ICU patients need different therapeutic and preventive medications, which can greatly affect a hospital's total medication expenses [5]. Antibiotics are the most frequently prescribed medications in ICUs; however, their extensive use, combined with patient overcrowding and invasive devices, encourages resistant organisms, increasing costs and risks for patients. Analyzing ICU medication practices aids in enhancing rational and economical treatment [6].

Worldwide research indicates that ICU patients exhibit varied traits; in a cohort across 50 countries, 10% were diagnosed with acute respiratory distress syndrome (ARDS), a quarter needed mechanical ventilation, and many underwent supportive treatments such as prone positioning and neuromuscular blockade, resulting in elevated mortality rates in severe instances [7]. In Sub-Saharan Africa, ICU patients on mechanical ventilation faced elevated mortality rates, with diabetes, low Glasgow Coma Scale scores at admission, and being admitted at night recognized as significant predictors of death [8].

Data from Bangladesh showed that critically ill COVID-19 patients in ICUs frequently exhibited respiratory distress and multi-organ failure, faced elevated mortality rates, and were managed with supplemental oxygen and mechanical ventilation [9]. Adherence to sepsis bundles in Bangladeshi ICUs was inadequate, mortality rates for severe sepsis patients were elevated, and prompt execution of guidelines was restricted [10]. In critically ill adults from Bangladesh suffering from severe sepsis, the most prevalent comorbidity was diabetes, the primary organ failure was respiratory dysfunction, and the leading source of sepsis was respiratory infections [11].

Despite these findings, most ICU-based research in Bangladesh remains retrospective, single-center, and primarily focused on COVID-19 or sepsis. There is limited comprehensive evidence regarding the overall prevalence of diabetes mellitus among ICU patients, as well as its association with clinical outcomes, major complications, and patterns of antibiotic utilization in the broader critically ill population. Therefore, this study aims to determine the prevalence of diabetes among ICU patients and to assess its relationship with ICU outcomes, significant complications, and antibiotic use. The findings are expected to contribute to improved clinical management strategies for diabetic patients in critical care settings.

METHODS & MATERIALS

This observational cross-sectional study, based in a hospital, was carried out in the Intensive Care Unit (ICU) of Anwar Khan Modern Medical College Hospital, Bangladesh, to evaluate the clinical features and treatment approaches of patients

admitted to the ICU. A total of 582 patients admitted from July 2024 to June 2025 were included through consecutive sampling. Patients with comprehensive medical records and an ICU stay exceeding 24 hours were included, whereas those admitted solely for observation, with incomplete documentation, or readmitted during the same hospitalization were excluded.

Data were gathered from patient records, lab reports, and ICU treatment documents via a pre-formulated structured form. Variables that were recorded encompassed demographics, main diagnosis, reasons for intensive care unit admission, comorbidities, duration of ICU stay, significant complications, interventions, and antibiotic usage patterns. Patient outcomes were classified as survived/ discharged, deceased, or discharged against medical advice (DAMA)

The analysis of data was conducted with SPSS version 27. Categorical variables were represented as counts and percentages, while continuous variables were indicated as mean ± standard deviation. Associations were evaluated using Chi-square or Fisher's exact tests, with $p < 0.05$ deemed significant. Ethical consent was secured from the hospital's Institutional Review Board, and patient privacy was ensured by means of anonymization

RESULTS

Table I shows ICU (n = 582) primarily consisted of middle-aged and elderly individuals, having an average age of 57.96 ± 17.44 years. The majority of patients fell within the 50–69 age range (286, 49.1%), succeeded by those aged ≥70 years (149, 25.6%), 30–49 years (97, 16.7%), and <30 years (50, 8.6%). Males represented 312 (53.6%) and females 270 (46.4%) of admissions, indicating a marginally greater percentage of older male patients in the ICU.

Table I

Demographic Characteristics of ICU-Admitted Patients (*n* = 582).

Characteristic	n	%	Mean ± SD
Age (years)			
<30	50	8.6	57.96±17.441
30–49	97	16.7	
50–69	286	49.1	
≥70	149	25.6	
Sex			
Male	312	53.6	
Female	270	46.4	

Primary Diagnosis and Reasons for ICU Admission

Table II presents Most ICU patients were admitted because of acute respiratory failure or hypoxia, which comprised more than half of all admissions (53.4%), followed by altered consciousness levels (32%) and shock or hemodynamic instability (24.1%). Infrequent causes comprised seizures, stroke, severe sepsis, cardiac emergencies, obstetric complications, trauma, and metabolic or toxic crises, emphasizing that respiratory and neurological problems are the main reasons for critical care admission in this group.

Table II

Primary Diagnosis / Reason for ICU Admission (*n* = 582).

Diagnosis / Reason	Frequency (n)	Percentage (%)
Acute respiratory failure / hypoxia	311	53.4
Shock / Hemodynamic instability	140	24.1
Altered level of consciousness	186	32.0
Seizure / Status epilepticus	25	4.3
Acute neurological deficit / Stroke	3	0.5
Severe sepsis / Septic shock	1	0.2
Acute cardiac emergency	8	1.4
Major hemorrhage	4	0.7
Trauma / Polytrauma	2	0.3
Obstetric emergency	8	1.4
Metabolic / Toxic emergency	3	0.5
Others	26	4.5

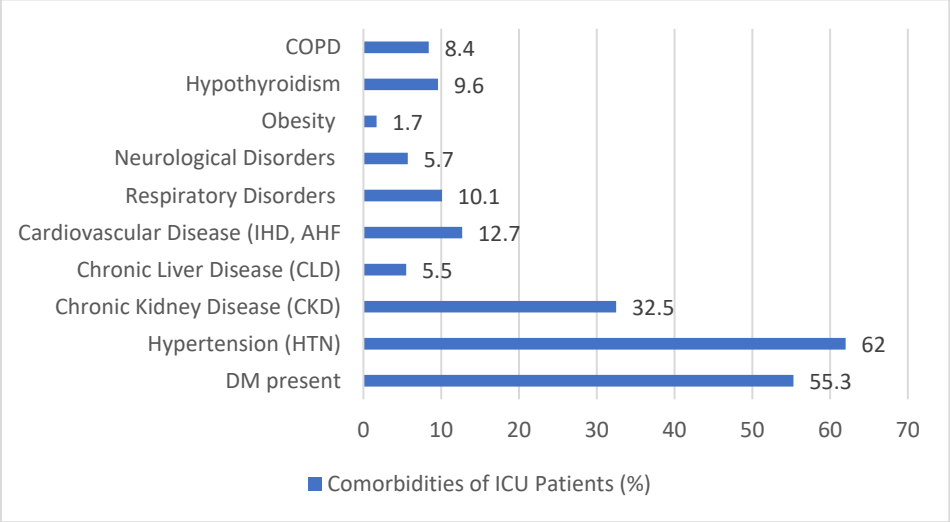


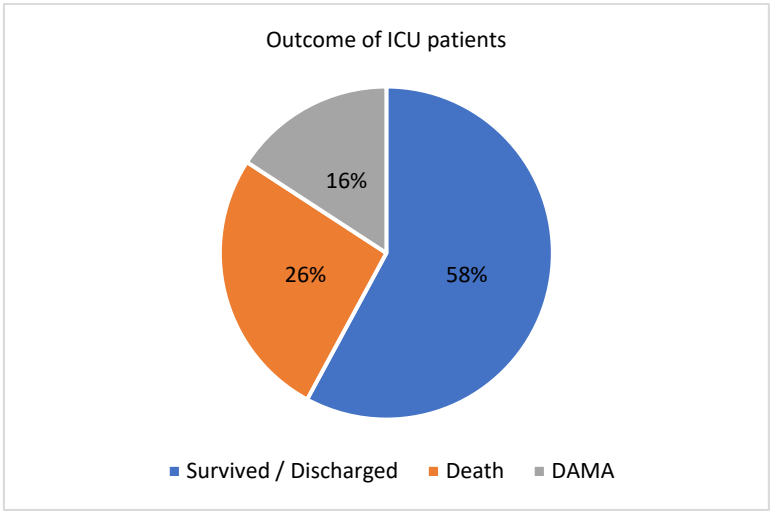
Figure 1 Comorbidities of ICU Patients (n = 582).

Figure 1 show, the most frequent comorbidities were hypertension (62.0%) and diabetes mellitus (55.3%). Demonstrating considerable multi-organ involvement. In general, ICU patients experienced a significant prevalence of cardiometabolic conditions and serious comorbidities.

Table III shows among the 582 ICU patients, the majority (65.3%) had a short ICU stay of 0–3 days, while 24.4% stayed for 4–7 days. A smaller proportion required prolonged admission, with 8.6% staying 8–14 days and only 0.9% remaining in the ICU for more than two weeks.

Table III
ICU Stay Duration and Patient Outcomes (n = 582).

Variable	n	%
ICU duration (days)		
0-3	383	65.3
4–7	142	24.4
8–14	50	8.6
>14	5	0.9



Note: DAMA = Discharge Against Medical Advice

Figure 2 Outcome of ICU patient

Figure 2 show more than half (57.9%) survived and were discharged, while 26.3% died during their ICU stay. Additionally, 15.8% of patients left against medical advice (DAMA). These findings indicate a moderate survival rate, with a considerable proportion of mortality and a notable percentage of patients discontinuing treatment prematurely.

Table IV shows acute respiratory failure (40.4%) was the most common ICU complication, followed by acute kidney injury (32.5%) and septic shock (28.9%), indicating frequent multi-organ dysfunction. Cardiogenic shock (16.2%) and metabolic crises (12.4%) were also notable, while other complications were less common. Overall, respiratory, renal, and septic complications predominated.

Table IV
Major Complications in ICU Patients (*n* = 582).

Complication	n	%
Acute respiratory failure	235	40.4
Septic shock / Severe sepsis	168	28.9
Acute kidney injury / CKD	189	32.5
Cardiogenic shock / Acute heart failure	94	16.2
Neurological emergency	33	5.7
Aspiration pneumonia	21	3.6
Metabolic / Electrolyte crisis	72	12.4
Hypovolemic / Hemorrhagic shock	25	4.3
Trauma / Surgical complication	28	4.8

Table V shows in the ICU, most patients required respiratory (47.1%) and hemodynamic support (33.3%), with renal support (14.4%) less common. Other interventions were rare, highlighting that respiratory and cardiovascular management were the main ICU interventions.

Table V
Support / Interventions Received in ICU (*n* = 582).

Intervention Type	n	%
Respiratory support	274	47.1
Hemodynamic / Cardiovascular support	194	33.3
Renal support	84	14.4
Neurological support	7	1.2
Hematological / Transfusion	10	1.7
Thoracic / Pulmonary procedures	13	2.2
Surgical / Invasive procedures	9	1.5
Diagnostic / Interventional procedures	3	0.5
Special / Targeted therapies	0	0

Table VI presents carbapenems (40.5%) were the most commonly used antibiotics, followed by fluoroquinolones (24.1%), BL-BLI combinations (20.8%), and cephalosporins (19.1%). Other antibiotics, including glycopeptides (8.6%), lincosamides (11.9%), polymyxins (7.4%), and aminoglycosides (3.4%), were used less frequently. Antifungals (4.1%), antivirals (6.5%), and anti-TB drugs (0.2%) were rarely prescribed. Overall, broad-spectrum antibiotics, particularly carbapenems, dominated treatment, reflecting the severity of infections in the ICU population.

Table VI
Antibiotic Use Among ICU Patients (*n* = 582).

Antibiotic Class	n	%
Carbapenems	236	40.5
BL-BLI combinations	121	20.8
Cephalosporins	111	19.1
Polymyxins	43	7.4
Fluoroquinolones	140	24.1
Glycopeptides	50	8.6
Lincosamides	69	11.9
Aminoglycosides	20	3.4
Tetracyclines / Glycylcyclines	19	3.3
Macrolides	11	1.9
Anaerobe coverage	18	3.1
Oxazolidinones	17	2.9
Penicillins (Non-BL-BLI)	26	4.5
Antifungals	24	4.1
Antivirals	38	6.5
Anti-TB drugs	1	0.2
Others	60	10.3

DISCUSSION

In our study, the ICU demographic mainly consisted of middle-aged and older individuals (average age 57.96 ± 17.44 years). This is consistent with Garland et al. (2013), which reported an average ICU patient age of 64.5 ± 16.4 years, with 48% falling within the 50–69 age range. Males represented a significant portion of admissions, align to Chung et al. (2023), who noted 65.2% male patients in the ICU. These results validate the usual ICU demographic of mainly older individuals with a slight male predominance, factors associated with increased ICU morbidity and mortality [12,13].

In our study, acute respiratory failure/hypoxia was the primary reason for

admission, surpassing the 458 patients reported in other ICU research. Altered states of consciousness and shock were frequently observed, resembling global ICU statistics. Infrequent causes—trauma, sepsis, cardiac issues, obstetric events, and metabolic crises—aggregated to a minor percentage, mirroring conventional patterns observed in medical ICUs [14,15].

In this study, hypertension (62.0%) and diabetes mellitus (55.3%) were the prevalent comorbidities, marginally exceeding the figures from Lee et al. (2023), which recorded hypertension in 67% and diabetes in 46% of ICU patients [16]. These issues—acute respiratory failure, acute kidney injury, and septic shock —were prevalent, indicating multi-organ dysfunction. Comparable research indicates respiratory failure occurs in approximately 56% and acute kidney injury in about 51% of ICU patients, highlighting the worldwide impact of multi-organ involvement in severe illness [17].

The majority of ICU patients had brief stays of 0–3 days, and only 0.9% remained for longer than 14 days, aligning with findings that most ICU patients are released within the first week, whereas extended stays are uncommon yet demand significant resources [18].

In this ICU group, most of the patients were discharged alive, indicating moderate survival and significant mortality; in another study, 70.4% showed improvement and were released, while 29.6% died, reflecting outcomes aligned with the general survival patterns [19].

In this study, respiratory assistance (47.1%) was the prevalent intervention. Patients needing invasive ventilation face an increased in-hospital mortality rate of approximately 38% and a reintubation rate around 7.6%, whereas noninvasive ventilation or high-flow oxygen also raises the risk to about 8.8% in comparison to individuals without advanced support [20].

In our study, carbapenems were the most frequently utilized antibiotics, followed by fluoroquinolones, BL-BLI combinations, and cephalosporins, indicating a broad-spectrum approach for serious infections. Reduced usage of glycopeptides, polymyxins, and aminoglycosides corresponds with their function in addressing resistant pathogens, in line with ICU antibiotic trends observed in critically ill individuals [21].

Overall, ICU patients exhibited significant severity due to cardiometabolic comorbidities, multiple organ complications, frequent need for respiratory and hemodynamic assistance, extensive use of broad-spectrum antibiotics, and moderate mortality rates.

CONCLUSION

Patients in the ICU were primarily middle-aged or older, admitted largely due to respiratory failure, shock, or changes in consciousness. Hypertension and diabetes were prevalent, often accompanied by respiratory, renal, and septic complications. The majority experienced brief ICU admissions, needed respiratory and hemodynamic assistance, and were given broad-spectrum antibiotics, indicating serious illness and multiple organ involvement.

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