

Original Article

Morbidity Pattern and Outcome among Patients in Intensive Care Unit and Associated Factors: A Single Centre Experience in Dhaka, Bangladesh

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**ABSTRACT**

Introduction: An intensive care unit (ICU) is a special unit of hospital that provides intensive treatment for patients with severe or life-threatening illness and injuries, which require constant and close monitoring with life support equipment. Mortalities in Intensive Care Units (ICU) are high especially in the developing countries. The unpredictability of death rates is attributable to age, sex, morbidity pattern, severity of illness, well timed medical attention and total management facilities. Evaluation of morbidity pattern and outcome of admitted patient can assess the efficacy and overall grade of the ICU which making it possible to take better decisions for further improvement of quality of care. **Materials & Methods:** This is a retrospective, descriptive hospital record based study conducted in a newly established ICU at Kurmitola General Hospital, Dhaka, Bangladesh from March 2018 to December 2019 (22 months). The admission and discharge

register of the ICU were used to extract information. The statistical analysis was carried out by using the Statistical Package for Social Science (SPSS), version 23.0. **Results:** A total of 575 (Male 293, Female 282) patients were admitted in this ICU over the 22 months period with the age range from 18-85 years. The primary cause of morbidity was medical cause 522 (90.78%) and rest are surgical cause 53 (9.22%). 207 (36%) of the patients died while other were improved and discharge 352 (61.22%) or referred to high centers 16 (2.78%). Respiratory disease 115 (20%), neurological disease 93 (16.17%) and cardiovascular disease 64 (11.13%) were the most prevalent reasons for ICU admission while respiratory disease 51 (24.64%) and cardiovascular disease 34 (16.72%) were the most important cause of mortality. Out of these 207 death, 123 (41.98%) were male and 84 (29.79%) were female. Mortality rate was significantly high among male ($\chi^2=9.27$, p -value=0.002). Mortality rate was 37.16% in medical cases and 24.52% in surgical cases. Among the admitted patients higher the length of stay (4 days or more), lower the mortality rate. Highest incidence of

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death 88 (42.51%) occurred for 1-3 days of ICU stay. **Conclusion:** The major cause of ICU admission among the patients were respiratory disease, neurological disease and cardiovascular disease. Respiratory disease and cardiovascular disease were the major contributor to the mortality. Male sex, geriatric patients, medical diagnosis and shorter duration of stay into ICU were associated with higher mortality rate.

Key Words: Intensive Care Unit, Morbidity, Mortality.

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INTRODUCTION

The intensive care unit (ICU) is that part of the hospital where critically ill patients required advanced airway, respiratory and hemodynamic supports. It is also known as Intensive Therapy Unit, Intensive Treatment Unit (ITU) or Critical Care Unit (CCU). The patient treated here are those with severe or life-threatening illness and injuries, which require constant care, close supervision by life support equipment and medication in order to ensure survival. In recent decades, intensive care medicine has developed into a highly specialized discipline covering several fields of medicine. It is only offered to patients whose condition is potentially reversible and who have a good chance of surviving with intensive care support. Common conditions that are treated in ICUs are respiratory, cardiac, neurological and other life-threatening conditions. The trend in the developed countries is to have separate and dedicated ICUs for different subspecialties like cardiac, neurological, renal, trauma¹. In the developing countries, a general ICU is still tenable due to scarce resources². Since these patients are critically ill, the outcome of intervention is sometimes difficult to predict. In critical care medicine, intensive care unit results can be assessed on the basis of outcomes such as "Death" or "Survival" by means of indicators such as mortality rate. Intensive care is an emerging but less emphasized concept in Bangladesh. The first ICU in Bangladesh was established in 1980³. Since then many ICUs have been established. Among all the ICUs, 78% are in private sectors in our country.⁴ Mortalities in Intensive Care Units (ICUs)

are high and widely variable. Across different ICUs about 6.4 to 40% of critically ill patients were reported to die every year despite of intensive care medicine⁵. The unpredictability of death rates is attributable to age, sex and severity of illness, co-morbidity, well timed medical attention, quality of attending staff, iatrogenic events, total management facilities and overall grade of the ICU in general⁶. Admission to an ICU is measured as an indicator of severe morbidity⁷. There after the current study was designed to review the death in ICU. It was carried out to investigate mainly the mortality rate among the critically ill patients. Other concerned aspects such as morbidity pattern, demography of the critically ill patients and duration of ICU stay before death were also studied.

METHODS AND MATERIALS

Study Design: Retrospective descriptive hospital record based study.

Study Period: March 2018 to December 2019.

Sample Size: 575 Patients those admitted into this ICU during this study period.

Study Place: Kurmitola General Hospital, Dhaka, Bangladesh which is a 500 bed tertiary care government hospital. The hospital operates a well equipped 10 bed modern ICU which admits critically ill patients from medical and surgical subspecialties. This ICU was established on 14th February, 2018 and operates by anesthetic team.

Data Collection:

As it is a record based study, data was collected from the ICU admission and

discharge register. Data extracted from the record included age, sex, diagnosis, duration of stay in ICU and outcome profile. The diagnosis were made by specialist in different subspecialties with additional confirmatory laboratory investigations. Outcome was classified as improved and discharge, referred to higher centre and death.

Data Entry and Analysis:

RESULTS

In this study, a total of 575 patients were admitted into ICU over 22 month's period. Out of these patients 293 (50.95%) were

Data entry was done by using Microsoft Excel-2007 software, Data analysis was carried out with help of Statistical Package for Social Science (SPSS), version 23.0. Chi-square test was done for the test of significance and p-value of <0.05 considered as statistically significant. Ethical approval was waived by the Ethics committee of the hospital as this is a retrospective observational study.

male and 282 (49.05%) were female (Fig.1).

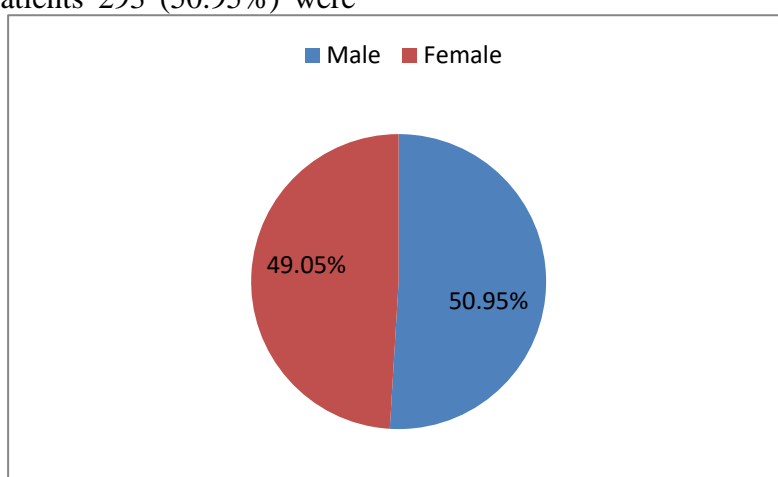


Fig 1: Distribution of the patients according to sex. (n=575).

Age range varies from 18 years to 85 years. The least affected age group was <20 years with 31 (5.39%) and highest

affected age group was ≥ 60 years with 241 (41.92%) (Table-I).

Table I: Distribution of the patients according to age. (n=575)

Age (years)	Frequency	Percentage (%)
<20 years	31	5.39%
20-39 years	132	22.95%
40-59 years	171	29.74%
≥ 60 years	241	41.92%

Among the patients 310 (53.91%) belongs to rural and 265 (46.09%) from urban background. Professional states, education and income of the patients were not

mentioned in any case paper. The primary cause of morbidity was medical cause with 522 (90.78%) and rest were surgical cause 53 (9.22%) (Table II).

Table II: Distribution of patients according to primary cause of ICU admission and death.

Primary Cause	Number of Patient	Number of Death	Mortality Rate
Medical Cause	522	194	37.16%
Surgical Cause	53	13	24.52%
Total	575	207	36.0%

The most common disease categories admitted were respiratory disease 115(20%), neurological disease 93 (16.17%) and cardiovascular disease 64 (11.13%) (Table III).

Table III: Distribution of patients according to morbidity pattern of ICU admission (n=575).

Morbidity Pattern	Frequency (n)	Percentage (%)
Respiratory Disease	115	20%
Neurological Disease	93	16.17%
Cardiovascular Disease	64	11.13%
Renal Disease	60	10.43%
Post operative complication (Surgical Cause)	53	9.22%
Cancer	40	6.95%
Endocrine Disease	39	6.78%
Hepatic Disease	38	6.62%
Dengue Fever	32	5.56%
GIT Problem	24	4.18%
Organophosphorous (OPC) Poisoning	10	1.74%
Unknown Poisoning	05	0.87%
Hanging	02	0.35%
Total	575	100%

In this study overall mortality of admitted patients in this ICU was 36%. (207/575). The mortality rate among medical case was 37.16% (194/522) and surgical case was 24.52% (13/53) (Table IV).

Table-IV: Mortality of the patients according to disease pattern of ICU admission (n=207).

Disease Pattern	Frequency			Mortality Rate
	Male	Female	Total	
Respiratory Disease	37	14	51	24.64%
Cardiovascular Disease	19	15	34	16.42%
Neurological Disease	14	05	19	9.18%
Renal Disease	06	12	18	8.69%
Cancer	10	07	17	8.21%
Endocrine Disease	06	09	15	7.25%
Hepatic Disease	12	02	14	6.76%

Post operative complication (Surgical Cause)	05	08	13	6.28%
GIT Problem	04	06	10	4.83%
Dengue Fever	04	05	09	4.35%
Organophosphorous (OPC) Poisoning	04	01	05	2.42%
Unknown poisoning	02	00	02	0.97%
Total	123	84	207	

Respiratory disease 51 (24.64%) and cardiovascular disease 34 (16.42%) were the major cause of mortality (Table IV). Mortality rate among male was 41.98% (123/293) and among female was 29.79% (84/282). Mortality rate was significantly

high in male ($\chi^2=9.27$, $P=0.002$) (Table V). Mortality rate was highest in ≥ 60 years age group 39.42% and lowest in <20 years age group 32.22% which was not statistically significant ($P=0.54$) (Table V).

Table-V: Socio-demographic variable and outcome following admission of patients.

Characteristics	Outcome		Chi-Square test, df and p value
	Survival	Death	
Sex			$\chi^2=9.271$, df (1) p = 0.002
Male	170 (58.02%)	123 (41.98%)	
Female	198 (70.21%)	84 (29.79%)	
Age group			$\chi^2=2.14$, df (3) p= 0.54
< 20 years	21 (67.78%)	10 (32.22%)	
20-39 years	88 (66.67%)	44 (33.33%)	
40-59 years	113 (66.61%)	58 (33.39%)	
≥ 60 years	146 (60.58%)	95 (39.42%)	

Among the admitted patients higher the length of stay (4 days or more) in ICU, lower the mortality rate. Higher incidence

of death 88 (42.51%) occurred for 1-3 days of ICU stay (table VI).

Table-VI: Length of stay in ICU before death (n=207).

Length of stay	Number of death (n)
< 24 hours	43 (20.77%)
1-3 days	88 (42.51%)
4 days to 1 week	41 (19.81%)
> 1 week	35 (16.91%)

Highest incidence of death occurred for 1-3 days of ICU stay (42.51%). In our study out of 575 admitted patients 207 (36%) patients died, 352 (61.22%) patients were

improved and discharged from ICU and 16 (2.78%) patients referred to higher center (Fig.2).

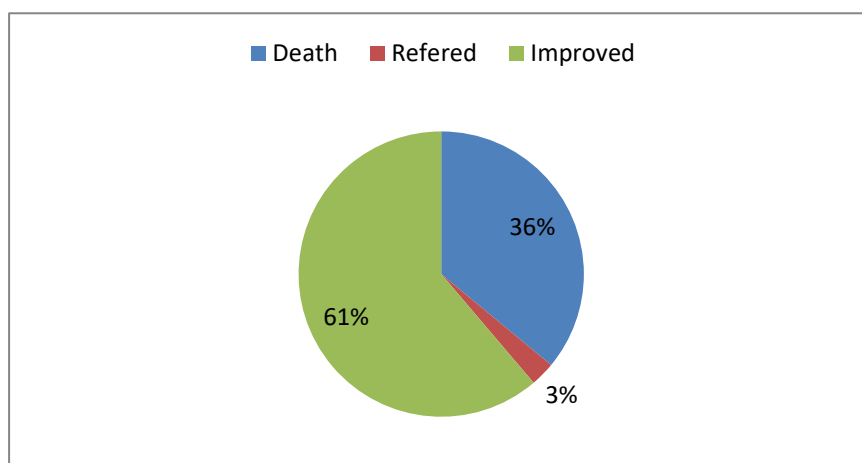


Fig 2: Outcome of admitted patients in ICU (n=575).

DISCUSSION

Morbidity pattern and outcome of patients admitted in intensive care unit (ICU) depends on both patients and ICU related factors, including age and sex of the patient, severity of disease, other comorbidity, medical attention at proper time, management facilities, quality of ICU staffs as well as the overall status of that ICU. Criteria for admission into the ICU includes patients who are critically ill but recoverable who need special support like mechanical ventilation and invasive monitoring. In this study, male preponderance of ICU admission. Male patients outnumbered female patients may be because it is a male dominating community which gives importance to males in the families and least priority to females.⁵ Ala.S. et al (2012)⁸ reported the similar result where they found male predominant in ICU admission. The age range of the patients admitted over the period was 18-85 years. This shows that no age group is exempted from severe or life-threatening illness and injuries which are managed in ICU. Patients aged 60 years and above (41.92%) were the most common age group admitted to the ICU which differ from some previous

studies. In their studies, they found young and middle age groups were most common age group admitted to ICU ^{5,6} Medical patients admitted in ICU was about ten times higher than the surgical patients (90.78% vs 9.22%). However, death rates was almost 1.5 times higher in medical treated patients (37.16% vs 24.52%). Medical cases are higher risk of ICU mortality because of their greater severity of illness in term of acute physiological derangement and un-optimized comorbidity. Similar result was found in a study of the Chittagong Medical College Hospital, Chittagong, Bangladesh. ¹⁰ The common reasons for ICU admission were respiratory disease, neurological disease and cardiovascular disease. Respiratory disease in most common in our country due to air pollution and smoking. In our study, Respiratory and cardiovascular disease were the major cause of mortality in the ICU. Similar result was found in Paudel. R. et al (2011) ¹¹ study. In this study, the overall death rate in the ICU was 36%, whereas it was found 57.23% in a 5 years retrospective study in the ICU of a large public hospital in this developing country. ¹⁰ In another study at

Maharashtra, India, they found ICU mortality rate was 27.77%⁵. Studies in Africa reported ICU mortality rate was 34%-43%.^{12,13,14} On the other hand, in developed country like France and USA, the estimated mean ICU mortality rate was found about 8%-18%.^{15,16} Higher mortality rate in developing country is due to late presentation of patients, availability of limited number of trained staff and lack of adequate life support equipment. In this study, mortality rate was significantly high in male patients and naturally the death rate among the geriatric patients was high. Dr. Dongre Ashwini. et al (2016)⁵ and Md. Rabiul Alam. et al (2017)⁶ also reported the similar result. The highest incidence of death occurred during 1-3 days of ICU stay which indicate that the first 72 hours in ICU is the most crucial period.¹⁷ The reason for the shorter mean admission duration of about 3 days for non-survivors is that those with very severe life-threatening condition die early while survivors are stabilized over more number of days and subsequently shifted to ward for further treatment.

CONCLUSION AND RECOMMENDATIONS

This retrospective study represented the morbidity pattern and outcome of the critically ill patients admitted in a newly established ICU in Bangladesh. Respiratory disease, neurological disease and cardiovascular disease were the most common reasons for admission in to ICU while respiratory disease and cardiovascular disease were the major contributor to the mortality. Surgical patients those admitted in this ICU were due to post-operative complications. Majority of the patients recovered which indicates good emergency and intensive care management. Male sex, geriatric patients, medical diagnosis and shorter duration of stay in ICU were associated with higher mortality. Death rate due to respiratory and cardiovascular disease can be reduced by life style modification and

proper health care delivery. ICU mortality analysis should focus on regular training and retraining of intensive care providers and improvement of health care resources. There is also need for the regular public health education on primary prevention of disease. We also recommended that there will be need to conduct a multicenter collaborative study on the morbidity pattern in ICU across the county in order to have a holistic view of the morbidity, mortality and possible solution.

LIMITATIONS OF THE STUDY

This is a retrospective study. Some of the data sought for the admission and discharge register were incomplete. There may be information bias and confusion bias as all information were collected from record documents.

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