Internal Medicine Section

Mortality Profile of Critical Patients in Medical Intensive Care Unit of Government Medical College of Central India

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ABSTRACT

Introduction: Mortality rate is always very high in Intensive Care Units (ICU) even with the best possible set ups, we should try to cater the need of the society according to the disease burden so that better care can be provided.

Aim: To estimate the prevalence of various medical disease mortality profile of critically ill patients admitted in Medical Intensive Care Unit (MICU) of our institution.

Materials and Methods: This was a retrospective observational study done at MICU of Bundelkhand Medical College and Hospital Sagar, Madhya Pradesh, India for a duration of one year (1st January 2019 to 31st December 2019). Data was retrieved from Medical Records Department (MRD) and total data of 349 deaths were registered. Disease was classified based upon ICD 10 (International Statistical classification of Diseases and related health problems) Score.

Results: A total of 349 deaths occurred in MICU during the period of one year at the institution, out of which male deaths were 55.9% and female deaths were 44.1%. MICU deaths occurred in higher numbers in males with male: female ratio of 1.2:1. This difference in ratio of male and female mortality was not statistically significant (p-value >0.05). Mean age of males at time of death was 58.4±16.3 years whereas mean age of females were 55.2±19.7 years. This difference in mortality with age and gender was not statistically significant (p-value >0.05). In present study, most common systemic causes of mortality were cardiovascular (29.8%), followed by respiratory (17.5%), renal (16.5%) and cerebrovascular diseases (13.8%). Mortality was documented in 276 (79%) individuals within duration of seven days of admission, whereas mortality in 46 (13.1%) and 27 (7.7%) cases were documented within 8 to 14 days and >14 days, respectively. The present study documented no statistically significant association between length of stay and age of patients (p-value >0.05).

Conclusion: Cardiovascular diseases are the most common causes leading to mortality especially in elderly male patients. Also, higher number of deaths is reported within seven days of admission signifying severity of illness at the time of admission.

INTRODUCTION

A Medical Intensive Care Unit (MICU) has been defined as a specially staffed and equipped section dedicated for care and treatment of critically ill patients with life threatening disease or their complications [1]. The MICU serves extremely ill patient population who undergo multiple complex interventions simultaneously. During the last decade, technological advancement has led to improvement in quality of care for patients admitted in MICU [2]. Despite high quality of care, the mortality remains much higher among such patients. There are no uniform data on mortality rate of MICU across India. However, various literature suggest that mortality rate in MICU may vary form 16.2% to 36.7% [3-5]. So every effort should be made to find out the diseases at early stages and their complications pertaining to any specific region to serve the society in a better way.

There are multiple causes of death in MICU. During the early phase of MICU admission, the cause of death could be underlying disease and their complications such as multi-organ failure. However, as the length of stay in MICU increases, the causes leading to mortality include hospital acquired infections, mesenteric ischemia, or healthcare-related complications [6]. The main purpose of MICU care is treatment of critically ill patients, monitoring of their vitals, doing various procedures and saving the life of patients. As death rate is always very high in ICUs, critical care is the most demanding and challenging part of medical field and always needs highly efficient team of doctors and nurses, upgrading of skilled staff such as training and newer equipment according to need of a particular region [5,6]. The present study was planned and conducted at the tertiary care centre to understand the diseases and causes of mortality of critically ill patients admitted in MICU of the present institution.

MATERIALS AND METHODS

The present study was conducted as an Institution based retrospective, observational study at MICU of Bundelkhand Medical College and Hospital Sagar, MP which is a Government funded tertiary care teaching hospital for a duration of one year (1st January 2019 to 31st December 2019). Ethics Committee (IEC BMC/2020/11 Dated 10.11.20) approval was obtained. Data of MICU was collected from MRD of the Hospital. In present study, we registered data of total 349 deaths due to medical causes which occurred among patients admitted in MICU of our institute in this duration of one year. No death data was missing from current study.

Inclusion criteria: Data regarding all the deaths which occurred during study period in MICU due to medical causes belonging to age group above 18 years were included in the study. Both the sexes were included and patients registered only with our institution were included.

Exclusion criteria: Patients below the age of 18 years were excluded. All postoperative, surgical, trauma cases were excluded from study. Patients who were not registered in our institution were excluded.

Socio-demographic details of patients, duration of stay in MICU, system involvement with diagnosis, events in 48 hours prior to death and cause of death was noted and entered in study proforma.

Disease was classified based upon ICD 10 (International Statistical classification of Diseases and related health problems) Score [7].

STATISTICAL ANALYSIS

Data was compiled using MS Excel and analysis was done using Statistical Package for Social Sciences (SPSS) version 20.0 software. Numerical data was expressed as mean±SD (Standard Deviation) and grouped data was expressed as frequency and percentage. The Chi-Square test was used to evaluate association between proportions. The p-value <0.05 was considered statistically significant.

RESULTS

Mean age of patients in present study was 56.9±17.99 years. Majority of deaths occurred in age range of 60 to 69 years (27.5%) followed by 50 to 59 years (16.6%). About 55.9% deaths in present study occurred in males and rest 44.1% were documented in females. Mean age of males at time of death was 58.4±16.3 years whereas mean age of females was 55.2±19.7 years. The present study documented no significant difference in mean age of males and females at the time of death (p>0.05) [Table/Fig-1].

Socio-demographic variables		Frequency (N=349)	Percentage
Age (years)	<30	32	9.2
	30-39	27	7.7
	40-49	44	12.6
	50-59	58	16.6
	60-69	96	27.5
	70-79	51	14.6
	≥80	41	11.7
Gender	Male	192	55.9
	Female	157	44.1

[Table/Fig-1]: Distribution of deaths according to socio-demographic variables (Age and Gender).
Chi-square test was used to calculate p-value; p-value >0.05 statistically significant

In present study, most common cause of mortality were cardiovascular (29.8%), followed by respiratory (17.5%). Amongst the cardiovascular causes, Coronary Artery Disease (CAD) was the leading cause of mortality documented in 12.9% cases followed by congestive cardiac failure and myocardial infarction in 8% and 7.2% cases, respectively. Other causes of deaths included pregnancy related complications in eight cases, poisoning four cases, cancer four cases, osteoarthritis three cases, fever three cases, sepsis two cases, autoimmune two cases, herpes zoster one case, peripheral arterial disease one case and snake bite in one case. Pregnancy related complications included eclampsia/pre-eclampsia in four cases whereas postpartum bleed, thromboembolism, abruptio placenta and gestational diabetes mellitus contributed each to one mortality. However, the present study documented no statistically significant difference in mortality among males and females (p>0.05) [Table/Fig-2].

Mortality was documented in 276 individuals within seven days of admission, whereas mortality in 46 and 27 cases were documented within 8 to 14 days and >14 days, respectively. The present study documented no significant association between duration of stay and age (p>0.05) [Table/Fig-3]. Most common events that occurred within 48 hours before mortality were cardiac arrest (37.5%), followed by anuria in 16.3% [Table/Fig-4].

DISCUSSION

Medical Intensive Care Unit (MICU) are specialised unit of hospitals and mortality in MICU remains high despite best efforts [8]. The present retrospective study assessed the pattern of mortalities in MICU of tertiary care teaching hospital over a period of one year. A total of 349 deaths were documented and male deaths were reported to be slightly higher as compared to females, about 55.9% deaths in present study occurred in males and rest 44.1%

System	Diagnosis	Male n (%)	Female n (%)	Total N (%)	
Cardiovascular	Coronary artery disease	24 (12.5)	21 (13.4)	45 (12.9)	104 (29.8)
	Congestive cardiac Failure	12 (6.2)	16 (10.2)	28 (8)	
	Myocardial infarction	14 (7.3)	11 (7)	25 (7.2)	
	Rheumatic heart disease	2 (1)	4 (2.5)	6 (1.7)	
Respiratory	Infective (Tuberculosis, pneumonia)	17 (8.9)	10 (6.4)	27 (7.7)	61 (17.5)
	Pleural effusion	3 (1.6)	1 (0.6)	4 (1.1)	
	Chronic obstructive pulmonary disease	15 (7.9)	13 (8.3)	28 (8)	
	Interstitial lung disease	1 (0.5)	0 (0)	1 (0.3)	
	Pneumothorax	0 (0)	1 (0.6)	1 (0.3)	
Renal	Chronic kidney disease	30 (15.6)	27 (17.2)	57 (16.3)	57 (16.3)
Central nervous system	Cerebral infarct	14 (7.3)	12 (7.6)	26 (7.4)	48 (13.8)
	Cerebral bleed	7 (3.6)	3 (1.9)	10 (2.9)	
	Meningoencephalitis	4 (2.1)	2 (1.3)	6 (1.8)	
	Epilepsy	3 (1.6)	1 (0.6)	4 (1.1)	
	Toxic encephalopathy	1 (0.5)	1 (0.6)	2 (0.6)	
Hepatobiliary and GIT	Acute liver disease	9 (4.7)	3 (1.9)	12 (3.4)	24 (6.9)
	Chronic liver disease	6 (3.1)	1 (0.6)	7 (2.0)	
	Viral hepatitis	0 (0)	1 (0.6)	1 (0.3)	
	Peritonitis	1 (0.5)	1 (0.6)	2 (0.6)	
	Gastritis	1 (0.5)	0 (0)	1 (0.3)	
	Paralytic ileus	0 (0)	1 (0.6)	1 (0.3)	
Endocrine	Diabetes mellitus	10 (5.2)	9 (5.2)	19 (5.4)	
Anaemia		3 (1.6)	4 (2.5)	7 (2)	
Others		15 (7.8)	14 (8.9)	29 (8.3)	
Total		192	157	349	

[Table/Fig-2]: Association of systemic cause of mortality with gender.
(Chi-square test was used to calculate p-value); p-value=0.611

Age (years)	Length of stay n (%)			Total n (%)
	≤7 days	8-14 days	>14 days	
<30	29 (10.5)	1 (2.2)	2 (7.4)	32 (9.2)
30-39	20 (7.2)	5 (10.9)	2 (7.4)	27 (7.7)
40-49	32 (11.6)	9 (19.6)	3 (11.1)	44 (12.6)
50-59	49 (17.8)	4 (8.7)	5 (18.5)	58 (16.6)
60-69	78 (28.3)	11 (23.9)	7 (25.9)	96 (27.5)
70-79	41 (14.9)	6 (13)	4 (14.8)	51 (14.6)
≥80	27 (9.8)	10 (21.7)	4 (14.8)	41 (11.7)
Total	276	46	27	349

[Table/Fig-3]: Association of age with duration of stay in deceased individuals.
Chi-square test was used to calculate p-value; p-value-0.35

Events	Frequency	Percentage
Cardiac arrest	131	37.5
Arrythmia	19	5.4
Hypotension	23	6.6
Desaturation	52	14.9
Anuria	57	16.3
Respiratory failure	34	9.7
Disseminated intravascular coagulation	21	6.0
Multiorgan failure	12	3.4

[Table/Fig-4]: Major adverse events in 48 hours before mortality.

were documented in females with the male:female ratio of 1.2:1. This difference in mortality in male:female ratio is statistically not significant (p-value>0.05). These findings were similar to study done by Shankar G and Kalburgi EB, Khare N et al., [9,10]. Highest cases of mortality was 27.5% in the age group of 60-69 years in present study as compared to study done by Shankar G and Kalburgi EB, 35.29%, Khare N et al., 24%, Reddy RJ and Reddy PV 33.8%, Orban JC et al., 28%, Pal A and Prashanth K 56%. Major cause of mortality was cardiovascular 28.9% in in the present study, Alam MR et al., 20%, Reddy RJ and Reddy PV 19.23%, Orban JC et al., 26%. In the present study, respiratory causes were the second most common 17.5% cause of death, which is similar to studies done by Khare N et al., 10.31%, Alam MR et al., 10% and Pal A and Prashanth K 10.9% [Table/Fig-5] [9-14].

Cardiac arrest followed by anuria were the most common adverse events that occurred in patients 48 hours prior to mortality, however DIC, arrythmia and multiorgan failure were observed in 6%, 5.4% and 3.4% cases, respectively in present study. These findings were supported by Reddy RJ and Reddy PV and Orban JC et al., [12,13].

Limitation(s)

The present study is not free of limitation. Being a unicentric and retrospective study, the findings could not be generalised. Retrospective study is associated with selection and recall bias. Thus, a large multicentric prospective study is recommended to obtain better results which help in planning and policy making.

S. No.	Various studies done in past	Percentage of deaths in age group 60-69 years	Cardiovascular (CAD) cause	Respiratory cause	Renal cause	Cerebro vascular accident (CVA) cause	Sepsis or infection	Duration of stay less than seven days before death
1	Shankar N and Kalburgi EB, [9]	35.29%	13.44%	4.76%	3.92%	10.92%	10.64%	-
2	Khare N et al., [10]	24%	14.63%	10.31%	4.75%	8.0%	24%	-
3	Alam MR et al., [11]	12.26%	20%	10%	1.42%	14.28%	1.42%	34.3%
4	Reddy RJ and Reddy PV [12]	33.8%	19.23%	3.4%	14.23%	13.46%	1.53%	55.38%
5	Orban JC et al., [13]	28%	26%	-	-	9.0%	-	-
6	Pal A and Prashanth K [14]	56%	14.7%	10.9%	7.1%	19.9%	26.3%	-
7	Current study	27.5%	29.8%	17.5%	16.3%	13.8%	0.57% (only 2 case)	79.1%

[Table/Fig-5]: Comparison of current study with other studies [9-14].

Mean age of males at time of death was 58.4±16.3 years whereas mean age of females were 55.2±19.7 years. This difference in age of male and female mortality was statistically not significant (p-value >0.05).

The present study observed that maximum deaths occurred in patients belonging to 60 to 69 years of age (27.5%) followed by 50 to 59 years (16.6%). Alam MR et al., in their ICU death audit documented overall mortality rate as 3.58% and death rates were maximum in geriatric population (over 60 years of age) i.e., 12.26% followed by 2.84% mortality in adults aged (13-60 years) and paediatric population (below 12 years) had 1.56% mortality rate [11]. Findings similar to present study were also documented by Faruque LI et al., [8].

In present study, cardiovascular diseases were the most common cause of mortality (29.8%) followed by respiratory (17.5%), renal (16.5%) and cerebrovascular diseases (13.8%). No statistically significant difference in mortality among males and females (p>0.05) was observed. Similarly, Reddy RJ and Reddy PV also documented cardiovascular diseases as the most common cause of mortality [12]. However, the second common cause of mortality were CKD in reference study whereas present study documented renal causes as third common cause of mortality after respiratory causes. Similar to the findings of present study, Alam MR et al., documented Ischemic Heart Disease (IHD) as the prime cause of death (20%) [11]. Cardiac followed by respiratory diseases as causes of mortality was also noted by Orban JC et al., [13]. Contrasting to the finding of present study, Pal A and Prashanth K observed sepsis, stroke, respiratory and cardiovascular diseases as the leading causes of mortality [14].

In present study, majority of deaths occurred within seven days of admission (79.1%) whereas 13.2% and 7.4% deaths were reported within 8 to 14 days and >14 days, respectively. Also, there was no significant association between length of stay and age (p>0.05). Similar results were observed by Alam AR et al., in which maximum deaths were reported within 1 to 3 days of admission (34.3%) [11]. Similarly, Reddy RJ and Reddy PV documented maximum mortality within 24 hours of admission (24%) and least mortality as the length of stay increased [12].

CONCLUSION(S)

Based on the findings of present study, we conclude that cardiovascular causes are the most common causes leading to mortality especially in elderly male patients. Also, higher number of deaths are reported within seven days of admission signifying severity of illness at the time of admission.

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