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SHORT TERM ICU MORTALITY AND PATIENTS'S CHARACTERISTICS: A RETROSPECTIVE STUDY IN A COLLEGE HOSPITAL.

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ABSTRACT

Intensive care unit (ICU) patients are extremely ill, need frequent monitoring and support, and has the highest reported hospital mortality rates. The aim of the study was to evaluate the characteristics of ICU patients and their short-term mortality. This retrospective study was performed in 2018 at IbnSina National College Hospital in Jeddah, Saudi Arabia. Records of 74 ICU patients hospitalized from January to August 2018 were reviewed for demography, clinical and laboratory data, mechanical ventilation (MV), use of vasopressor, length of stay, and short-term mortality. Sequential Organ Failure Assessment (SOFA) score was calculated. Results showed that most ICU patients were non-elderly (85.1%) men (79.7%) with diabetes (50.7%) and hypertension (44%). The main causes of admission were DKA (21.6%) and neurological (21.6%) emergencies. Only 10.8% received vasopressors but no MV. Short term mortality was 12.2% including only men with significantly high odds ratio in patients older than 40 (p=0.04), cardiac (p=0.008) or hepatic diseases (p=0.003), high SOFA score (>8) (p=0.008), and duration of admission >2 days (p=0.034). In conclusion, our mortality rate was within the lower limit of the globally reported rate of 6-40%; probably because of non-elderly age, associated comorbidities, frequent admission of DKA, infrequent need for vasopressor, and absent need for MV. Mortality was related to old age, underlying cardiac or hepatic diseases, long stay in ICU, and high Sofa score.

KEYWORDS: *ICU, Intensive care unit, Mortality, co-morbidities, SOFA score.*

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INTRODUCTION

Intensive care unit (ICU) patients are heterogeneous group of patients who are extremely ill, need frequent monitoring and support, and has the highest mortality rates compared to patients admitted to other hospital units. [1] Worldwide, ICU mortality rate is between 6 and 40% with medical care. [2] Respiratory, cardiac, and neurologic illnesses are the most common causes for admission to ICU in adults; while mechanical ventilation is the most common technological support in ICU. [3] In a retrospective cohort study[4] of 26 ICUs, patients with short term mortality had 12.4% greater costs than survivors. In another study[5] ; ICU patients had higher mortality, more use of hospital resources and 51% higher mean 5-year hospital costs compared to matched hospital controls. They also found that patients' comorbidities were stronger predictors of hospital resource use than acute illness factors. [5] Taken together, measuring ICU outcomes in terms of mortality can help guide resources, improve quality of service, and improve overall hospital outcome and costs. In a systematic review with meta-analysis in 2016[6] ; 33 studies concerned by ICU mortality were reviewed. The estimated rate was high with significant differences in the prevalence of ICU mortality in different countries. Thus, it is necessary to conduct more studies on the predictors of ICU mortality in different nations. In Saudi Arabia, there are different reports about the mortality rate with a huge controversy over the underlying causes and predictors. [7-9] Therefore, the aim of the study was to evaluate the characteristics of ICU patients and their short-term mortality.

MATERIALS AND METHODS

This single-center retrospective study was performed from September to October 2018 in IbnSina National College Hospital in Jeddah, Saudi Arabia. It included all consecutive ICU patients (children and adults) hospitalized within an eight-month period from January to August 2018. The file numbers were retrieved from the ICU admission book lists and were obtained from the medical record unit. Only files with incomplete data were excluded. Collected data included demographic data, the underlying diseases, the reason for admission, on admission clinical and laboratory data, mechanical ventilation, use of vasopressor, length of stay in ICU, and short-term mortality. Organ dysfunction/failure and mortality prediction at admission were assessed using the "Sequential Organ Failure Assessment" (SOFA) score. [10] The SOFA score is used for prediction of ICU mortality based on laboratory tests and clinical data. The total score is based on scores of 6 variables of organ systems: respiratory, cardiovascular, hepatic, coagulation, renal, and neurological systems. Each organ system is assigned a point value from 0 (normal) to 4 (high degree of dysfunction/failure). The Score was calculated using the worst values (the highest number of points) reported in the first 24 hours of ICU admission. The SOFA score and the expected mortality rate were calculated for each patient using the online calculator. The protocol of the study was approved by the ethical committee of IbnSina National College, and the data were dealt confidentially. Owing to the retrospective nature of the study there were no requests for patients' consents.

STATISTICAL ANALYSIS

SPSS version 22 was used for statistical analysis and Excel 2013 for constructing figure 1. A descriptive analysis was performed on the patient's characteristics. Categorical and continuous data are reported as number (%), or median with the range. Chi-squared tests were used to examine the differences in categorical variables and odds ratio estimation. Non-parametric tests were applied to examine the differences in the non-normally distributed continuous variables. All statistical tests were two-sided, and a P-value less than 0.05 was considered significant.

RESULTS

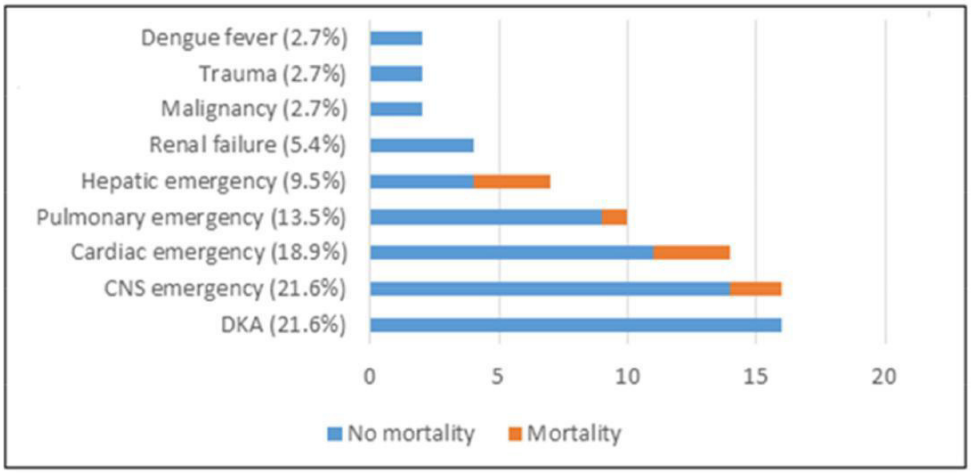
All patients were Jeddah residents, mostly men (79.7%) and 14.9% were elderly (at or above 65years). Many patients had diabetes (50.7%) and hypertension (44%). Their median SOFA score was 5, ranging from 2 to 12 with the corresponding median predicted mortality rate of 20.2% (from 6.4 to 95.2%). High SOFA score was considered if it was at or above 8 (with expected mortality at or above 33%). The median duration of admission was two days; ranging from 1 to 16 days and the short stay was considered if it was at or below two days. No one was ventilated mechanically, 10.8% received vasopressor for hypotension (Table 1).

Table 1
Patients' characteristics among ICU patients.

		ICU Patients (N=74) N(%)
Age.	<65	63(85.1).
	>=65	11(14.9).
Gender.	Males	59 (79.7).
	Females	15 (20.3).
Underlying comorbid condition.	Diabetes mellitus.	38(50.7).
	Hypertension.	33(44.0).
	Respiratory diseases.	4(5.3).
	Cardiac illness.	11(14.7).
	Hepatic diseases.	3(4)
	Renal diseases.	4(5.3).
Duration of admission in days.	≤2	48(64.9).
	>2	26(35.1).
SOFA score	<8	58(78.4).
	>=8	16(21.6).

Statistical analysis by Chi-square test. *Significant p<0.05. **Mortality included only males

Figure 1 demonstrates the causes of ICU admission and mortality. The most common causes of admission were diabetic ketoacidosis (DKA) (21.6%), neurological emergencies (21.6%), pulmonary emergency (18.9%), pulmonary emergency (13.5%), and hepatic emergency (9.5%). Causes of death included cardiac (3(33.3%)), hepatic (3(33.3%)), neurological (2(22.%)), and pulmonary (1(11%)) emergencies. Significantly high odds of mortality were seen in those with cardiac (p=0.008) and hepatic emergencies (p=0.003).



CNS: central nervous system, DKA: diabetic ketoacidosis.

Figure 1
The main causes of ICU admission and mortality.

Table 2 shows ICU mortality and odds ratio. Nine male patients (12.2%) had died (there was no mortality among female patients); but only patients with underlying cardiac (p=0.008) and hepatic diseases (p=0.003) had significantly higher odds of mortality. Significantly high mortality odds ratios were also detected in those who aged ≥40 years (0.04), stayed for more than two days in ICU (P=0.34) or had a SOFA score above 8 (P=0.008).

Table 2
ICU mortality odds ratio among ICU patients.

		Mortality (N=9) N (%)	Mortality odds ratio.	95% Confidence Interval.	P.
Age	<40	1(3.6%)	5.68	0.67-48.15	0.04*
	≥40	8(17.4%)			
Gender.	Males.	15.3%(9)	0.847	0.761-0.944	0.107
	Females.	0(0%)			
Underlying comorbid condition.	Diabetes mellitus.	4(10.5%)	0.73.	0.18-2.96.	0.658.
	Hypertension.	6(18.2%)	2.8.	0.65-12.26.	0.155.
	Respiratory diseases.	1(25%)	2.6.	0.24-27.91.	0.419.
	Cardiac illness.	4(36.4%)	6.6.	1.43-30.64.	0.008.*
	Hepatic diseases.	2(66.7%)	18.3.	1.47-228.20.	0.003.*
	Renal diseases.	0(0%)	0.87	0.80-0.95	0.444
Duration of admission in days.	≤2	3(6.3%)			
	>2	6(23.1%)	4.5	1.02-19.82-	0.034.*
SOFA score.	<8	4(6.9%)			
	≥8	5(31.3%)	6.14	1.42-26.58	0.008.*

Chi-square test was done for comparison and odds ratio estimation.*Significant p<0.05.

DISCUSSION

In this study, short term ICU mortality was high (12.2%) and included only men. The significantly high odds ratio of mortality was seen in patients older than 40, with underlying cardiac or hepatic diseases, high SOFA score (>8), and duration of admission more than 2 days. Our reported mortality (12.2%) was among the lower half of the globally reported rates between 6 and 40%. [2] One explanation was the increased number of non-geriatric patients (85.1%) in our cohort. Geriatric ICU patients institute a very large critical group in ICU with a high risk of mortality. [11] Moreover, our mortality rate was lower than that reported by other researchers in patients with septic shock. [12,13] A systematic review and meta-analysis of early goal-directed therapy for septic shock reported mortality of 23.2%. [12] However, we did not exclusively study patients with septic shock; we included all ICU patients who were admitted because of different critical conditions. Finally, our reported mortality was also lower than predicted from the patient's SOFA score (20.2%). We assessed SOFA score based on the values on admission; not the worst values during the whole ICU stay, and this may explain the disparity between actual and expected mortality in this study. The relatively low mortality rate in our ICU compared to others could also be explained by the causes of death which did not include DKA (21.6%); the highest cause of admission. The significant high mortality odds in this study were found in cardiac and hepatic emergencies. Other researchers who reported higher mortality rate (52.3%) than ours; had more serious frequent causes of admission like hemodynamic instability, respiratory failure and sepsis. [14]

Limitations: Our study was limited in several important ways — first, the relatively small number of patients because of our small hospital with only 100 beds. Second, the retrospective retrieval of patients' data from files. We were unable to complete necessary information in patient data charts, to adjust for all ICU treatments administered to patients, or to apply other important prognostic scoring systems like "Acute Physiology and Chronic Health Evaluation".

CONCLUSION

Our ICU patients were mainly non-elderly men with associated comorbidities of diabetes and hypertension. Their mortality rate (12.2%) was within the lower limit of the globally reported rate of 6-40%; probably because of patient's non-geriatric age, specific causes of admission, associated comorbidities, infrequent need for vasopressor, and absent need for MV. Mortality was related to male gender, underlying etiology mainly the cardiac and hepatic diseases, long stay in ICU, and high Sofa score.

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AUTHOR CONTRIBUTION STATEMENT
All authors shared in literature review, analyzed and interpreted the patient data FA and AA calculated the SOFA score for individual patients, and BM with WA, SA were a major contributor in writing the manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTEREST

Conflict of interest declared none.

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