

Causes of Mortality among Critically Ill Patients Admitted in Intensive Care Unit

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Background: There are only a few studies about the causes of mortality among critically ill patients in Intensive Care Unit (ICU).

Objective: To determine the main causes of death among critically ill patients in ICU.

Design: A Retrospective Study.

Setting: Ibn Sina Teaching Hospital, Hadhramout Province, Yemen.

Method: A retrospective study was conducted in mixed medical-surgical 12-beds Intensive Care Unit from 1 January 2013 to 31 December 2013. Data were collected from the medical records and analyzed using SPSS version 14.

Result: Five hundred one patients were included in the study. The mean age of death was 60.35% (years) and the most common causes of death were from circulatory system disorders 215 (42.91%), followed by 99 (19.76%) renal failure. Most patients were in the age group of ≥ 70 years at the time of death; average hospitalization was 1-7 days. There was a significant statistical relationship between the death in ICU with the age and length of stay ($P = .0001$).

Conclusion: Circulatory system disorders and renal failure were the most common causes of death among the critically ill patients in the ICU.

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Intensive care medicine has developed into a highly specialized discipline covering several fields¹. Critically ill patients are admitted to ICU to reduce morbidity and mortality associated with acute illness, trauma or surgical procedures². ICU is also one of the sites in which medical errors are most likely to occur because of the complexity of care^{3,4}. ICU patients are severely ill and undergo multiple complex interventions; therefore, these patients are extremely vulnerable to experiencing adverse outcomes^{5,6}.

Mortality rates in the ICU strongly depend on the severity of illness. Across different ICUs, 6.4%-40% of critically ill patients were reported to die despite intensive care⁷. The

knowledge of the causes of mortality in critically ill patients would not only help improve the proper evaluation of critically ill patients, but would also necessitate the development of new treatment strategies to be implemented in the management of critically ill patients in ICU.

Many studies have evaluated the causes of mortality in patients who were admitted to ICU in western countries but a little is known about the causes of mortality among critically ill patients who were admitted in the ICU in our region⁸.

The aim of this study is to investigate the causes of mortality and duration of hospitalization among patients who were admitted to ICU.

METHOD

A retrospective study was conducted from 1 January 2013 to 31 December 2013; medical and surgical critical cases were included. All patients ≥ 18 years were included. The patients with incomplete medical records were excluded.

Personal characteristics and history data were entered and analyzed using SPSS version 14. Data were given as frequency distribution, mean values, standard deviation and P-value.

RESULT

Five hundred one dead patients in the ICU were documented during one year of the study. Three hundred ten (61.9%) were males and the mean age was 60.53 with $SD \pm 17.23$. Two hundred seventeen (43.3%) patients were ≥ 70 years and 32 (6.4%) were 18-29 years, see table 1.

Table 1: Mortality, Age Groups and Length of Stay

	Duration of stay			
	1-7 days	8-14 days	≥ 14 days	
18-29 years	28	2	2	32 (6.4%)
30-49 years	73	6	9	88 (17.6%)
50-69 years	139	6	19	164 (32.7%)
≥ 70 years	171	10	36	217 (43.3%)
	411 (82%)	24 (4.8%)	66 (13.2%)	Total 501 (100%)

*Chi-square=153.85

P value=0.0001

*Degree of freedom (DF) =43.

There was a significant statistical relationship between the death in the ICU with age and length of stay ($P=0.0001$). Most of the deaths occurred in patients who were hospitalized in the ICU for 1-7 days, 411 (82%). Most common causes of hospitalization were as follows: 100 (19.96%) cerebrovascular accident, 99 (19.76%) renal failure and 60 (11.97%) ischemic heart disease, see table 2.

Table 2: Causes of Admission in ICU

Cause of Hospitalization	
Cerebrovascular Accident (CVA)	100 (19.96%)
Renal Failure	99 (19.76%)
Myocardial Infarction (MI)	60 (11.97%)
Malignancy	34 (6.78%)
Hepatic Encephalopathy	32 (6.38%)

Infections	30 (5.98%)
Coma	28 (5.58%)
Congestive Heart Failure	26 (5.2%)
Diabetic Ketoacidosis	25 (5%)
Head Injury	24 (4.8%)
Shock¹	17 (3.4%)
Burn	12 (2.4%)
Other²	11 (2.2%)
Seizure	3 (0.59%)
Total	501 (100%)

¹Included septic and hypovolemic shock.

²Other included non-specific causes e.g.: headache, nausea vomiting, abdominal pain and breathing difficulty.

The causes of mortality were classified according to ICD-10. Diseases of the circulatory system were the most common (CVA, Ischemic Heart Disease (IHD) and congestive heart failure), 215 (42.91%). Renal failure was the second most common cause of mortality, 102 (20.36%), malignancy was the third cause of death, 35 (6.99%). Infectious diseases were ranked as a fourth cause of death, 34 (6.8%) and meningitis, malaria, dengue fever and Human Immunodeficiency Virus (HIV) were included, see table 3.

Table 3: Causes of Mortality among Intensive Care Unit Patients

Cause of Death	
Circulatory System Disorders¹	215 (42.91 %)
Renal Failure	102 (20.36%)
Malignancy²	35 (6.99 %)
Infectious Diseases	34 (6.79%)
Hepatic Encephalopathy	32 (6.39%)
Head Injury	25 (4.99%)
Perforated Peptic Ulcer	17 (3.39%)
Burns	16 (3.19%)
Diabetic Ketoacidosis (DKA)	14 (2.79%)
Unknown Cause³	11 (2.2%)
Total	501 (100%)

¹Cerebrovascular disease is the most common cause of death in this category.

²The most common type in this category was colon cancer.

³The patients were rushed to ICU and died before determine the cause.

DISCUSSION

There are few studies among critically ill patients in our country. The study is limited by insufficient resources to allow full collection of data for calculating disease severity in all patients.

In the present study, the mean age of dead patients was 60.35 years with $SD \pm 17.23$. The highest mortality rate was in the age group of ≥ 70 years. Most studies have shown that the rate of mortality and hospitalization increase with increasing age^{9,10}. Our result revealed that 61.3% of the studied subjects were males which is consistent with other studies^{11,12}.

The most common causes of hospitalization were cerebrovascular accident, followed by renal failure, and myocardial infarction. Our result was inconsistent with another study by Mayr et al, which showed that the most frequent cause of death among critically ill patients in the ICU was multiple organ failure¹³. Other studies showed that the five primary ICU admission

diagnoses are in decreasing order: respiratory insufficiency/failure, postoperative management, ischemic heart disorder, sepsis, and heart failure¹⁴⁻¹⁶. In that study, the mean duration of patients' hospitalization in the ICU was 4.68 days. Our result was closely consistent with the study of Chen et al, which revealed that the mean duration of patients' stay in the ICU has been 5 days⁹. In a study by Ahsan et al, the mean duration of patients' stay was four days¹⁷. In Noorizad et al study, the hospital stay was 8.4 days^{17,18}.

Although critically ill patients in the ICU receive care for a large variety of disease states, the most common cause of mortality was circulatory system disorders, 42.91%; this is consistent with another study which defines the second leading cause of death in the ICU as cardiovascular failure¹³. The second leading cause of death in our study was renal failure, (20.36%); that finding has been observed by others¹⁹.

In this study, mortality decreased with the increased hospital stay. This is inconsistent with another study by Moradmand et al, where mortality increased with the increased hospital stay²⁰.

CONCLUSION

Causes of deaths were approximately equally distributed among study groups, except for Cerebrovascular Disease followed by Ischemic Heart Disease and Congestive Heart Failure. Research should focus on effective therapy to improve the general outcome of critically ill patients to reduce mortality. A prospective research trial is recommended using the Mortality Probability Models (MPM) at the ICU.

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