17694-Azmat-Increasing age and sepsis

by Azmat Ali

Increasing age and sepsis: A leading cause of mortality in intensive care units

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Abstract

Background: In resource poor countries, management of critically ill patients face serious challenges. Due to insufficient early sepsis care and delayed presentation to hospital and subsequently to Intensive Care Unit (ICU), mortality is as high as 40.1 %. This study was conducted with a view to ascertain the shortcomings in our referrals, delayed implementation of standard operating protocols (SOPs) and have an idea of local ICU mortality figures.

Method: Current study enrolled 1036 patients admitted in Medical ICU of Khan Research Laboratories (KRL) Hospital, Islamabad, Pakistan from April 16, 2016 till April 16 2017. This was a retrospective cohort study. All statistical analysis was done by using statistical package for social sciences (SPSS version 20).

Result: Out of 1036 patients admitted, 775 (74.8%) belonged to Medicine department. Of these 16.1% (n=125) died. 54.4 % (n=68) were males and 45.6 % (n=57) were females. Majority of patients who died i.e. 55.2 % (n=69) were between 71 and 100 years of age. 65.6 % (n=82) patients who died had more than 1 reason for admission while 34.4 % (n=43) had single reason for admission. Pneumonia 39.2 % (n=49) was the most common reason for admission followed by UTI 12.8 % (n=16) and Septicemia 11.2 % (n=14). Hypertension 26.4 % (n=33) was the most common comorbid followed by Diabetes Mellitus 19.2 % (n=24) and Ischemic Heart Disease 14.4 % (n=18).

Conclusion: Increasing age and related complications are major reasons for ICU admissions. Sepsis and sepsis related complications are major causes of ICU mortality. Unusual delay in our referral system complicates the situation. Emphasis lies on improved ICU facilities, trained and sufficient number of nursing and paramedical staff.

Key Words: Intensive Care Unit; ICU; Mortality; Sepsis; Developing countries; Pneumonia; Elderly; Hypertension; Diabetes Mellitus; Pakistan

Introduction:

Islamabad is one the most beautiful cities in the world famous for its natural beauty which includes mountains, trees, lakes and 4 weathers with a blend of modern urbanization. Multiple hospitals exist in Islamabad, (Khan Research Lab) KRL hospital being one of them. According to the census done in 1998 total population of Islamabad was 805235 persons; Male 434239 (53.93%) and Female 370996 (46.07 %).[1] It is estimated that Islamabad's current population is 1.9 to 2.0 million. In resource poor countries, management of critically ill patients face serious challenges. The few intensive care unit (ICU) services that exist are often hampered by a shortage of bed capacities, physicians and nurses with specific training in intensive care, as well as material resources.[2,3] This often results in inadequate care associated with high mortality rates and adverse functional long-term outcomes.[4] Management of critically ill patients requires

significant human, infrastructural, and financial resources. These resources are typically limited in low-income countries. Major intensive care units (ICUs) are mostly found in large hospitals in urban or metropolitan areas.[5] ICUs in high-income regions of the world have mortality rate between 10–20.9%.[6,7,8] In developing countries, due to insufficient early sepsis care and delayed presentation to hospital and subsequently to ICU mortality from sepsis is high.[9] In developing countries ICU mortality is 40.1%.[10] Sepsis and septic shock are the leading causes of mortality and morbidity in critical care units.[11] In Asian countries, the overall hospital mortality is 44.5%, and the intensive care unit mortality is 36.7%. The median (interquartile range) length of stay in the intensive care unit and hospital is 7 days (4-12) and 18 days (11-33), respectively, in survivors and 6 days (3-12) and 10 days (4-22), respectively, in non-survivors.[12] Different predictive scoring systems are used in ICUs for measuring important outcomes typically mortality. For Acute Physiologic and Chronic Health Evaluation (APACHE), the predicted mortality is based upon the sum of categorical variables entered into a computer-generated algorithm. For Simplified Acute Physiologic Score (SAPS) and Mortality Prediction Model (MPM$_0$), the severity score, which is based upon the sum of the variables, is entered into an equation that calculates a predicted mortality. For Sequential Organ Failure Assessment (SOFA), sequential severity scores plot the trajectory of the clinical course to provide a semi-quantitative assessment of mortality, based upon multi-organ failure. However, clinicians should be aware of what the limitations are in a specific population of interest. As an example, SAPS 3 may underestimate mortality in patients with cancer and solid organ transplant, and SOFA may be more useful in a population with sepsis.[13, 14-16.] This study was conducted with a view to ascertain the shortcomings in our referrals, delayed implementation of standard operating protocols (SOPs) and have an idea of local ICU mortality figures.

Method:

Current study enrolled 1036 patients admitted in Medical ICU of Khan Research Laboratories (KRL) Hospital, Islamabad, Pakistan from April 16, 2016 till April 16 2017. This was a retrospective cohort study conducted after approval from ethical review board of the hospital. All deaths were analyzed using medical records. Age, gender, comorbid conditions, reason for admission, hospital stay and cause of death were among the variable collected for analysis.
KRL Hospital is a 350 bedded hospital and has a 13-bed ICU equipped with cardiac monitors, electronic beds, 3 ventilators, 2 isolation rooms and dialysis facility. It provides level II ICU services to all kinds of critically ill patients. Level II care includes mechanical ventilation for longer than 24 h, and specific organ support like dialysis and inotropic infusions. Hospital has a Medical Information System (MIS) department and all medical records are compiled and retained through computer based software.
Statistical Package for Social Sciences (SPSS) version 20 was used for data analysis. The clinical data of the study patients were stated as number of patients and percentages.

Results:

1036 patients were admitted in Medical ICU of KRL Hospital, Islamabad from April 16, 2016 till April 16, 2017. Out of 1036 patients admitted, 775 (74.8%) belonged to Medicine department. Of these 16.1% (n=125) died.

Among expired patients, 54.4 % (n=68) were males and 45.6 % (n=57) were females. This is demonstrated in Table 1.

Table 1: Gender distribution among expired patients
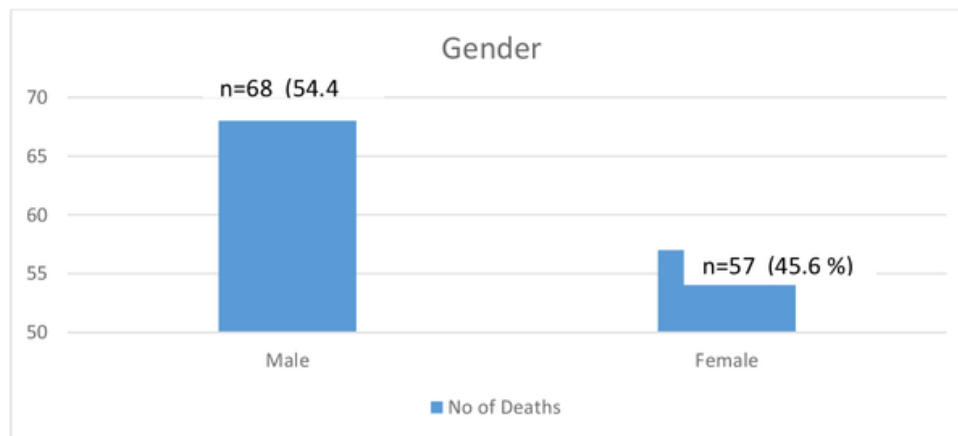
As illustrated in Table 2, majority of patients who died i.e. 55.2 % (n=69) were between 71 and 100 years. 29.6 % (n=37) were between 56 and 70 years while only 15.2 % (n=19) were less than or equal to 55 years.

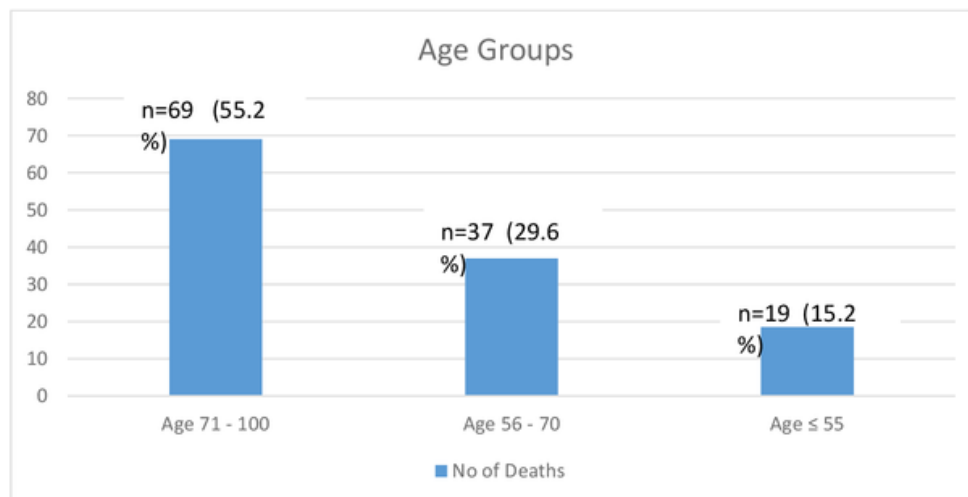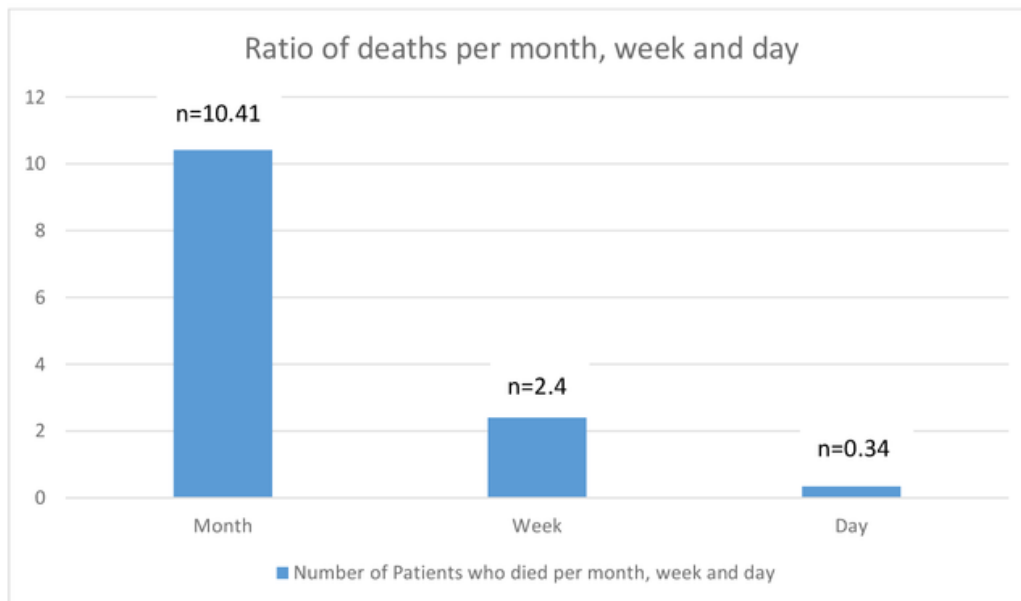**Table 2: Age groups among expired patients**

Table 3 shows deaths per month, week and day.

Table 3: Ratio of deaths per month, week and day

Ratio of deaths per month, week and day

65.6 % (n=82) patients who died had more than 1 reason for admission while 34.4 % (n=43) had single reason for admission. This is shown in table 4.

Table 4: Admission with Single/Multiple reasons for admission

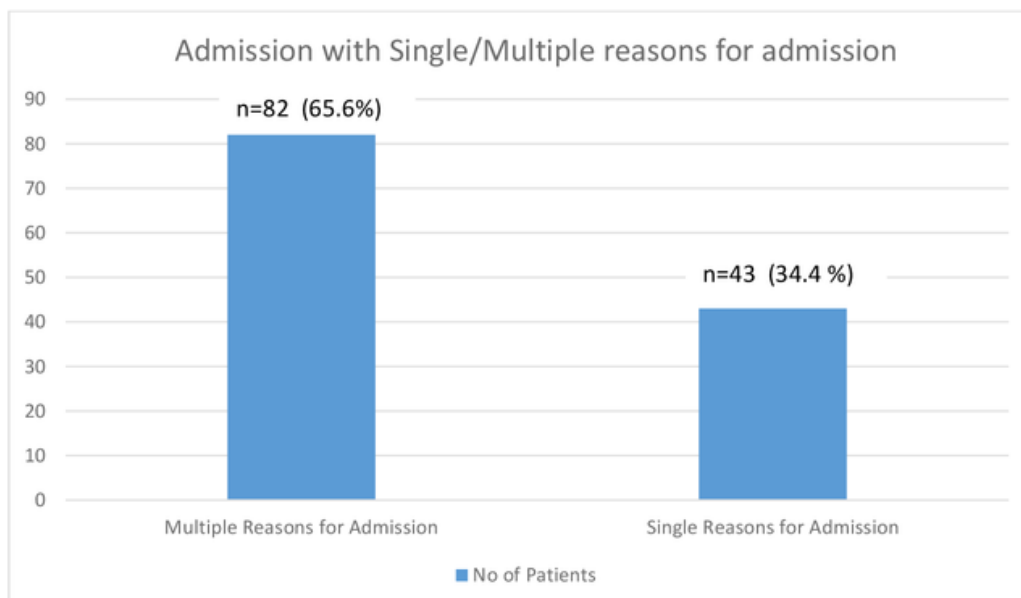Admission with Single/Multiple reasons for admission

Table 5 illustrates the reason for admission in ICU among patients who died. Pneumonia 39.2 % (n=49) was the most common reason for admission followed by UTI 12.8 % (n=16).

Table 5: Diagnosis of expired patients

Admission Diagnosis	No of Patients
Pneumonia	39.2 % (n=49)
Urinary tract infection (UTI)	12.8 % (n=16)
Septicemia	11.2 % (n=14)
Cerebro-Vascular-Accident (CVA)	08 % (n=10)
Decompensated chronic liver disease (DCLD)	6.4 % (n=8)
Acute Kidney Injury (AKI)	04 % (n=5)
Myocardial infarction	04 % (n=5)
Hepatocellular carcinoma (HCC)	3.2 % (n=4)
Left Ventricular Failure (LVF)	3.2 % (n=4)
Tuberculosis	2.4 % (n=3)
Diabetic Ketoacidosis (DKA)	1.6 % (n=2)
Upper Gastro-Intestinal Bleed	1.6 % (n=2)
Atrial fibrillation	1.6 % (n=2)
Acute Leukemia	0.8 % (n=1)

Table 6 illustrates the comorbid conditions among expired patients. Hypertension 26.4 % (n=33) was the most common comorbid followed by Diabetes Mellitus 19.2 % (n=24) and Ischemic Heart Disease 14.4 % (n=18).

Table 6: Frequency of comorbid conditions among expired patients.

Co-Morbid	No. of Patients	Percentage (%)
Hypertension (HTN)	33	26.4
Diabetes Mellitus (DM)	24	19.2
Ischemic Heart Disease (IHD)	18	14.4
Chronic Obstructive Pulmonary Disease (COPD)	18	14.4
Chronic Liver Disease (CLD)	15	12
Chronic Kidney Disease (CKD)	05	04
Pulmonary Tuberculosis (TB)	01	0.8
Hepatocellular Carcinoma (HCC)	01	0.8
Breast Carcinoma	01	0.8
Non-Hodgkin Lymphoma	01	0.8
Lung Carcinoma	01	0.8
None	07	5.6

Discussion:

ICUs in most Hospitals consume very high cost and sophisticated devices but mortality rates are still very high. Current study evaluated mainly the mortality along with some other parameters among patients admitted in ICU of a tertiary care facility of a developing country.

Our study found out that mortality rate among patients admitted to Medical ICU was 16.12 %. According to a study conducted in the Netherlands from 1997-2001, hospital mortality for ICU-admitted patients in the National Intensive Care Evaluation (NICE) registration was 12.9%.[7] A 10-year retrospective cohort study done using the Australian and New Zealand Intensive Care Society adult patient database found that overall mortality rate was 16.1 %.[8] A retrospective audit conducted in a general ICU in a university hospital in Uganda from January 2003 to December 2009 found average mortality rate of 40.1%.[6] Results of a 1-month audit conducted in six hospitals in the Mersey region of the UK concluded that ICU mortality between medical referrals was 31.3%.[19] Mortality in ICU patients is estimated to be about 15% in France.[21] In a study conducted in Lahore, Medical ICU mortality was 17.8 %.[17] Current study is one of the largest study done to date in Pakistan and shows the mortality rate of 16.12 % among Medical ICU patients. The reason for this low mortality as compared to other developing countries can be attributed to better ICU facility, sufficient specialist Doctors, permanent resident Doctors, trained and adequate number of nurses and paramedical staff.

Gender distribution among expired patients was 54.4 % males versus 45.6 % females. In a study conducted at Mulago hospital of Uganda majority of the patients (56.5%) were males.[10] In another study conducted in Lahore; among expired patients 56.6% were males while 43.4 % were females.[18] In our study majority of patients who died, 55.2 % were between 71 and 100 years. High mortality among elderly is because of the fact that multiple comorbid conditions exist in this age group.

In our study the most common diagnosis among patients who expired was Infection; including Pneumonia, Urinary Tract Infection, Pulmonary Tuberculosis and Septicemia. In a study conducted in Uganda, sepsis (49 %) was also the top most working diagnosis among expired patients.[10] In another study done in China, sepsis was the most common diagnosis among expired patients.[20] In developing countries, due to insufficient early sepsis care and delayed presentation to hospital and subsequently to ICU, mortality from sepsis is high.[9] High rate of infections among expired patients can also be attributed to the fact that majority of patients were elderly and had multiple comorbid conditions thus having low immunity and more prone to infections. Furthermore, lack of proper hygienic conditions and delayed presentation to hospital are major factors responsible for such high rates of infection. Due to traditional taboos, patients are taken to quacks first who obviously have no knowledge or skill to deal with such patients. Later they are taken to facilities which have paucity of resources (e.g. untrained staff, unavailability/unreliability of microbiological diagnostics and lack of appropriate antibiotics). After sufficient delay these patients are brought to tertiary care facilities but by then it had

become almost impossible to save such patients as most of the times multi organ failure (MOF) had ensued.

Conclusion: Increasing age and related complications are major reasons for ICU admissions. Sepsis and sepsis related complications are major causes of ICU mortality. Unusual delay in our referral system complicates the situation. Emphasis lies on improved ICU facilities, trained and sufficient number of nursing and paramedical staff.

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