



Journal Homepage: -www.journalijar.com
**INTERNATIONAL JOURNAL OF
 ADVANCED RESEARCH (IJAR)**

Article DOI:10.21474/IJAR01/10564
 DOI URL: <http://dx.doi.org/10.21474/IJAR01/10564>



RESEARCH ARTICLE

TRAUMATIC AND NON-TRAUMATIC MORTALITY IN THE EMERGENCY DEPARTMENT

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Manuscript Info

Manuscript History

Received: 22 December 2019

Final Accepted: 25 January 2020

Published: February 2020

Key words:-

Emergency, Department, Mortality,
Surgical

Abstract

Background: The mortality rate in an emergency department is an efficient tool to appraise the quality of healthcare provided by this department.

Objective: The main objective of this study was to estimate the mortality rate in the emergency department (ED) at King Faisal Medical Complex in Taif, Saudi Arabia, and to also determine the most common causes of death and the profiles of patients who die in the ED.

Methods: This was a retrospective study conducted in (392,862) consecutive patients who were admitted to the ED during the period between June 1st, 2016 and February 28th, 2018. Data were analyzed using SPSS 2012, version 21.

Results: Out of 392,862 admitted patients, 194 (0.049%) died in the emergency room. The majority of these deaths were non-traumatic (88.1%). The most common causes of non-traumatic death were heart disease other than coronary artery disease (50.0%) and sudden death of unknown cause (33.0%). While traumatic deaths (11.9%) were predominantly caused by motor vehicle accidents (10.4%) and gun shoot wounds or falling down (1.5%). Higher rates of traumatic death were reported among males ($p=0.038$) and younger patients ($p<0.001$).

Conclusion: Our study reveals the emergency department in King Faisal Medical Complex has a relatively low mortality rate that indicates a high level of medical care quality in the department.

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Introduction:-

The crucial and unique role of the emergency department (ED) in the healthcare system is the reason it is often referred to as “the safety net”. However, crowding has recently been identified as a prevalent problem that is associated with ED management [1,2]. According to the Institute of Medicine, a continuously growing crowding problems in an ED leads to a “breaking point” [3].

The most common consequences of ED crowding are increased rates of patient mortality, treatment delays, ambulance diversions, transport delays, and unnecessary costs [4].

There is no doubt that the mortality rate in an ED is an important predictor of the quality of health care provided by the department. Mortality rate is defined as the number of patients who came to and died in an ED out of the number of patients who were admitted to the ED [5,6].

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Mortality rate in traumatized patients, usually from motor vehicle accidents (MVA), is significantly affected by the quality of medical care received prior to admission to the hospital, as well as the duration between injury and admission and the type and severity of the injury [7-9]. The majority of traumatized patients are from road traffic accidents (RTAs) [10].

A retrospective study conducted at a Nigerian University hospital reported a mortality rate of 6.0%, or 647 patients out of 10,728 admitted patients died during a 12-month follow-up period [11].

Another retrospective study used 22,791 patients to estimate the mortality rate after accidents in the ED of an urban hospital in Nigeria, and found a mortality rate of 2% [12].

The most common causes of death in an emergency room are cardiovascular diseases (mainly cardiac arrest), cerebrovascular accidents, chronic obstructive pulmonary diseases (COPD), cancer, drug intoxication, suicide, traffic accidents and other traumatic causes [13-17].

This retrospective observational study was conducted to determine the mortality rate in the ED of King Faisal Medical Complex and to identify the most common causes of death at this ED. In addition, the causes of death in males and females will be analyzed.

Materials and Methods:-

Study design:

This retrospective study was carried out in the ED of King Faisal Medical Complex (KFMC) in Taif, Saudi Arabia to estimate the mortality rate and identify the most common causes of death.

Data collection:

Data were collected from the medical records of 392,862 patients who were admitted to the ED of KFMC during the period between Jun 1st, 2016 and February 28th, 2018.

Data regarding the patients' age, gender, cause of death, length of stay in the ED before death, and arrival status were extracted and recorded.

Patients who died after being registered in and admitted to the ED were included in the study, while patients who were not registered in the ED, and patients who died after being discharged from the ED were not included.

Statistical methodology:

Data were statistically described in terms of frequencies (number of cases) and valid percentages for categorical variables. Median and inter-quartile ranges (IQR) were used to describe non-parametric numerical variables. Comparison of categorical variables between the subgroups (cross-tabulation) was done using Chi-square tests, and the Mann-Whitney U test was used to compare non-parametric numerical variables between the subgroups. P values less than 0.05 were considered statistically significant. All statistical calculations were done using IBM SPSS (Statistical Package for the Social Science; IBM Corp, Armonk, NY, USA) release 21 on Microsoft Windows PC.

Ethical considerations:

We obtained the institutional review board's approval before conducting any study related procedures.

Results:-

Mortality rate:

Per the collected data, a total of 392,862 patients were admitted to the ED throughout the study period. Of these patients, 194 (0.049%) died while in the ED.

Characteristics of patients who died in the ED:

The majority of patients who died in the ED were males (68.0%), while females constituted (32.0%) of the total cases. The median (IQR) age was 62.5 (\pm 30.0) years with a range of 0-108.0 years old.

Length of stay in the ED before dying:

The median (IQR) length of stay was 101 (110) minutes with a range of 0-3,240 minutes. More details regarding the length of stay are provided in figure 1.

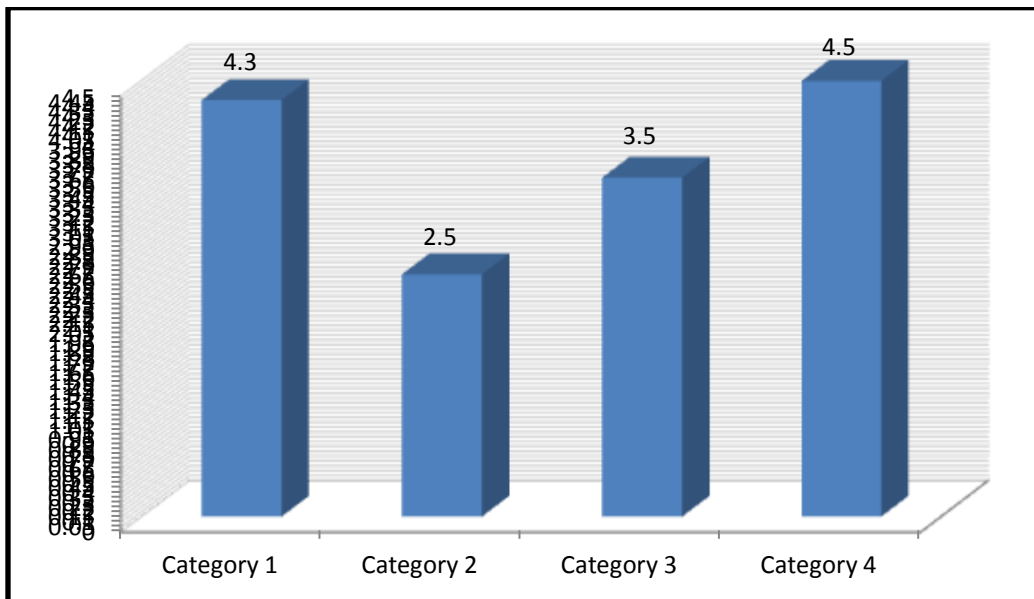


Figure 1:- Length of stay in the emergency room before dying.

Causes of death:

The vast majority of patients (88.1%) died from non-traumatic causes, while 11.9% of the patients died from traumatic causes.

The most common non-traumatic causes of death included heart diseases, which was reported in half of the patients (50.0%), followed by sudden death of uncertain cause (33.0%), chronic obstructive lung disease (2.6%), pneumonia (1.0%), cancer (0.5%), coronary artery disease (0.5%) and toxicity (0.5%). On the other hand, traumatic causes of death included motor vehicle accidents (10.4%) and gun shoot wounds or falling down (1.5%).

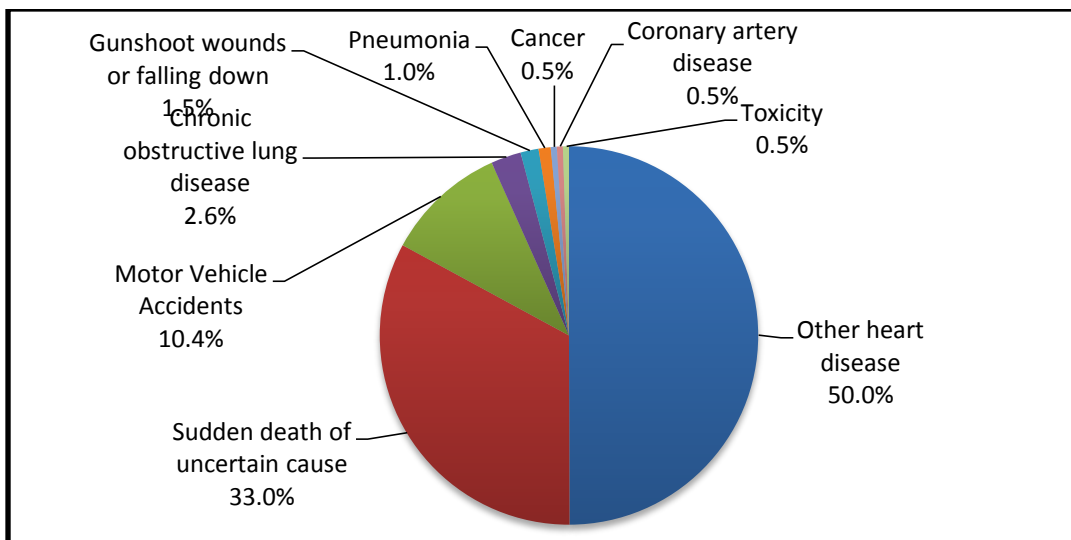


Figure 2:- Causes of death in the emergency department.

Causes of death among males and females:

The proportion of males who died due to traumatic causes (10.3%) was significantly higher ($p=0.038$) than the proportion of females who died from traumatic causes (1.6%).

More details about the causes of death among males and females are provided in table 1.

Table 1:- Causes of death among males and females.

Diagnosis	Male	Female	P value*
Traumatic causes	10.3%	1.6%	0.038
Motor vehicle accident	8.8%	1.6%	
Gun shoot wounds or falling down	1.5%	0.0%	
Non-traumatic cause	57.7%	30.4%	
Other heart diseases	36.1%	13.9%	
Sudden death of unknown cause	18.0%	14.9%	
Chronic obstructive lung disease	1.0%	1.5%	
Pneumonia	1.0%	0.0%	
Cancer	0.5%	0.0%	
Coronary artery disease	0.5%	0.0%	
Toxicity	0.5%	0.0%	

*Chi square test was used to compare the proportion of deaths due to traumatic causes among males and females

Age of patients who died due to traumatic and non-traumatic causes:

It was found that patients who died due to traumatic causes, with median (IQR) age of 32 (34.3) years, were significantly younger ($p<0.001$) than those who died due to non-traumatic causes with median (IQR) age of 65.0 (29) years.

Discussion:-

With a continuously growing population of patients that seek emergency medical care, along with the increasing number of visits to emergency departments (EDs) in several developed countries during the past decades, it becomes more important to give special consideration to the quality of service provided in the emergency department. Mortality rate is an efficient tool to assess the quality of medical services and healthcare provided to ED patients [18-20].

However, there is not enough information regarding the mortality rate in EDs in Saudi Arabian hospitals.

We conducted a retrospective study to obtain more information about the mortality rate in the ED of King Faisal Medical Complex, along with identifying the most common causes of death among males and females.

We reviewed the medical records of all patients who were admitted to the ED of King Faisal Medical Complex between June 1st, 2016 and February 28th, 2018, which constituted a total of 392,862 patients. We extracted data of patients who died while in the emergency room (194 patients) revealing a mortality rate of 0.049% in all admitted patients. This rate is relatively low compared to other rates reported in the literature, which ranged from 0.3% to 10.9% in some regions. These data indicate high quality of medical care provided in this department [11,12,21,22].

Most of the patient deaths (88.1%) were caused by non-traumatic incidents that included heart diseases (50.0%), sudden death of uncertain cause (33.0%), chronic obstructive lung disease (2.6%), pneumonia (1.0%), cancer (0.5%), coronary artery disease (0.5%) and toxicity (0.5%). This is consistent with a recent study published in 2017, which reported that cardiovascular diseases are the leading cause of death in the emergency department, and is also consistent with our findings that reveal more than half of the patients died from heart diseases [23]. Moreover, a 9-year follow-up study of emergency room users reported that the most dominant causes of death include circulatory system disorders, cancer, and violent events [24].

Regarding deaths due to traumatic causes, which was reported in 10.3% of deceased patients in our study, motor vehicle accidents constituted 10.4% of these deaths and gunshot wounds or falling down constituted (1.5%).

Another study conducted in Nigeria reported that 40.1% of the total deaths were due to traumatic causes that included road accidents, assault, falling down and gunshot wounds being the most common [25].

In the current study, male deaths constituted 68.0% of all deaths. This is consistent with the findings by Rukewe et al., where 62% of all patient deaths in the ED were male and the findings of Faridaalae et al., where males constituted 68.0% of patient deaths [11, 26].

The median (IQR) age of death in our study was 62.5 (30) years old, while the mean \pm SD age in the studies by Rukewe et al. and Faridaalae et al. was reported to be 44.5 ± 19.1 and 63.1 ± 5.2 years old, respectively [11, 26].

Our results revealed a significantly higher ($p=0.028$) prevalence of traumatic death among males compared to females. This is consistent with the results reported by Ugare et al., where the male to female ratio, in terms of traumatic death, was 6.7:1. This is reflective of males being more prone to traffic accidents than females [25].

Conclusion:-

This study has revealed a relatively low mortality rate in the ED of King Faisal Medical Complex, which indicates a high level of medical care quality. Higher rates of death were reported among males compared to females. Traumatic causes of death were more common among young males.

These results necessitate that awareness programs targeting this demographic should be implemented that highlight important driving safety instructions and that clarify the dangerous consequences of unsafe driving. In addition, providing efficient training for accident and emergency healthcare professionals will allow for better the management of patients in the ED, which will likely reduce mortality rates.

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