Introduction

Trauma is a worldwide major cause of death and disability. It accounts for 9% of global mortality annually and 10% of morbidity and mortality in Oman, particularly those related to road safety [1]. In fact, it continues to be a worldwide burden on all societies and may outpace infectious diseases as a leading cause of worldwide mortality [2]. Since the initial hour after an injury is the most crucial time for trauma patients, early resuscitation is of vital importance. Trauma Resuscitation is defined as “assessment and stabilization of vital functions and prioritization of therapeutic and diagnostic interventions for the severely injured patient arriving in the Emergency Department [3].” Time is considered an essential determinant in the initial care of trauma patients, as rapid effective trauma resuscitation decreases patient morbidity and mortality. Trauma resuscitation time (TRT) is defined as “the time between the actual arrival of the patient into the emergency department trauma bay and the final disposition” [4]. This initial period is directly related to the patients’ outcomes and delays might result in preventable deaths [5]. Different retrospective studies have reported different trauma resuscitation time with a median...
time ranging from fifteen minutes to a hundred and fifty-six minutes [3–7]. To our knowledge, this is the first study to investigate trauma resuscitation time in Oman. We, therefore, aim to evaluate the trauma resuscitation time among trauma patients who attended Sultan Qaboos University Hospital during the period from June 2016 to June 2017. In addition, we aim to identify the causes of delay in trauma resuscitation in order to improve trauma team performance and the quality of trauma resuscitation.

Materials and methods

Study design and population

This is a retrospective observational study that was conducted at the Sultan Qaboos University Hospital (SQUH), Muscat, Oman. It included all trauma patients who attended the Emergency Department (ED) and required trauma resuscitation by the trauma team in the period between June 2016 and June 2017. We excluded patients with minor traumatic injuries who did not require trauma team assessment, patients who were managed at and referred from different hospitals, regular trauma consults, and patients who were initially managed by emergency physicians. The study was approved by the Research and Ethics Committee in the College of Medicine and Health Sciences, Sultan Qaboos University.

Data collection

Electronic health records (HER) via (Trakcare® system) were reviewed to extract data of all eligible patients included in the study. These data include: patients’ demographics, trauma type, mechanism of injury, Glasgow Coma Scale (GCS), resuscitation time, resuscitation procedures and patients’ outcomes. The emergency trauma bay entry-to-exit time was considered as the trauma resuscitation time (TRT). The exit time represents the end of the resuscitation time, which includes transferring the patient to the radiology department, operating theater (OR), admission, discharge, and death.

Data analysis

Statistical Package for the Social Sciences (SPSS, version 23.0) was used for statistical analysis. Descriptive analyses were applied to evaluate the median trauma resuscitation time, mean age, frequency of trauma mechanisms, resuscitation procedures, and outcomes. Chi-square and Fisher’s exact tests were used to evaluate the statistical significance of differences among categorical data. Mann-Whitney U test and Kruskal-Wallis H test were used to compare the resuscitation time between the groups of the categorical data. A p-value of less than 0.05 was considered significant.

Results

A total of 295 patients met the inclusion criteria. Of those, 25 patients were excluded because of missing data in their records. A total of 270 patients were included in the final results. The age of the study population ranged from 1 to 86 years, with a mean of 26.9 ± 13.9 years. Male predominance accounts for 85.6% (Table 1).

Two-hundred and fifty-four (94.1%) patients experienced blunt traumatic injuries and 16 (5.9%) patients were victims of penetrating injuries. The most frequent mechanism of injury was motor vehicle collision (MVC) (45.9%); followed by pedestrian struck (25.2%); fall (17.4%); stab injury (5.9%); crush injury (4.4%); burn (0.7%) and assault (0.4%). A hundred and twenty-eight (47.4%) patients required one or more of the resuscitation procedures: 67 (52.3%) patients required intubation, 19 (14.8%) patients required chest tube insertion, and 2 (1.5%) patients required a central line insertion. In addition, 13 (4.8%) patients required focused assessment with sonography in trauma (FAST) and 27 (10%) patients required cast application for upper and lower extremity fractures (Figure 1).

Two-hundred and two (74.8%) patients were admitted directly from the emergency department, 14 (5.2%) patients required emergent surgery, 34 (12.5%) patients were discharged home, 4 (1.5%) patients were referred to a different hospital and 16 (5.9%) patients died. Of those who died, 14 patients died during the resuscitation. The median trauma resuscitation time was found to be 25 minutes (interquartile range (IQR)= 17). There was no statistical significance between GCS, age, gender, mechanism of injury and trauma resuscitation time. However, there was a statistically significant correlation between the trauma resuscitation time and death (p-value= 0.004). The trauma resuscitation time and patients’ characteristics are described in Table 2.

Binary logistic regression analysis demonstrated that GCS ≤ 8 and intubation were significantly associated with death (p-value= 0.0001 and 0.024, respectively) whereas trauma resuscitation time and mechanism of injury are independent causes of mortality (Table 3).

Discussion

In our study, a higher number of trauma visits was observed among male adults (85.6%), a finding that is consistent with different studies [7,9,10]. The median trauma resuscitation time was 25 minutes, making it comparable with internationally recognized trauma centers [2–5]. However, a

Table 1: Demographic data.

<table>
<thead>
<tr>
<th>Age</th>
<th>Male (n=231)</th>
<th>Female (n=39)</th>
<th>Total (N=270)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>≤ 12 years</td>
<td>26</td>
<td>65.0</td>
<td>14</td>
</tr>
<tr>
<td>13-59 years</td>
<td>201</td>
<td>89.7</td>
<td>23</td>
</tr>
<tr>
<td>60 years</td>
<td>4</td>
<td>66.7</td>
<td>2</td>
</tr>
</tbody>
</table>

Figure 1: Distribution of procedures among trauma patients.
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