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Original Research

Data Analysis of 1811 Major Trauma Patients Admitted to the Emergency Departments of Thirteen Hospitals

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ABSTRACT

Objective: Our objective was to determine metrics and measure the trauma-related emergency care quality.

Methods: Patients with majortrauma admitted to emergency departments of 13 hospitals in the north region of İzmir between January 01, 2014, and December 31, 2014, were included in this study. For the definition of major trauma, guideline of Centers for Disease Control (CDC) for field triage of injured patients version 2011 was used. Age, time passed in emergency, first order timing, number of consultations and amount of time taken by the consultations, number of deaths in emergency departments and intensive care units, number of radiological tests applied to patients, total score of interventional applications, and total billing were recorded.

Results: In one-year period, 2,415,361 patients applied to selected hospitals' emergency departments, and 1811 patients (0.07%) were accepted as major trauma. The mean age of the patients was 29.4 years. The meantime passed in emergency was 28.3 h. The mean number of consultations and amount of time taken by consultations were 1.6 and 26.2 h, respectively. The number and mean X-ray, ultrasound, computerized tomography, and magnetic resonance imaging numbers were 3910 and2.16; 518 and0.29; 2805 and1.55; 114 and0.06, respectively. The total mortality rate was 1.04% (19 patients).

Conclusion: This is a preliminary study presenting the data obtained from different level hospitals in the region, and indicators in such a high number of patient group were evaluated for the first time. We believe that as national emergency care is built and strengthened with data, management of care for patients with trauma will improve.

Keywords: Data, emergency department, major trauma

INTRODUCTION

The increasing burden of trauma has emphasized the need for effective emergency care to alleviate the morbidity and mortality. About 1.25 million people died from traffic injuries in 2013 (1). One of the most important causes of deaths in the first four decades of life is trauma, which also leads to serious disabilities. According to estimations, if the number of injuries continue to increase at this rate, trauma will settle in the third place among all the causes of deaths in 2020 (2). Every trauma that results in death in the United Kingdom means 45 hospitalizations, 630 consultations, and 5000-6000 minor traumas to the hospital (3). Annually, 50 million people become permanently disabled because of trauma. The number of cases with all known causes of death is 280,531 in our country according to the 2009 data. Four percent of the deaths (approximately 11,000 people) is caused by traumatic events. Although trauma affects all age groups, it is primarily seen in young population. Medical, social, and economic consequences of trauma have led to structural changes in the treatment of these patients. As a result, understanding the pathophysiology of trauma-related medical conditions and improvement of patient care in prehospital and emergency services, imaging systems, trauma surgery, and intensive care unit have favorably altered the prognosis of patients with major trauma. However, if the necessary medical interventions are not carried out adequately on time, the efficacy of the treatment will diminish despite all the developments (4). In Turkey, some study groups are working on trauma, aiming to establish the national trauma systems (5). Little has been reported about the metrics

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Table 1. Major trauma criteria

1. Patients with vital signs abnormality after trauma
Blood pressure <90/60 mmHg, heart rate>100 beats/min, respiratory rate>20/min, O^2 saturation <90%
2. Glasgow coma score <14
3. Patients who require permanent airway for any reason
4. Patients with penetrative, incisive tool injury to the body / gunshot wounds or suspected gunshot wounds
5. Epidural hematoma, subdural hematoma, traumatic subarachnoid hemorrhage, deplase head fracture, head base fracture, or suspected ones
6. Patients with major burn criteria
7. Two or more proximal long bone fractures
8. Complete or almost complete amputations proximal to the wrist and ankle
9. To be involved in a fatal traffic accident in the same vehicle
10. Falling down >2 flats/>5 m (more than three times of the children height)
11. An extremity injury without a distal pulse
12. Pelvic fracture or suspected fracture
13. Flail chest
14.Thrown from a car, stuck in a vehicle, motorcycle accident, bike–vehicle collision
15. Deep neck incisions (incision below M. sternocliculo mastoid), enlarging neck hematoma, post–traumatic hoarseness, active bleeding
16. Active bleeding from the injuries proximal to elbow and knee
17. Risky patients who do not fulfill the above criteria (>20 weeks of gestation, advanced respiratory failure, chronic dialysis program, coumadin treatment, age over 65 years)

and measures of the patients with major trauma admitted to hospitals in our country. As global emergency care is built and strengthened with data, regulations of the emergency medicine departments and management of care for patients with trauma will improve. This paper aims to contribute to the eliminate this deficiency.

METHODS

Study Design

This study analyzed the patients with major trauma who applied to the emergency departments of 13 hospitals in the north region of İzmir, two of which are training and research type. A module named "major trauma patient collection card" was structured in the hospital information management system (HBYS). Through this module, all patients who applied with a trauma diagnosis between January 2014 and December 2014 were prospectively evaluated by the "2011 Guidelines for Field Triage of Injured Patients," and among them, patients with major trauma were selected for the study (6). Major trauma criteria are shown in Table 1. Trauma indicators were determined before the study and collected as prospective data during the hospitalization of patients with major trauma (Table 2). As far as we know, the indicators used in this study were first to be prospectively evaluated in such a large group of patients in our country.

Study Duration

Between January 2014 and December 2014, the data of the patients with major trauma who applied to the emergency departments of 13 hospitals, two of which are training and research type, were included in this study.

This is a retrospective analysis of data within the knowledge of hospital administrations. Therefore, no ethics committee was consulted. Since this was a retrospective study performed only with screening of medical records no informed consent was obtained from the patients. The study was conformed in accordance with the ethical issues as outlined in the Declaration of Helsinki.

RESULTS

During the study period, 2,415,361 cases were applied to the emergency services of 13 hospitals; and a total of 1811 patients were identified as major trauma in our database. Among them, 1255 patients (69.3%) were male, and 556 (30.7%) were female. The mean age of patients was 29.4±23.4 years. As evident from Table 2, the median waiting periods for the first order and clinical intervention were 42 min and 47 min, respectively. The average number of consultations required was 1.6. The mean time to complete the consultations and the duration of emergency stay were 26.2 h and 28.3 h, respectively. A total of 3910 X-ray

Table 2. Major trauma indicators

Total number of emergency department admissions	2,415,361
Number of major trauma patients (% ratio)	1811 (0.07%)
Mean age (years)	29.4
Mean emergency department length of stay (h)	28.3
Mean duration for first order (min)	42.8
Mean consultation number (per patient)	1.6
Mean duration for finalization of consultation (h)	26.2
Number of exitus in emergency department (% ratio)	6 (0.33%)
Number of emergency department dispatch (% ratio)	71 (3.92%)
Number of hospitalization to ICU (% ratio)	199 (11%)
Mean ICU stay (days)	11.4
Total hospitalization number in surgical clinics (% ratio)	846 (46.7%)
Mean hospital stay (days)	6.2
Total exitus number (% ratio)	19 (1.04%)
Mean invoice cost per patient (Turkish Lira)	650.1
Mean invasive procedure score	343.9
X–ray number/mean	3910/2.16
Ultrasound number/mean	518/0.29
CT number/mean	2805/1.55
MR number/mean	114/0.06

h: hour; ICU: intensive care unit; CT: computed tomography; MR: magnetic resonance

(mean 2.16), 518 ultrasound (mean 0.29), 2805 computerized tomography (mean 1.55), and 114 magnetic resonance imaging (mean 0.06) were performed to 1811 patients with major trauma. A total of 199 patients (11%) were treated in the intensive care unit, and 846 patients (46.7%) were treated in the surgical clinics. Six patients died in the emergency room, nine in the intensive care unit, and four were already dead when they arrived to emergency department. Total mortality was 1.04%. The duration of average hospitalization was 6.2 days, and the average cost per patient was 650.1 Turkish Lira.

DISCUSSION

In this study, patients with major trauma among emergency department attendances were found to be 0.07%. Even though this ratio is low, 1811 patients with major trauma affect the emergency department process both in healthcare empowerment, medical procedures, and costs. Rapid, accurate, and privileged medical intervention is needed to save lives. The mean age of the patients was29.4 years. Since this population is socially and economically active, the loss of empowerment is highly dramatic. The mean length of stay and time passed until first order in emergency department was 28.3 hand 42 min, respectively. The mean consultation number was 1.6, and the mean duration for completion of consultations was 26.2 h. These data are important to show the burden of patients with major trauma in emergency departments. But unfortunately, comparison of these data is not possible in our country because of lack of studies in this regard.

It is very important to make quick decisions and administer the correct interventions in major trauma cases. In our study, the median time passed until first physician order and first clinical intervention were 42minand 47 min, respectively. Since that time range includes the radiological assessments, it is considered acceptable. The mean emergency department length of stay was found to be long (28.3 h) in our study. Rathlev et al. (7) reported 232 min of emergency department length of stay (3.8 h).

Our study results showed lower mortality rate than the results of studies conducted in other countries. In our study, the total mortality rate was 1.04% (19 patients). Harnod et al. (8) showed a mortality rate of 12.5% for severely injured patients (ISS>15) and Leung et al. (9) showed 31.6% for such patients. In Turkey, most of the patients with trauma are carried to the nearest hospitals by ambulance. Once the patients enter the nearest hospitals, their medical records are out of sight; and patients who died from injury outside the hospitals are also not recorded in our database. This could be

one of the reasons explaining the lower mortality rate in our research. Nineteen deaths were included in this study. Six of them occurred in emergency department, nine in the intensive care unit, and four of them were already dead when they arrived to emergency department. This shows that effective and rapid treatment is necessary for this patient group. We suggest that all patients with major trauma should be sent to trauma centers or most convenient hospitals than the closest one. These centers have more staff to manage such patients and a greater chance of providing on-time operations for them. Thus, patients with major trauma may have better survival rates in such hospitals.

Each emergency department needs measured metrics that they have used. This will provide them to plan how the patients will be coordinated at the emergency care. Avoiding waits and sometimes harmful delays can only be achieved in this way (10). To improve the management of patients with trauma, future work is needed to analyze outcome-based measures.

In addition, there is no information about how much money is annually spent on patients with trauma in Turkey. It was found to be 650 Turkish Liras per patient in our study.

A few limitations of our study need to be recognized. Although the injury severity score (ISS) should serve as a considerable adjustment, we adjusted our major trauma criteria only depending on the "Guidelines for field triage of injured patients: recommendations of the National Expert Panel on Field Triage, 2011," and we did notevaluate the mortality rates of patients who were transferred from one hospital to another.

CONCLUSION

Major trauma remains a significant medical concern, leading 11,000 deaths annually in Turkey. Trauma metrics and measurements improve the outcomes in different countries. In Turkey, we also urgently need the data for regulations of the emergency medicine departments and management of care for patients with trauma.

Ethics Committee Approval: Authors declared that the research was conducted according to the principles of the World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects", (amended in October 2013).

Informed Consent: Since this was a retrospective study performed only with screening of medical records no informed consent was obtained from the patients.

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