Developing a trauma registry for the emergency department of a tertiary care hospital in Egypt: a step toward success

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Background
Trauma continues to be a common problem affecting global health care systems. Accordingly, different types of trauma have been considered major causes of morbidity and mortality, with approximately five million deaths per year. Road traffic injuries, in particular, have been recognized by the WHO as the sixth leading cause of death in the eastern Mediterranean region. Developed countries have realized the importance of implementing registries across all health care systems to improve service quality. Unfortunately, Egypt has yet to establish a national trauma registry in its hospitals. Although data banks have been available in a few hospitals, they have been inconsistent.
Purpose
The present study aimed at developing a trauma registry for a major tertiary hospital in Cairo.
Patients and methods
To this end, data from 202 patients admitted to the emergency department of Ain Shams University Hospital owing to trauma were collected. Procedures and actions used were then described to create a trauma registry from January to December 2017.
Results
The collected data were statistically analyzed, after which the epidemiological distribution of the trauma patients was described. Accordingly, our results showed that among the included patients, 65% were men, whereas most were single, illiterate, and unemployed. Thereafter, statistics regarding trauma circumstances were generated.
Conclusion
In conclusion, the present study found that hospital trauma registries can be established, are essential for improving the quality of health care services, and should be used ubiquitously throughout the country's hospitals to establish a national registry.

Keywords:
emergency department, road traffic injuries, trauma registry, traumatic injuries

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Introduction

Traumatic injuries, one of the main causes of morbidity and mortality, have continued to be major health care problems worldwide. Injuries have caused approximately five million deaths worldwide every year, with an expected surge in mortality and morbidity by 2030 [1]. Injuries have also been among the leading causes of death during the productive years (<45 years of age), leading to significant economic losses. Moreover, injuries account for 8.3% of age-standardized disability-adjusted life years, with road traffic injuries (RTIs) ranked eighth among the 20 leading causes of disability-adjusted life years in 2012 [2].

Although 90% of world's road traffic-related fatalities occur in low-income and middle-income countries, injury prevention and trauma care programs in these countries have still remained deficient [3]. In 2004, the WHO published that RTIs were the sixth leading cause of death in the eastern Mediterranean region, with 146 000 mortalities and 2.8 million nonfatal injuries [4].

A trauma registry is a database wherein epidemiological data, processes, and outcomes are documented and stratified. Although trauma registries, which have been considered a cornerstone in quality improvement programs, have been widely

used in advanced countries, considerable deficiencies in the availability of databases have been a concern in developing countries [5].

Egypt, in particular, has experienced an alarming increase in the burden of traumatic injuries. In 2009, the WHO showed that Egypt had a road traffic death rate of 42/100 000 individuals, one of the highest among eastern Mediterranean region countries [6,7]. Road traffic incidents have been a leading cause of death and hospitalization in Egypt, accounting for 63% of injury-related deaths and 34% of nonfatal injuries. Moreover, such incidents particularly affect younger individuals, consequently affecting economic productivity. The high prevalence of road accidents in Egypt and consequent human casualties places considerable socioeconomic and psychological burden on all Egyptian citizens and presents significant challenges for development [8]. However, published data regarding the actual burden of the problem have been scarce, while ~53% of Egyptian hospitals are not included in the national health surveillance system [7]. Moreover, most trauma databases across Egyptian hospitals are variable and inconsistent regarding coverage and reporting, leading to a substantial gap between available data and actual volume of traumatic injuries [7].

A number of obstacles hinder the establishment of a sustainable trauma registry within developing countries. However, many of these countries had succeeded in establishing reliable databases using systematic methods [9]. Ain Shams University Hospital, a tertiary care hospital located in Cairo, Egypt, is a massive health institute with numerous available subspecialties. Their surgery hospital alone has 664 beds, which will only continue to expand. Annually, ~48 000 patients visit their emergency room, whereas ~102 000 patients visit their outpatient clinics, with 36 000 admissions [10].

The present study aimed to introduce a basic trauma registry for the emergency department of Ain Shams University Hospital, one of the tertiary care hospitals involved in trauma management within Cairo. Accordingly, we sought to highlight the procedures needed to establish such a registry and efforts required to overcome barriers to its success. Moreover, this study reviewed the results of the registry, including demographic data, circumstances, and causes of various traumatic injuries presented to the emergency department.

Objectives

The aim was to establish a reliable trauma registry for the emergency department of Ain Shams University Hospital and describe our experience with its development.

Patients and methods

Study design

This qualitative descriptive study detailed the steps for developing a trauma registry in Ain Shams University Hospital.

Study setting

This study was conducted at the Emergency Department of Ain Shams University Surgery Hospital. Approval of the ethical committee of the General Surgery Department, Ain Shams University, and the ethical committee board in the University of Maryland was obtained before starting the study. Accordingly, a team composed of two interns, a resident in charge, a medical secretary, and the principal investigator was created. Data from patients with trauma admitted to the Surgical Emergency Department on a particular day of the week (i.e. the day our unit was in charge of emergency surgical cases) throughout 2017 were collected by trained house officers using a data collection sheet developed through the collaboration between Ain Shams University and the University of Maryland. Data were collected manually on paper under direct supervision from the surgical resident who ensured that data for all target patients were collected. Data sheets were revised by the principal investigator and forwarded to the medical secretary who entered and coded the data onto a Microsoft access sheet on the department's computer every week. Data on the computer was password-protected, whereas data collection sheets were locked in a secure desk at our office within the hospital and were only available to the study personnel under the supervision of the principal investigator. After completing data collection, the database was forwarded to a statistician who formulated the results.

Patient inclusion criteria

(1) All patients with trauma who were not admitted to our emergency department once weekly on the day our unit was in charge of the emergency room were included.

Patient exclusion criteria

The following were the exclusion criteria:

(1) Patients with trauma admitted to the hospital.

(2) Patients with isolated orthopedic trauma given that they were presented to a separate emergency room.
(3) Patients with burns given that they were presented to a specialized burn center.

Statistical analysis

Statistical analysis was performed using SPSS, version 23 (SPSS Inc., Chicago, Illinois, USA). Qualitative variables were presented as frequencies and percentages, with bar charts being used to graphically demonstrate percentages.

Results

Throughout 2017, 202 patients experiencing injuries were recorded in our unit [median age: 22 years (interquartile range, 15–32), range: 1–62 years]. Table 1 summarizes their sociodemographic characteristics. Patients predominantly lived in urban areas, with less than 5% living in rural areas. Additionally, more than half were unemployed, 38.12% were illiterate, more than half were single, and 46.53% were smokers. Figure 1 shows the frequencies of patients admitted per month in 2017, whereas Table 2 shows the characteristics of injuries in the study population. Moreover, around one-third of the patients were admitted owing to RTIs, whereas another quarter were admitted owing to injuries resulting from interpersonal violence. Tables 3 and 4 provide details related to interpersonal violence and RTIs, respectively.

Table 1 Sociodemographic characteristics of the study population

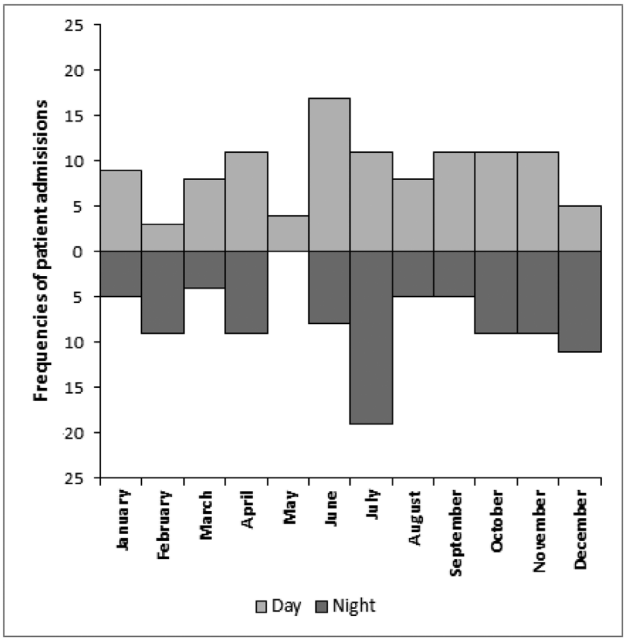
Characteristic	*n* (%)
Sex	
Male	130 (64.36)
Female	72 (35.64)
Residence	
Urban	193 (95.54)
Rural	9 (4.46)
Occupation	
Unemployed	113 (55.94)
Official work	28 (13.86)
Manual work	33 (16.34)
Driver	8 (3.96)
Others	20 (9.90)
Education	
Illiterate	77 (38.12)
Literate	28 (13.86)
Essential	27 (13.37)
Secondary/technical	27 (13.37)
University	43 (21.29)
Marital status	
Single	113 (55.94)
Married	76 (37.62)
Widow	7 (3.47)
Divorced	6 (2.97)
Smoking	
None	108 (53.47)
Cigarette	25 (12.38)
Shisha	6 (2.97)
Both	63 (31.19)
Total	202 (100)

Prehospital events included transport; first aid at the scene; going home; waiting for family; traffic jam; visiting a clinic, pharmacy, or hospital before arrival at Ain Shams University Hospital; or being directly taken to our emergency room. Recording of prehospital events had been completed for 92.16% of patients with RTIs. However, prehospital events were largely missing for patients admitted owing to other causes (Fig. 2). Table 5 summarizes the prehospital events for patients with RTIs. Data regarding signs of alcohol and drug use, as well as comorbid conditions, were largely missing for injuries other than RTIs. Figure 3 shows the frequencies of comorbid conditions among patients with RTI, whereas Table 6 presents the details regarding medical examination of injured patients. Finally, Table 7 shows the monthly audit of data entry to confirm its accuracy.

Discussion

Although our trauma team managed to create a trauma registry prototype, further improvements and

Figure 1



Frequencies of patient admissions per month in 2017.

Table 2 Injury characteristics

	n (%)
Event exposure	
Interpersonal violence	66 (32.67)
Road traffic	51 (25.25)
Other	85 (42.08)
Type of injury	
Polytrauma	92 (45.54)
Cut	25 (12.38)
Concussion	30 (14.85)
Fracture	14 (6.93)
Stab	28 (13.86)
Others	13 (6.44)
Site of injury	
Head	38 (18.81)
Chest	11 (5.45)
Abdomen	18 (8.91)
Extremities	32 (15.84)
Multiple sites	97 (48.02)
Not specified	6 (2.97)
Total	202 (100)

Table 3 Details related to interpersonal violence

	n (%)
Relation to the assailant	
Parent	11 (16.67)
Child	4 (6.06)
Intimate partner	3 (4.55)
Friend	15 (22.73)
Stranger	25 (37.88)
Others	7 (10.61)
Not specified	1 (1.52)
Assailant's education	
Illiterate	39 (59.09)
Literate	12 (18.18)
Essential	11 (16.67)
Secondary/technical	3 (4.55)
University	0
Not specified	1 (1.52)
Assailant's job	
Unemployed	47 (71.21)
Official work	3 (4.55)
Manual work	11 (16.67)
Driver	2 (3.03)
Others	1 (1.52)
Not specified	2 (3.03)
Total	66 (100)

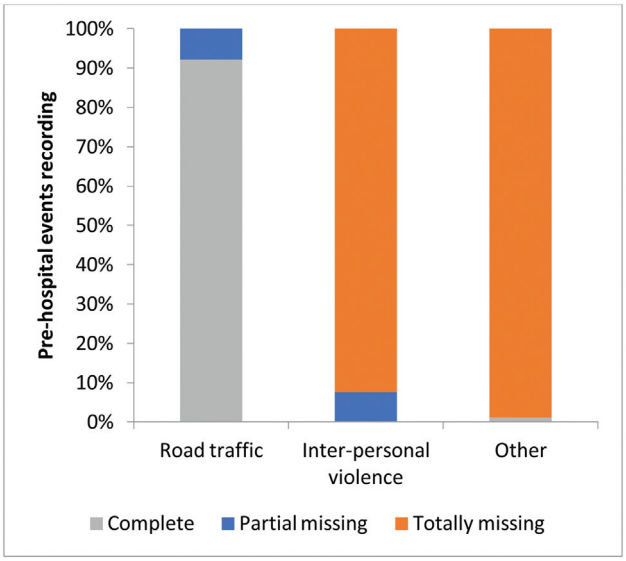
modifications are needed for our results to be generalized for all patients with trauma visiting our hospital. First, the team leader recruited reliable team members who were responsible for doing the work; this team comprised a resident officer, a medical secretary, and two interns. The entire team together with the team leader held discussions and training sessions to explain the concept and determine the necessary steps, subsequently starting data collection in January 2017.

Table 4 Details related to road traffic injuries

	n (%)
Victim status	
Driver	20 (39.22)
Passenger	12 (23.53)
Motor cyclist	2 (3.92)
Pedestrian	17 (33.33)
Seat belt*	
Yes	1 (3.1)
No	20 (62.5)
Not specified	11 (34.4)
Air bags*	
Yes	0
No	21 (65.6)
Not specified	11 (34.4)
Head restraint*	
Yes	0
No	21 (65.6)
Not specified	11 (34.4)

*Described for vehicle drivers and passengers (*N*=32).

Figure 2



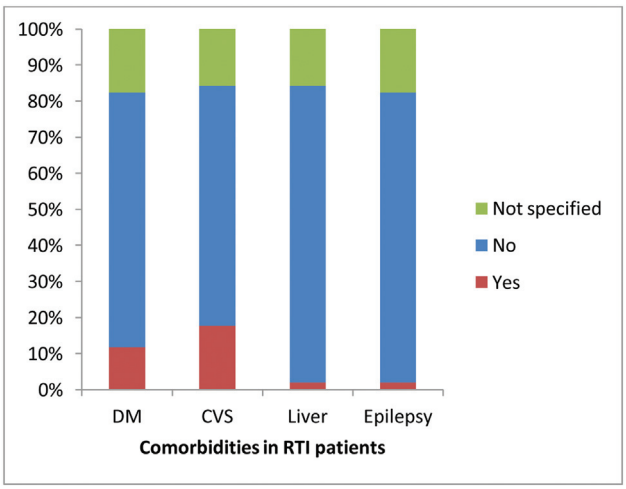
Completeness of prehospital event recording according to cause of injury.

During the first 2 months, the interns collected data using the specified sheets under the supervision of the resident officer. The collected data were revised by the team leader and forwarded to the secretary for data entry into the access sheet database. At this time, two obstacles were identified. First, the team was not accustomed to performing data collection tasks, considering that this was not routine. This obstacle was addressed by continuous contact and data collection audits by the resident officer throughout the 24 h we were responsible in the emergency room. Moreover, the team leader personally revised the data sheets on the following day to confirm that

Table 5 Prehospital events for patients with road traffic injuries

	n (%)
Transport	
Ambulance	27 (52.9)
Taxi	4 (7.8)
Private	19 (37.3)
Other	0
Not specified	1 (2.0)
First aid at the scene	
Yes	12 (23.5)
No	39 (76.5)
Going home	
Yes	1 (2.0)
No	50 (98.0)
Waiting for family	
Yes	21 (41.2)
No	30 (58.8)
Traffic jam	
Yes	28 (54.9)
No	23 (45.1)
Clinic	
Yes	0
No	49 (96.1)
Not specified	2 (3.9)
Pharmacy	
Yes	1 (2.0)
No	48 (94.1)
Not specified	2 (3.9)
Hospital	
Yes	14 (27.5)
No	36 (70.6)
Not specified	1 (2.0)
Directly transferred to the emergency room	
Yes	26 (51.0)
No	22 (43.1)
Not specified	3 (5.9)
Total	51 (100)

Figure 3



Frequencies of comorbid conditions among patients with road traffic injuries.

nothing was missing. The second obstacle encountered was that data collection could not be completely entrusted to the two specific interns. This was because we could not ensure that the same two interns could attend to all cases involving injuries for 24 h throughout the whole study year and because the interns had to rotate departments every 2 months according to their training system. Hence, we decided to modify our procedure such that different interns with exchanging roles were responsible for data collection, with their work being continuously audited to confirm the precision of data collection. At the end of the first 6 months, we found that the data collection process became considerably easier, faster, and less time consuming. Moreover, the data collection process had become integrated into the daily work routine, with even the accuracy of data collection remarkably increasing every month. Over the next 6 months, the system was already established, data collection was effortless, and all team members were alert and performed their job efficiently and effortlessly. Data accuracy was considerably high, as shown in Table 7. Ultimately, the trauma registry included 202 trauma patients with all their relevant data.

Lessons learned from establishing the trauma registry

We conducted a pilot study in which a simple, primitive trauma registry was used in our emergency room. By the end of the study, we determined that the concept of a registry of patients containing all relevant data is definitely crucial. Establishing a registry is the very first step for improving the entire health care system, given that it provides concrete and accurate data that would form the base for any prevention and management protocol. Some of the important findings of the present study were that men were predominantly affected by trauma (65%) and that most of the patients were single, unemployed, and illiterate. Although RTIs accounted for 25.25% of all traumas, a surprising 62.5% of patients involved therein were not using seat belts. Based on this simple information, we can customize injury prevention and management strategies based on our conditions.

Current obstacles

The following points summarize the most significant obstacles for establishing a sustainable trauma registry in our hospital – a representative tertiary care hospital in Egypt (low–middle income country).

(1) Lack of data collection policy provided by the institution.
(2) Imprecise data collection due to the work load of the medical suppliers and emergency attendants.

Table 6 Details regarding the medical examination of injured patients

	Violence (*N*=66) *n* (%)	Road traffic (*N*=51) *n* (%)	Other (*N*=85) *n* (%)
Alcohol signs			
Yes	3 (4.55)	9 (17.65)	1 (1.18)
No	0	33 (64.71)	8 (9.41)
Not specified	63 (95.45)	9 (17.65)	76 (89.41)
Drugs signs			
Yes	0	0	1 (1.18)
No	2 (3.03)	42 (82.35)	9 (10.59)
Not specified	64 (96.97)	9 (17.65)	75 (88.24)
Comorbid conditions			
Yes	0	13 (25.49)	0
No	0	31 (60.78)	0
Not specified	66 (100)	7 (13.73)	85 (100)

Table 7 Data entry auditing

Months	Number of registered patients	Number of correct data	Accuracy percentage
January 2017	14	10	71.4
February 2017	12	9	75
March 2017	12	11	91.6
April 2017	20	15	75
May 2017	4	4	100
June 2017	25	22	88
July 2017	30	28	93.3
August 2017	13	13	100
September 2017	16	15	93.75
October 2017	20	20	100
November 2017	20	19	95
December 2017	16	16	100

Total number of patients (202).

(3) Inability to maintain a precise registry without extra effort owing to inadequate training of the data collectors.
(4) Financial burden on the medical institute related to the expenses of this project.

Steps for continuity and improvement

(1) Teaching the trauma registry process to all residents and interns and performing continuous audits and rehearsals to establish an automated process that is not dependent on individuals.
(2) Implementing this process as an institutional policy such that it is used for all patients with trauma in the emergency department and not only in a single unit (as we did in our pilot study).
(3) Adding fields to collect more data from patients with trauma and cover all required information needed for improving health care services.
(4) Conducting further studies based on the collected data, which would considerably affect the quality of care given to patients.

Conclusion

The present study showed that developing a reliable trauma registry in our hospital is feasible. We believe that this is a fundamental step in furthering emergency services and is a cornerstone for quality improvement that must be implemented in our system. Further studies should be designed to upgrade the registry and maximize the benefits obtained from the data collected.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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