

A look on Trauma Code Activation in a Major Trauma Centre in UAE, A Descriptive Study

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Received: 20 February 2020 / Accepted: 14 March 2020 / Published online: 20 July 2020

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Abstract

Introduction: Trauma is considered to be a major cause of morbidity and mortality all over the world. This is a descriptive study that emphasizes on the mechanism and patterns of trauma, with a consideration of why trauma code was activated, and the imaging results in regard to the severity of the trauma.

Material and Methods: A descriptive study was conducted in Al Ain Hospital over the year of 2017. 886 patients were included who presented with trauma and considered dangerous according to hospital guidelines. They underwent a full-body trauma CT and got admitted to the hospital. We looked at the mechanisms, patterns, time of the day, and radiological findings. Injury severity score (ISS) and Revised trauma score (RTS) were calculated, and the cause of trauma code activation was evaluated.

Results: The study shows that; Positive imaging findings were found in 364 (41%) of patients while 524 (59%) had normal radiological tests. The principal mechanism of injury was motor vehicle accident (54.4%) followed by falls (21%) then pedestrian accidents (10.1%). Overall, 69.75% (618 patients) were admitted to hospital, 22 patients needed immediate interventions and 36 patients needed ICU admission. Only 2 patients died in the emergency room

Conclusions: The hospital policy in activating a trauma code should be revised, with more care being paid to the mechanisms of injury and the condition of the patient, without missing any injury that could harm the patient. So, the emergency physician should be better prepared to do a detailed physical examination and weigh the risk of radiation against missing a dangerous injury.

Keywords: Trauma code, Trauma CT, Radiological findings, Hospital policy.

Introduction

According to WHO data, about 9 people die every one minute due to violence and injuries, and nearly 5.8 million people of different ages and economic groups lose their lives yearly because of unintentional injuries and violence. Interestingly, the burden of those injuries is thought to be much more significant, viewed as about 12% of the world total burden of disease. [1].

Trauma is considered to be the dominant cause of mortality all over the world in patients less than 44 years

of age and the 4th reason for death in all high-income countries [2]. Survivors usually undergo a long-term process of rehabilitation and complex reintegration into their previous normal lives, making it a principal socioeconomic load on both the patients and the community in general, with the exponential increase in health costs.

Al-Ain is a growing city with the population reaching about 750,000 people according to the latest data, with two major governmental hospitals considered as major trauma centres receiving the majority of trauma patients with the availability of all specialties, imaging and operating rooms.

The burden of unintentional injuries is growing and to estimate the numbers of patients received by the hospital, a trauma registry book was developed in Al-Ain and updated on day to day basis including all kinds of trauma from simple to complicate.

The objective of our study was to study the epidemiology, mechanisms, and patterns of major trauma presenting to Al-Ain Hospital emergency department, with emphasis and evaluation of imaging done according to hospital guidelines.

Original article, no submission or publication in advance or in parallel

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Material and Methods

This is a retrospective study done in Al-Ain hospital emergency department, trauma registry data were evaluated from 1 January 2017 – to 1 January 2018, all patients presenting with major trauma according to our hospital guidelines (Figure 1), were included in the study.

All included patients who underwent a trauma code, whole-body trauma CT, and admitted at least one day for observation. Although some patients who refused to do whole-body CT scan are excluded from our study. We evaluated the mechanism, pattern, time of the day, age, sex, revised trauma score (RTS), injury severity score (ISS), and CT findings. We will try to evaluate our hospital guidelines for initiating a trauma code by the emergency medicine physician and doing a trauma CT with the findings in CT scans and the journey of the patient to hospital discharge.

Trauma registry data acquired after approval from hospital administration and approval from patients were not taken as there is no individual information to be disclosed.

We divided the patients into 4 groups according to ISS score, and evaluated each group for the kinds of trauma and disposition, we then did the same calculation but regarding to the RTS.

Diurnal variations of trauma also were looked at, in which the day was divided into 3 periods according to our shift's timings, morning is from 7 am to 3 pm, evening from 3 pm to 11 pm and night from 11 pm to 7 am.

The study also evaluated the trauma code activation protocol in our hospital, in which trauma code is activated and whole-body CT trauma was done, we matched the protocol with our CT findings.

Results

Over the period of 1 year, 886 patients were included in the study, of which 718 were males and 168 were females, the average age was 32.6. Positive imaging findings were found in 364 (41%) of patients while 524 (59%) had normal radiological tests, the principal mechanism of injury was motor vehicle accident (54.4%) followed by falls (21%) then pedestrian accidents (10.1%) (Figure 2) and (Table 2).

The most frequently injured body parts were head and neck (14%), then chest (13%),

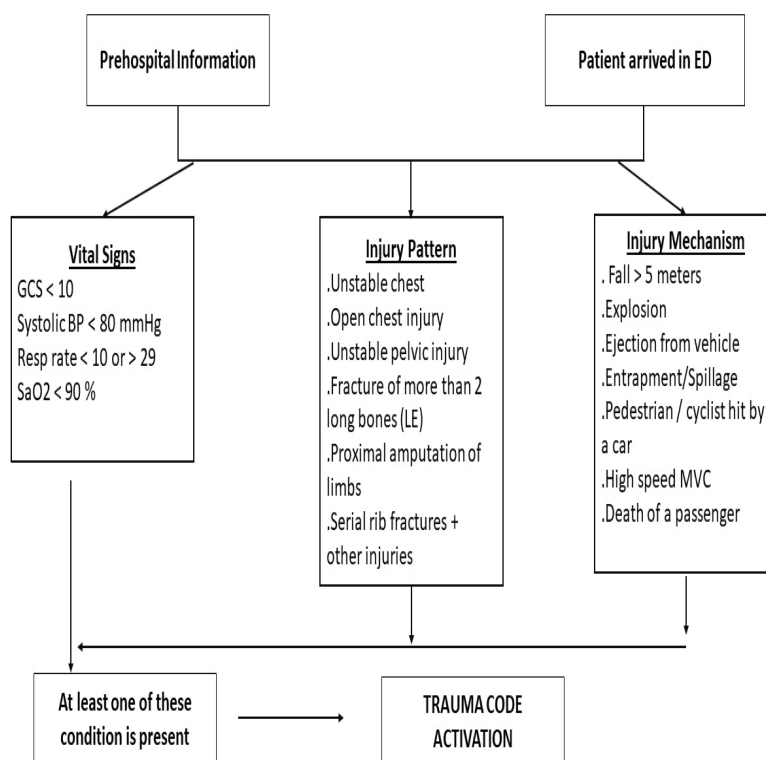


Figure 1: Trauma code activation protocol in Al-Ain Hospital

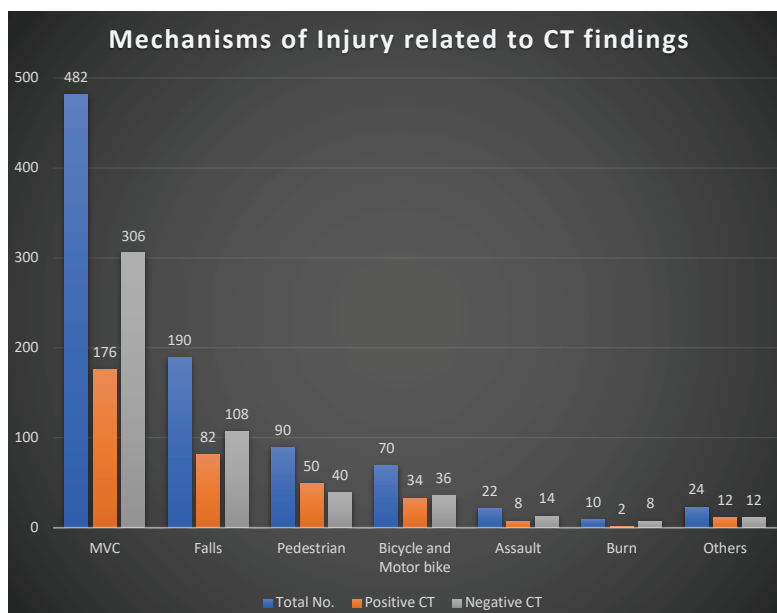


Figure 2: Mechanisms of Injury related to CT findings

followed by spinal injuries (12%)(Table 3).

The severity of injury was defined by (injury severity score [ISS] \geq 24) accounted for 8.1%, while according to (revised trauma score [RTS] it was defined by a score of <5) and accounted for only 1.8%. (Table 4 and 5).

The majority of trauma codes were noticed to happen in the evening shifts (51.9%), followed by morning shifts (30.4%). (Table 6).

Overall, **69.75% (618)** patients were admitted to hospital, and only **22** patients needed immediate interventions, while **36** patients needed ICU admission, and only **2** patients died in emergency room.

Type of Trauma	Total number	Positive CT Findings	Negative CT
MVC	482 (54.4%)	176	306
Pedestrian	90 (10.1%)	50	40
Falls	190 (21.4%)	82	108
Bicycle and Motor Bike	70 (7.9%)	34	36
Assault	22 (2.4%)	8	14
Burn	10 (1.1%)	2	8
Others*	24 (2.7%)	12	12
Total	886	364(41%)	524(59%)

Table 1: Mechanisms of trauma and relation with imaging findings.

*Includes strangulation, stab wound, fall of heavy object, injuries by camel and explosion of cooking gas tanks.

Body Part Injured	Number of Patients	Percentage
Head and Neck	130	14%
Chest	124	13%
Abdomen	30	3%
Pelvis	70	7%
Spine	108	12%

Table 2: Percentages of body part injured.

Variable	ISS below 12	ISS 12 -15	ISS 16 – 24	ISS more than 24	Total
Patients	724	36	54	72	886
Age					
Average (yrs.)	30.2539	29.5556	34.6296	36.6389	
Std Dev.	13.4241	13.7636	17.458	17.5697	
Gender					
M	576	34	46	62	718
F	148	2	8	10	168
Trauma type					
MVC	408	12	24	38	482
Pedestrian	68	4	8	10	90
Fall	156	14	12	8	190
Bicycle/motor					
Bike	56	2	6	6	70
Assault	14	2	0	4	20
Burn	8	0	0	2	10
Disposition					
Ward admission	508	32	46	32	618
Discharge	140	0	0	0	140
LAMA	68	0	0	0	68
ICU admission	0	2	8	26	36
OT	8	2	0	12	22
Death	0	0	0	2	2

Table 3: Trauma mechanisms in relation to ISS.

Variable	RTS above 5	RTS 5 and below	Total
Patients	870	16	886
Age			
Average (yrs.)	31	28	
Std Dev.	14.16	14.9	
Gender			
M	704	14	718
F	166	2	168
Trauma type			
MVC	474	8	482
Pedestrian	90	0	90
Fall	94	2	190
Bicycle/motor			
Bike	18	2	20
Assault	20	2	22
Burn	10	0	10
Others	20	2	22
Disposition			
Ward admission	616	2	618
Discharge	140	0	140
LAMA	68	0	68
ICU admission	22	14	36
OT	22	0	22
Death	0	2	2

Table 4: Trauma mechanisms in relation to RTS.

Time of the day	Number of patients
Morning (0700-1500)	270 (30.4%)
Evening (1500-2300)	460 (51.9%)
Night (2300-0700)	156 (17.6%)
Total	886

Table 5: Diurnal variation in regard to the shift time.

Discussion

The number of patients with positive results on imaging was less than the those who tested normal and had no injuries at all, and this mainly happens due to hospital policy in trauma code activation, resulting in more imaging and unnecessary admissions to the floor, although we had not missed any life-threatening injury. This finding should be weighed against the radiation exposure and hospital policy to perform a trauma CT and should direct the attention of physicians to perform a detailed physical examination and pay extra attention to the mechanism of injury before activating a trauma code.

The percentage of male patients continued to constitute the highest number of casualties and this due mainly to the cultural nature of the city, and car accidents were the main cause of trauma in our hospital leading to a trauma code activation the same as many worldwide statistics[4].

Head and neck injuries accounted for the highest body parts injured and this is mainly contributed to the high-speed

motor vehicle collisions and falls, and this finding is similar to many other studies [2, 3].

ISS was found to be more sensitive than RTS in detecting the severity of the injury however, it is more difficult to calculate and need imaging, and require a system-based calculator for easier estimation [5].

The diurnal variations in trauma clearly point out that rush and working hours contributed to the majority of accidents, and thus hospital staff should be more aware and prepared at these timing with the availability of all specialties and consultants on-call for possibly better outcomes.

Pedestrian injuries although dangerous but were lower than falls, and this was mainly due to excellent road traffic regulations and strict rules in our city, however extra care should be directed towards falls, and extra safety regulations should be in place with strict supervision of already available ones.

Conclusions

Detailed physical examination and the more teamwork-based decisions should be in place to activate a trauma code, before exposing patients to high sometimes unnecessary radiation.

Moreover, hospital policy in activating a trauma code should be revised, with more care being paid to the mechanisms of injury and the condition of the patient, without missing any injury that could harm the patient and put the physicians under scrutiny and legal issues.

The emergency room should be better prepared during peak times, with the availability of senior ED consultants, to provide high-quality care to trauma patients, and decrease unneeded imaging.

COI Statement: This paper has not been submitted in parallel. It has not been presented fully or partially at a meeting or podium or congress. It has not been published nor submitted for consideration beforehand.

All authors declare that there is no conflict of interest. **This research received no specific grant from any funding agency in the public, commercial, or non-profit sectors.** There are no relevant or minor financial relationships from authors, their relatives or next of kin with external companies.

Disclosure: The authors declared no conflict of interest. No funding was received for this study.

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