

Length of trauma patients' stay in imam Reza hospital as a tertiary center of Trauma and effective factor such as Routine Trauma X-rays

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Abstract: Emergency department is the first place that medical team gets contact with the patient. In order to have higher standards in traumatic patient care, continuous quality control is an essence and time is an important factor for this perspective in emergency department. Current study evaluates management of traumatic patients visiting emergency department (ED) in Imam Reza hospital by assessing length of stay and its effective factors such as Routine Trauma X-rays. Between April and December 2011, 300 traumatic patients visiting emergency department, Imam Reza hospital were randomly studied. Time needed to perform the routine trauma x-rays (lateral cervical vertebra, AP chest and AP pelvis radiographies), and the length of stay (LOS) in the ED were recorded. Mean physician and nurse first visit was 7.93 ± 0.47 and 11.91 ± 9.38 minutes, respectively. X-rays in was performed within 70.30 ± 53.08 minutes. Mean surgery and neurosurgery visits were obtained within 37.40 ± 3.16 minutes and 33.48 ± 2.10 minutes, respectively. The average LOS in the ED was 404 ± 238.51 minutes. There was no significant difference in LOS in the ED according to age, gender and trauma severity. Total ED stay of trauma patients in our ED was found to be significantly longer than other advanced centers. Structural improvement of emergency department and diagnostic modalities availability could reduce LOS in ED.

[Alireza Ala, Sajjad Ahmadi, Samad Shams Vahdati, Ali Jannati, Hesam Rahmani, Ali Taghizadie, Payman Mohramzadeh, Mahbob Poraghayi, Hamidreza Morteza Beigi, Vahid Dehghan Manshadi. **Length of trauma patients' stay in imam Reza hospital as a tertiary center of Trauma and effective factor such as Routine Trauma X-rays.** *Life Sci J* 2012;9(4):578-582] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 87
doi:[10.7537/marslsj090412.87](https://doi.org/10.7537/marslsj090412.87)

Keywords: Emergency department; Trauma; Trauma management

1. Introduction

Emergency Department (ED) of a hospital is the initial entrance for the majority of patients with emergency and non-emergency medical problems to the healthcare system. ED care is a proper opportunity to study the problems and differences due to the pervasive health problem of accumulation of patients in ED, where patients wait often for a long time to be examined by a physician for the initial evaluations, treatment and hospitalization (Andrulis, 1991; Derlet and Richard, 2001). The crowding in the ED is accompanied by delayed antibiotic treatment of pneumonia, delayed thrombolysis in acute myocardial infarction and delayed prescribing of analgesic drugs for patients with severe pain (Pines, 2006; Schull, 2004; Pines and Hollander, 2008; Pines, 2007; Fee, 2007).

Lack of sufficient attention to trauma and traumatic patients leads to death or disability and composes destructive effects on the social economic structure of countries and is becoming an epidemic across the world (Aksoy, 2001). In order to have high standards in providing medical care to traumatic patients, continuous quality control is a necessity. Within the framework of quality control, traumatic

patients should be determined and proper medical care algorithms be provided for these patients (Walters and McNeill, 1990). In recent years, an algorithm called "advanced trauma Support, ATLS" has been applied by the American College of Surgeons. Reduction in preventable mortality and shorter hospitalization duration can only be achieved through improved quality of trauma care. "Time" is an important factor in managing multi-traumatic patients in the ED.

Due to either insufficient medical knowledge or lack of the necessary facilities, services by emergency physicians for traumatic patients may often cause chronic or fatal and severe injuries for young patients or patients with relatively good health condition at the time of the incident, or when taking a proper action could have given them the best quality of life. Use of Radiology, guidelines and the patterns of traumatic patients increase the chance of diagnosis. Modern facilities gradually phased in EDs will lead to improved procedure of timely diagnosis (Oyar and Aktuglu, 2000). Given that traumatic patients, especially those in shock, will have 1 percent increased mortality for every three minutes delay in the emergency intervention, in this study, we

intended to evaluate the quality of service to traumatic patients admitted to ED of Imam Reza hospital of Tabriz assessing the duration of patient's stay and determining the factors effective on it.

2. Material and Methods

In a descriptive-analytical study in the ED of Imam Reza hospital of Tabriz in 2011, the relationship between staying duration of traumatic patients in Imam Reza ED as a third-level trauma center, and the factors involved in it was studied.

In this study, 300 traumatic patients were randomly selected and included in the study from among traumatic patients admitted to ED of Imam Reza hospital.

In all cases, the start time of the Primary Survey and requesting other routine graphs of trauma (radiographs of lateral spinal column, anterior-posterior chest and pelvis) was recorded and the interval was calculated. The time of requesting surgical and neurosurgical consultation and its conduction time were also recorded and the time interval calculated. Finally, the time of patient's discharge or un-discharge due to either decease, operating room, admission in intensive care unit (ICU), ward, or dispatched to another hospital were recorded. Selected patients were included in one of the following three groups:

Group 1: Multiple traumatic patients with life-threatening problems (respiratory airway, blood circulation), unstable Hemodynamic, and patients not responding to resuscitation in the Primary Survey.

Group 2: Patients who have no life-threatening problems, but they need emergency surgery or ICU admission.

Group 3: Patients with stable Hemodynamic who eventually need hospitalization (such as admission to operating room, ICU and ward).

Ethical Considerations

This study was in perfect compliance with privacy protection, and all patients' information is completely confidential and their name and specifications have never been revealed.

The study data was collected through questionnaires and entered into SPSS software and assessed by t-test and chi square tests and the power of the test was calculated at the end.

Table 1. Evaluation of findings between two genders

	Gender		P
	Male	Female	
Age	35.76±18.77	37.07±19.46	0.65
First Visit	7.86±0.5	8.28±1.27	0.73
Nursing Visit	11.64±9.05	13.19±10.81	0.28
Routine Trauma X-rays	70.53±47.50	70.25±54.27	0.97
Suture and Dressing	51.97±5.65	45±9.70	0.58
Splints	53.92±10.67	61.87±38.35	0.78
Surgery Visits	40.76±3.73	21.55±3.43	0.02
Neurosurgery Visits	34.09±2.33	30.67±4.83	0.53
Final Decision	397.18±242.54	442.07±216.61	0.21

Table 2. Evaluation of findings based on Trauma or CPR ward

	Emergency ward		P
	Trauma	CPR	
Age	35.26 ± 18.98	37.84 ± 18.62	0.28
First Visit	8.62 ± 0.57	6.18 ± 0.78	0.02
Nursing Visit	13.53 ± 0.65	7.82 ± 0.79	<0.001
Routine Trauma X-rays	66.32 ± 2.71	80.36 ± 8.29	0.03
Suture and Dressing	45.03 ± 4.27	63.51 ± 12.72	0.08
Splints	43.18 ± 9.89	81.06 ± 25.08	0.10
Surgery Visits	40.43 ± 4.19	29.83 ± 3.49	0.13
Neurosurgery Visits	33.66 ± 2.27	33.04 ± 4.68	0.89
Final Decision	410.67 ± 250.61	390.52 ± 250.40	0.51

Table 3. Evaluation of findings based on the patients' age groups

	Age Group			P
	<14	14-55	>55	
First Visit	6.19 ± 1.17	7.73 ± 0.52	10.30 ± 1.57	0.07
Nursing Visit	9.58 ± 6.90	12.10 ± 9.60	12.61 ± 9.71	0.32
Routine Trauma X-rays	67.90 ± 52.58	72.90 ± 56.79	58.00 ± 23.37	0.23
Suture and Dressing	30.00 ± 20.00	48.88 ± 4.55	85.00 ± 39.93	0.13
Splints	34.16 ± 7.23	55.27 ± 12.40	71.12 ± 38.46	0.66
Surgery Visits	28.68 ± 6.44	37.04 ± 3.36	45.35 ± 12.41	0.44
Neurosurgery Visits	25.48 ± 4.32	32.93 ± 2.49	41.97 ± 5.58	0.15
Final Decision	427.22 ± 252.58	399.97 ± 234.50	415.52 ± 253.63	0.79

3. Results

In the present study, 300 traumatic patients, including 248 men (82.7%) and 52 women (17.3%) were studied.

The mean age was 35.76±18.77 years (Chart 1) in the male cases and 37.07±19.46 years in the female cases (P= 0.650). In terms of age, patients were divided into three groups of under 14 years (31 cases, 10.3%), 14 to 55 years (227 cases, 75.7%), and over 55 years (42 cases, 14%).

As seen, most of the patients were dispatched from the hospital by an ambulance.

At the time of reference, 215 cases (71.7%) were admitted in trauma section, and 85 cases (28.3%) in Cardiopulmonary resuscitation (CPR) section of ED due to their deteriorated condition.

The mean duration of the first visit by emergency attendant or Resident was 7.93±0.47 minutes. The mean duration of the first action by the nurse was 11.91±9.38 minutes. The mean duration from the time of request to the conduction of simple graphs was 70.30±53.08 minutes. The mean duration from the time of request to the surgical visit was 37.40±3.16 minutes. The mean duration from the time of request to the neurosurgical visit was 33.48±2.10 minutes.

Suture and dressing was requested in 88 cases (29.3%) where the mean duration from the time of request to application of suture and dressing was 50.70±4.94 minutes respectively. Splinting was necessary in 47 cases (15.7%) where the mean duration from the time of request to application of splint was 55.27±10.78 minutes.

Finally, out of the 300 patients, 34 (11.3%) were sent to the orthopedic hospital, 47 (15.7%)

hospitalized in the Surgery ward, and 139 (46.3%) in neurosurgery ward. 80 cases (26.7%) were also discharged after completing the assessments.

The mean duration of request for transferring to orthopedic hospital was 475.05 ± 223.75 minutes. The mean duration of transferring to orthopedic hospital was 487.05 ± 22.81 minutes. The mean duration from the time of request to transferring to orthopedic hospital was 30.44 ± 21.00 minutes. The mean duration of making the final decision in all patients was 404.97 ± 238.51 minutes.

Table 1 shows the different findings between the two genders. As seen, there is a statistically significant difference between the two genders in

terms of neurosurgical visits and hospitalization in Neurosurgical ward.

Table 2 shows the different findings among the admission areas. As seen in the table, the patients admitted in the CPR have had significantly shorter durations of visit by nurse, graphing and surgery visit.

Table 3 shows the different findings based on different age classes. As seen in the table, there is no significant statistical difference in the variables under study among the different age classes.

Table 4 shows the different findings based on the outcome of patients. As observed, there is a statistically significant difference in age and the time of the final decision among the four groups.

Table 4. Evaluation of findings based on the Patient's Outcome

	Patient's Outcome				P
	Orthopedy Ward	Surgery Ward	Neurosurgery Ward	Discharge	
Age	31.14 ± 19.21	33.34 ± 16.57	39.18 ± 18.69	34.06 ± 19.66	0.045
First Visit	10.26 ± 1.84	7.38 ± 0.91	7.39 ± 0.69	7.27 ± 0.86	0.32
Nursing Visit	14.05 ± 10.89	10.78 ± 9.39	12.10 ± 9.55	11.27 ± 8.34	0.42
Routine Trauma X-rays	72.08 ± 28.49	81.14 ± 52.20	72.74 ± 66.49	58.92 ± 28.30	0.11
Suture and Dressing	37.11 ± 11.37	65.90 ± 22.77	55.34 ± 7.48	42.00 ± 5.54	0.34
Splints	52.82 ± 17.76	75.09 ± 32.47	45.76 ± 15.41	46.50 ± 14.76	0.78
Surgery Visits	47.85 ± 15.04	31.89 ± 3.97	34.76 ± 3.55	40.92 ± 7.64	0.50
Neurosurgery Visits	40.18 ± 8.47	35.72 ± 4.27	34.19 ± 3.48	28.00 ± 2.45	0.37
Final Decision	487.50 ± 224.81	563.08 ± 273.00	381.51 ± 195.13	317.75 ± 240.43	<0.001

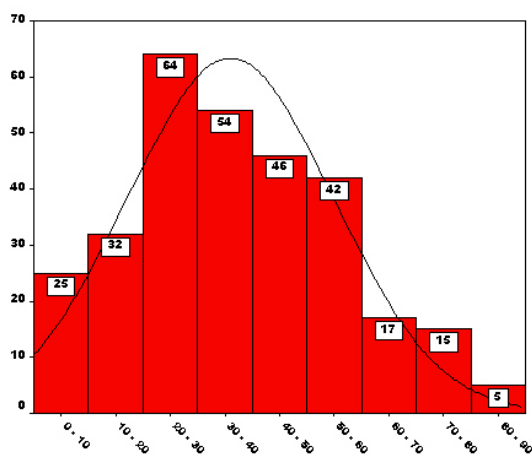


Chart 1. Age distribution of patients

4. Discussions

Patients often wait for a long time at the ED of hospital to get examined by a physician for the initial evaluations, treatment and hospitalization. "Time" is an important factor in managing multi-traumatic patients in the ED. Since multi-traumatic patients require a systematic, standard and regular approach in a short timeframe, healthcare quality control, especially in such patients, is a necessity in order to offer an adequate and appropriate care to these patients (Waydhas, 2001).

In the present study, assessing 300 traumatic patients admitted to ED of Imam Reza hospital, the quality of healthcare was studied regarding the elapsed time. In the current study, the mean durations to the first visit by physician and nurse were 7.93 ± 0.47 and 11.91 ± 9.38 minutes respectively, where the time of the first visit by physician and nurse to the patients in the CPR were 6.18 ± 0.78 and 7.82 ± 0.79 minutes, respectively that is significantly shorter than to the cases admitted to the trauma section of ED. This may be due to the badly dangerous condition of the CPR patients who are more in need of quicker attention. Some other factors such as less number of nurses in the trauma section, visits by first-year residents in ED who have less experience and lower agility in the evaluation of patients are also involved.

In a study of healthcare quality management by Nast-Kolb et al, the duration of trauma team's arrival at trauma CPR room had reduced from 10 minutes to 3. The goal of this action is for the leader in charge of the trauma team to arrive at CPR room before or at the time of the traumatic patient's arrival (Nast-Kolb and Ruchholtz, 1999). In order to achieve this objective, informing the ED about the patient before their arrival is a prerequisite and a necessary condition.

The most effective factor on hospitalization duration of multi-traumatic patients in the ED is clearly the time spent for radiological studies. The ideal condition includes these routine radiological

studies in restoration room in the ED (Oktay, 2000; Eray, 2002; Oyar and Aktuglu, 2000) (13-15).

In this study, the mean duration of performing routine radiographies of trauma was 70.30 ± 53.08 minutes. In studies by Cebicci et al, graphies were performed in the range of 47 ± 20 minutes (Çebicci, 2008). The results of the above mentioned study are much lower than those of the current study. Similarly, Wayd has et al with the help of their quality improvement studies, reduced the duration of performing routine trauma graphies from 24 minutes to 14. In this study too, the mean duration of conducting laboratory tests was reduced from 50 minutes to 24 (Waydhas, 2001).

The main reason for such delays in various studies is that there has been no automation system, nor personnel in charge of transferring the samples required for testing to the lab, conveying the patient to the radiology room and fetching the results of lab and radiology to the physician, and all of these are done by the patient's companions. Only in cases of patients in the restoration room of ED, a patient-carrier is in charge of these tasks which, in case ED is crowded, are done only for some patients.

Patient's staying in ED decelerates the course of action on ED patients, and leads to crowding due to the occupation of emergency beds by these people for a long time that reduces the capacity of admission, examination and attending the new patients (Rathlev, 2007; Zintl, 1997).

Other researchers have expressed this duration as short as between 31-75 minutes. However, such results are corresponding to the initial evaluations in the CPR and recovery stage, and do not include the time spent for additional evaluations, assessments and interventions (such as graphies and CT scan) performed in the ED (Zintl, 1997).

Unlike the above mentioned findings in this study, the mean duration of making the final decision in all patients was 404.97 ± 238.51 minutes. There was no significant statistical difference in duration of staying in ED in terms of age, sex and severity of trauma based on the place of admission. One of the reasons for prolonged duration of making the final decision for the patients is the multitude crowding in this center as the main trauma referral center in Eastern Azerbaijan province, which makes it impossible to offer quick services to all patients. However, in this study, the amount of crowding in ED is not mentioned, because it may have a significant effect on the conduction of diagnostic evaluations.

In the present study, duration of patients' hospitalization in the surgical ward, transferring to orthopedic hospital admission in Neurosurgical ward, and discharge time was significantly prolonged.

Quick discharge of the patients with non-severe trauma is justifiable. One of the reasons of prolonged hospital stay of patients in the surgical ward is the lack of adequate number of visiting resident surgical freshmen. Besides, considering the fact that the majority of hospitalized patients have been admitted from Trauma section and not from CPR, the bustle in trauma section during most hours of the day can be one of the other causes to this issue.

Due to the need for quicker hospitalization and treatment follow-up, Neurosurgical patients were hospitalized earlier than the other cases. However, due to presence of only one Neurosurgical resident in ED, delay in performing the CT scan and other assessments, and delay in getting the approval for surgery make it impossible to reduce this duration.

In the case of transferring to Orthopedic hospital, insufficient number of staff to accompany the patient, lack of well-equipped vehicles to transport patients, and delay in getting the approval for the surgical and Neurosurgical issues can be mentioned as the causes of delay.

Conclusion

In this study, staying duration of traumatic patients is much higher than previous studies. Development and improvement of infrastructures of ED and diagnostic modalities can be helpful in improving the issue.

Suggestions

According to the results of this study and other studies, it is recommended to provide the possibility of fulfilling various modalities for trauma section of ED dedicating the ultrasound, CT scan and radiology sections to it to reduce the duration of traumatic patients' staying and making the final decision for them.

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9/18/2012