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A cohort retrospective study on traumatized pediatrics referred to an adult trauma center

Abstract

Objectives
Trauma is the second cause of death after cardiovascular diseases and the leading cause of wasting active years of life in the Iranian population. Trauma is one of the main causes of hospitalization, death, and short-term and long-term disability in the first five decades of life. Considering the few studies and the inconsistencies in the results of studies on the length of hospitalization of traumatized pediatrics in the emergency department and the resulting complications, we decided to investigate the most important factors related to the length of hospitalization in the emergency department and the resulting complications in traumatized pediatrics referred to an adult trauma center in west of Iran.
Method
In this retrospective study, all children aged under 12 years admitted to the emergency department from 2020 to 2021 were included. Demographic data including age, sex, time of trauma, place of residence, mechanism of trauma, length of stay, location of injury, inpatient department, undergoing surgery, complications of hospitalization, final outcome after hospitalization were extracted from patient data file. For data analysis, frequency and percentage were utilized for qualitative variables, whereas mean and standard deviation were employed for quantitative variables. The length of hospitalization for traumatized children was shown to be correlated with several characteristics, which were found by multivariate regression analysis and correlation coefficient tests on the data.
Result
400 children were included in this study. The average age was 8.07 ± 3.99 years, 78.78% were male and 22.21% were female. 2% of children died during the study period. The average length of stay in the emergency department was 3.15 days. Older age, male gender, motor vehicle collisions, limb injuries and hospital infections caused a longer stay in the emergency room ($p \leq 0.05$). Finally, patients who had a longer length of stay in the emergency department(2.8%) had a more mortality in comparison to patients with a short-timed stay (1.7%), ($p < 0.05$).
Conclusions
This study determined that age, sex, mechanism of injury, hospital infection, type of injury can lead to a longer stay in the emergency department so by removing modifiable risk factors this issue could be addressed.

Keywords: *Emergency department, Pediatric, Trauma, Adult trauma center*

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1. Introduction

Among all age categories, trauma is one of the main causes of illness and death [1]. Trauma is linked to a range of injuries that need to be quickly assessed and treated in order to preserve lives and avoid long-term impairment [2]. Every day, injuries claim the lives of around 16,000 individuals globally [3, 4]. Trauma is the primary cause of mortality in children, accounting for over 11,000 fatalities and over 8 million non-fatal injuries among those aged 1 to 19 in 2015. In recent decades, there has been a significant reduction in child mortality worldwide.

The primary cause of mortality and disability globally is pediatric injuries, which impose a heavy burden on nations with limited resources. Every year, trauma claims the lives of almost 5 million youngsters. In the US, trauma accounts for a higher percentage of deaths in this age range than all other causes combined. In the under-14 age group, traumatic injuries were responsible for around 22,000 fatalities, according to the 2006 data. Studies on the frequency and possible risk factors of pediatric trauma are extremely rare in underdeveloped nations. Potential preventative and intervention techniques to lessen the impairment caused by pediatric injuries can be found by a thorough investigation of the epidemiology of pediatric trauma [5,6].

Today, the hospital emergency departments play a special role as one of the most important health care providers. Considering the increasing number of patients and at the same time the lack of available resources and facilities, it is necessary to pay close attention to reducing the unnecessary stays of patients. Overcrowding in these departments is considered a serious and pervasive problem which has affected the quality of services provided to patients [7,8]. In an Iranian study, only about 10% of patients had a long stay in the emergency department. The proportion of children under 12 years old among patients with acceptable length of stay was significantly higher. In fact, patients with an acceptable length of stay are more likely to be less than 12 years old, while patients with a long length of stay are more than 12 years old [9]. Some researchers have shown

worse outcomes in trauma patients with longer ED stays, while others have found no significant difference in mortality from ED length of stay. Considering the few studies and the contradictions in the results of studies on the length of hospitalization and resulting complications of traumatized children in the emergency department, we decided to investigate the most important factors related to the length of hospitalization in the emergency department and the resulting complications in traumatized children referred to a trauma center in west of Iran in 2021.

2. Methods

In a trauma facility, descriptive-analytical retrospective research was carried out. Every traumatized kid between the ages of 0 and 12 who was sent to our facility between January 2021 and December 2021 and hospitalized for at least 24 hours was included in the research population. A trained research assistant obtained and recorded data on demographics, trauma mechanism, time of trauma, place of residence, length of stay, site of injury, hospitalization department, history of hospitalization, number of hospitalizations, surgery, complications during hospitalization, and final outcome following hospitalization by consulting the clinical records of the patients. A colleague doctor or someone with training in pediatric emergency care completed the patient charts. As an expert, the project's initial executor authorized this questionnaire. Patients who had incomplete files or were discharged from the trial before 24 hours were not allowed to participate.

Frequency and percentage were used for qualitative factors and mean and standard deviation for quantitative variables in order to arrange and summarize the data once it was collected. In order to determine the variables associated with the duration of hospitalization for children who have experienced trauma, the data were subjected to multivariate regression analysis and correlation coefficient tests. A statistically significant P value was defined as one less than 0.05. Data analysis was performed using the statistical program SPSS 22.

The design was approved by the Ethics Committee of Kermanshah University of Medical Sciences. [IR.KUMS.MED.REC.1402.066]

3. Results

In this study, 400 patients were enrolled. The youngsters were 8.07 ± 3.99 years old on average. Boys made up 78.78% of the youngsters, while females made up 22.21%. 2% of kids passed away while the trial was underway. 3.15 days was the average length of stay in the emergency room. The patients were split into two groups: the first group spent more than three days in the hospital, while the second group stayed in the emergency room for more than three days.

The relationship between the study variables and the duration of hospitalization in the emergency department is presented in Table 1.

Table 1. Correlation between study variables and length of hospitalization in the emergency department

Variables		Length of hospitalization in the emergency department (days)		P value
		≥3 (n=107)	**≤ 3 (n= 293)**	
Age		9.09 ± 1.66	6.14 ± 1.74	≤ 0.05
Gender	female	19(17.75%)	90(30.71%)	≤0.05
	male	88(82.25%)	203(69.29%)	≤0.05
Time of event	spring	29(27.1%)	74(25.25%)	≥0.05
	summer	33(30.84%)	69(23.54%)	≥0.05
	fall	20(18.69%)	75(25.59%)	≥0.05
	winter	25(23.36%)	75(25.59%)	≥0.05
Residence location	Urban	58(54.20%)	162(55.29%)	≥0.05
	Rural	49(45.79%)	131(44.70%)	≥0.05
Mechanism of trauma	Motor vehicle collision	96(89.71%)	200(68.25%)	≤0.05
	Other accidents	11(10.28%)	93(31.75%)	≤0.05

Anatomy of injury	Head & neck	16(14.95%)	57(19.45%)	≤0.05
	Face	9(8.41%)	12(4.09%)	≤0.05
	Chest	3(2.8%)	25(8.53%)	≤0.05
	limbs	64(59.81%)	141(48.12)	≤0.05
	Trunk	15(14.01%)	58(19.79%)	≤0.05
Ward	orthopedics	34(31.77)	98(33.44)	≥0.05
	Neurosurgery	37(34.57%)	105(35.83%)	≥0.05
	ICU	36(33.64%)	90(30.71%)	≥0.05
History of hospitalization	Yes	1(0.93%)	3(1.02%)	≥0.05
	No	106(99.06%)	290(98.97%)	≥0.05
Undergoing surgery	Yes	0	0	≥0.05
	No	107	293	≥0.05
Infection	Yes	8(7.47%)	5(1.71%)	≤0.05
	No	92(99.53%)	288(98.29%)	≤0.05
Final outcome after hospitalization	Discharge	97(99.20%)	288(98.30%)	≤0.05
	Death	3(2.80%)	5(1.70%)	≤0.05

Age, gender, mechanism of injury, anatomy of injury, and presence of infection were significantly related to the duration of hospitalization. For example, older age, being male, motor vehicle collision, limb injuries, and existing nosocomial infection make patients prone to longer hospitalizations ($P \leq 0.05$). Finally, the rates of mortality in patients with longer and shorter duration of hospitalization were 2.8% and 1.7% respectively ($P \leq 0.05$).

4. Discussion

In underdeveloped nations, trauma is the main cause of mortality for children. The average age of the youngsters in our research was 8.07 ± 3.99 years. The average age of all traumatized children admitted to a Tehran general hospital's emergency room was 4.68 ± 1.23 years, according to cross-sectional research by Akbarian [10], which was less than half the age of the kids in our study. This average age was reported as 7.3 ± 3.8 years in the research of Yousufzadeh Chabek [11], which is similar to our findings.

There were 21.22% girls and 78.78% boys in our survey. Boys made up 70% of the population in the Akbarian research [10] and 62% in the Yusufzadeh Chabek study [11], which is similar to our study. The gender distribution of the patients in our study also agrees with the findings of the Memarzadeh [12] and Rahami Daulatabadi [13] investigations. Numerous additional studies [14–17] have likewise indicated a greater percentage of males among traumatized pediatric patients. Male children tend to be more active, which might be the cause of this [10].

In our study, 2% of children died during the hospitalization period. This amount was reported as 1.07% in Akbarian study [10], which is lower than our study. The difference can be related to referral of more complicated patients to our trauma center.

According to our research, auto accidents were the most frequent cause of trauma. Falling was the most prevalent mechanism of trauma, accounting for 57.8% of all injuries, and explained the mechanism of injury in 97.9% of patients in another study [10]. Per Javed's research [15], the two most frequent causes of severe injuries in children are car accidents and falls from heights. 32.9% of traumatic occurrences happened on inner-city streets, whereas 49.6% happened at home, according to Asadi's [16] findings from another survey. The most frequent causes of traumatic injuries, according to their data, are falls from heights and car crashes, which account for 35.1% and 40.4% of traumatic occasions, respectively. According to Alyafei [18], blunt trauma accounted for 98.2% of the mechanism of damage in pediatric injuries. Additionally, they discovered that 35% of the traumas were brought on by auto accidents, and 35.6% of the traumas were caused by falls from a height. According to different research by Garg [19], motor vehicle collisions were the most prevalent cause of traumatic accidents in older children, whereas falls from heights were the most common mechanism in younger children. Additionally, they stated that the most typical location for traumatic events to occur was the home. Given the age range of the children under study, this conclusion is plausible.

The average duration of hospitalization in our study was 3.15 days. This amount was reported in the study of Yousufzadeh Chabek [11] 2.3 days, which is very close to our study.

The results of our study showed that the male gender has a slightly longer length of hospitalization. Another study that examined the effect of gender on length of stay in adult trauma patients found that men had a longer hospital stay [20] which is in agreement with our results.

5. Conclusion

In our study, age, gender, mechanism of injury, infection, anatomy of injury can affect the length of hospitalization of traumatic children. According to the anatomy of the injury, patients with limb injury had a longer average length of stay in the hospital. In addition, non-surviving children had a longer stay in the hospital than survivors. Therefore, the duration of stay in the emergency department and hospitalization can be reduced by eliminating modifiable risk factors.

Ethical approval

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards

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None

Author contribution

Dr. Shahrouz Tabrizi: conceptualized and designed the study, drafted the initial manuscript, and reviewed and revised the manuscript.

Dr. Pouria Mansouri: Designed the data collection instruments, collected data, carried out the initial analyses, and reviewed and revised the manuscript.

Dr. Akram Zolfaghari Sadrabad: Coordinated and supervised data collection, and critically reviewed the manuscript for important intellectual content.

Dr. Reza Farahmand Rad: Coordinated and supervised data collection, and

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Declaration of competing interest

The authors deny any conflict of interest in any terms or by any means during the study

Guarantor

Dr. Shahrouz Tabrizi

Provenance and peer review

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Human and animal rights

No animals were used in this research. All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013

Consent for publication

Informed consent was obtained from each participant.

References

1. Ali K, Arain GM, Masood AS, Aslam M. Pattern of injuries in trauma patients presenting in Accident and EmergencyDepartment of Jinnah Hospital, Lahore. Ann King Edward Med Coll 2006; 12: 26.

2. Tabish SA, Shah S, Bhat AS, Bhat FA, Shoukat H, Mir My. Clinical profile

and mortality pattern in patients of ballistic trauma. JIMSA 2004; 13: 247–250.

3. Soroush AR, Ghahri-Saremi SH, Rambod M, Malek-Hosseini SA, NickEghbal S, Khaji A. Pattern of injuries in Shiraz. Chinese J Trauma 2008; 11: 2–8.

4. Ansari S, Akhdar F, Mandoorah M, Moutaery K. Causes and effects of road traffic accidents in Saudi Arabia. Public Health 2000; 114: 37–39.

5. Holder Y, Peden M, Krug E, Lund J, Gururaj G, Kobusingye O. Injury

Survelliance Guidelines. Geneva: World Health Organization; 2001. Available

from:

http://www.who.int/violence_injury_prevention/media/en/136.pdf

6. Hatamabadi HR, Mahfoozpour S, Alimohammadi H, Younesian S.

Evaluation of factors influencing knowledge and attitudes of mothers with

preschool children regarding their adoption of preventive measures for home injuries referred to academic emergency centres, Tehran, Iran. Int J Inj Contr Saf Promot. 2014;21:252–9.

7. Chen M, Unruh M, Pesko F, Jung H, Miranda Y, Cea M, et al. The role of hospitals in improving non-medical determinants of community population health. New York, NY: NYS Health Foundation. 2016.

8. McKee M, Edwards N, Atun R. Public-private partnerships for hospitals.Bulletin of the World Health Organization. 2006;84:890-6.

9. Siamisang K, Mokute K, Mhaladi BB, Tlhakanelo JT. Waiting Times and

Length of Stay of Trauma Patients in a Botswana Referral Hospital Emergency Department. Open Journal of Emergency Medicine. 2022;10(1):54-65.

10. Akbaryan F, Derakhshanfar H, Heidari K, Vafaei A, Matin S. Prognosis in children with traumatic injuries referring to the emergency department. Chin J Traumatol. 2019

Dec;22(6):323-327. doi: 10.1016/j.cjtee.2019.07.009. Epub 2019 Sep 26. PMID: 31677984; PMCID: PMC6921176.
11. Yousefzadeh Chabok S, Ranjbar Taklimie F, Malekpouri R, Razzaghi A. Predicting mortality, hospital length of stay and need for surgery in pediatric trauma patients. Chin J Traumatol. 2017 Dec;20(6):339-342. doi: 10.1016/j.cjtee.2017.04.011. Epub 2017 Nov 4. PMID: 29198715; PMCID: PMC5832455.
12. Memarzadeh M., Hoseinpour M., Sanjary N. A study on trauma epidemiology in children referred to Isfahan Alzahra Hospital during 2004-7. KAUMS J (FEYZ) 2011;14:488–493.
13. olatabadi A.A., Mohseninia N., Amiri M. Pediatric trauma patients in Imam Hossein emergency department; an epidemiologic study. Iran J Emerg Med. 2016;3:4–8.
14. Jalalvandi F., Arasteh P., Faramani R.S. Epidemiology of pediatric trauma and its patterns in western Iran: a hospital based experience. Glob J Health Sci. 2016;8:139–146.
15. Javid M.D., Shahcheraghi M.D., Lahiji A. Road traffic injuries in children. Iran J Orthopaedic Surg. 2006;4:1–6.
16. Asadi P., Asadi K., Rimaz S. Epidemiology of trauma in children admitted to poursina teaching hospital. J Guilan University Med Sci. 2015;23:9–15.
17. Gürses D., Sarioglu-Buke A., Baskan M. Cost factors in pediatric trauma. Can J Surg. 2003;46:441–446.
18. Alyafei K.A., Toaimah F., El Menyar A. Analysis of pediatric trauma data from a hospital based trauma registry in Qatar. Int J Crit Illn Inj Sci. 2015;5:21–26.
19. Garg K., Sharma R., Gupta D. Outcome predictors in pediatric head trauma: a study of clinicoradiological factors. J Pediatr Neurosci. 2017;12:149–153.
20. Liu T, Xie J, Yang F, et al. The influence of sex on outcomes in trauma patients: a meta-analysis. Am J Surg. 2015;210:911e921. https://doi.org/10.1016/j.amjsurg.2015.03.021.