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Investigating the frequency of trauma and its final outcome in the emergency department of Kowsar Hospital, Sanandaj, Iran

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Original Article

Abstract

BACKGROUND: Trauma is one of the causes of death and part of the cause of disability in the active population in developing countries. This study was conducted with the aim of investigating trauma and consequences in emergency patients of Kowsar Hospital, Sanandaj, Iran, in 2018-2019.

METHODS: In this cross-sectional study, the files of 245 patients who referred to the emergency department (ED) of Kowsar Hospital from April 2018 to March 2019 with the diagnosis of trauma equal to the prepared checklist were examined and the required information was extracted and analyzed using SPSS software.

RESULTS: 74.3% were men and 25.7% were women. The average age was 26.49 ± 11.43 years. 58% of trauma mechanism was related to accidents, 40% to falls, and 2% was due to conflicts. 51% of patients were hospitalized in the emergency room and 5.7% in the intensive care unit (ICU). 41.6% were discharged and 1.6% died as a result of trauma. There was a significant relationship between the scene of the accident, transfer to the hospital from the scene of the accident, and the location of the lesion with the outcome of trauma in the studied patients (P < 0.0001).

CONCLUSION: The results of the present study showed that accidents and falls were the main reasons for patients to visit the emergency trauma department. There was a significant relationship between the anatomical location of the injury and the trauma's outcome. Most of the patients were admitted to the emergency room. Outcomes were trauma, hospitalization, discharge with personal consent, and death.

KEYWORDS: Trauma; Patient Outcome Assessment; Injuries; Emergency Room; Cause of Death

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Introduction

Losses due to trauma are more than 5 million people every year and millions of people suffer serious injuries.[1] Moreover, the final trauma outcomes included in this study are death, discharge with personal consent, hospitalization in the intensive care unit (ICU), or hospitalization in the emergency ward. In 2016, the World Health Organization (WHO) announced that road traffic crashes (RTCs) were the eighth cause of death worldwide and also in middle-income countries.[2] The number of deaths on the world's roads is unacceptably high, with an estimated 1.35 million people dying each year.[3] The burden of trauma-related diseases, especially RTCs, is expected to increase dramatically by 2020.[4] In recent years, trauma-related mortality has become one of the most important public health issues

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in Iran. Recent studies have shown that RTCs are the most common cause of injuries in Iran, followed by falls and blows.[5-7] According to a report from the Institute of Health Measurement and Evaluation, RTCs ranked third among the 10 main causes of death and disability in Iran.[8] Iran, with a population of more than 80 million people, had 15932 deaths due to RTCs in 2017.[3] In Germany, accident-related deaths among children and adolescents have been declining for years, but in 2020, traumatic injuries were also the second most common cause of death among children aged 1-15 years.[9] Injuries in childhood and adolescence are also one of the common causes of hospitalization. According to the German Federal Statistical Office, accidents are the most common cause of hospitalization for children aged 5 to 19 years and the second most common cause for children aged 1 to 4 years.[10] In Japan, the Japan Advanced Trauma Assessment and Care was introduced in 2002, and since then trauma deaths have decreased. However, reports show that the mortality of pediatric trauma patients has not decreased.[11] 57% of all trauma deaths occurred before or after hospital admission. Traffic accidents for the age group of less than 1 year have been the highest category of deaths (15%). The overall in-hospital mortality of Japanese pediatric trauma patients was 3.9% based on the National Trauma Registry in Japan. The main cause of severe trauma was traffic accidents.[12] Sarvari et al. in Iran reported that from 1555 injured people, 71.6% were men and 28.4% were women. The average age was 29.30 ± 18.17. Most of the occurred events were within the city and were related to passenger cars. Traffic accidents were more frequent in summer morning.[13] Various studies conducted on trauma have provided a grim picture of trauma patients' outcomes and measured the severity of anatomical and physiological damage of patients referred to the hospital.[14] Trauma is now the leading cause of death for 46-year-old individuals and younger. The largest increase in the number of trauma deaths and the highest crude number of trauma deaths occurred in baby boomers.[15] Ahmed et al. reported that across the world, traffic accidents caused major health problems and were of concern to health institutions. Nearly 1.35 million people are killed or disabled in traffic accidents every year. In 2019, 93% of road traffic injury-related mortality occurred in low- and middle-income countries with an estimated burden of 1.3 million deaths. This issue is growing; by 2030, road traffic injuries will be the seventh leading cause of death globally.[16] Trauma is a leading cause of death worldwide, and approximately 2/3 of patients have chest trauma varying in severity from a simple rib fracture to penetrating cardiac injury or respiratory compromise. Blunt chest trauma is the most common with an incidence of 90%, and less than 10% require surgical intervention of any kind. Mortality from chest trauma is second only to head injury, highlighting the importance of early management.[17] On the other hand, it should be noted that the causes of trauma, which are referred to as the mechanism of trauma, include a wide range of causes; however, in this study, the most common causes of trauma (according to the results of articles and similar research), i.e., falls, road accidents, and also conflicts, will be examined. The present study aims to investigate the frequency of trauma and its final outcome.

Methods

This cross-sectional study was performed in Sanandaj City, in the ED of Kowsar Hospital from April 2018 to March 2019. Taking into account the final result of trauma, which is death, estimated at about 20% in other studies,[7] the sample size for this study was calculated at the 95% confidence level and 5% error as follows. Based on the following

formula, 245 cases were randomly selected.

$$n = \frac{Z_{1-\alpha/2}{}^2 \times P \times (1-P)}{(d)^2} = \frac{1.96^2 \times 0.20 \times (1-0.20)}{(0.05)^2} = 245$$

After the approval of the study in the Kurdistan Medical Sciences Research Council and coordination with the Research Vice-Chancellor of Kowsar Hospital, a researcher made a checklist of study variables including age, gender, place of residence, marital status, occupation, education, season, mechanism of trauma, place of accident, manner of transport from the scene of the accident, anatomic site of injury, and outcome of the trauma (including death, discharge by personal consent, admission to ICU, admission to the emergency room). The criteria for entering the study were the files in which the required information was completely included or had the least amount of data defects. Exclusion criteria were patients aged less than 5 years and more than 50 years. The medical records of all trauma patients in the ED of Kowsar Hospital in 2019 were reviewed by the moderator and colleagues of the study, and the information of the files according to the entry and exit criteria was extracted according to the checklist. To eliminate the study's confounding factors, all the investigated cases were examined twice by two different colleagues to minimize any mistakes in data collection. This study was conducted by simple sampling method. Mean and standard deviation (SD) were calculated for quantitative variables and frequency and percentage were calculated for qualitative variables. All study variables in this checklist had equal points. Chi-square method was used to test analytical hypotheses. Data analysis was done using SPSS software (version 14, SPSS Inc., Chicago, IL, USA). The ethics code was 1399.271.

Results

In this study, the medical records of 245 patients with a mean age of 26.49 ± 11.43 years (74.3% men and 25.7% women) were checked out. Most traumas happened in summer (31.4%), followed by 26.1% in spring, 24.1% in autumn, and 18.4% in winter. Regarding the trauma mechanism, 58% were accidental, 40% fall, and 2% were conflict-related. 59.2% of the accidents occurred on the road, 30.2% at home, and 10.6% at work. 59.2% of people were transported from the accident site by themselves, and 40.8% were ambulanced to the hospital. In terms of anatomical location, 34.3% were inflicted on the limbs, 31% were multiple trauma, 27.3% were head and neck, and 7.3% were abdomen and chest traumas. The outcomes of trauma were 51% admission to the emergency ward, 41.6% discharged with personal consent, 5.7% hospitalization in the ICU, and 1.6% death (Table 1).

Table 1. Frequency distribution of factors related to trauma in the studied subjects

Variable	n (%)
Season	
Spring	64 (26.1)
Summer	77 (31.4)
Autumn	59 (24.1)
Winter	45 (18.4)
Trauma mechanism	
Accident	142 (58.0)
Fall	98 (40.0)
Fight	5 (2.0)
Place of incident	
At home	74 (30.2)
At work	26 (10.6)
On the road	145 (59.2)
Mode of transfer from the place of accident	
By themselves	145 (59.2)
By ambulance	100 (40.8)
Anatomical location of the injury	
Head and neck	67 (27.3)
Abdomen and chest	18 (7.3)
Organs	84 (34.3)
Multiple trauma	76 (31.0)
The outcome of trauma	
Discharge with personal consent	102 (41.6)
Admission to the emergency ward	125 (51.0)
Hospitalization in the ICU	14 (5.7)
Death	4 (1.6)

ICU: Intensive care unit

67.3% of the patients lived in the city, and 32.7% lived in the suburbs. Regarding marital status, 66.5% of the studied subjects were

unmarried, and 33.5% were married. Regarding occupation, 23.3% of the patients were self-employed, 22% were retired or governmental employees, 22.4% were unemployed or homemakers, and 32.2% were students. Considering education level, 10.6% of the studied subjects were illiterate, 60.8% had a diploma or lower education, 24.5% had an associate's or Bachelor's degree, and 4.1% had a master's or higher education (Table 2).

Analytical results showed no significant relationship between the trauma season and the trauma mechanism with the outcome of the trauma in the studied subjects (P > 0.05) (Table 3). However, there was a significant relationship between the location of the accident, the mode of transfer from the accident place, and the anatomical location of the injury with the outcome of the trauma in the studied subjects (P < 0.0001).

Discussion

The present study investigated the frequency of major trauma and trauma-related components and outcomes in patients referred to the ED of Kowsar Hospital in 2017-2018. The investigations carried out showed that there was no written information available in this regard.

Table 2. Frequency distribution of demographic variables in the studied subjects

Variable	n (%)
Gender	
Men	182 (74.3)
Women	63 (25.7)
Place of residence	
City	165 (67.3)
Village	80 (32.7)
Marital status	
Single	163 (66.5)
Married	82 (33.5)
Occupation	
Self-employed	57 (23.3)
Retired or employee	54 (22.0)
Unemployed or housewife	55 (22.4)
Student	79 (32.2)
Education	
Illiterate	26 (10.6)
Diploma or lower	149 (60.8)
Associate's or bachelor's	90 (24.5)
Master's or higher	10 (4.1)

Table 3. Determining the relationship between variables related to trauma with the outcome of trauma in the studied subjects

	The outcome of trauma				Total	F-test	P
	Discharge with personal consent	Admission to the emergency ward	Hospitalization in the ICU	Death			
Season						4.31	0.89000
Spring	31 (30.4)	30 (24.0)	3 (21.4)	0 (0)	64 (26.1)		
Summer	30 (29.4)	39 (31.2)	6 (42.9)	2 (50.0)	77 (31.4)		
Autumn	24 (23.5)	32 (25.6)	2 (14.3)	1 (25.0)	59 (24.1)		
Winter	17 (16.7)	24 (19.2)	3 (21.4)	1 (25.0)	45 (18.4)		
Trauma mechanism						11.44	0.07600
Accident	48 (47.1)	79 (63.2)	12 (85.7)	3 (75.0)	142 (58.0)		
Fall	51 (50.0)	44 (35.2)	2 (14.3)	1 (25.0)	98 (40.0)		
Fight	3 (2.9)	2 (1.6)	0 (0)	0 (0)	5 (2.0)		
Place of incident						13.58	0.03500
At home	37 (36.3)	37 (29.6)	0 (0)	0 (0)	74 (30.2)		
At work	14 (13.7)	9 (7.2)	2 (14.3)	1 (25.0)	26 (10.6)		
On the road	51 (50.0)	79 (63.2)	12 (85.7)	3 (75.0)	145 (59.2)		
Mode of transfer						49.08	< 0.00001
Themselves	82 (80.4)	63 (50.4)	0 (0)	0 (0)	145 (59.2)		
Ambulance	20 (19.6)	62 (49.6)	14 (100)	4 (100)	100 (40.8)		
Location of the injury						86.65	< 0.00001
Head and neck	43 (42.2)	24 (19.2)	0 (0)	0 (0)	67 (27.3)		
Abdomen and chest	7 (6.9)	11 (8.8)	0 (0)	0 (0)	18 (7.3)		
Organs	49 (48.0)	34 (27.2)	1 (7.1)	0 (0)	84 (34.3)		
Multiple trauma	3 (2.9)	56 (44.8)	13 (92.9)	4 (100)	76 (31.0)		

ICU: Intensive care unit

The mechanism of trauma in this study was accidental (58%), falling (40%), and conflict-related (2%). Analytical results showed no significant relationship between the mechanism of trauma and the outcome in the studied subjects; however, the highest rate of death and hospitalization in the ICU occurred in people traumatized by accident. The place of the accident was home (30.2%), workplace (10.6%), and road (59.2%). In this study, there was a significant relationship between the accident's location and the trauma's outcome in the studied subjects, so that the people who suffered trauma on the road had the highest percentage of death and hospitalization in ICU. In this study, the two most common trauma mechanisms were motor vehicle and falling accidents. These results have also been consistent with the study conducted by Azami-Aghdash et al. reporting 7176344 patients (70.6% men) with the mean age of 27.5 ± 17.8 years who were registered to 657 EDs. RTC was the most common cause of injury (31.0%) followed by hit (28.2%) and fall (10.1%). While roads were the commonest place of injuries, 34.0% of patients have been injured at home. More than 90% of injuries were unintentional. Assault and suicide attempt were causes of injury in 5.6% and 3.9% of patients, respectively.[18]

In addition, the results of the present study are consistent with the findings of the study by Zamani et al. that studied 1363 traumatic patients with mean age of 30.50 ± 17.35 years (73.6% men). The mean time from event to reaching the ambulance was 9.00 ± 7.81 minutes and average time of patient's transportation to the hospital was 27.07 ± 14.49 minutes. Motor vehicle crashes and falling from height were the most common trauma mechanisms and mortality. The rates of mortality and hospitalization in men, respectively, were 7 and 3.4 times more than women. The rates of mortality and intensive care need were estimated 0.66% and 6.82%, respectively. Chest and head traumas were the most common causes of death.[19]

The years of life lost (YLL) due to traffic-related injuries and deaths in Iran showed that the number was 4 times higher in men than in women (15.2 vs. 3.7 per 1000) for injuries, and was 3.5 times higher in men than in women (15.84 vs. 4.75 per 1000) for deaths. Results showed that YLL due to death and years of life lost due to disability (YLD) caused by traffic accidents were higher in young age groups, especially in 15-29, which was higher than all age groups (53.4% of injured were in this age group). Gender difference between these two parameters was in ways that in all age groups, except for the 0-4 year age group, men were more prone to traffic-related injury and death compared to women. The more frequent deaths in men were consistent with similar studies throughout the world.[20-22]

The epidemiological findings of the present study were similar to the results of most international studies. Most trauma patients studied by Baradaran et al. were young and active, and men were more injured than women,[23] which was consistent with this study.

The analytical results showed no significant relationship between the event's season and the trauma's outcome in the studied patients. However, the highest rate of death and hospitalization in the ICU happened in the summer season. This finding can explain the greater risk associated with higher agricultural activities in this season. In the study of AghaKhani et al., it was shown that most cases of injuries occurred in summer.[24]

Regarding the method of transportation from the accident site, 59.2% attended the hospital themselves, and 40.8% were taken to the hospital by ambulances. There has been a significant relationship between the way of transportation from the accident site and the outcome of trauma in the studied subjects, so that the people who were transported by

ambulance from the accident site suffered more severe trauma and had the highest rate of death and hospitalization in ICU. The transportation method of injured patients to the hospital is one of the most important issues in developed countries. Abbasi et al. reported that from 2010 to 2015, the percentage of late deaths decreased significantly from 68% to 54%.[25]

In general, there was a strong association between death and cause of trauma. The most of the analysis demonstrated that the mortality of the pedestrians, cyclists, and motorcyclists was higher than other trauma patients.[26] The number of casualties due to trauma varies in different countries; the comparison of road casualties in Turkey and America showed 13.09% versus 4.26%.[27]

The results of this study showed that efforts could be made to formulate preventive trauma protocols by identifying the groups at risk and the care needed. It is also possible to monitor the quality of services by implementing quality control programs and improving hospital care with the help of a regular and accurate registration system for trauma patients. One of the limitations of this study is its short period of time, and for future studies, the comparison of the number of clients due to trauma before, during, and after the coronavirus disease 2019 (COVID-19) should be investigated. In the end, it should be acknowledged that the promotion of preventive programs and pre-hospital care, followed by hospital care, are essential priorities in dealing with trauma. Finally, this study provides us with the necessary planning and policies in the health sector by determining and examining these causes and consequences in Kurdistan Province.

Conclusion

According to the results of the present study, accidents with motor vehicles and falls from a height alone accounted for more than 98% of the reasons for patients to visit the emergency trauma units of the three studied hospitals. This is despite the fact that these two causes were the most common mechanism of trauma in patients who died and needed hospitalization in the ICU. More than 92.6% of patients with good general condition were discharged from the ED or other inpatient departments. The in-hospital mortality rate of these patients was significantly lower than that of developed countries.

Conflict of Interests

The authors have no conflict of interest.

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