

# Evaluation of injuries caused

## by intentional and unintentional accidents in patients referred to Shohadaye Haft-e-Tir Hospital, Tehran

*Evaluación de un año de lesiones causadas por accidentes intencionales y no intencionales en pacientes remitidos al Hospital Shohadaye Haft-e-Tir, Teherán*



Reza Foruzanfar

<sup>1</sup>Medical School, Shahed University, Tehran, Iran.

Email: [R.Foruzanfar@gmail.com](mailto:R.Foruzanfar@gmail.com)

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### Abstract

**Introduction.** Intentional and unintentional accidents are the most significant reason for abnormal deaths in Iran and are required to be addressed in different ways. Different tensions such as accidents, conflicts, and occupational accidents can affect on various aspects, including economy, society, comfort and security, public welfare, and disabilities. Due to the lack of comprehensive studies on injuries resulted from accidents; we conducted, for the first time, research using the national information of Iran.

**Methodology.** This was a descriptive cross-sectional study, with a sample of 1575 patients referred to the emergency ward of Shohadaye Haft-e-Tir Hospital, due to intentional and unintentional injuries in the period 2014-2015, were considered. Patients' information was recorded in the national standard form of National Accidents and Emergency Management Center. Data from the completed forms were analyzed by the statistical package SPSS 20.

**Results.** From the 1575 patients referred to the emergency ward of Shohadaye Haft-e-Tir Hospital, 1195 (75.9%) and 380 (24.1%) were male and female, respectively. The mean and standard deviation of the age of samples was  $30.8 \pm 16.7$  years (minimum 1 year and a maximum of 93 years). The

majority of injured were city residents (1502), and a few lived in the villages (41). The most common location for the occurrence of accidents was urban public passageways. Patients were referred to medical centers through ambulances (115, Medical Center, and the Red Crescent), personal vehicle, and taxi. Driving accidents, falling, and colliding with static mechanical forces were the most important. Investigating the cause of accidents made it obvious that 1458 patients were injured unintentionally, and only 71 cases resulted from intentional accidents. Considering the mortality rate showed that 31 patients (1.96%) died. Multivariate logistic regression analysis showed that head and neck fractures ( $OR=36.2$ ) as well as patient's coma on arrival ( $OR=43.13$ ), are factors increasing the chances of death.

**Conclusion.** It seems possible to predict and prevent some common factors in the occurrence of accidents at different points. Moreover, there are some predictors of poor prognosis in accidental patients. Fractures in the head and neck area and patient's coma on arrival, are factors that increase the risk of death and should be considered seriously in the pre-hospital and in-hospital emergency wards.

**Keywords:** Intentional accidents, unintentional accidents, injuries, the prevalence of mortality, outcome.

### Resumen

**Introducción.** Los accidentes intencionales y no intencionales son la razón más importante de muertes anormales en Irán, y deben abordarse de diferentes maneras. Las diferentes tensiones, como los accidentes, los conflictos y los accidentes laborales, pueden afectar diversos aspectos, como la economía, la sociedad, la comodidad y la seguridad, el bienestar público y las discapacidades. Debido a la falta de estudios exhaustivos sobre lesiones resultantes de accidentes, realizamos, por primera vez, una investigación utilizando la información nacional de Irán.

**Metodología:** En este estudio descriptivo de corte transversal, se consideraron todos los pacientes remitidos a la sala

de emergencias del Hospital Shohadaye Haft-e-Tir, debido a lesiones intencionales y no intencionales en 2014-2015. La información de los pacientes se registró en la forma estándar nacional del Centro Nacional de Manejo de Accidentes y Emergencias. Los datos de los formularios completados fueron analizados por el paquete estadístico SPSS 20.

**Resultados.** De los 1575 pacientes remitidos a la sala de urgencias del Hospital Shohadaye Haft-e-Tir, 1195 (75,9%) y 380 (24,1%) eran hombres y mujeres, respectivamente. La media y la desviación estándar de la edad de las muestras fue de  $30,8 \pm 16,7$  años (mínimo 1 año y máximo 93 años). La mayoría de los heridos eran residentes de la ciudad (1502),



y unos pocos vivían en las aldeas (41). La ubicación más común para la ocurrencia de accidentes fueron los pasillos públicos urbanos. Los pacientes fueron remitidos a centros médicos a través de ambulancias (115, Medical Center y la Media Luna Roja), vehículos personales y taxis. Los accidentes automovilísticos, las caídas y los choques con fuerzas mecánicas estáticas fueron los más importantes. Al investigar la causa de los accidentes, se hizo evidente que 1458 pacientes resultaron heridos involuntariamente, y solo 71 de los casos resultaron de accidentes intencionales. Teniendo en cuenta la tasa de mortalidad, se observó que 31 pacientes (1,96%) murieron. El análisis de regresión logística multivariante mostró que las fracturas de cabeza y cuello (OR=36.2), así como el coma del paciente al llegar (OR=43.13), son factores que aumentan las posibilidades de muerte.

**Conclusión.** Parece posible predecir y prevenir algunos factores comunes en la ocurrencia de accidentes en diferentes puntos. Además, hay algunos predictores de mal pronóstico en pacientes accidentados. Las fracturas en el área de la cabeza y el cuello y el coma del paciente al llegar son factores que aumentan el riesgo de muerte y deben considerarse seriamente en las salas de emergencia prehospitalarias y hospitalarias.

**Palabras clave:** Accidentes intencionales, accidentes no intencionales, lesiones, prevalencia de mortalidad, resultado.

## Introduction

For many centuries, communicable diseases have been the most important cause of human death. But, after World War II, because of scientific advances in vaccination, antibiotics, and improved living conditions, non-communicable diseases became the leading cause of death in industrial societies. This profound advance in medicine has reduced the burden of communicable diseases, but non-communicable diseases, including unintentional and intentional accidents, are increasingly one of the problems that societies confront with<sup>1</sup>.

According to the World Health Organization (WHO), an accident is an unprecedented event that causes detectable injury. Annually, about 600 million people around the world suffer from injuries. The most common method of classifying accidents and injuries is by the accident location (home, work, and road) and the type of accident (driving injuries, burns, drowning, poisoning, homicide, suicide, electric shock, and falls)<sup>2</sup>.

As one of the most life-threatening factors, accidents lead to the death of more than 5 million people a year or 16,000 people a day. Among the 15 leading causes of death for 15 to 29 year-old-people, five are related to unintentional injuries, including road accidents, drowning, burns, poisoning, and falls<sup>3</sup>.

Death accounts for only a small portion of the burden of accidents, while the non-fatal and debilitating effects of this problem include a much larger share. Most accidents result in a permanent disability of the patient, therefore, imposing massive medical costs on health systems. Due to the higher

prevalence of injuries in the young population, the number of years that a patient spends with a disability would be very high. The extent of this problem is so far-reaching that, based on statistics of the WHO, up to 50% of children who go to the hospital due to unintentional injuries are discharged with some form of disability<sup>4</sup>. Traffic accidents and falls, with a prevalence of 17.5% and 12.2%, are the major causes of disability, respectively<sup>5</sup>.

In Iran, accidents are the second leading cause of death, and traffic accidents are at the forefront. Every day, thousands of people lose their lives or get injured on the roads. Intentional and unintentional accidents are of the highest number of accidents in the country. Then, mental illness has the highest burden of disease in the country, and the third factor is cardiovascular accidents<sup>4,6,10</sup>. Accident-related deaths in Iran have increased steadily in recent years, with an annual growth rate of 15% during the years 1993-1998<sup>11</sup>.

Injuries caused by accidents are a matter of concern for professional health providers and government officials, which are affected by various factors. The reasons for these accidents are very complex and multifaceted. Specific policies and strategies are required to provide and promote the general health, the whole process of which needs accurate information and indices. Identifying the consequences of intentional and unintentional accidents as one of the most important causes of mortality is one of the most important indices that can be very useful in explaining strategies to reduce the burden of diseases. Due to the lack of comprehensive studies in the field of accident injuries, and the significance of the issue of injuries and incidents and the inconsistencies that exist in the factors affecting its prevalence, it seemed necessary to conduct this study. Therefore, in this study, we decided to evaluate the injuries caused by intentional and unintentional accidents in patients admitted to Shohadaye Haft-e-Tir Hospital in 2013.

## Materials and Methods

In this descriptive cross-sectional study, all patients referred to the emergency ward of Shohadaye Haft-e-Tir Hospital, due to intentional and unintentional accidents in 2013, were considered. Exclusion criteria included lack of consent to participate in the present study, the inability of the patient and their companion to answer the questions, as well as using medications effective on the level of consciousness and thinking by the patient and their companion.

This study was documented by the Ethics Committee of Shahid Beheshti University of Medical Sciences. Patients were satisfactorily enrolled in the study. Then, they were interviewed and clinically examined, and their questionnaires were completed by the forensic medicine resident. In the case of the patient's incapacity, their companion had to complete the questionnaire with accurate and complete information about the patient and accident. Patients' information was entered in the standard form of the National Accidents and Emergency Management Center. Interview and questionnaire were completed after the initial diagnostic and thera-

peutic measures and stabilizing the patient's condition. The data gathered from the patients are confidential, and they are exclusively utilized in this study.

Variables of the study included age, gender, place of living, type of accident: transportation, burns, falls, poisoning, electric shock, and radiation, collision with static mechanical forces, collision with moving mechanical forces, airway obstruction, reptiles or insects bites, drowning or immersion in water, accident time, accident location, person's status in traffic accidents, intentional or unintentional, type of service received, the process of leaving the hospital, death reason, type of injury, model of transporting, time of arrival, and referral from other centers.

Data from the completed forms were analyzed using SPSS 20.0. Descriptive statistics were expressed in frequency and proportion (%). To study the effective factors on disease outcomes, Chi-square test and Fisher's exact test were applied for qualitative variables, and independent t-test or one-way ANOVA for quantitative variables.  $P < 0.05$  was considered as the level of significance.

## Results

In this descriptive cross-sectional study, 1575 patients referred to the emergency ward of Shohadaye Haft-e-Tir Hospital were evaluated, among whom, 1195 (75.9%) were male and 380 (24.1%) were female. The mean and standard deviation of the age of samples was  $30.8 \pm 16.7$  years (minimum 1 year and a maximum of 93 years). The mean age of men was  $29.6 \pm 15.2$  years, and for women was  $34.9 \pm 20.2$ . Independent t-test showed a significant difference between

the mean age of the two genders ( $p = 0.001$ ) (Table 1). The majority of injured people were city residents (1502) and few lived in the villages (41).

**Table 1. The mean age of injured patients based on their gender**

Age mean (year)*	Number (%)	Gender
29.15 ± 6.2	1195 (75.9%)	Male
34.20 ± 9.2	380 (24.1%)	Female
30.16 ± 8.7	1575 (100%)	Total

\* $P < 0.001$  between the age means of the two groups

The most common location of accidents was urban public passageways. According to the data, 1003 people were injured in urban public passageways, 235 patients at home, 25 at sports facilities, 87 at work, and 9 in educational settings. The most common location of injury for persons under 14 was traffic accidents with a frequency of 71 patients. Fall (54 people) and collision with static objects (23 people) are in the next ranks. Driving accidents falls, and collisions with static objects were the most common sites of injury in the elderly over 65. Chi-square test showed a significant relationship between age and place of injury ( $p < 0.001$ ) (Table 2).

Driving accidents falls, and colliding with static mechanical forces, were the most important mechanisms. The most important mechanisms of injury in men were traffic accidents (681 cases), falls (299 cases), and collision with static objects (242 cases). In women, traffic accidents (199 cases), falls (97 cases), and collision with static objects (35 cases), were the most common causes of injury. The Chi-square test showed that the mechanism of injury was significantly different between men and women ( $p < 0.0001$ ) (Table 3).

**Table 2. Relationship between age and accident location in the injured**

Age		Age		Total	Chi-square	
14.1 - 35.0	35.1 - 65.0	65.1 ≤	≤ 14.0			
550 (62.3%)	233 (26.4%)	29 (3.3%)	71 (8.0%)	884 (56.1%)	$p < 0.001$	Driving accidents
0 (0.0%)	1 (50.0%)	0 (0.0%)	1 (50.0%)	1 (0.1%)	$p < 0.001$	Burns
119 (40.2%)	93 (31.4%)	30 (10.1%)	54 (18.2%)	299 (19.0%)	$p < 0.001$	Falls
1 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.1%)	$p < 0.001$	Poisoning
0 (0.0%)	2 (100.0%)	0 (0.0%)	0 (0.0%)	2 (0.1%)	$p < 0.001$	Electric shock
165 (69.0%)	48 (20.1%)	3 (1.3%)	23 (9.6%)	242 (15.3%)	$p < 0.001$	Collision with static objects
30 (81.1%)	3 (8.1%)	1 (2.7%)	3 (8.1%)	37 (2.3%)	$p < 0.001$	Collision with moving objects
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	$p < 0.001$	Air passage obstruction
1 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.1%)	$p < 0.001$	Reptiles and insects' bites
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	$p < 0.001$	Drowning
55 (50.5%)	26 (23.9%)	5 (4.6%)	23 (21.1%)	110 (7.0%)	$p < 0.001$	Other

\*  $p < 0.001$  between age and place of injury

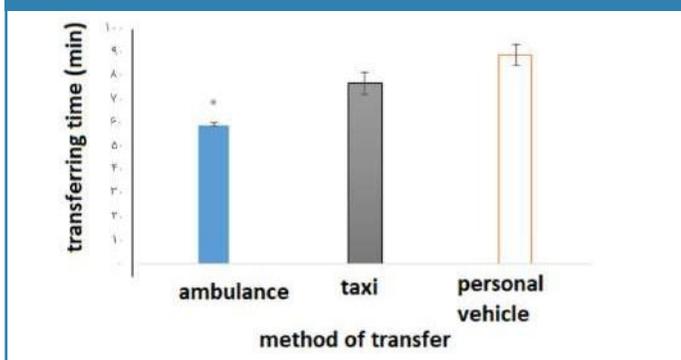
**Table 3. Relationship between accident outcome and gender in the injured of the present study**

Gender		Unknown	Total	
Males	Females			
681 (77.0%)	199 (22.5%)	4 (0.5%)	884 (56.1%)	Driving accidents
0 (0.0%)	1 (100.0%)	0 (0.0%)	1 (0.1%)	Burns
201 (67.2%)	97 (32.4%)	1 (0.3%)	299 (19.0%)	Falls
1 (100.0%)	0 (0.0%)	0 (0.0%)	1 (0.1%)	Poisoning
2 (100.0%)	0 (0.0%)	0 (0.0%)	2 (0.1%)	Electric shock
207 (85.5%)	35 (14.5%)	0 (0.0%)	242 (15.3%)	Collision with static objects
32 (86.5%)	5 (13.5%)	0 (0.0%)	37 (2.3%)	Collision with moving objects
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	Air passage obstruction
1 (100.0%)	0 (0.0%)	0 (0.0%)	1 (0.1%)	Reptiles and insects bites
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	Drowning
74 (67.3%)	36 (32.7%)	0 (0.0%)	110 (7.0%)	Other

\*  $p < 0.0001$  between men and women

Patients were referred to health centers through ambulances (115 Medical Center and the Red Crescent), personal vehicles, and taxis. Transmission by 115 Medical Center's ambulance was the most frequent- 818 patients. Next are referrals by personal vehicles and accident witnesses with 623 and 90 cases, respectively. Few patients (45 people) were transferred from the other medical centers, and 1530 injured were directly referred to Shohadaye Haft-e-Tir Hospital. The mean time of transferring to this hospital was  $71.0 \pm 64.3$  minutes. The transferring time of 247 patients was less than or equal to 30 minutes. While the transferring time of 583 cases was between 31-59 minutes, 565 cases between 60-119 minutes, 188 cases between 120-179 minutes, and 97 cases more than 180 minutes. The mean time of transferring by ambulance, personal vehicle, and the taxi was  $22.9 \pm 59/4$ ,  $88.8 \pm 99.3$ , and  $54/0 \pm 76.85$  minutes, respectively. One-way analysis of variance showed a significant relationship between transferring time and means of transmission (df:2, 1497,  $F=35.9$ ;  $p<0.0001$ ). Tukey post hoc showed that ambulance was faster in transferring patients than personal vehicles ( $P<0.001$ ) and taxis ( $p=0.011$ ) (Figure 1).

Figure 1. Time of transferring patients. \* $p<0.001$  compared with the two groups of taxi and personal vehicles.



In investigating the causes of accidents, 1458 cases were unintentionally injured, and only 71 cases suffered from intentional accidents. Considering the type of injury, patients were divided into five general categories: Abrasion, Laceration, Fracture, Dislocation, and Soft tissue injury. It is noteworthy that 229 patients had a facial laceration, and the same number (229 patients) had soft tissue injury (Table 4).

Table 4. Type of the main injury and its location

Soft tissue injury	Dislocation	Fracture	Laceration	Abrasion	
(4.9) 74%		(1.7) 25%	(5.5) 82%	(3.9) 58%	Head
(5.1) 77%				(0.8) 12%	Neck
(0.8) 12%		(1.2) 18%	(6.7) 100%	(5.7) 85%	Face
(5.3) 79%		(2.4) 36%			Chest
(5.7) 86%		(2.5) 37%		(0.8) 10%	Stomach and pelvis
(3.7) 55%	(0.6) 9%	(1.3) 20%	(1.3) 19%	(0.8) 12%	Shoulder, elbow, arm
(2.0) 30%		(3.3) 50%	(6.5) 98%	(5.7) 86%	Forearm and hand
(2.0) 30%		(6.5) 98%	(2.4) 36%	(2.1) 32%	Thigh and knee
(0.5) 8%		(2.7) 40%	(2.7) 40%	(3.1) 46%	Leg and ankle

Of the 1575 patients studied, 939 were treated in the emergency ward, and 636 were admitted to the ward. In the present study, 1445 patients were treated and discharged from the emergency ward. 97 patients gave their consent and were discharged from the emergency or other hospitalized wards. It should be noted that 2 patients were discharged from the emergency ward without any notice. The mortality rate of the patients was 31. Multivariate logistic regression test showed that head and neck fractures (OR=36.2) and patient coma on arrival (OR=43.13) were factors that increased the chances of death (Table 5).

Table 5. Results of multivariate logistic regression test. Factors influencing on patients mortality

P	Confidence level 95%	AOR*	Variable
0.001	4.308-24.73	36.2	Head and neck fracture
<0.001	11.168-6.11	43.13	Patient coma on arrival

\*Adjusted odds ratio

## Discussion

The present study is among the pioneer researches in Iran applying a high sample size in the field of intentional and unintentional accidents, the consequences of these accidents, and the factors affecting them. In general, the pattern of intentional and unintentional accidents in different countries depends on a variety of factors, including the age composition of society, economic or cultural development or underdevelopment, employment level, level of literacy, safety, and cultural and social skills, access to social and health services, and ultimately, the strengths and weaknesses of social security institutions<sup>12-15</sup>. Overall, deaths from accident-related injuries are twice for men, and only in some areas, suicide and burn rates are higher for women<sup>2,16,17</sup>. In the present study, 75.9% of men had intentional and unintentional accidents, and women constituted 24.1% of injured people. As is obvious, the number of men is three times more than women.

In the present study, younger people were more affected than children, middle-aged, and elderly people. In fact, the highest number of injured was between 14 and 35. Fifty percent of accident-related deaths worldwide occur in the age group of 15 to 44 years<sup>18</sup>. The role of children under 5 in some accidents is more obvious, in a way that, 25% of deaths are from falls and 15% from burns worldwide<sup>19</sup>. If in accidents, age groups, and places of living be under consideration, the priority of prevention will be different. In the present study, 1502 out of 1575 accidents occurred for patients who were city residents.

In a prospective cross-sectional study in one of Michigan's inter-city emergency wards, 1128 people aged 14 to 18, who were referred to the emergency ward within a year, were interviewed. Among them, 61.8% reported unintentional injury and 38.1% intentional injury. Among those with intentional trauma, 39.9% used alcohol, 35.2% smoked, 41% used marijuana, and 36.9% carried weapons<sup>20</sup>. In the present study, 92.6% of the injuries were unintentional and 4.5% were in-

tentional. As is evident, the rate of unintentional injuries in the present study is lower than the study in Michigan, the reasons for which are the strict rules regarding carrying cold and firearms and also the prohibition of alcohol and drug use in Iran. These restrictive rules in Iran limit the incidence of intentional accidents. Another reason for this sheer difference is the different cultural and religious beliefs of Iranian people comparing to Michigan.

The prevalence of mortality in this study was 1.97%. Findings showed that fractures in the head and neck and patient coma on arrival were factors that increased the risk of death. Comparing to the findings of the present study, Farchi et al. reported a mortality of 0/43 for domestic accidents<sup>21</sup>. In a study in 10 provinces of Iran, Akbari and his colleagues concluded that the incidence of deaths in unintentional accidents was 4%. Traffic accidents were the most common cause of death with 7.51%<sup>10</sup>. Investigating motor vehicle accidents and hospital costs, Torabi et al. showed that the incidence of mortality was 4%. The most significant cause of death in these patients was head and neck injury<sup>22</sup>.

Although controlling and reducing traffic accidents is largely beyond the scope and responsibilities of the health sector, notifying relevant agencies of the importance of this issue and planning and proposing cross-sectoral cooperation to control and reduce this major group of causes of death, can be within the capabilities of the health sector. Also, the above statistics highlight the need for more attention to emergency services and the importance of providing and equipping trauma centers. The high rate of deaths from accidents can be attributed to the increasing number of vehicles and moving to industrialization in recent years as well as their accidents without raising the living standards. Three levels of prevention in injuries control, such as reducing substance abuse, safety training, upgrading workplace safeguards, urgent and primary care at the scene of the accident, eliminating causal factors (deceleration, correct road markings, etc.), intensifying enforcement of traffic laws, and also rehabilitation services, are some of the useful measures effective in preventing accidents and death.

## Conclusion

The findings of the present study showed that 939 of 1575 patients were treated and discharged from the emergency ward. The prevalence of mortality in the present study was 1.96%. Findings suggested that fractures in the head and neck area and patient's coma on arrival are the factors that increase the chance of death.

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