



# Epidemiology of trauma in Markazi (Center) province of Iran; eliminate the hazard is first priority

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## ABSTRACT

**Objective:** To investigate the epidemiology of traumatic patients, referred to the Vali-asr trauma center, Arak, Iran in the summer of 2016. **Methods:** In a cross-sectional study, all patients with trauma, entered the study considering inclusion and exclusion criteria. Data were then analyzed by the SPSSv.19. Mean, SD, percentage and frequency were used for data analysis. **Results:** A total of 1 049 patients were released after examination due to normal vital signs. A total of 483 patients were transferred to be under observation in hospital's wards. All patients were chest X-rayed, among whom, 17 unusual cases were found. **Conclusions:** It is recommended that comprehensive investigations should be made to identify road and non-road hazardous factors, and that a great step and first priority in safety and removal of hazards is effectively taken by accurate planning in addition to higher public educations.

## 1. Introduction

Injuries, specifically those resulting from road accidents are the most important public health concerns around the world[1]. According to report by the WHO, mortality from car accidents increased from 999 000 in 1990 to more than 1 000 000 in 2002. Also, it has been predicted that the number will reach 2 million deaths in 2020[2]. After cardiovascular diseases, car accident is the second major cause of fatality in Iran[3]. Despite the fact that only 40% of motorized vehicles are used in the developing world, 85% of the mortality of car accidents occur in these countries[4].

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Recent studies have shown that the highest injury and mortality rate resulting from motor vehicle accidents belong to pedestrians and bike riders[5,6].

In addition to mortality, trauma incurs social and economic, direct and indirect costs in the society; for example, treatment costs, income loss during hospitalization, time and costs of training new skills to traumatic patients who may not perform their previous jobs. It also causes decreased productivity of the society, unperformed jobs and management of organizations governed by traumatic

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people. In 1995, an evaluation of trauma economic costs in Texas showed that trauma costs more than 180\$ billion/ year. In the Netherlands, total direct and indirect trauma costs reach 3 billion francs/year, from which, a small amount is spent for the treatment of injured people and the rest is the cost of disabilities and loss of labor in the society[7].

An important factor for the prevention and management of trauma is description of the demographic characteristics of the injured people. Arak as capital of Markazi province, is a major industrial city with Crowded road, heavy traffic jam and transportation in Iran, the present study aimed at investigating the epidemiology of traumatic patients, referred to the Vali-asr trauma center, Arak, Iran in the summer of 2016.

## 2. Materials and methods

In a cross-sectional study, between June, 2016 and September, 2016, all patients with trauma, referred to the Vali-asr trauma center, Arak, Iran entered the study. The exclusion criteria included, cases who were reported dead by the EMS before they arrived at the Emergency room, and without cardiovascular resuscitation indicators. Analysis was done based on the subjects who needed hospitalization and patients with minor traumas and without obvious fracture were not included and were just managed in the out-patient setting. The data including age, gender, time, type of vehicle, means of reference to the EMS, hospitalization time, patient death, hospitalization ward, and the time to visit in the EMS were collected in the Emergency Room. Also, the clinical and laboratory characteristics e.g. vital signs, GCS, CT scan, imaging finding and Urine Analysis result were recorded.

Data were then analyzed by the SPSSv.19. Mean, SD, percentage and frequency were used for data analysis.

The researchers complied with the ethical principles announced by the Ministry of Health and Medical Education, the declaration of Helsinki and the approval by the Committee of Medical Ethics of the Arak University of Medical Sciences during the study. The patients consented to the study and no obligation was applied. The patients' information was kept anonymous and private.

## 3. Results

In the present study, 1538 traumatic patients were referred to the Vali-asr trauma center, as a result of normal examination, normal imaging and no need for hospitalization, 1049 (68.47%) patients were discharged after some hours of observation in ED. A total of 6 patients were transferred to the hospital with cardiac arrest by 115( EMS in Iran) and none of them return to spontaneous circulation. Based on the Vali-asr Hospital policy, all patients with a fracture or trauma requiring a specialist consultant are hospitalized upon visitation (the analysis was performed for 483 hospitalized patients).

The average age of the patients was  $36.86 \pm 19.51$  years. There were 355 men (73.4%) and 128 (26.6%) women (Table 1).

**Table 1**

Demographic characteristics of the traumatic patients hospitalized in Vali-asr trauma center, Arak, Iran.

Characteristics	n	%
Gender		
Male	355	73.40
Female	128	26.60
Age		
<2	7	1.50
2-18	66	13.70
<18	410	84.90
Transport		
By own	100	20.70
EMS (115)	275	56.90
Transfer from other centers	108	22.40
Time of event		
Day	318	65.83
Night	165	34.17
Trauma		
Vehicle type (Car or motor)	393	81.40
Pedestrian	30	6.20
falling	60	12.40

All patients referred to the Vali-asr trauma center were triaged in an average duration of  $(48.0 \pm 0.9)$ s from arriving at the EMS and all cases were triaged in less than one minute. All patients were examined by the Emergency Medicine physician in 3 min 35 s with the SD of 1 min 20 s from arriving at the emergency acute care unit, the time was less than 5 min in all cases.

The average blood pressure of the patients was 123.18 at the time of arrival at the Emergency Department (Table 2).

**Table 2**

Examination and vital signs of the traumatic patients needing hospitalization in the Vali-asr hospital, Arak, Iran<sup>\*</sup>.

Characteristic	n	%
BP		
Hypotension (<90)	36	7.50
NL (>90)	447	92.50
HR		
NL (60-100)	338	69.97
Tachycardia	134	27.74
Bradycardia	11	2.27
GCS		
13-15	370	76.60
9-13	66	13.60
<13	47	9.70
RR		
NL (12-23)	399	82.60
Tachypnea	76	15.73
Bradypnea	8	1.65

<sup>\*</sup>Without considering age and gender.

All patients were chest X-rayed, among whom, 17 unusual cases were found. Other X-rays requested are listed in the Table 3.

A total of 1 049 patients were released after examination due to normal vital signs. A total of 483 patients were transferred to be under observation in hospital's wards (Table 4).

The average number of hospitalization days was (7.45 ± 5.98, Mean ± SD). The highest and lowest numbers of hospitalization days were 46 d and 1d, respectively (Figures 1).

**Table 3**

Radiographic and laboratory characteristics of traumatic patients hospitalized in Vali-asr hospital, Arak, Iran.

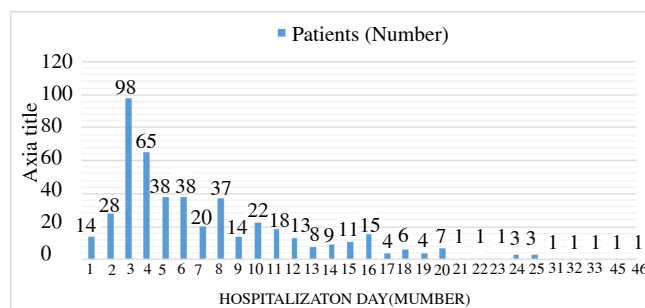
Para clinic	n	%
<b>CXR</b>		
NL or not needed	466	96.50
Ab-NL(pneumothorax , fracture, hemothorax)	17	3.50
<b>Chest CT</b>		
NL or not needed	441	91.30
pneumothorax	34	7.00
HTX	11	2.30
Rib fracture	32	6.62
<b>PXR</b>		
NL or not needed	431	89.24
Ab-NL(fracture)	52	10.76
<b>Upper Limb</b>		
NL or not needed	277	57.30
Ab-NL(fracture)	206	42.70
<b>Lower Limb</b>		
NL or not needed	323	66.90
Ab-NL(fracture and sprain)	160	33.00
<b>e-FAST</b>		
NL	457	94.60
Ab-NL( free fluid)	26	5.40
<b>Brain CT</b>		
NL or not needed	321	66.50
Ab-NL3	162	33.50
<b>Abdominal CT</b>		
NL or not needed	440	91.10
Ab-NL(hematom or fluid or laceration )	43	8.90
<b>Spinal CT</b>		
NL or not needed	433	89.60
Ab-NL(fracture)	50	10.40
<b>Spinal X ray</b>		
NL or not needed	450	93.20
Ab-NL(fracture)	33	6.80
<b>U/A</b>		
NL	402	83.20
Hematuria	81	16.80

**Table 4**

Disposition of traumatic patients referred to Vali-asr Hospital, Arak, Iran.

Disposition	n	%
Discharge from Acute ED	1 049	68.47
Admitted to or discharged from		
Male ED observe	71	14.70
Female ED observe	51	10.60
General Surgery	58	12.00
Neurosurgery	95	19.67
Orthopedic	143	29.60
ICU	43	2.90
Discharge against medical advice	12	2.48
Expired	10	2.07

**Figures 1.** Number of hospitalization days of traumatic patients in Vali-asr hospital, Arak, Iran.



**Figure 1.** Number of hospitalization days of traumatic patients in Vali-asr hospital, Arak, Iran.

#### 4. Discussion

Annually, more than 5 million people die due to several types of accidents around the globe (750 deaths /hour). Trauma is the leading cause of death for teenagers and a major cause of disability and health-related economic loss in developing countries[8]. Addressing the increasing trend of deaths from accidents requires recognition of the status quo of road accidents[9]. In our study, road accidents with 87.6% and falling with 12.4% are the most frequent traumas. This is consistent with most international studies epidemiologically[9-11].

Most traumatic subjects of the present study were from the employed youth. Men were affected more than women. This is in accordance with many other studies[12-14]. The average age of the study was 36.80±19 years. This reveals that many casualties are of working age. It was found that 55% of the injured subjects were between 15-44 years of age. This is an indication of the importance and harms of road accidents for the society. This is also consistent with the literature. The results of a study conducted in 1998, showed that 51% of fatalities and 59% of disabilities are in the age group of 15-44[15]. In our study, the higher frequency of this age group may be attributed to younger subjects and more hazardous behaviors.

In the present study, the number of men was 2.7 times the number of women. In another study by Naghavi et al. in 12 Iranian provinces, the number of inadvertent accidents leading to hospitalization was, for men, 7.3 times the number for women[3]. In a study in Kermanshah, 8.89% of traumatic subjects were men[16]. This is relatively consistent with the present paper. It should be noted that most of our women are housekeepers, this is important in the quality of family life. Also, these differences may be due to the conditions of our country and other developing countries, in which, men are more involved than women in transportation. Also, due to cultural constraints, women usually do not use motorbikes and bicycles in Iran.

In a report on traffic accidents in 2004, the WHO stated that pedestrians and motor riders are the most susceptible on the road[17]. In the present paper, accidents involving riders, and falling,

accounted for the most casualties. According to the results, from among 483 traumatic subjects needing hospitalization 81.4% were riders, 6.2% pedestrians, and 12.4% fell from a height. In this paper, 87.6% of fatalities were victims of traffic accidents. About 12.5% of patients fell from a height, which is the second fatal traumatic mechanism. In 2 000, fatality due to falling was 283 000 around the world. In a study in 12 Iranian provinces, the rate of hospitalization due to falling was estimated to be 100/100 000[8]. The fatality rate of accidents was reported as between 5%-22%<sup>[18-20]</sup>. Based on this study, the two frequent traumas in this study are road accidents and falling. This result was obtained in another study in Tehran<sup>[21]</sup>. This shows the importance of the two civilian traumas. Also, the inter- and intra-city roads show the highest numbers of accidents, which necessitates that more attention should be brought to road accidents. The means of transferring patients to the hospital is an important point in developed countries<sup>[22]</sup>. According to their study in 12 provinces, Naghavi, *et al.* found that 2.7% of the traumatic patients were transferred by EMS ambulance and 8.9% by ordinary cars<sup>[8]</sup>. Also, in Tehran, only 5% of the patients were transferred by ambulance<sup>[23]</sup>. In the present study, 56.9% of the patients were transferred by ambulance, 20.7% by private vehicles, and 22.4% are patients referred to Vali-asr Hospital. This shows relatively suitable conditions of transferring patients to this hospital despite the lack of qualitative and quantitative development of medical aid systems, weakness of rescue systems and insufficient facilities in the province. Therefore, proper planning and higher attention are required in this regard. On the other hand, the fact that 22.4% of the patients were referents from other medical centers shows the importance of Vali-asr Hospital as a medical hub in western Iran. The higher proportion of ambulance transfers from other medical centers show the higher relevant referring rate.

In the present study, the highest rate of injury was related to the neck, head and upper limbs, However, in other studies in Rafsanjan and Kashan, the highest injury rate was related to the head<sup>[24-25]</sup>. The results obtained by Masud Khatami *et al.* in the Baghiyat-Allah Hospital were consistent with the results obtained in Kashan and Rafsanjan<sup>[26]</sup>. In another study in India, the rib cage and limbs were the most injured parts<sup>[27]</sup>. In yet another study in Toronto, Canada, in 2004, the highest rate of injuries, like our study, was related to the head and the neck, followed by the lower limbs <sup>[28]</sup>. It was also found that the mostly injured section is the abdomen followed by the spine, head and neck.

Due to its geography and lots of industrial factories, Markazi Province, and specifically Arak City require more attention in terms of the safety of intercity roads, and more priority should be given to compliance with work safety standards and removing the hazards. Road and work safety measures are the most effective ways of preventing harsh accidents. Also, education publishing is important,

it is of no use without safe infrastructures. The epidemiology of the accidents, in addition to the removal of threatening factors is effective in the prevention and treatment of traumas. The frequency of some non-road accidents like falling or work traumas in this study shows the importance of these accidents, and should be brought into more attention and preventive measures like safety clothes should be taken.

It is recommended that comprehensive investigations should be made to identify road and non-road hazardous factors, and that a great step and first priority in safety and removal of hazards is effectively taken by accurate planning in addition to higher public educations.

### Conflict of interest statement

The authors report no conflict of interest.

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