

Predictive Factors of Home-Related Injuries among Patients Admitted to the Emergency Departments

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Abstract

Background: Home-related accidents are the main health problem and the second frequent reason of morbidity and mortality after road accidents. This study aimed to determine the status of home injuries and related factors during 2018–2019 in Kashan, Iran. **Methods:** This cross-sectional study was conducted during 2012–2013, in Kashan, convenience sampling method was used and patients referred to the emergency department who met the inclusion criteria were included in the study. A validated self-administered questionnaire was used for data collection. Data were analyzed using Chi-square test and *t*-test also for multivariate analysis logistic regression analysis was used. **Results:** The number 939 questionnaires were completed in total, that 420 were male. There was a statistically significant between age, job, educational level, place of reference, primary cause, mechanism and type of injury, medical diagnosis, and patients' hospitalization. Multiple logistic regression analysis revealed that the effective factors such as the place of referral (Shahid Behesht Hospital) (odds ratio [OR] = 1.923, $P < 0.001$), past medical history (OR = 4.280, $P = 0.015$), cut and sharp instrument (OR = 2.104, $P = 0.006$), falling (OR = 1.626, $P = 0.022$), and fracture (OR = 2.781, $P < 0.001$) have increased the risk of hospitalization. **Conclusions:** This study provides novel evidence suggesting predictive variables of home accidents are associated with the outcome of hospitalization. Therefore, educational programs and specific interventions should focus on predictive factors to prevent of home accidents.

Keywords: Emergency service, home accidents, injuries

INTRODUCTION

Injuries are the leading cause of morbidity and mortality for children, adolescents, and older adults in all countries.^[1,2] Home-related injuries are one of the most important mechanisms of nonfatal and fatal injuries.^[1] Home injuries were defined as “any event taking place in the home or in the immediate surroundings of the home that resulted in injury.”^[3]

Globally, home injuries are the main health problem and the second frequent reason of morbidity and mortality after road accidents.^[4] Varnaccia *et al.* stated most injuries (60.7%) occur at home.^[5] There are more than 30,000 death annually in the U.S from unintentional home injuries.^[6] Furthermore,

the U.S.A reported that there are more than 16,000 deaths in children and adolescents and more than 9 million emergency visits in year.^[1] In the study of Alkhamis and Abdulkader, the prevalence of unintentional home injuries was 74.3% in childhood in the past 12 months.^[7]

Home injuries cause psycho-emotional complications on the persons and their families.^[4] They also are imposing an important socioeconomic burden on the families and societies and health care system.^[4,8] In the United Kingdom,

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the costs of home injuries have been estimated 3.3–3.7 billion pounds yearly. In Iran as low- and middle-income country, despite a relatively high socioeconomic and health burden of home injuries, little attention has been paid to these injuries and policy-makers have considered these injuries as low priority. In such a way that mortality rate in low- and middle-income countries is 4.3 times higher than high-income countries.^[9] Furthermore, it is reported that the mortality rate of home injuries in children in low- and medium-income countries is nearly four times higher than high-income countries (41.7/100,000 versus 12.2/100,000).^[10]

A review of the literature showed that although several epidemiological studies have been conducted on unintentional home injuries and related factors,^[10-13] studies about the outcomes (outpatient visit or hospitalization) of home injuries are limited. Since patients admitted to the tip of the iceberg are injured and not only place a heavy economic burden on health care systems and families but also have high morbidity and mortality, so the identification of predictors of outcome Hospitalization with home injuries can be effective in designing and implementing effective safety procedures to prevent severe home injuries that lead to hospitalization of patients. Therefore, this study aimed to determine the frequency, outcomes, and potential predictors of home injuries among patients admitted to the emergency departments in Kashan, Iran.

METHODS

Study design and population

This cross-sectional study was conducted during 2012–2013, in Kashan, Iran. Two special trauma health centers in Kashan (Beheshti hospital and Naqavi hospitals) were selected. Verbal and written consent were given. Convenience sampling method was used and patients referred to the emergency department who met the inclusion criteria were included in the study. Inclusion criteria included emergency room visits due to injury in the home environment and in both sexes and at any age.

Sample size

The sample size was calculated by 785 participants using the Cochran formula (confidence level = 0.99 and accuracy of 0.04) and 25.2% prevalence of home-related injuries.^[14]

Instruments

The research tool consists of two parts: patients' demographic data (gender, job, habitant place, educational level, place of reference, time of injury) and home injuries checklist (primary cause, referral time, how to injury, type of injury, place of injury, and medical diagnosis). This checklist was developed based on literature review. Content validity was confirmed by ten members of the nursing faculty and emergency nurses. For ensuring its reliability, the inter-rater agreement method was used and (intraclass correlation coefficient = 0.92) was calculated.

Ethical approval

This study was approved by the Research Council and the

Research Ethics Committee of the Kashan University of Medical Sciences (project number: KAUMS.REC.8929). All subjects initially were informed of the aim of the study and had signed a consent form to participate in the study and were assured that their personal information will remain confidential.

Data analysis

Statistical analysis of data was conducted using SPSS 22.0. (SPSS Inc., Chicago, IL, USA) For univariate analysis proportions of home, injuries were reported. *T*-test, Chi-square was used for analysis. For multivariate analysis, multiple logistic regression with the conditional backward method was used for determining effective variables on patients' hospitalization. The inclusion criteria for the model were $P < 0.1$. Furthermore, adjusted O.R was used to determine the odds of inpatient rather than outpatient ones.

RESULTS

The 939 questionnaires were completed in total, that 420 were male (44.7%) and 519 were female (55.3%). The mean and standard deviation of the age was 28.18 ± 23.45 years in the range of 1 month to 95 years old. There was statistically association between age, job, and educational level with hospitalization [Table 1].

Among variables related to home injuries, there was a statistically significant difference between the place of reference (Naghavi hospital and Shahid Beheshti hospital) ($P < 0.001$), primary cause ($P < 0.001$), mechanism of injury (MOI) ($P < 0.001$), type of injury ($P < 0.001$) and medical diagnosis and patients' hospitalization. Furthermore, Carelessness, cut and sharp instrument, rupture, and superficial rupture were the most important factors of home injuries [Table 2].

Although afternoon and night were the most significant time for injury time and referral respectively, there are no statistically differences between the time of injury and time of referral and patients' outcome as a hospitalization. Furthermore, there is no significant difference between the place of injury and hospitalization.

Multivariate logistic regression analysis revealed that the effective factors such as the place of Shahid Beheshti Hospital (odds ratio [OR] = 1.923, $P < 0.001$), past medical history (OR = 4.280, $P = 0.015$), cut and sharp instrument (OR = 2.104, $P = 0.006$), falling (OR = 1.626, $P = 0.022$), and fracture (OR = 2.781, $P < 0.001$) have increased the risk of hospitalization. By contrast, factors such as contusion (OR = 0.217, $P < 0.001$), burn (OR = 0.097, $P < 0.001$), head and neck (OR = 0.359, $P < 0.001$), upper limb (OR = 0.683, $P = 0.081$), lower limb (OR = 0.479, $P = 0.002$), superficial rupture (OR = 0.144, $P < 0.001$), and spinal cord injury (OR = 0.176, $P = 0.017$) have reduced the risk of hospitalization [Table 3].

DISCUSSION

The study presents the outcomes of home injuries in a

Table 1: Frequency of demographic variables of home accident patients based on hospitalization outcome

Variables	Status	Outpatients (%)	Inpatient (%)	P
Gender	Female	309 (59.5)	210 (40.5)	0.553
	Male	242 (57.6)	178 (42.4)	
Age (mean±SD)		25.50±20.33	31.99±26.85	0.001
Job	Self employed	120 (52.6)	108 (47.4)	0.049
	Employed	23 (52.3)	21 (47.7)	
	Unemployed	408 (61.2)	259 (38.8)	
Habitant place	City	462 (59.9)	309 (40.1)	0.082
	Village	45 (47.9)	49 (52.1)	
	Suburb	44 (59.5)	30 (40.5)	
Educational level	Illiterate	193 (54.1)	164 (45.9)	0.032
	Primary school education	150 (58.6)	106 (41.4)	
	Middle school education	72 (60.5)	47 (39.5)	
	High school education	91 (61.9)	56 (38.1)	
	Academic education	45 (75)	15 (25)	

SD: Standard deviation

wide sample of the population with home accidents in Iran. Likewise, it also explores the association between outcomes of home injuries and a set of sociodemographic and accident-related factors and identify the potential predictors that may best predict the outcome of home injuries. In this sense, the study improves the current knowledge and understanding of home injuries construct in the population.

There was statistically difference between age and outcome of the home accident so the older the clients, the higher their hospitalization. Al Rumhi *et al.* reported that although nearly 36.0% of children aged ≤18 years old had severe accident injuries, only about 5% were treated in the hospital.^[3] On the other hand, Da Silva *et al.* stated the rate of trauma and hospitalization is higher in elderly patients and clinical outcomes of the trauma injury in older adults were frequently hospitalization in orthopedics parts after treatment in the emergency unit.^[15] It seems that the type of trauma injury is effective factor in hospitalization of older adults. Since the rate of upper and lower limb fractures is higher in older people, the hospitalization rate is higher. Yapici *et al.* considered that people older than 65 years old with lower education levels had home injuries more frequently than those with moderate educational levels.^[13] Older adults are more likely to admit to the emergency department exacerbates the risk of negative outcomes following the visit and increases the probability of hospitalization than the younger population which their cognitive impairment.^[16]

The present study showed that there was an association between home accidents and job and educational levels, with the prevalence of unemployed people and lower-level education. This result is in line with that of a study that found individuals with poorer socioeconomic status and less-educated status, more at risk fall-related injuries.^[12] Another study showed that people with lower education levels had more home injuries than those with moderate educational levels.^[13] Romli *et al.*

considered low level of education along with factors such as traditional housing, Chinese ethnicity, greater number of home occupants, lower monthly expenditure, and poor vision related to home accidents.

The findings of this study showed significant difference between the type of hospital and referrals of home accidents and related outcomes. It means the referral ad hospitalization rate of home accidents were much more in Shahid Beheshti Hospital than Naghavi Hospital. This can be because Shahid Beheshti Hospital is a subspecialty trauma center, and public people and prehospital emergency personnel refer most trauma patients to this center therefore higher referrals and higher inpatient clients are undeniable.

In general, the findings of this study indicated that carelessness was the most important primary cause of home accidents which is followed by dizziness, quarrel, and medical history. This finding is compatible with some studies.^[17,18] However, the prevalence of home accidents increases because of carelessness, the number of outpatients is more than inpatients (62.3% versus 37.7%). In opposite, the rate of hospitalization in-home accident clients with past medical history was almost three times more than outpatient ones. What is more, the number of inpatient was equal with outpatient clients in-home injuries that predisposed with dizziness and quarrel.

According to findings, cuts and sharp instrument injuries, fall and burn were the most important MOI. Although the cuts and sharp instrument injuries were the most common MOI, the number of hospitalizations was lower than outpatient ones. This could be because cuts and sharp instrument injuries did not cause serious injuries that require hospitalization and most of patients treated on an outpatient basis. In contrast, the number of hospitalization of patients who are admitted due to fall injuries was about two times outpatients, therefore the mechanism of falling injury made severe outcomes which the patients need to hospitalize. Compatible with this finding Choi *et al.* concluded fall-related injuries inside the home in

Table 2: Frequency distribution of outcomes of home injury based on injury-related variables

Variables	Status	Outpatients (%)	Inpatient (%)	P
Place of referral	Naghavi hospital	198 (74.2)	69 (25.8)	0.000
	Shahid beheshti hospital	353 (52.5)	319 (47.5)	
Time of accident	Morning	165 (58.7)	116 (41.3)	0.53
	Afternoon	200 (56.7)	153 (43.3)	
	Night	186 (61)	119 (39)	
Primary cause	Carelessness	473 (62.3)	286 (37.7)	0.001
	Dizziness	25 (48.1)	27 (51.9)	
	Quarrel	25 (51)	24 (49)	
	Suicide	5 (71.4)	2 (25.6)	
	Defects in the house	15 (40.5)	22 (59.5)	
	Disease	6 (22.2)	21 (77.8)	
	Unknown	2 (25)	6 (75)	
Time of referral	Morning	154 (60.6)	100 (39.4)	0.69
	Afternoon	187 (58.8)	131 (41.2)	
	Night	210 (57.2)	157 (42.8)	
Mechanism of accident (MOI)	Fall	113 (32.21)	237 (67.79)	0.001
	Cuts and sharp instrument injuries	156 (64.5)	86 (35.5)	
	Strike	75 (70.1)	32 (29.9)	
	Burn	77 (85.5)	13 (14.5)	
	Other	30 (60)	20 (40)	
Type of accident	Rupture	181 (68.6)	83 (31.4)	0.001
	Contusion	163 (74.4)	56 (25.6)	
	Fracture	40 (20)	160 (80)	
	Burn	77 (88.5)	10 (11.5)	
	Bleeding	37 (59.7)	25 (40.3)	
	Sprain	14 (51.9)	13 (48.1)	
	Dislocation	6 (40)	9 (60)	
	Strain	7 (70)	3 (30)	
	Other	26 (47.3)	29 (53.7)	
	Place of injury	Upper limb	237 (58.8)	
Head and neck		147 (64.2)	82 (35.8)	
Lower limb		119 (58.9)	83 (41.1)	
Pelvic		21 (39.6)	32 (60.4)	
Torso		18 (72.2)	12 (27.8)	
Spinal cord		9 (40.9)	13 (59.1)	
Medical diagnosis		Extremity trauma	246 (62.4)	148 (37.6)
	Superficial rupture	228 (78)	64 (22)	
	Traumatic brain injury	28 (47.5)	71 (52.5)	
	Torso trauma	1 (25)	3 (75)	
	Pelvic trauma	13 (18.1)	59 (81.9)	
	Spinal cord injury	9 (60)	6 (40)	

MOI: Mechanism of injury

older adults were more than one-third of emergency department visits which result in hospitalization.^[19] Verma *et al.* estimated the total annually cost of fall injuries that led to hospitalization in an emergency department was nearly 110 billion dollars in 2010.^[20]

The superficial rupture was the most major type of home injuries that was followed by contusion and burn in this study. Of course, the rate of outpatients was more than hospitalization ones in every three type of injury which confirms that these types of home injuries were relatively low so that the complications of the injury could be managed

by outpatient referral and only a small number of them need to be hospitalized. However in the meantime, the need to be hospitalized for fracture home injuries were far greater than the outpatient visit (four times), and this shows that although the fractures occurred to a lesser extent, caused more severe complications that require hospitalization of patients. Most patients with fractures undergo hospitalization and considerable resources are required for treatment, therefore putting a heavy burden on the health care system.^[21]

Furthermore, this study indicated that extremity trauma and superficial rupture were the most common medical diagnosis

Table 3: Logistic regression analysis of effective factors of home injuries for the risk of hospitalization

Variables	B	SE	Wald	Significant	Adjusted OR
Place of reference					
Beheshti hospital	0.654	0.180	13.157	0.000	1.923
Mechanism of injury					
Past medical history	1.454	0.598	5.918	0.015	4.280
How to injury					
Falling	0.486	0.213	5.210	0.022	1.626
Cut and sharp instrument	0.744	0.268	7.676	0.006	2.104
Type of injury					
Fracture	1.023	0.249	16.811	0.000	2.781
Contusion	-1.528	0.233	43.118	0.000	0.217
Burn	-2.337	0.382	37.478	0.000	0.097
Place of injury					
Head and neck	-1.025	0.264	15.123	0.000	0.359
Upper limb	-0.382	0.218	3.051	0.081	0.683
Lower limb	-0.736	0.239	9.435	0.002	0.479
Past medical history					
Superficial rupture	-1.941	0.235	67.933	0.000	0.144
Spinal cord	-1.736	0.730	5.658	0.017	0.176

SE: Standard deviation, OR: Odds ratio

in the home which were often treated on an outpatient basis. In opposition to, the inpatients rate of TBI, torso trauma, and pelvic trauma were nearly two, three, and five times more than the outpatient's rate. Compatible with this finding, Fu *et al.* reported TBI-induced hospitalization is increasing, also evidence showed that the incidence of hospitalization of patients with pelvic fractures is high due to hemodynamic instability, vascular injury, and bleeding.^[22] The period of hospitalization was different from 2.85 to 12.3 days.^[23,24]

Multivariate logistic regression analysis revealed that the effective factors such as the place of referral (Shahid Beheshti Hospital), past medical history, cut and sharp instrument, falling and fracture have increased the risk of hospitalization. By contrast, factors such as contusion head and neck, upper limb, lower limb, superficial rupture, and spinal cord injury have reduced the risk of hospitalization. Rau *et al.* 2014. Concluded that fall, preexisting comorbidities and fractures in the elderly are associated with increased hospitalization and mortality rate.^[25] Rumhi conducted a study among 1333 children aged ≤ 18 years old and indicated that falls and fractures were the most important causes of home accidents requiring hospitalization which is in line with this study but in contrast, head injury, burn, poisoning, and suffocation also were severe for children aged ≤ 18 years old.

CONCLUSIONS

This study provides novel evidence suggesting predictive variables of home accidents are associated with the outcome of hospitalization. Given that factors such as past medical history, cut and sharp instrument, falling, and fracture are associated with the increase of hospitalization risk, the educational

programs and specific intervention for home safety should focus on the effective factor which increases the hospitalization rate and in the meantime, special attention should be paid to people with past medical history.

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Conflicts of interest

There are no conflicts of interest.

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