Assessment of Patients' Physical Injuries and Falls in Accordance with Season in an Emergency and Trauma Centre

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Key Words: *emergency and trauma centre, patients, injury, fall, seasons.*

Summary. *The aim was to assess trauma characteristics of patients with physical injuries according to seasons and fall frequency in an emergency and trauma center.*

Material and Methods. The study was performed at the Hospital of Lithuanian University of Health Sciences Kauno Klinikos Emergency and Trauma Centre. The data were collected from December 2015 through November 2016 by seasons. In total, 357 patients participated in the study. A questionnaire was composed by the authors. The study protocol was approved by the Centre of Bioethics at the Lithuanian University of Health Sciences (No. BEC-KS(M)-75).

Results. The mean age of patients was 55.78±1.13 years. The most prevalent trauma in an emergency trauma centre for all seasons was concussion injuries, more often in autumn (59.3%) and less in summer (47.3%). The second trauma by frequency was fractures, and more patients came to an emergency trauma centre due to fractures in spring (33.3%) and fewer in autumn (18.6%). The most frequent localization of trauma by all seasons was head trauma, more prevalent in spring and autumn (55.6% each) than in summer (25.3%). The most frequent reason for trauma in all seasons was falls (57.4 % for all seasons), more frequent in spring (64.5%) and less in summer (50.5%).

In 205 of 357 patients, the cause of trauma was a fall. Patients younger than 65 years old mostly had (71.2%) one fall per year, although half (50.6%) of patients ⩾65 years experienced two falls per year, and 26.4% three or more falls. Patients in the age group ⩾65 years more frequently fall indoors (59.3%) and patients <65 years most often fall outdoors (61.9%).

Conclusion. Concussion injuries and fractures with head localization were the most frequent trauma in patients at an emergency and trauma centre. Almost two thirds of trauma causes were falls in all seasons. Thus, fall prevention must be one of the priorities in community care for nurses and other health care specialists.

Introduction

According to the World Health Organization (WHO), injuries are a leading cause of the global burden of death and disability (1). Injuries adversely affect the health and welfare of all people, regardless of country of origin or economic status, through premature death, disability, medical costs, and lost productivity.

Traumatic injury is a term that refers to physical injuries of sudden onset and severity, which require immediate medical attention. Many accidents resulting in traumatic injury can be treated appropriately in hospital emergency departments.

The elderly population is rapidly growing, and traumatic injury of geriatric individuals is a significant problem for health care systems of most advanced countries (2). Elderly patients experience traumatic injuries as drivers or passengers in motor vehicles, as pedestrians being struck by motor vehicles, by falling from a height, and from crushing (3-4). Injury consequences can affect the patient's quality of life. All effects of trauma can take place either over a short period of time or over the course of weeks or even years. Any effects of trauma should be addressed immediately to prevent permanence.

Trauma, including one-time, multiple, or long-lasting repetitive events, affects everyone differently. Some individuals may clearly display criteria associated with post-traumatic stress disorder, but many more individuals will exhibit resilient responses or brief subclinical symptoms or consequences that fall outside of diagnostic criteria. The impact of trauma can be subtle, insidious, or outright destructive. How an event affects an individual depends on many factors, including characteristics of the individual, the type and characteristics of the event(s), developmental processes, the meaning of the trauma, and sociocultural factors (5).

One reason of admission of patients with different trauma to an emergency and trauma centre is a fall. Globally, approximately 28–35% of people aged 65 and over fall each year. This increases to 32–42%

for those over 70 years of age (6). Approximately, 5% of falls result in fractures or hospitalisation (7).

Some falls are of little or no consequence to older individuals; however, a proportion of falls result in injury and/or functional decline. These range from minor injuries such as bruising and sprains to more serious injuries including fractures. Falls may also result in fear of further falls, activity avoidance, social isolation, reduced quality of life, need for institutional care and death.

Injury prevention means making positive choices about minimizing risk at all levels of society while maintaining healhy, active and safe communities and lifestyles. Those choices are influenced by social, economic and physical enviroments. One of the community nurses' goal is to be involved in client's injury prevention.

In our study, we examine the most frequent trauma of patients at an emergency and trauma centre according to seasons and the proportion of falls among all traumas.

The aim was to assess trauma characteristics of patients with physical injuries according to seasons and fall frequency at an emergency and trauma centre.

Materials and Methods

Study Design and Sample. The study was performed at the Hospital of Lithuanian University of Health Sciences Kauno klinikos Emergency and Trauma Centre.

The study population was calculated by a presented official list of 2012–2014 statistics of patients in Emergency and Trauma centre by International Classification of Diseases codes (IDC): S (fracture, concussion, dislocation, tension, bruices), T (burn, frostbite), W (falls), and V (crash). Nearly 10,000 of patients were admitted to the Emergency and Trauma Centre with trauma codes. According to Jadov (8), the statistic table in the study must present 375 patients (95% reliability and 5% error). In total, 357 patients (response rate 95.2%) participated in our study. The patient inclusion criteria were the following: a visit to the Emergency and Trauma Centre with trauma by IDC code (S, T, W, V), age ⩾18 years, ability to speak Lithuanian, and conciousness. The exclusion criteria were patients in need of extra intensive care.

The data were collected between December 2015 and November 2016 by seasons:
1. Winter season, 01 December 2015 – 29 February 2016, 90 patients.
2. Spring season, 01 March 2016 – 01 May 2016, 90 patients.
3. Summer season, 01 June 2016 – 31 August 2016, 91 patients.
4. Autumn season, 30 September 2016 – 30 November 2016, 86 patients.

In total, 357 patients participated in the study by all seasons.

Study organization. One author (GV) collected the data at the Hospital of Lithuanian University of Health Sciences Kauno klinikos Emergency and Trauma Centre. Patients who were able to fill the questionnaire filled it themselves. However, one of authors (GV) helped to fill the questionnaire for patients who needed help (e.g., hand trauma).

Data collection did not disturb patient's treatment, diagnostics and nursing care procedures. Data collection for one patient lasted about 10 min. A pilot test was performed (n=10) before gathering data.

Instruments. The questionnaire was made by the authors and consisted of three parts: a) sociodemographic characteristics of patients; b) trauma assessment by IDC, localization, and cause; c) fall assessment.

A fall was defined as an unintentional event that results in the person coming to rest on the ground or another lower level not as the result of major intrinsic event (such as stroke or epilepsy) or overwhelming hazards (such as being pushed) (9). Additional information was gathered from patient medical documentation (Form No. 025/a and Form No. 027/a.)

Ethical Consideration. The study protocol was approved by the Centre of Bioethics at the Lithuanian University of Health Sciences (No. BEC-KS(M)-75).

Statistical Analysis. Statistical analysis was carried out on SPPS version 17.0 (10). The data were analyzed using the χ^2 test. Comparisons were made between age groups. The difference was considered statistically significant when $P \leqslant 0.05$.

Results

Sociodemographic Characteristics. Sociodemographic characteristics of patients are presented in Table 1. The mean age of patients was 55.78±1.13 years. The oldest patient was 92 years old. There were more patients younger than 65 years (61.6%) and from the city (77.3%).

Table 1. Sociodemographic Characteristics of Patients

Sociodemographic Characteristics		n (%) (n=357)
Gender	Male	152 (42.6)
	Female	205 (57.4)
Age group	<65 yr.	220 (61.6)
	⩾65 yr.	137 (38.4)
Family status	Married	225 (63.0)
	Widower	47 (13.2)
	Single	37 (10.4)
	Live with partner	48 (13.4)
Place of residence	City	276 (77.3)
	Rural	81 (22.7)

Table 2. Distribution of Patient's Trauma Characteristics According to Seasons at an Emergency
and Trauma Centre (n=357)

Item of Trauma		Seasons, n (%)					χ^2, df, P
		Summer (n=91)	Spring (n=90)	Autumn (n=86)	Winter (n=90)	Total, n=357	
Trauma	IDC						
Fracture	S	26 (28.5)	30 (33.3)	16 (18.6)	24 (26.7)	96 (26.6)	χ^2=37.01, df=18, P=0.005
Burn	T	0	0	0	1 (1.1)	1 (0.3)	
Frostbite	T	0	0	0	2 (2.2)	2 (0.6)	
Concussion injuries	S	43 (47.3)	45 (50.0)	51 (59.3)	49 (54.4)	188 (52.7)	
Dislocation	S	0	0	2 (2.3)	6 (6.7)	8 (2.2)	
Tension	S	2 (2.2)	0	0	0	2 (0.6)	
Bruices	S	20 (22.0)	15 (16.7)	17 (19.8)	8 (8.9)	60 (16.8)	
Trauma localization							
Neck		6 (6.6)	4 (4.4)	0	0	10 (2.8)	χ^2=81.12, df=21, P<0.001
Head		23 (25.3)	50 (55.6)	44 (51.2)	50 (55.6)	167 (46.8)	
Face		39 (42.9)	7 (7.8)	22 (25.6)	8 (8.9)	76 (21.3)	
Thorax		1 (1.1)	3 (3.3)	1 (1.2)	0	5 (1.4)	
Abdomen, pelvis		0	5 (5.6)	1 (1.2)	3 (3.3)	9 (2.5)	
Pelvis		2 (2.2)	4 (4.4)	3 (3.5)	0	9 (2.5)	
Arm, leg		16 (17.5)	8 (8.9)	10 (11.6)	20 (22.2)	54 (15.1)	
Femoral neck fracture		4 (4.4)	9 (10.0)	5 (5.7)	9 (10.0)	27 (7.6)	
Reasons							
Car crash		18 (19.8)	14 (15.5)	9 (10.5)	22 (24.5)	63 (17.6)	χ^2=37.01, df=18, P=0.005
Fall (from height)		10 (11.0)	9 (10.0)	14 (16.3)	9 (10.0)	42 (11.8)	
Fall		46 (50.5)	58 (64.5)	50 (58.1)	51 (56.7)	205 (57.4)	
Violence		17 (18.7)	9 (10.0)	13 (15.1)	8 (8.8)	47 (13.2)	

IDC, International Classification of Diseases codes; S, (fracture, concussion, dislocation, tension, bruices),
T (burn, frostbite).

Patients' Trauma Assessment According to Seasons. Patients' trauma assessment according to seasons at the Emergency and Trauma Centre is presented in Table 2.

The most prevalent trauma at the Emergency and Trauma Centre in all seasons was concussion injuries, more often in autumn (59.3%) and less in summer (47.3%). The second trauma by frequency was fractures, and more patients came to the Emergency and Trauma Centre due to fractures in spring (33.3%) and fewer in autumn (18.6%).

The most frequent localization by all seasons was head trauma, more prevalent in spring and aumtum (55.6% each) than in summer (25.3%). The second localization by frequency was face trauma although those traumas were the most frequent in summer (42.9%). The third localization by frequency by all seasons was arm and leg, more frequently occurring in winter (22.2%) and summer (17.5%). Femoral neck fractures more often occurred to patients in spring and wintertime (10.0% each).

The most frequent cause of trauma in all seasons was falls (57.4% for the whole year), more frequent in spring (64.5%) and less in summer (50.5%). The second cause by frequency was car crash in spring (15.5%) and winter (24.5%). Similar causes of trauma by frequency were car crash (19.8%) and violence (18.7%) in summer, and a fall from high (16.3%) and violence (15.1%) in autumn.

Fall Assessment Among Fallers. Fall assessment among fallers is presented in Table 3. A fall was the most prevalent cause for patient trauma in all seasons. A fall was a cause of trauma in 205 of 357 patients. Patients younger than 65 yeard mostly (71.2%) had one fall per year, although half of patients ⩾65 years (50.6%) experienced two falls per year and 26.4% three or more falls. More women (52.5%) than men (41.4%) experienced one fall per year; however, more men (37.9%) than women (30.5%) fell twice per year. Patients ⩾65 years fall more frequently inside (59.3%) and patients <65 years fall outdoors (61.9%).

Table 3. Fall Assessment among Fallers by Age Groups and Gender (n=205)

Fall in last yr/place		Fallers (n=205), n (%)				
		Age group		Gender		
		<65 yr.	⩾65 yr.	Female	Male	Total
Falls in the last 1 year	1	84 (71.2)	14 (16.1)	62 (52.5)	36 (41.4)	98 (47.8)
	2	25 (21.2)	44 (50.6)	36 (30.5)	33 (37.9)	69 (33.7)
	3+	7 (5.9)	23 (26.4)	17 (14.4)	13 (14.9)	30 (14.6)
	Not remember	2 (1.7)	6 (6.9)	3 (2.5)	5 (5.7)	8 (3.9)
		χ^2=10.27, df=2, P=0.006		χ^2=3.45, df=3, P=0.327		
Fall place	Inside	45 (38.1)	51 (59.3)	41 (47.1)	55 (47.0)	96 (47.1)
	Outdoors	73 (61.9)	35 (40.7)	46 (52.8)	61 (52.1)	106 (52.9)
		χ^2=9.82, df=2, P=0.007		χ^2=0.04, df=2, P=0.977		

Patients more frequently (42.9%) fall during the day, i.e., between 12 am and 5 pm, 27.8% of patients fall in the morning between 8 am and 12 am, 26.3% of patients fall in the evening between 5 pm and 10 pm, and 2.9% of patients fall in the night, i.e., between 10 pm and 8 am. We asked for patients' subjective opinion about the cause of the fall. The most frequent causes according to patient's opinions were dizziness (52.2%) and loss of balance (19.5%). Other causes were trip (11.7%), slip (6.3%), falls related to alhohol consumption and reaching some object (3.9% each) or subjects did not know (2.5%).

Discussion

Patient's physical trauma negatively affects patient's quality of life, limits mobility, dependency, social life and has psychological consequences. The current study demonstrated falls to be the most frequent cause of trauma of patients admitted to the Emergency and Trauma Centre in all seasons. Thus, fall prevention must be one of the priorities in different care levels including interdisciplinary teams.

In one German study, 27% of trauma was caused by motorbike accidents, 35% by car accidents, 5% by bicycle accidents and 16% by a fall from a height (11). According to the National Hospital Ambulatory Medical Care Survey, approximately 117 million visits to emergency departments in the United States in 2007 (14.6%) were for lower extremity injuries (12).

Extremity injuries are among the most common injuries in the adult population and are a major source of disease burden and productivity loss in society (13, 14). Elderly trauma patients usually have co-morbidities; thus, the complications and the long-term mortality of traumatic injury is greater for elderly individuals than for young individuals (15).

The Lithuanian Institute of Hygiene Health Information Centre reported injury circumstanc-es of hospitalized injured patient in Lithuania. In 2015, the main cause of injury was a fall (51.8%), and other causes were car crash (4.4%), treatment complication (5.1%), deliberate injury (5.4%) and other causes. In fact, 39.8% of patients admitted to an emergency department due to fall consequences need emergency department services and are not hospitalized; they need out-patient care after diagnostics and treatment are provided (16).

Falls and the interrelated category of being struck by or against objects accounted for more than 30% of injury cost, making them a strong prevention target (17).

In one study, community-dwelling elderly who presented to an emergency department with a fall had similar fall characteristics as in our study. The causes of falls were loss of balance (22.2%), slip or trip (46.3%), alcohol consumption (5.6%). The majority of falls occurred outside (51.9%) and 35.2% in home (18).

The emergency department visit may be a sentinel event to prevent such falls and change the trajectory of older adults' functional decline. Identifying a senior at a high risk of falls can lead to targeted therapies through pharmacy, social work, home health, and physical therapy referrals. In preparing for discharge from the emergency department or hospital, interdisciplinary teams can promote individualized and multi-component exercise programs, the most effective strategy in reducing falls among community-dwelling elderly (19).

One study concluded that, when at-risk patients are identified, interventions can be implemented to prevent future falls; thus, fall-risk identification with simple, validated tests, such as the Timed Up & Go Test, and emergency department-based interventions are important in the falls management (20).

A service with intervention provided by fall teams (which included occupational therapists,

physiotherapists, and nurses) in England to prevent falls in the community reduced the fall rate and improved clinical outcome in the high-risk group of older people who call an emergency ambulance after a fall but are not taken to hospital (21).

One of the most important predictive characteristics of return to work following injury is the duration of sick leave taken post-injury (22). Injuries cause not only loss of life but also long-term disabilities and other consequences including economic burden for individuals, families and communities. In high-income countries, prevention strategies are better established and proven to be effective, resulting in a continuously decreasing number of deaths and disabilities from injuries. However, in many low- and middle-income countries, people are not aware of injuries as a problem, there is a paucity of injury data, and little to no information on injury prevention measures has been disseminated. Injuries can only be effectively prevented by active collaboration between stakeholders from international, national, and local communities, and individuals to address the problems and create prevention strategies and policies (23).

The approach involves a detailed assessment, often by multiple health professionals, followed by development and implementation of a targeted intervention plan to address modifiable risk factors.

Conclusions

Concussion injuries and fractures with head localization were the most frequent trauma in patients at an emergency and trauma centre. Almost two thirds of trauma causes were falls in all seasons. Less than one third of patients older than 65 years fell three or more times during last year. Thus, fall prevention must be one of the priorities in community care for nurses and other health care specialists.

Statement of Conflict of Interest
The authors state no conflict of interest.

Pacientų fizinių traumų ir griuvimų vertinimas pagal sezoniškumą skubios pagalbos ir traumų centre

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Raktažodžiai: Skubios pagalbos ir traumų centras, pacientai, susižalojimai, griuvimai, metų sezoniškumas.

Santrauka. Straipsnio tikslas – įvertinti pacientų, patyrusių fizines traumas ir patekusių į skubiosios pagalbos skyrių, traumų ir griuvimų dažnį per metus ir priežastis pagal sezoniškumą.

Medžiaga ir metodai. Tyrimas buvo atliktas Lietuvos sveikatos mokslų universteto ligoninės Kauno klinikose Skubios pagalbos ir traumų centre. Duomenys buvo renkami 2015 m. gruodžio – 2016 m. lapkričio mėn. pagal metų sezonus. Iš viso tyrime dalyvavo 357 pacientai. Klausimynas buvo sudarytas tyrėjų. Gautas Lietuvos sveikatos mokslų universiteto Bioetikos centro leidimas vykdyti tyrimą (Nr. BEC-KS(M)-75).

Rezultatai. Pacientų amžiaus vidurkis buvo 55,78 ± 1,13 m. Dažniausi Skubios pagalbos ir traumų centre pacientų fiziniai sužalojimai buvo sutrenkimai, dažniau rudenį (59,3 proc.) nei vasarą (47,3 proc.). Antra pagal dažnumą trauma buvo lūžiai, dažniau pavasarį (33,3 proc.) nei rudenį (18,6 proc.). Vertinant pacientų traumas pagal vietą, dažniausios visais metų sezonais buvo galvos traumos, dažniau pavasarį ir rudenį (atitinkamai po 55,6 proc.) nei vasarą (25,3 proc.). Dažniausia susižalojimų priežastis visais sezonais buvo griuvimas (visais sezonais per metus 57,4 proc.), dažniau pavasarį (64,5 proc.) nei vasarą (50,5 proc.).

205 iš 357 pacientų traumos priežastis buvo griuvimas. Jaunesni nei 65 m. pacientai dažniau griuvo vieną kartą metuose (71,2 proc.), o beveik pusę (50.6 proc.) vyresnių nei 65 metų pacientų griuvo du kartus ir 26,4 proc. griuvo tris ar daugiau kartų per metus. Vyresni nei 65 metų pacientai dažniau griuvo patalpoje (59,3 proc.), o jaunesni nei 65 m. pacientai – lauke (61,9 proc.).

Išvados. Skubios pagalbos ir traumų centre dažniausi pacientų sužalojimai buvo sutrenkimai ir lūžiai, traumos vieta – galva. Beveik du trečdaliai traumų priežasčių visais metų sezonais buvo griuvimas. Taigi, griuvimo prevencija turėtų tapti vienu iš bendruomenės slaugytojų ir kitų sveikatos priežiūros specialistų prioritetu.

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