Original Article

Determining Patients' Risk of Falling in the Emergency Department

Fatma Tanrikulu, MSc
Research Assistant, Sakarya University Faculty of Health Science, Nursing Department, Adapazari, Turkey

Dilek Sari, PhD
Associate Professor, Ege University College of Nursing, Nursing Department, Bornova, Izmir, Turkey

Correspondence: Fatma Tanrikulu Research Assistant, Sakarya University Faculty of Health Science, Nursing Department, Adapazari, Turkey. E-mail: ftanrikulu@sakarya.edu.tr

Abstract

Objectives: This study was conducted with the aim of determining the risk of falling in patients admitted to the emergency department, and was a descriptive and cross-sectional study.

Method: The study was conducted in the emergency department at a university hospital in Izmir Turkey. The sample consisted of the 752 patients who were admitted to the emergency department and who accepted to take part in the research. Data, which consisted of patients' socio-demographic characteristics and falling characteristics, was collected using an Individual Characteristics Form, the Falling Risk Assessment Scale devised by the Delmarva Foundation. Statistical evaluation of data was performed with the use of numerical and percentage values, the chi-square test and Kruskal-Wallis variance analysis.

Results: It was found that 37% of the patients taking part in the study were in the over-65-year age group; 52% were male and 59.4% had a chronic illness. It was established that 30.3% of the patients had a high risk of falling according to the Delmarva Foundation Scale (10 points or more). A statistically significant difference was found between the level of risk of falling and the patients' age, state of chronic illness, the unit of the emergency department where they were, and the reason for their admission to the emergency department (p<0.001).

Conclusion: A significant proportion of patients who are admitted to the emergency department are at risk of falling. In particular, patients' risk of falling is affected by individual characteristics, their state of chronic illness, the unit of the emergency department where they are, and the reason for their admittance to the emergency department.

Keywords: Emergency department; falls; fall risk evaluation; fall risk factors; patient safety.

Introduction

Patient safety is one of the important topics of a quality program in health services, and all personnel working in health services may be faced with a situation in which a patient's safety is at risk (Cirpi et al., 2009). The Joint Commission International (JCI) has developed international patient safety targets with regard to incidents negatively affecting patient safety.

Among these targets is that of reducing the risk of falling (JCI, 2014). Falling is defined as an unplanned sudden change in movement towards the ground which may result in physical injury, or an incident which results in a person descending involuntarily to the ground or to below the level at which he/she was previously located (World Health Organization, 2012; JCI,2014).

Patient falls are stated to be an important patient safety problem in health care institutions in the whole world, and are among the most frequently encountered of reasons for secondary injury in hospitals (Berke and Aslan, 2010; Bulut et al., 2013). Falls may result in serious injuries such as fractures, cuts or bleeding, which can extend hospital stay, reduce the functional capacity of the hospital and increase health care costs (Lamis et al., 2012; AHRQ, 2013).

Studies which have been conducted have shown that rates of falling vary from one department to another. In a study by Schwendimann et al. (2006), rates of falling were found to be 1.17% in

geriatrics, 1.13% in internal medicine, and 0.29% in surgery. In a study by Sanar et al. (2013) conducted in the internal medicine and surgery services of a government hospital, it was reported that 0.3% of the patients in the hospital suffered falls. In a study conducted in the emergency department, Terrell et al. (2009) examined two years of records and found that 56 patients had fallen.

Patient falls are situations which can be avoided, and nurses can reduce patient falls to a minimum by means of effective preventive measures (Savci et al., 2009; Madak, 2010). The first step in preventing patient falls is for nurses to assess patients for their risk of falling (Bayar, 2013).

In a study by Spiva and Hart (2013) on the prevention of falling in acute care patients, risk factors for falling were found to be muscular weakness, impairment in walking and balance, advanced age and the use of risky drugs (narcotics and anticoagulants). According to a study on the prevention of falling in old patients, the existence of postural hypotension and an impaired state of consciousness were among the factors affecting patients' risk of falling (Tinetti, 2003).

Materials and Methods

The population of this descriptive and cross-sectional study consisted of the patients admitted to the Emergency Department of a university hospital in the province of Izmir, Turkey. The study population consisted of 22178 patients who were receiving inpatient treatment in the emergency department in two months. The study was performed between 1 November and 31 December 2014. The number of patients needed for the sample was found to be 376 through the use of the Epi lnfo TM Statcalc program.

The number of patients included in the sample was recalculated with design effect to overcome the deviation caused by random sampling when cluster sampling was done. The final sample included 752 patients who were not delirious or in a confused state, were aged 18 and over, and accepted to take part in the study. The numbers of patients admitted to the emergency department and their characteristics showed a day/night and week/weekend variation, and therefore the days and times when the research was conducted were distributed equally.

The study was conducted in units within the emergency department. These were trauma, fast track, triage, monitored observation I, and monitored observation II. The trauma unit takes, follows up and treats all trauma patients injured for such reasons as traffic accidents inside or outside vehicles, falling, injuries with firearms, injuries with sharp instruments, and motorcycle accidents. The fast track unit is a unit which deals with cases which do not need urgent intervention at times in the day when there are the most patients. The triage unit deals with patients with stomach ache, nausea and vomiting and fever and other non-life-threatening complaints. In monitored observation I, patients with critical life-threatening complaints are treated and monitored. In monitored observation II, patients are monitored who need individual monitoring, especially hemodynamic monitoring (those with breathing difficulties, with a history of seizures, chest pain similar to heart attack, etc.).

The Individual Characteristics Form was developed by the researchers and contained questions on the patients' identifying characteristics and questions regarding falling. The Risk of Falling Assessment Scale developed by the Delmarva Foundation was developed by Nebraska's Medicare Quality Improvement Organization, making use of the Falls Management Guidelines. The validity and reliability of the Turkish version of the Scale was carried out by Tekin et al. (2013). This form assesses the patient's risk of falling and when the scores from the assessment are added up, this gives the patient's risk of falling score. A total score of 0-5 shows that the risk of falling is low, 6-9 indicates a medium risk, while 10 and above indicate a high risk of falling (Tekin et al., 2013).

Data Analysis Procedures

The program SPSS 24 was used to analyze the data obtained. The Kolmogorov-Smirnov test was used because the data conformed to normal distribution. In comparing the level of the patients' risk of falling with the data obtained from the patients, the chi-square test was used. The level of statistical significance was taken as $p<0.05$.

Ethical Approval

Written approval was obtained from Tekin et al. who carried out Turkish validity work on the Risk of Falling Assessment Scale developed by the Delmarva Foundation and from the Scientific Ethics Committee of the Nursing College of Ege University. Hospital administrators provided

written approval to conduct the study, and there were no invasive procedures planned for human beings during the study period. Verbal consent was obtained from all of the patients who agreed to participate after they were informed about the study content.

Results

The identification characteristics obtained showed that 37% of the patients taking part in the study were aged 65 or more and that 52% were male. Their mean age was found to be 54.45±20.31. The patients taking part in the study were being treated in various different units of the emergency department: 53.2% in the triage unit, 22.9% in the monitored observation II unit, and 17.6% in the trauma unit.

Table 1 shows the distribution of factors affecting the risk of falling in patients. It was found that more than half of the patients had chronic illnesses (59.4%), 6.2% were disorientated or had intermittent confusion, 22.5% had a history of falling, and 16.1% had weak eyesight or were blind. It was determined that 65.5% of patients taking part in the study experienced walking or balance problems, and 9.6% had orthostatic hypotension. It was found that 60.4% of the patients were using medication that increased their risk of falling, and 32.2% had illnesses which affected their risk of falling (Table 1).

Table 1. Distribution of Factors Affecting the Risk of Falling in Patients

Affecting Factor	n	%
Chronic illness		
No	305	40.6
Yes	447	59.4
Consciousness level		
Alert and oriented	706	93.8
Disoriented / Intermittent confusion	46	6.2
History of falling		
No	583	77.5
Yes	169	22.5
Vision		
Adequate	632	83.9
Weak / Blind	120	16.1
Walking and Balance		
No problems	260	34.5
Problems	492	65.5
Orthostatic Hypotension		
No	680	90.4
Yes	72	9.6
Medication*		
Not using	298	39.6
Using	454	60.4
Illnesses**		
Not present	510	67.8
Present	242	32.2

*Medications: anesthetics, antihistamines, laxatives, diuretics, antihypertensives, antiepileptics, benzodiazepines, hypoglycemics, psychotrophics, sedatives/hypnotics.**Illnesses: hypotension, vertigo, cerebrovascular disease, Parkinson; loss of limb, seizures, arthritis, osteoporosis, fractures.

Table 2. Patients' Levels of Risk of Falling According to the Risk of Falling Assessment Scale developed by the Delmarva Foundation

Degree of Risk	n	%
Low risk of falling (0–5 points)	328	43.6
Medium risk of falling (6–9 points)	196	26.1
High risk of falling (10 points and above)	228	30.3

Table 3. Comparison of Patients' Identifying Characteristics with their Levels of Risk of Falling

Characteristics	Low Risk		Medium Risk		High Risk		Test result
	n	%	n	%	n	%	
Age							
18- 44	188	6.4	38	15.4	20	8.2	χ^2=259.7
45- 64	106	46.5	76	33.3	46	20.2	p=0.001
65 and above	34	12.2	82	29.5	162	58.3	
Gender							
Female	148	41	103	28.5	110	30.5	χ^2=2.72
Male	180	46	93	23.8	118	30.2	p=0.2
Unit							
Trauma	59	44.7	36	27.3	37	28.0	
Fast track	18	85.7	2	9.5	1	4.8	χ^2=125.4
Triage	216	54	105	26.2	79	19.8	p=0.001
Monitored observation I	0	0	4	15.4	22	84.6	
Monitored observation II	35	20.2	49	28.3	89	51.5	

Table 4. Comparison of Patients' Levels of Risk of Falling with the Factors Causing Falling

Factors	Low Risk		Medium Risk		High Risk		Test Result
	n	%	n	%	n	%	
Chronic Illness No Yes	223 105	73.1 23.5	54 142	17.7 31.8	28 200	9.2 44.7	χ^2=191.7 p=0.001
Consciousness Level Alert and Orientated Disoriented/ Intermittent confusion	328 0	46.5 0	193 3	27.4 6.5	185 43	26.1 93.5	χ^2=93.01 p=0.001
History of Falling No Yes	311 17	53.3 10.1	148 48	25.4 28.4	124 104	21.3 61.5	χ^2=126.8 p=0.001
Vision Normal Weak/ Blind	319 9	50.5 7.5	170 26	26.9 21.7	143 85	22.6 70.8	χ^2=121.0 p=0.001
Walking and balance No problems Problems	230 98	88.5 19.9	27 169	10.3 34.4	3 225	1.2 45.7	χ^2=332.2 p=0.001
Orthostatic Hypotension No Yes	322 6	47.4 8.4	181 15	26.6 20.8	177 51	26.0 70.8	χ^2=66.6 p=0.001
Medication Not using Using	226 102	75.8 22.5	53 143	17.8 31.5	19 209	6.4 46.0	χ^2=223.8 p=0.001
Illness No Yes	295 33	57.8 13.6	127 69	24.9 28.5	88 140	17.3 57.9	χ^2=163.5 p=0.001

It was found that less than half of the patients had a low risk of falling (43.6%), 26.1% had a medium risk and one third had a high risk of falling (30.3%) (Table 2), and that 8.4% of the patients met the conditions for tendency to fall (unsteadiness, slipping, losing grip, stumbling). The most frequent of these was unsteadiness (4.4%). Two patients of those at high risk of falling had experienced a fall (0.3%). One of these had fallen during mobilization in the monitored observation II unit, and the other had fallen while being transferred to the radiology unit.

Table 3 shows the comparison of the patients' identifying characteristics with their levels of risk of falling. As age increased, so did the risk of falling. It was found that more than half of the patients aged 65 and above (58.3%), most of patients in monitored observation I (84.6%) and 51.5% of patients in monitored observation II had a high risk of falling (p<0.05). Examining the relationship between gender and the level of risk of falling, it was found that there was no statistically significant difference between males and females in terms of the risk of falling (χ^2=2.72, p=0.2) (Table 3).

Comparing the level of risk of falling with the causative factors, it was found that 44.7% of patients who had chronic illnesses, 93.5% of those who were disoriented or were in a state of intermittent confusion, 61.5% of those with a history of falling, 70.8% of those whose vision was weak or who were blind, 45.7% of those with walking or balance problems, 70.8% of those with orthostatic hypotension, 46% of those who used medication which gave a risk of falling, and 57.9% of those who had an illness which could create a risk of falling were at high risk of falling (p<0.05).

Discussion

Patient falls which occur in hospital are recognized as a serious health problem. Falls, especially in patients aged 65 and over, can cause injury and loss of mobility (Madak, 2010; Feil and Gardner, 2012). It is stated in the literature that the risk of falling increases with advancing age (Berke and Aslan, 2010; Naughton et al., 2012; Mollaoglu et al., 2013). In the present study also, the risk of falling increased with age (p<0.05). In a study by Berke and Aslan (2010), 76% of the patients aged 66 and above who participated in the study were found to have a high risk of falling. In a study in which the risk of falling in an internal medicine clinic was determined, 63.2% of patients in the 61-80 year age group were found to be at high risk of falling (Mollaoglu et al., 2013). The findings of our study are similar to those of other studies.

No significant difference was found between the patients' risk of falling and their gender (p>0.05). Results have been found indicating both that gender affected falling and that it did not affect it. Karatas and Maral (2001) reported that the rate of falling in the 65 and above age group was 1.5% in males and 8.4% in females; Madak (2010) reported that men were more likely to fall than women at 61.2%, while Terrell et al. (2009) found that 67% of patient falls in the emergency department were by males. In a study in which the risk of falling by aged patients in surgical clinics was determined, Cecen and Ozbayir (2011) found no significant difference between males and females. The results of our study are similar to Cecen and Ozbayir's research.

It is known that having a chronic illness increases the risk of falling, and the chronic illnesses most frequently seen in patients who fall are hypertension, diabetes, diseases of the circulatory system, diseases of the digestive system, arthritis, stroke, depression and neurological diseases (Madak, 2010; Berke and Aslan, 2010). The results of our study showed that there was a significant difference between chronic illness and the level of risk of falling in the patients. The another study was indicated that the chronic illnesses of the patients who fell were hypertension (55.5%), diabetes (33.3%), and musculo-skeletal diseases (19.4%) (Madak, 2010). In a study determining the risk of falling in neurosurgery patients, it was found, similar to our study, that most of the patients with a high risk of falling had chronic illnesses (72.2%) (Berke and Aslan, 2010)

The patients involved in the study were being treated in units of the emergency department. It was found that most of patients in monitored observation I were at high risk of falling (84.6%), and a significant difference was found between the unit. It is thought that because 73.1% of patients in monitored observation I were aged 65 and over, patients in this unit had a higher risk of falling.

When the relationship between a history of falling and the risk of falling was examined, it was found that patients with a history of falling were at a high risk of falling. Similarly, in a study investigating the falling risk factors of hospitalized patients, Schwendimann et al. (2006) found that half of patients who fell had a history of falling (50.1%). In a study in which the degree of risk of falling in neurosurgery patients was determined, Berke and Aslan (2010) stated that 15% of patients with a high risk of falling had a history of falling in the previous three weeks.

Falling in patients is related to many factors, and it has also been found to be related to the patient's degree of vision. Particularly in old age, vision problems can be a reason for falling (Harwood, 2001). Rubenstein (2006) stated that among the risk factors for falling, vision problems affected the risk of falling by 2%. It was also found in our study that patients' vision problems affected their risk of falling.

The World Health Organization (WHO) (2012) identified muscular weakness, walking and balance problems and the need to use an aid when walking as risk factors for falling. Schwendimann et al. (2006) reported that impaired balance (83.1%) was among the risk factors which caused falling in patients, and Terrell et al (2009) found in a study to determine the risk of falling in the emergency department

that impaired mobility was significant in patients who fell. It was found in our study that patients with walking and balance problems had a high risk of falling.

The presence of orthostatic hypotension in patients has been determined as a risk factor for falling (Rubenstein, 2006). In a study by Berke and Aslan (2010) in which the risk of falling in neurosurgery patients was determined, it was found that 35.4% of patients had signs of orthostatic hypotension, and 42.2% of patients who experienced orthostatic hypotension were at high risk of falling. In our study it was found that patients with a finding of orthostatic hypotension had a significantly high risk of falling.

Various groups of drugs have been found to affect falling in patients. These drug groups are sedatives, hypnotics, antidepressants, benzodiazepine group drugs, diuretics, antihypertensives, antiarrhythmic drugs, antiepileptics and hypoglycemics (Lamis, 2012; Eyigor, 2012; Feil and Gardner, 2012). It was found in our study that 46% of patients using drugs which were at a high risk of falling. In Terrell et al. study's (2009), it was reported that 19.6% of patients who fell in the emergency department had used sedative drugs before falling. It was reported in another study that before falling, 38.6% of patients had used narcotics, and 25.4% had used psychotropic drugs (Schwendimann et al., 2006). The results of other studies were found to be similar to those of our study.

The WHO (2012) identified circulatory system diseases, chronic obstructive pulmonary disease, depression and arthritis as medical conditions which increased the risk of falling. According to the results of this study, more than half (57.9%) of patients with illnesses which could create a risk of falling (hypotension, vertigo, cerebrovascular disease, Parkinson, loss of a limb, seizures, arthritis, osteoporosis and fractures) had a high risk of falling. Terrell et al. (2009) reported a 14.3% rate of dizziness and vertigo in patients before a fall. According to a study by Mollaoglu et al. (2013), one of the conditions which increased the percentage of falling in patients was their 40.6% rate of vertigo.

It was found that one third (30.3%) of patients have a high risk of falling, and 4.4% of patients had experienced unsteadiness, one of the contributors to a tendency to fall, and 0.3% of the patients had fallen. Terrell et al. (2009) found that 35.7% of patients in the emergency department had a high risk of falling. According to the same study, a falling rate of 0.288 per thousand was determined for patients admitted to the emergency department. Similarly, in a study determining the risk of falling in the internal medicine and surgery services of a government hospital, Sanar et al. (2013) found that 0.3% of inpatients had experienced a fall.

Limitations

Patients with delirium or confusion were excluded from the study because there was no statement relating to delirious and confused patients in the Consciousness Level and Mental State section of the Risk of Falling Assessment Scale. A limitation of the study is that it was conducted at certain times on certain days over a period of two months, and that data was collected in that period from patients who met the sample selection criteria. In addition, the fact that patients who were unstable or who needed emergency intervention were excluded from the study can be seen as a limitation.

Conclusion

A significant proportion of patients admitted to the emergency department are at risk of falling. Patients' individual characteristics, chronic illnesses, the unit in the emergency department where they are located, and the reason for their admission to the emergency department can affect their risk of falling.

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