

The Evaluation of the Risk of Falling in Pediatric Patients



Medical Science

KEYWORDS : falling, child, nursing

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ABSTRACT

Purpose of this study determining the risk and factors effecting falling in child inpatients. This is a definitive study. The data was gathered between 1 January 2012- 31 December 2012. The study consist of 4346 inpatients with the risk of falling. %55.5 (n=2410) of the patients were male, %41.3 (n=1797) of them were under the age of 3, %68.3 (n=2970) of them were ER patients. According to the Harizmi Falling Scale (HRFS) %79.1 (n=3438) of the patients were in the high risk group, the average of male patients scores was (23,09±10,10) and statistically higher than the female patients score of (22,46±10,35), the HRFS points averages of ER patients were (28,15±9,32 and 26,00±8,80) which is a statistically higher score in points compared to child inpatients in other wards. 9 of the 4346 patients presented a case of falling. The findings attained from our study are in conformity with the literature.

Introduction

Healthcare institutions are often strange places for children where they are exposed to diagnostic applications, medication and tests which may cause them to feel uncomfortable and scared. Falling and medical malpractices are highly emphasized issues regarding the pediatric illnesses, child's mental state during the pediatric patient's treatment process from the aspect of patient safety (Joint Commission, 2008; National Center for Patient Safety, 2008).

According to The Joint Commission including unexpectedly sliding off a chair while standing, seated or lying down is considered as falling. (Joint Commission, 2007). Falling influences morbidity and morale of the child and extends the time of stay in hospital. This also causes increased medication use, use of lab tests and other diagnostic methods, causes labor loss and creates a great burden for the country's economy (Razmus et al, 2006; Cooper and Nolt, 2007; Kissinger and Marin, 2010).

Joint Commission first declared its national patient safety goal in 2005 aimed to reduce the hazards caused by falling in 2005 and started a program in order to reduce falling in 2006. (Joint Commission, 2007). And in 2009 the commission aimed to reduce the hazards caused by falling as the 9th aim of National Patient Safety. According to this program hospitals should develop programs in order to manage and evaluate the falling risk of patients. (Joint Commission, 2011). Healthcare Institutions in our country were made liable for taking the necessary steps and creating regulations that would prevent patients from falling through the directive published in the 06/04/2011 dated and 27897 numbered Official Gazette through the "Directive Regarding Maintaining Employee and Patient Safety" (Official Gazette, 29 April 2009).

The falling incidence of children was first introduced by Nimityongskul and Anderson in 1987 as a result of a 5 year study. The study revealed that one in every 118 patients presented a case of falling. (a total of 76 patients) (Kissinger and Marin, 2010). According to a three year study by Monson et al. (2008) new born patients in 18 hospitals presented a 0.16 rate of falling for 1000 days of hospitalization. Cooper ve Nolt (2007), reported the cases of falling for 1000 days of hospitalization in a children's hospital as 0.8. Another 3 year study reveals the annual rate of falling for 1000 days of hospitalization as 1.0-0.56. (Hill-Rodriguez et al, 2008). A study that took place in our country revealed the rate of falling as %0.7 (Demir et al, 2011).

Acceptances related to risks of children falling;

- The illness generally deteriorates the motor and cognitive skills of children
- New and strange environments, tools and appliances create a risk of falling for children
- The development of the cognitive and motor skills of children influences the risk of children falling
- Hospitals need to develop protocols that would prevent children from falling
- Hospitals need to implement specially designed scales in order to evaluate the risk of children falling
- The falling risk scale is a component of an extensive falling prevention program. (Razmus et al, 2006; Cooper and Nolt, 2007; Kissinger and Marin, 2010).

While there are many programs and scales for preventing adults from falling, the studies for children in this sense are limited. The common practice of adapting current standards for adults to children put the children under great risk (Griffith and White, 2007).

Some of the limited scales that evaluate the risk of children falling are as follows. Graf (2004), in the retrospective case-control study 20 of 38 variables defined related to children falling was observed and a general scale for the evaluation of falling pediatric patients was developed. In 2006 Razmus et al. defined the risk factors for falling pediatric patients and developed the CHAMPS falling scale. (Razmus et al, 2006). Meanwhile in 2008 Hill-Rodriguez et al, developed and tested the validity of the Humpty-Dumpty Falling Risk Scale. (Hill-Rodriguez et al, 2008). Demir ve friends. (2011) Developed the highly valid and reliable 18 clause BUCH Falling Risk Recognition Scale for children patients. The Ministry of Health developed the Harizmi Falling Risk Evaluation Scale" for child patients.

It is believed that these studies that define the features of children under the risk of falling will contribute to the literature.

MATERIALS AND METHOD

Purpose

This study is done in order to determine the risk and factors effecting falling in child inpatients in pediatric wards.

Type, Population and Sample Choice of the Study

This study is planned as a definitive study. 4530 inpatients admitted in the pediatric ward (except new-born unit) of a public university hospital between 1 January 2012 and 31 December

2012 make the population of the study. 4346 inpatients under the risk of falling during this period make the sampling of this study.

Data Collection Tools

The "Harizmi Falling Scale" and the "Falling Risk Monitoring Form" developed by Turkish Republic Ministry of Health Performance Management and Quality Development Department and the researchers was used as the data collection method.

Harizmi Falling Risk Scale: The scale was developed by Turkish Republic Ministry of Health Performance Management and Quality Development Department. The scale questions the following nine factors: the illness of the patient, presence of a neurological illness, presence of a risky illness, oxygenation status, the bed, presence of a visual impairment, equipment used, use of medication with the risk of supplements, and the post-op period. The scale also defines neurological illnesses, risky patients, oxygenation status, and risky medication. A total score above 5 indicates low risk group and a total score above 15 indicates a high risk group.

Falling Risk Monitoring Form: This form was developed by the researchers and was collected through designating all the inpatients under the risk of falling. The form has 2 sections. The first section defines the features of the illnesses while the second section questions the circumstances of the falling if occurred. The first section consists of 6 questions regarding the age, gender, ward, date of admission, diagnosis and the falling risk score of the patient. The second section consists of 5 questions regarding the date and hour of the falling, medication given in the 1st 24 hours, pre-falling mental/emotional status, and the condition of the patient after the incident of falling.

The Ethical Aspect of The Study

Necessary written consent of the hospital administration was obtained before the starting the study. Besides, the forms were given to the patients after informing them on the study and their written consent.

EVALUATING THE DATA

The data collected from the study was evaluated using SPSS (Statistical Package for Social Sciences) for windows 17.0. The demographical variables and the variables related to the illnesses are given in numbers, percentages, averages and median values. The existence of a difference in the averages of the Harizmi falling Scale (HRFS) for non-parametrical data according to the cases' demographic features and the features of their illnesses for nonparametric data was evaluated by Mann Whitney U test and for parametrical values the data was evaluated with an independent sample t test or the ANOVA test. Chi square tests were used to compare the modulating differences between the groups. The results were in the %95 reliability range and meaningfulness was evaluated as $p < 0.05$.

RESULTS

The demographical features of the children indicate that % 55.5 are male, % 44.5 are female, % 41.3 are under the age of 3, % 22.3 are between the ages 4-6, % 15.5 are between the ages of 7-10 and % 20.9 are older than 11. % 68.3 of the patients involved in the study are ER patients, % 6.1 in hematology, % 5.8 intensive care, % 5.2 nutrition & metabolism and % 14.6 are patients in other wards. % 19.8 of the patients have neurological diseases % 17.5 hematologic % 15 gastrointestinal, % 13 metabolic, % 9.5 respiratory system diseases, % 9 infections, % 7 cardiovascular system diseases and % 29 of the patients were admitted for other diseases. % 8.5 of the child patients had an additional diseases (Table 1).

Table 1. The demographic and disease information (n=4346)

Features	n	%	Median	Min.-Max.
Age (years)	4346	-	4,5	<1-16
≤3	1797	41,3		

4-6	967	22,3		
7-10	672	15,5		
11≤	910	20,9		
Gender				
Male	2410	55,5		
Female	1936	44,5		
Clinics				
Emergency unit	2970	68,3		
Hematology	267	6,1		
Intensive care	254	5,8		
Nutrition & metabolism	225	5,2		
Cardiology	221	5,1		
Neurology	99	2,3		
Gastroenterology	90	2,1		
Nephrology	90	2,1		
Allergy	60	1,4		
Infection	39	0,9		
General pediatrics	31	0,7		
Diagnosis				
Neurological diseases	861	19,8		
Hematologic diseases	761	17,5		
Gastrointestinal diseases	653	15,0		
Metabolic diseases	564	13,0		
Respiratory system diseases	413	9,5		
Infections diseases	391	9,0		
Cardiovascular system diseases	305	7,0		
Intoxication	202	4,6		
Genitourinary system diseases	125	2,9		
Invasive procedures	43	1,0		
Genetic diseases	17	0,4		
Accidents	11	0,3		
Additional diseases				
No	3977	91,5		
Yes	369	8,5		

The patients HRFS points average was found $22,81 \pm 10,22$ (Figure 1). According to the scale %79,1 of the cases belong to the high risk group, while %20,9 belong to the low risk group. (Table 2).

Figure 1. Harizmi risk of falling scale (HRFS) mean score

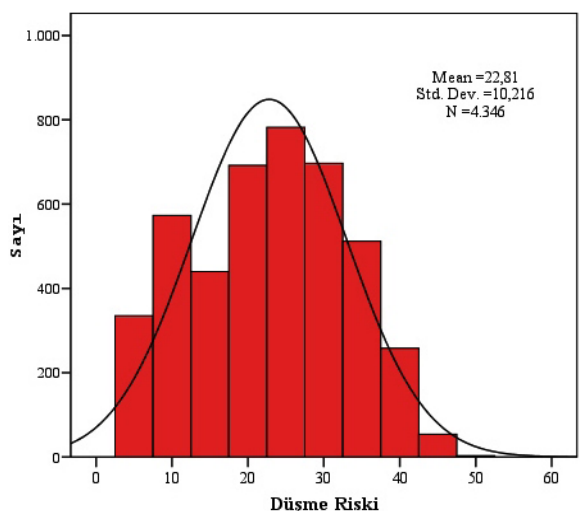


Table 2. Harizmi risk of falling scale (HRFS) risk stratification

HRFS	Score	n	%
Low risk	≤14	908	20,9
High risk	15≤	3438	79,1

The range of the HRFS point averages according to the demographic features of the patients and the features of their illnesses show that: The HRFS points average of patients aged 11 and older are lower in a statically meaningful sense, the male children's HRFS points are statistically higher than female children, the child patient's HRFS points average admitted in ER and intensive care are statistically higher than child patients admitted in other wards, the HRFS points average of patients admitted with invasive attempts (37.2), cardio vascular and genitourinary illnesses are statically lower than other diagnostic groups, HRFS points average of patients with an ongoing illness at the time of diagnosis are statistically higher than the points average of patients without an additional illness (Table 3; $p<0,05$).

Table 3. Based on demographic and disease characteristics of the Harizmi risk of falling scale (HRFS) the distribution of the mean scores

	HĐRÖ			
Features	Ort	Ss	Anlamlılık	P
Age (years)			F=13,333	<0,001*
<1	23,88	9,55		
2-3	23,70	10,02		
4-6	22,40	10,19		
7-10	23,39	10,51		
11≤	20,88	10,58		
Gender			t=2,008	0,045**
Male	23,09	10,10		
Female	22,46	10,35		
Clinics			F=447,825	<0,001*
Intensive care	28,15	9,32		
Emergency unit	26,00	8,80		
Neurology	15,00	6,89		
Infection	14,36	8,52		
Hematology	13,24	3,48		
Others	11,58	6,98		
Diagnosis			F=72,163	<0,001*
Neurological diseases	29,60	9,17		
Hematologic diseases	19,90	8,73		
Gastrointestinal diseases	21,97	8,84		
Metabolic diseases	21,36	11,32		
Respiratory system diseases	24,96	8,59		
Infections diseases	23,24	8,37		
Cardiovascular system diseases	17,20	10,30		
Intoxication	20,10	9,42		
Genitourinary system diseases	16,40	10,45		
Invasive procedures	13,72	12,15		
Genetic diseases	27,94	10,32		

Accidents	26,82	8,45		
Additional diseases			t=10,649	<0,001*
No	22,31	10,03		
Yes	28,16	10,65		

*= $p<0,001$,**= $p<0,05$; ANOVA test, **Independent sample t test**

The research on the demographic and the illness characteristics revealed that 9 of the 4346 patients presented an incident of falling. 5 of the patients falling (%55.6) were above the age of 5, 8 were (%88,9) male, 9 had (%100) no additional illness (Table 4).

Table 4. Demographic and disease characteristics of patients in the event of falling (n=9)

Features	n	%	Median	Min.-Max.
Age (years)	9		5	1-15
<5	4	44,4		
≥5	5	55,6		
Gender				
Male	8	88,9		
Female	1	11,1		
Clinics				
Intensive care	1	11,1		
Nutrition & metabolism	3	33,3		
Cardiology	2	22,2		
Neurology	1	11,1		
Gastroenterology	1	11,1		
Nephrology	1	11,1		

The risk factor and the type of falling of the cases reveal that; 6 of the 9 falling cases (%66,7) are in the low risk group, while (%33,3) of the cases are in the high risk group. 7 (%77.8) of the falling patients fell on a week day, 6 (%66.6) fell between the hours of 06:00-12:00, 5 (%55,5) of the falling patients were given an anticonvulsant within the 24 hours prior to falling and 2 (%22.2) of the falling patients developed a complication caused by the falling. (Table 5).

Table 5. The risks of falls and fall characteristics of the patients in the event of falling

Features	n	%	Median	Min.-Max.
HRFS	9	-	14	5-35
≤14	6	66,7		
≥15	3	33,3		
Fall time				
Hours				
6-10	3	33,3		
10-12	3	33,3		
12-18	2	22,2		
18-24	1	11,1		
Week				
Weekdays	7	77,8		
Weekend	2	22,2		

On the day of admission				
<1 week	4	44,4		
1 - 4 weeks after	3	33,3		
≥ 4 weeks	2	22,2		
Complication				
Yes (nicks, scratches)	2	22,2		
No	7	77,8		
Falling location				
Patient room	7	77,8		
Corridor	2	22,2		
Drugs given in 24 hours				
Anticonvulsant	5	55,5		
Antibiotic	2	22,2		
Other drugs	2	22,2		

DISCUSSION

The risk factors and falling rates need to be defined in order to be able to take necessary precautions against falling in hospitals. A research on the literature shows that Cooper and Nolt (2007) indicated the annual rate of falling for 1000 days of hospitalization as 0.8. Another study indicates the 3 year average of falling for 1000 days of hospitalization as 1.0-0.56 (Hill-Rodriguez et al, 2008). A study in our country revealed the rate of falling as %0.7 (Demir et al, 2011). While our study indicated a lower rate (%2) than the literature indicates.

A discussion was held in the light of the research regarding the definition of the risk factors of falling in child patients.

6.1. Hospital Environment: Children in hospitals mostly fall; when getting out of bed, going to bed, while wandering around, going to the bathroom, while in someone's arms, walking on wet surfaces or on equipment or when being pushed by someone. (Razmus et al, 2006; Cooper and Nolt, 2007). In their study Razmus and friends. (2006) reported that when compared to the bathroom most falling incidents take place in the hospital room. In their study Demir and friends. (2011) reported that most children fell while turning from one side to the other in their beds. Another study similar to ours revealed that %32.4 of the cases of falling occurred in the patient's room. (Kissinger and Marin, 2010).

6.2. Age & Gender: Age is an important factor in falling. Younger patients are under greater risk of falling. (Cooper and Nolt, 2007; Hill-Rodriguez et al, 2008). Research indicates that falling is more frequently seen in patients under the age of three. (Cooper and Nolt, 2007; Hill-Rodriguez et al, 2008). Our study also revealed that the points average taken from the falling risk scale increased as the age decreased. However as a contrast to the literature patients aged over five presented a higher incidence of falling. This may be explained by the changes in cognitive and motor skills of children closing to puberty. Also the incidence of male children is higher than female children, sup-

porting the literature. (Dedoukou et al, 2004; Cooper and Nolt, 2007).

6.3. Time of Falling: There is very little research regarding the time of falling. A study similar to ours indicated that the incident of falling mostly occurs before noon time. (McGreevey, 2005).

6.4. Presence of Family: It is important for the nurses that the child patient has a family with him to keep an eye on him. However research similar to ours shows that most cases of falling occur when the family is present. This is because the presence of the family makes the child feel more independent and they wander around, climb over objects and run freely. This is thought to form a basis for falling. (Levene and Bonfield, 1991; Cooper and Nolt, 2007; Razmus et al, 2006; Kissinger and Marin, 2010; Demiret al, 2011).

6.5. Patient Features: Patients with deteriorated movement, unstable mental status, male gender, prolonged stay in hospital and a history of falling are under greater risk of falling. (Dedoukou et al, 2004; Graf, 2005; Razmus et al, 2006; Cooper and Nolt, 2007). It is also known that the medication used by the patient is a factor influencing falling. The most influential medication are sedatives such as anticonvulsants and painkillers. (Kissinger and Marin, 2010). A research revealed that in %68 of 71 cases of falling %29.6 of the patients were given opioids, and %12.7 were given anticonvulsants in the last 12-24 hours prior to the incident of falling. (Kissinger and Marin, 2010). Our study also revealed that 555.5 of the falling patients were given an anticonvulsant 24 hours prior to the incident of falling at the most.

Our study supports the fact in the literature that most cases of falling occur within the first week of admission to hospital. (Graf, 2004; McGreevey, 2005; Razmus et al, 2006; Kissinger and Marin, 2010). As supported by our study cases of falling generally result in minor injuries such as scratches, cuts and bruises. (Cooper and Nolt, 2007; Kissinger and Marin, 2010).

CONCLUSION

Falling children is an important indicator of healthcare. Falling risk factors need to be identified in order to prevent children from falling. The findings of our study concur with the literature in the aspects of gender, diagnosis and admitting ward, medication used and time of falling. What is different from the literature is that the rate of falling found was lower than indicated in the literature. The findings attained from our study are in conformity with the literature regarding age, gender, diagnosis and the admitting ward. The fact that most of the falling patients are in the low risk group according to their scores in the HRFS may be explained by the lower precautions taken for such patients compared to high risk patients. A scaling with a larger number of samples may be suggested

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