

## Reviewing Patient Falls Following Implementation of the Fall Prevention Program

### *Düşme Önleme Programının Uygulanmasını Takiben Hasta Düşmelerinin İncelenmesi*

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### Öz

**Amaç:** Bu çalışma, bir üniversite hastanesinde düşme önleme programı sonrası ortaya çıkan hasta düşmelerinin incelenmesi amacıyla yapılmıştır.

**Yöntem:** Bu çalışma, retrospektif türden bir çalışma olup, Ankara'da bir vakıf üniversite hastanesinde gerçekleştirilmiştir. Araştırmanın örneklemini, bir üniversite hastanesinde düşen 103 hasta oluşturmuştur. Bu üniversite hastanesinde hasta düşmelerini önleme programı zaman içinde yeniden düzenlenmiştir. Araştırmada veri toplamak için "Hendrich II Düşme Risk Değerlendirme Formu, İtaki Düşme Ölçeği ve Hasta Düşmelerini İnceleme Formu" kullanılmıştır.

**Bulgular:** Çalışma sürecinde, hasta düşme oranı %0,16'dan %0,12'ye düşerken, düşme riski olan hastalar %25,3'ten %67,6'ya yükselmiştir. Hastaların %63,1'inde düşmenin hastaya ait faktörlerden kaynaklandığı belirlenmiştir. Düşme nedenlerinin ilk sıralarında hastaların yaşı, kullanılan riskli ilaçlar, denge sorunu, konfüzyon, baş dönmesi ve mobilizasyon sırasında yardım istememesi gibi durumlar düşme riskinin belirleyicisi olarak bulunmuştur.

**Sonuç:** Çalışmada, tüm risk etmenlerinin göz önüne alındığı düşmeyi önleme programları geliştirilebileceği belirlenmiştir. Bu çalışmanın sonuçlarını göz önünde bulundurarak fonksiyonel güç ve dengeyi iyileştirilmesi için düzenlemelerin yapılması, düşme önleme önlemleri hakkında yeterli bilgi sağlanması ve daha yakından izlenmesi önerilebilir. Ayrıca bu program, sağlık ekibinin yardımıyla, hastaları bu şekilde güçlendirerek düşmelerin azaltılmasına katkıda bulunan egzersizlere de odaklanmalıdır.

**Anahtar kelimeler:** Düşmeler, hemşirelik, hasta güvenliği, önleme ve kontrol, risk faktörleri

### Abstract

**Aim:** This study was conducted to investigate patient falls occurred after a fall prevention program implemented in a university hospital.

**Methods:** This is a retrospective study conducted to investigate patient falls that occurred in a foundation (private) university hospital located in Ankara. The sample consisted of patients (n:103) who fell from a height in a foundation university hospital in Turkey. The Fall Prevention program has been revised over time. Itaki Fall Risk Scale, Environmental Risk Assessment Form, Falling Patient Monitoring Form, Incident Report Form, Data Collection Form were used.

**Results:** While the rate of patient falls decreased from 0.16% to 0.12%, fall risk of the patients increased from 25.3% to 67.6%. The 63.1% of the patient falls were caused by intrinsic factors. Patients' age, risky medication(s), balance problem, confusion, fatigue, dizziness and failure to ask for help during mobilization were found as the determinants of the fall risk.

**Conclusion:** In the study, fall prevention programs can be improved considering all risk factors. Considering the results of this study; making adjustments for improving functional strength and balance, providing adequate information on fall prevention measures and closer monitoring can be suggested. With the help of health team, the program can further focus on the exercises, contributing to the reduction of falls by strengthening the patients in this way.

**Keywords:** Falls, nursing, patient safety, prevention and control, risk factors

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## Introduction

Falling is a major problem that can cause injury, disability and even death in individuals, leading to the development of additional complications by prolonging the hospital stay (Abreu, Mendes, Monteiro, Santos, 2012; Anderson, Dolansky, Damato, Jones, 2015; Callis, 2016; National Database of Nursing Quality Indicators, 2013). The incidence of patient falls in hospitals was found to range from 1 to 7 per 1000 bed days (Baek, Piao, Jin, Lee, 2013; Bergen, Stevens, Burns, 2016). More than 27.000 people of 65 years of age and older died due to falling, while 2.8 million elderly people were treated due to fall-related injuries in 2014 (Banu et al., 2018).

Several internal and external factors can lead to falls (Baek et al., 2013; Bergen et al., 2016; Callis, 2016; Calkins, Biddle, Biesan, 2012). Internal factors are of physiological origin, while external factors include risky medications and some environmental conditions (Carroll, Dykes, Hurley, 2010). The falls were also classified as expected and unexpected falls (Bergen et al., 2016).

Falls can be affected by many variables such as advanced age, gender, patients transferring without assistance, cognitive impairment; impaired vision, some medications, previous history of falling, incontinence, balance/gait deficit and some chronic diseases (Chen, Yu, Lee, Chung, Shang, Liu, 2014; Watson, Salmoni, Zecevic, 2018). Factors such as ineffective communication, lack of awareness of patient needs, working conditions and workload of nurses can affect patient falls (Watson et al., 2018).

While a significant part of patient falls are reported to be preventable (Hou et al. 2016), they are also considered to be one of the quality-of-care indicators of hospitals and nursing services (Bergen et al., 2016; Çalık, Aktaş, Bulut, Anahar, 2015; Huges, 2008). As falls are both a serious and growing problem and a preventable quality indicator, development of fall prevention programs has become a necessity. Fall prevention programs are usually multidimensional. These programs include patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, informatics and monitoring fall rates and data (Spoelstra, Given, Given, 2012).

While the positive results are being achieved on the efficacy of the fall prevention programs, these programs do not reduce the patient falls at the desired level and its effect is not long-lasting and intensity, and duration of interventions are not clear (Neiman, Rannie, Thrasher, Terry, Kahn, 2011; Spoelstra et al., 2012). Effectiveness of multicomponent interventions in long-term care settings is also less established (Resnick, Galik, Gruber-Baldini, Zimmerman, 2012). Examination of the falls occurring after these programs is of great importance in terms of determining risk factors and failures in the program and the improvement of the fall prevention programs.

## Method

**Aim:** This study was conducted to examine the reason for the patient falls occurred after implementation of the fall prevention program in a university hospital.

**Design:** This is a retrospective study conducted to examine the etiology of the patient falls that occurred after a fall prevention program.

**Setting and sample:** The study was conducted in a foundation university hospital in Ankara, Turkey. The hospital which has single or double-patient rooms, has a total bed capacity of 339 and 278 nurses were employed.

The sample of the study consisted of patients who fell from a height between January 2010 and December 2015 in a university hospital. The patient fall prevention program in this university hospital has been revised over time, although it has been implemented since 2007. All the forms used for falls have been included in patient files since 2010, the list of patients falling between in 2010 and 2015 were identified from quality statistics and a total of 143 patients fell from a height but 103 (72%) patients' forms were available in their files. Twenty patients with missing data were excluded from the study.

### Patient fall prevention program

This program includes 5 subjects:

- Nursing Training Program: In-service training is given to each new nurse about patient fall prevention program in consideration of patient safety and culture. This program is also explained with individual trainings in clinics.
- Risk assessment (individual and environmental): The daily risk of falling for each patient coming to the hospital is evaluated within the fall prevention program. Itaki Fall Risk Scale is used to assess fall risk. In the

context of the patient fall prevention program, a form has been created to check the environmental risk factors and precautions. For patients at risk of falling, this form is filled in by every nurse and a green arm band and a four-leaf clover label are used to draw attention to the risk.

- Implementation of the precautions: Necessary arrangements and precautions (transferring patients to the nearest room of the nursing station, more frequent monitoring, selecting proper shoe and clothing, providing glasses and hearing devices, management medication, teaching safe transferring and moving and other environmental precautions) have been performed for each patient. Patients who have a high risk of falls are accompanied by a relatives or caregivers with nurse's assessment and physician's consent.
- Patient and formal or informal caregiver teaching: Training of patients and their relatives is performed according to risk factors. Also a brochure including fall prevention measures for the patients is prepared. Every patient who is at risk of falling and patient's relatives are informed by the nurses using this brochure and also nurses demonstrate use of a call bell, safe moving or standing up.
- Monitoring fall: If the fall incident occurs, the very detailed incident report form is prepared by patients, relatives/caregivers and nurses and the patient monitoring form (monitoring vital signs, measurement, interventions, consultation and additional precautions) is filled out. The falls are recorded monthly on the patient quality forms for statistics.

**Data Collection Tools:** Itaki Fall Risk Scale: It is a scale developed by the Ministry of Health of the Republic of Turkey. This scale consisting of 19 items including 11 minor and 8 major risk factors, is used to determine the risk of falls in adults. A total score of 5 or more indicates a high risk of falling. A "Four-leafed Clover" figure is placed on the doors of the patient's rooms in order to identify high-risk patients and take necessary precautions (Ministry of Health, 2011).

**Environmental Assessment Form:** It was developed for the fall prevention program. Risk factors include mobility tools, footwear, bed railings, call bell, lighting, thresholds, clutter etc. (Letts et al., 2010; Pynoos, Steinman, Nguyen, 2010).

**Incident Report Form:** The form for each falling patient include statements of the patients, patients' relatives/informal caregivers and nurses, unit; falling time and shifts and effectiveness of the situation of the patients.

**Monitoring Form for Falling Patients:** This form includes patient information, vital signs, neurological assessment, physical examination, laboratory tests, examinations and interventions and affecting situations. The form is filled in by the nurse and sent to nursing management.

**Data Collection Form:** This form was developed based on the clinical form to determine the causes of patient falls and related literature by researchers (Chen et al. 2014; Hitcho et al., 2004; Huges, 2008; Rubenstein, 2006; Yeşilbalcan and Karadakovan, 2005). This form contains 28 questions including 7 questions to determine the descriptive characteristics (age, gender, diagnosis, chronic diseases, medication(s), mental and physical situations, other questions including extrinsic and intrinsic factors. Intrinsic factors include syncope, confusion, arrhythmia, seizure, orthostatic hypotension, stroke etc. and extrinsic factors include wetness of the floor, barriers, clutter, the lack of sight-hearing devices, bed rails or locks etc. (Calkins, Biddle, Biesan, 2012; Hou et al., 2016; Morse, 2008).

**Data Collection:** The data obtained from all forms in the patient file were recorded and Incident Report Form and Monitoring Form for Falling Patients were requested from nursing management. Itaki Fall Risk Scale scores were also recorded on this form. In addition, explanation of the patient, caregivers and nurses about falling was obtained from fall reports.

**Data Analysis:** Data were transferred into Version 17.0 (SPSS for Windows, Chicago, Ill., USA, September 2012; License Number: 1093910). The scores of the 21 patients evaluated with the Hendrich II Fall Risk Assessment Form were converted to Itaki Fall Scale scores to analyse. According to normality testing skewness, and kurtosis values were 0.23, and -0.23, respectively. Descriptive statistics (percent, mean, standard deviation) and t test were used. To determine the effects of descriptive characteristics on the fall risk one model was developed by using backward multivariate linear regression analysis.

**Ethical Considerations:** Necessary approvals were obtained from the "The University Institutional Review Board (94603339/050.01.08.01-1022 date:04.08.2015) and The Hospital Management.

**Limitations of the Study:** The fact that falling forms were not filled in for each patient has limited the number of samples.

## Results

**Table 1. Patient characteristics (N=103)**

Variable	Number (%)
<b>Gender</b>	
Female	42 (40.8)
Male	61 (59.2)
<b>Age (years)</b>	
<65	47 (45.6)
≥65	56 (54.4)
<b>Units</b>	
Inpatients/wards	94 (91.2)
ICUs	9 (8.8)
<b>Diagnosis</b>	
Cancer/malignancies	27 (26.2)
GU system (ARF, CRF, TUR)	22 (21.4)
Cardiovascular (CAD, Heart Failure, Stents, Arrhythmia)	13 (12.6)
Neurology-Brain Surgery (Cerebrovascular disease, Hemorrhage, Adenoma, Subarachnoid hemorrhage, laminectomy)	11 (10.7)
GI (Chronic liver failure, Gastrointestinal bleeding, ileostomy, coledocojejenostomy)	9 (8.7)
Respiratory System	7 (6.8)
Transplantation	4 (3.9)
Other (Endocrine (3), hypervolemia, Hematology(2), General Condition Disorder, orthopedics (2), Obstetrics/gynaecology)	10 (9.7)
<b>Chronic Disease</b>	
Yes	88 (85.4)
No	15 (14.6)

A total of 103 adult patients were included in the study. 59.2% of the patients were male. The mean age of the patients was 64.12±16.79 years, while 54.4% of them were in the group of 65 years and over, and 91.2% of them were inpatients. While 85.4% of them had a chronic disease; 26.2% of them had a malignant disease (Table 1).

**Table 2. Fall-related characteristics**

Features	Number (%)
<b>Risk status for fall(n=98)*</b>	
Low risk	20 (19.4)
High risk	83 (80.6)
<b>Falling Factors</b>	
Intrinsic	65 (63.1)
Extrinsic	38 (36.9)
<b>Mean Risk Factors Number: 3.77±1.9 (min:0, mak:9)</b>	
<b>Itaki Fall Risk Scale Score (Before fall) 8.05±4.04</b>	
<b>Itaki Fall Risk Scale Score (After fall) 13.36±4.82</b>	
<b>Cause of fall</b>	
Hypotension/dizziness	27 (26.2)
Loss of balance	25 (24.3)
Confusion/disorder of orientation	14 (13.6)
Foot shift	13 (12.6)
Do not get up without warning	11 (10.7)
Weakness	7 (6.8)
Other (lethargy, effect of anesthesia, hypertension, obesity, Ventricular tachycardia, hypoglycaemia, unknown)	6 (5.8)
<b>Falling situation in last 3 months</b>	
Yes	17 (16.5)
No	86 (83.5)
<b>Falling time</b>	
Morning (8-16 hr)	24 (23.3)
Evening (16-24 hr)	31 (30.1)
Night (24-08 hr)	48 (46.6)
<b>Falling place</b>	
Patient's room	54 (52.4)
Bath	36 (35)
Bed	10 (9.7)
Hall	3 (2.9)
<b>Companion**/ patient's relatives</b>	
Present	51 (49.5)
Absent	52 (50.5)
<b>Companion's statement (n=51)</b>	
Failure to help the patient by accompanying family members/relatives/friends	16 (31.4)
The patient was not accompanied by family members/relatives/friends or sleeping	16 (31.4)
Unassisted movement and getting out of bed	12 (23.5)
Patient was alone in the toilet	7 (13.7)
<b>Patient's statement (n=100)</b>	
Dizziness	35 (34.0)
Disorientation	25 (24.3)
Loss of balance/ stumbli	22 (21.3)
Foot shift	13 (12.6)
Weakness	5 (4.8)
<b>Effected from falling/ injuries</b>	
Yes	53 (51.5)
No	50 (48.5)

\* Values were calculated by using Hendrich II and Itaki risk scale scores

\*\*Relatives or caregivers escorting the patient in the hospital

The mean number of the medications were  $8.9 \pm 3.9$  and risky medications for fall were taken by 59.2% of the patients (Table 2).

Itaki Fall Risk Scale Score was measured as  $8.05 \pm 4.04$  before the fall and  $13.36 \pm 4.82$  after the fall. It was determined that the mean number of risk factors was  $3.77 \pm 1.9$ . It was determined that 80.6% of the patients had a high risk of falling and in 63.1% of them falls were caused by intrinsic factors (Table 2). Although not included in the tables, internal, and external factors, risk level and injury status were compared with demographic and other variables without any statistically significant relationship.

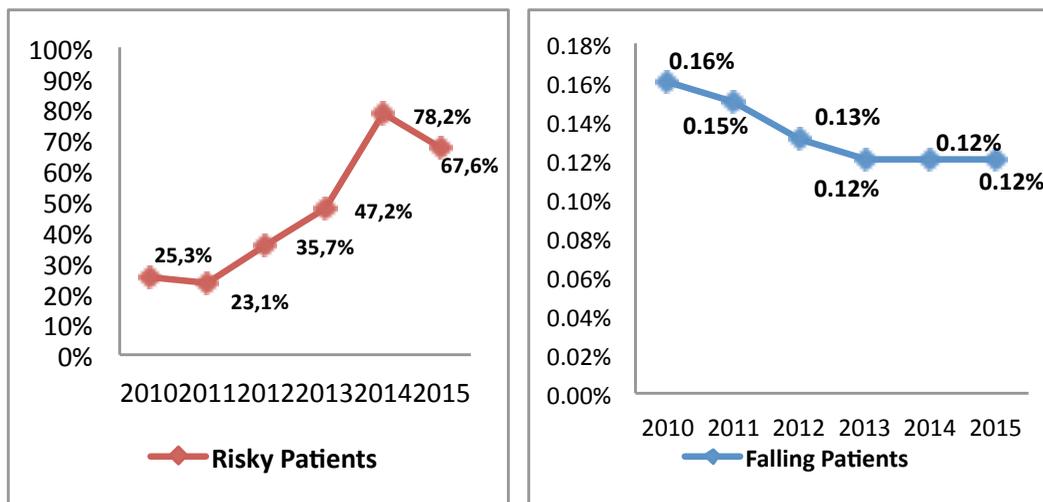
Primary causes of falls include hypotension, loss of balance, and confusion/disorientation. While, 52.4% of the patients fell in the patient room and 35% in bath (Table 2).

While almost half of the patients had relatives/caregivers (49.5%), accompanying them, the patients did not ask for their help. Although not shown in the table, 20.4% of the patients explained that they wanted to go to the toilet without disturbing the companion or the nurse, or they fell while left alone in the toilet. The 51.5% of the patients were affected by the fall and as a result of the examinations and consultations made, 12.6% of the patients were transferred to intensive care (Table 2).

**Table 3. Fall risk factors**

Risk	n (%)
Treatment delay	22 (21.4)
Using a new drug	25 (24.3)
Using medications leading to fall	61 (59.2)
Medications that create risk for falling	
Antiepileptic	10 (9.7)
Antihypertensive	36 (35)
Diuretic	19 (18.4)
Laxatives	10 (9.7)
Benzodiazepine	11 (10.7)
Having risk fall-related disease	47 (45.6)
Electrolyte imbalance	45 (43.7)
Fatigue	50 (48.5)
Visual deficit	4 (3.9)
Using hearing aid	18 (17.5)
Need to use mobility devices	45 (43.7)
Confusion/ Impaired consciousness	9 (8.7)
Orientation disorder	12 (11.7)
Diarrhea	3 (2.9)
Constipation	7 (6.8)

Risky medications used included; antihypertensives (35%), diuretics (18.4%), benzodiazepines (10.7%), laxatives (9.7%), antiepileptics (9.7%) and 2 or more medications (20.4%) that could lead to falls (Table 3).



**Graphic 1.** Fall rates and risky patients between 2010 and 2015

The rate of the falling patients were decreased from 0.16% to 0.12%, despite the number of patients who have falling risk increase from 25.3% to 67.6% between 2010 and 2015 but remained at the same level between 2013 and 2015 (Graphic 1).

**Table 4.** Itaki fall risk scale score according to descriptive characteristics (N=103)

Variables	n	Scale Score	
		Mean (SD)	Test, p value
<b>Gender</b>			
Male	61	7.11 (3.82)	t=1.983
Female	42	8.70(4.10)	p=.050
<b>Age</b>			
<65	47	6.57 (3.90)	t=-3.605
≥65	56	9.30 (3.76)	p<.001
<b>Risky Medication</b>			
Yes	61	8.93 (3.91)	t=2.731
No	42	6.78 (3.92)	p=.007
<b>Balance problem</b>			
Yes	46	9.58(4.09)	t=3.647
No	57	6.82(3.58)	p<.001
<b>Fatigue</b>			
Yes	50	8.84 (4.32)	t=1.930
No	53	7.32 (3.65)	p=.056
<b>Dizziness</b>			
Yes	33	6.48 (3.83)	t=-2.799
No	70	8.80(3.95)	p=.006
<b>Previous incident of fall</b>			
Yes	17	13.24(4.99)	t=-.115
No	86	13.38(4.81)	p=.090

The factors, which were found to have statistically significant on falls, were assessed with multivariate linear regression analysis. The risk factors associated with falls were ageing, using risky medication(s), balance problem, fatigue, dizziness, confusion and failure to ask for help during mobilization were found as the determinants of the fall risk (Table 4).

**Table 5. Multiple linear regression analysis of the independent variables (N=103)**

Model	B	SE	$\beta$	t	p
Constant	4.412	1.549	.281	2.849	.005
Age	.068	.021	-.164	3.163	.002
Risky Medication <sup>a</sup>	-1.346	.706	-.287	-1.907	.059
Balance Problem <sup>b</sup>	-2.324	.692	.194	-3.358	.001
Fatigue <sup>c</sup>	1.676	.749	.281	2.239	.027
Dizziness <sup>d</sup>	4.412	1.549		2.849	.005

Model:  $R = .552, R^2 = .30, F = 10.741, p < .001$ .

Note: Dependent variable: ItakiFall score

<sup>a</sup> Risky Medication; (No=1; Yes=0); <sup>b</sup> Balance Problem (No=1, Yes=0); <sup>c</sup> Fatigue (No=1, Yes=0); <sup>d</sup> Dizziness (No=1, Yes=0);

This model explains 30% of the variance in Itaki Fall Risk Scale Score, which is statistically significant at  $\alpha = .05$ ,  $R^2 = .30$ ,  $F(9, 93) = 8.71$ ,  $p < .001$ . The model showed that fall risk increased with aging,  $\beta = .28$ ,  $t = 3.163$ ,  $p < .002$ , with the presence of a concomitant balance problem,  $\beta = .28$ ,  $t = 3.358$ ,  $p = .001$ , fatigue  $\beta = .19$ ,  $t = 2.239$ ,  $p = .027$ , dizziness,  $\beta = .28$ ,  $t = 2.849$ ,  $p = .005$ , confusion,  $\beta = .18$ ,  $t = 2.173$ ,  $p = .032$  and failure to ask for help during mobilization,  $\beta = .22$ ,  $t = 2.593$ ,  $p = .011$ . A statistically significant relationship did not exist incident of falls and gender, constipation and fall history (Table 5).

## Discussion

Although implementation of the comprehensive fall prevention programs, falling is still a major problem for patient safety. In this study, the characteristics of the falling patients and the factors leading to the fall were examined despite patient falls prevention program. Despite the increase in the number of patients with this risk, the falling rates decreased over the years after the fall prevention program has been implemented (Graphic 1).

It was determined that the majority of the patients had a high risk of falling, the average risk factor being  $3.77 \pm 1.9$  (Table 2). In the study by Chen et al. (2014), there was a high risk of falling in almost all patients and the mean number of risk indicators was  $2.49 \pm 1.28$ . The fact that more than half of the patients had fallen due to intrinsic risk factors also supports this finding (Abreu et al., 2012; Hou et al., 2016). We found that patient risk score increased approximately 5 point after the falls (Table 2). This result suggests that nurses may have missed some of the factors in the assessment risk factors for falling patients. It is also a fact that although risk assessment tools for falls are comprehensive they do not include all risks. This may have limited the assessment of all risk factors like unexpected falls and can cause sentinel events. Although the majority of injuries were mild, intensive care, consultations and close monitoring are required for some patients. During the study, 62.7% of the patients did not suffer from injuries, 34.7% had minor, and 2.6% had major injuries (Tzeng and Yin, 2009).

When we compare the fall cases based on the demographic characteristics, results of this study are similar with literature. The fall rates vary according to the gender. Some studies have emphasized that women are at risk of falling, while others indicate that men are at higher risk (Çelik and Zingal, 2016; Tzeng and Yin, 2009). In our study, men were found to have a higher fall rate than women (Table 2)

In this study, age, balance problem, fatigue and dizziness were found as the determinants of the fall risk. While age is a non-modifiable risk factor, dizziness, balance problem or fatigue can be modifiable. Intrinsic factors and unexpected situations were the most common causes of falls in the studied patients (Table 4). In the literature, these have been emphasized as important factors leading to the fall (Abreu et al. 2012; Calkins et al., 2012; Hou et al., 2016; Morse, 2008).

Ageing is a significant risk factor for falls (Chen et al. 2014; Poh and Shorey, 2008; Tzeng, 2011; Yeşilbalkan and Karadakovan, 2005). According to Hong et al. (2015) older age was among the factors that were shown to increase fall risk. It has been stated that age greater than 65 is predictive of serious fall injury in hospitalized patients (Anderson et al. 2015). We found that ageing and balance problem are two important factors for fall risk (Table 5).

Dizziness, fatigue or balance problem can be caused by many factors such as nutritional problems, limitation in mobility, liquid and electrolyte imbalance, pain, medications, sleep problems or some diseases (European Renal Best Practice, 2014; Hong, Kim Jin, Piao, Lee, 2015). In a study, confusion was listed among the causes of fall (De Villiers and Kalula, 2015). Huey-Ming and Chang-Yi (2015) emphasized that the risk factors most strongly associated with falls were confusion and depression. Balance problem is also an important factor for patient falls (De Villiers and Kalula, 2015; Resnick et al., 2012). It is recommended that falls prevention programs focus on optimizing balance (Resnick et al. 2012). These results are similar with those of our study. On the other hand, in a study, older adults aged 60 to 70 did not acknowledge their risk of falling and were not motivated to exercise simply to help prevent falls (ERBP,2014). These results suggest that more focus should be placed on risk factors such as confusion, dizziness, balance in the fall prevention program.

While some medications such as antihypertensives, antidiabetics, antidepressant sedatives cause risk of falling, polypharmacy increases this risk more (Baek et al. 2013; Chen et al. 2014; O'Neil et al., 2018). In this study, Itaki Fall Risk Scale Score was found to be higher in patients who used risky medication(s) than those who did not use.

Close monitoring of patients is important in preventing falls. For patients with a high risk of falling, it may be advisable to be accompanied by a relative/caregiver. On the other hand, both patients and relatives/caregivers stated that the patients also wanted to go to the toilet without disturbing the relatives/caregivers or the nurses, but they fell while they were left alone in the toilet. When these feedback are taken into account, it is revealed that patients should be informed and supported with an approach appropriate to their cultural characteristics. In other studies, 38.2%-79.2% of the patients were not accompanied by anyone (Hitcho et al.,2004; Tzeng and Yin, 2009). These results suggest that the relatives/caregivers' awareness regarding prevention of falling is not sufficient and that they do not have sufficient opportunity to rest, and that the patients are not informed at the desired level related to the prevention of falls. It is also important to note that having a relative/caregiver by the side of the patient may also reduce the nurse's level of observation.

As an important finding half of the patients have been affected by falls. O'Neil and others (2018) found that similar result for one of the independent risk factor as needing an assistive device or person assistance to ambulate (Taylor and Hignett, 2016). It is stated that some extrinsic factors also may increase the risk of falling. Among them, the characteristics of the floor, non-presence of family members in the room, the color and characteristics of the floor, the change of the level, the inability to reach the call ring, the inappropriate use of handrails, inadequate lighting were listed (Taylor and Hignett, 2016; Tsai et al. 2007) . Although environmental preventive factors were considered part of the fall prevention program in this study, approximately one third of the falls were caused by environmental factors. It may be due to the limitation of cooperation with patients and their relatives because of the heavy workload of nurses.

These results have shown that multidirectional approach including barriers, cultural factors beyond individuals and environmental factors should be implemented. Needs of patients and caregivers also should be considered to prevent falling. Watson et al., (2018) emphasized that existing fall prevention strategies are not always effective and additional strategies are needed to prevent falls. The multifactor risk assessment and management program are considered to be a very effective and the most efficient initiative (Chen et al., 2014).

## Conclusion and Recommendations

In this study, the causes of the patient falls that occurred after a fall prevention program were examined. According to results of the study, there are many risky individual and environmental factors causing falls for patients. More comprehensive risk assessment, management of drug therapy, providing adequate information on fall prevention measures and consideration of cultural factors can be suggested. Exercise for strength and balance is the weakest part of the program. Development of an exercise program which the patient can perform voluntarily and safety may be suggested. Strengthening the program in this direction together with the health team can contribute to reducing the number of falls.

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