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Article

Evaluation of Risk Factors for Fall Incidence Based on Statistical Analysis

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Abstract: Falls are common among hospitalized patients, particularly affecting older adults. This study analyzed patients who experienced falls at Kangwon National University Hospital (KNUH) and classified them based on department and nursing shift hours. Data from adult patients admitted to KNUH between 2018 and 2023 who experienced falls were analyzed, focusing on demographics, medications, comorbidities, alcohol and smoking histories, and the Morse Fall Scale. The goal was to identify key variables contributing to falls in hospitalized patients. From 2018 to 2023, 336 internal medicine and 159 surgical patients experienced falls. Surgical patients had a longer length of stay (34.49 ± 47.52 vs. 24.63 ± 28.37 d, $p = 0.016$), and falls occurred more frequently during night shifts. Internal medicine patients had higher rates of neurological and respiratory conditions, while surgical patients had more cardiovascular and musculoskeletal issues. Patients who fell during night shifts were older, while those who fell during day shifts had a longer length of stay. The study found higher fall rates in internal medicine patients who had shorter lengths of stay and took fewer medications. Further research is needed on fall risk factors and prevention strategies.

Keywords: Fall; Risk-factor; hospital inpatient

1. Introduction

A fall refers to an involuntary loss of balance, resulting in a person stumbling or falling to the ground. According to a 2021 report by the World Health Organization, approximately 684,000 fatal falls occur annually, with the mortality rate from falls being highest among adults aged ≥ 60 years worldwide [1]. In South Korea, according to statistics from the Korea Disease Control and Prevention Agency, falls were most prevalent among the age groups 0–14 years and ≥ 75 years. In 2022, falls accounted for the highest proportion, 37.8%, of emergency room patients by mechanism of injury. Additionally, hospital admissions due to falls showed a continuous increase in the proportion of fall-related admissions among all hospitalizations, from 35.3% in 2013 to 49.7% in 2022 [2]. Falls are common among hospitalized patients. The fall rates per 1,000 patient-days range from 2.4 in large tertiary university hospitals to 9.1 in geriatric hospital departments.

Such falls are caused by a combination of factors, including impaired balance [3], muscle weakness [4], declining vision [5,6], medication use [7], and environmental hazards. This is a major factor contributing to health deterioration [8,9], including fractures, head injuries, and complications, and it can have particularly severe effects on older adults.

Although many studies have been conducted to effectively prevent and manage falls [10–12], further diverse research is needed to gain a clear understanding of the causes and mechanisms of falls.

In this study, adult inpatients at Kangwon National University Hospital (KNUH) who experienced falls were classified into 1) surgical and internal medicine groups and 2) nursing shift hours to examine the characteristics of patients who experienced falls in each group.

2. Materials and Methods

2.1. Study population

This study used a dataset collected from KNUH in South Korea. We utilized data from adult patients who were admitted between January 2018 and December 2023 and had a fall record available. The dataset was approved by the Institutional Review Board of KNUH (IRB No. KNUH-2023-12-007-001). Patients were categorized into internal medicine and surgical department groups (details of the departments can be found in Table 1). The time of fall occurrence was divided into day (7 a.m. to 3 p.m.), evening (3 p.m. to 11 p.m.), and night (11 p.m. to 7 a.m.) shifts based on nurses' working hours.

Table 1. Details of the departments for each group.

Groups	Departments
Internal Medicine	Cardiology
	Pulmonology
	Gastro enterology
	Nephrology
	Endocrinology
	Hemato-oncology
	Infectious diseases
	Allergy
	Rheumatology
	Neurology
	Rehabilitation
	Psychiatry
	Geriatrics
	Emergency
Surgery	General Surgery
	Orthopedic Surgery
	Neuro-Surgery
	Thoracic Surgery
	Otorhinolaryngology
	Plastic Surgery
	Urology
	Dental Surgery
	Obstetrics and Gynaecology
	Ophthalmology

2.2. Data Collection

To identify factors influencing falls, variables, such as demographics (age, sex, height, weight), main symptoms at admission, medications, comorbidities, alcohol history, smoking history, and Morse Fall Scale were analyzed for patients who experienced falls. Before 2020, all patients were assessed using the Morse Fall Scale upon admission to identify high-risk patients. Since 2020, patients aged ≥ 75 years have been considered a high-risk group for falls without separate evaluation, and fall prevention activities are immediately implemented.

2.3. Statistical Analysis

In this study, chi-square analysis was performed on categorical data, and t-test and ANOVA were performed on continuous data to examine group distribution differences. All analyses were conducted with a p-value of 0.05, and SPSS version 29.0 was used.

3. Results

From 2018 to 2023, 83,208 internal medicine patients and 79,297 surgical patients were hospitalized at KNUH. Among these, 336 internal medicine patients and 159 surgical patients experienced falls during their hospitalization, accounting for 0.4% and 0.2%, respectively.

The length of stay for surgical patients was longer at 34.49 ± 47.52 d than that at 24.63 ± 28.37 d for internal medicine patients (p-value = 0.016). Falls occurred at a higher rate during night shifts (11 p.m. to 7 a.m.) in both internal medicine (40.2%) and surgical patients (37.1%), making it the highest among the three shifts. Cardiovascular, musculoskeletal, and eye diseases were more prevalent in surgical patients, whereas neurological and respiratory diseases were more common in internal medicine patients. The number of medications taken was higher in surgical patients (9.20 ± 4.328) than that in internal medicine patients (6.83 ± 4.013). Among fall-risk medications, anticonvulsants were more commonly used in surgical patients, whereas diuretics were more frequently prescribed to internal medicine patients. Before the fall, narcotic analgesics were used for approximately 6.17 d in internal medicine patients and 3.77 d in surgical patients, indicating that falls occurred after a shorter duration of medication use in surgical patients. Additionally, a higher proportion of internal medicine patients than that of surgical patients could perform activities independently (Table 2).

Table 2. Patients classified by internal medicine and surgery.

Variables	Frequency or mean (\pm SD)	Internal medicine	Surgical	Chi-square or T (<i>p</i> -value)
Demographics				
Sex, male, n(%)				
Age, mean (\pm SD)	67.59 (\pm 14.752)	67.53 (\pm 14.352)	67.72 (\pm 15.610)	-0.130 (0.897)
Height, mean (\pm SD)	161.807 (\pm 9.349)	162.04 (\pm 9.261)	161.31 (\pm 9.545)	0.806 (0.421)
Weight, mean (\pm SD)	60.70 (\pm 12.184)	59.43 (\pm 11.317)	63.39 (\pm 13.488)	-3.411 (0.001)
BMI, mean (\pm SD)	23.14 (\pm 4.01)	22.61 (\pm 3.816)	24.27 (\pm 4.199)	-4.353 (< 0.001)
Length of stay, mean (\pm SD)	27.80 (\pm35.905)	24.63 (\pm28.367)	34.49 (\pm47.520)	-2.421 (0.016)
Time of falls				
Day shift (7 a.m. – 3 p.m.)	154 (31.1)	108 (32.1)	46 (28.9)	2.053 (0.358)
Evening shift (3 p.m. – 11 p.m.)	147 (29.7)	93 (27.7)	54 (34.0)	
Night shift (11 p.m. – 7 a.m.)	194 (39.2)	135 (40.2)	59 (37.1)	
Underlying disease, n (%)				
Cardiovascular disease	275 (55.6)	171 (50.9)	104 (65.4)	9.210 (0.002)
Neurological disease	80 (16.2)	63 (18.8)	17 (10.7)	5.172 (0.023)
Respiratory disease	82 (16.6)	67 (19.9)	15 (9.4)	8.620 (0.003)
Malignancy, n (%)				
In treatment	87 (17.6)	74 (22.0)	13 (8.2)	14.487 (0.001)
End of treatment	34 (6.9)	23 (6.8)	11 (6.9)	
No treatment	374 (75.6)	239 (71.1)	135 (84.9)	
Musculoskeletal disease, n (%)	89 (18.0)	48 (14.3)	41 (25.8)	9.680(0.002)
Digestive/urinary system disease, n (%)	236 (47.7)	165 (49.1)	71 (44.7)	0.858(0.354)
Eye disease (Cataract), n (%)	33 (6.7)	16 (4.8)	17 (10.7)	6.099 (0.014)
Alcohol, n (%)				
Present	102 (20.6)	65 (19.3)	37 (23.3)	9.823 (0.007)
Past	77 (15.6)	64 (19.0)	13 (8.2)	
Not applicable	316 (63.8)	207 (61.6)	109 (68.6)	

Smoking, n (%)				
Present	121 (24.4)	79 (23.5)	42 (26.4)	9.136 (0.010)
Past	87 (17.6)	71 (21.1)	16 (10.1)	
Not applicable	287 (58.0)	186 (55.4)	101 (63.5)	
Number of medications taken, mean (\pm SD)	7.56 (\pm4.252)	6.83 (\pm4.013)	9.20 (\pm4.328)	-5.606 (< 0.001)
Fall risk medications, n (%)				
Sleep sedative/psychotropic drug	43 (8.7)	28 (8.3)	15 (9.4)	0.165 (0.685)
Antidepressants	42 (8.5)	28 (8.3)	14 (8.8)	0.031 (0.860)
Anxiolytics	83 (16.8)	61 (18.2)	22 (13.8)	1.442 (0.230)
Antipsychotics	118 (23.8)	85 (25.3)	33 (20.8)	1.227 (0.268)
Narcotic analgesics	95 (19.2)	64 (19.0)	31 (19.5)	0.014 (0.906)
Anticonulsant	79 (16.0)	42 (12.5)	37 (23.3)	9.334 (0.002)
Diuretic	75 (15.2)	60 (17.9)	15 (9.4)	5.956 (0.015)
Laxative	123 (24.8)	81 (24.1)	42 (26.4)	0.308 (0.579)
Duration of fall-risk medication use up to the time of the fall occurrence, n(%)				
Sleep sedative/psychotropic drug	7.33 (\pm 12.727)	5.39 (\pm 5.659)	10.93 (\pm 20.069)	-1.375 (0.088)
Antidepressants	6.88 (\pm 6.444)	6.46 (\pm 5.997)	7.71 (\pm 7.426)	-0.588 (0.560)
Anxiolytics	7.14 (\pm 6.964)	6.08 (\pm 5.838)	10.09 (\pm 8.922)	-1.961 (0.060)
Antipsychotics	8.51 (\pm 8.731)	8.27 (\pm 7.921)	9.12 (\pm 10.653)	-0.473 (0.637)
Narcotic analgesics	5.39 (\pm 5.788)	6.17 (\pm 6.558)	3.77 (\pm 3.263)	2.379 (0.019)
Anticonulsant	11.38 (\pm 13.058)	11.33 (\pm 13.935)	11.43 (\pm 12.178)	-0.033 (0.973)
Diuretic	8.89 (\pm 12.081)	7.62 (\pm 9.655)	14.00 (\pm 18.540)	-1.290 (0.215)
Laxative	8.93 (\pm 9.928)	9.28 (\pm 10.228)	8.26 (\pm 9.407)	0.540 (0.590)
Mental status (Not included semi-coma), n (%)				
Alert	420 (84.8)	284 (84.5)	136 (85.5)	0.086 (0.770)
Confuse	61 (12.3)	42 (12.5)	19 (11.9)	0.030 (0.862)
Drowsy	8 (1.6)	6 (1.8)	2 (1.3)	0.189 (0.664)
Stupor	1 (0.2)	0 (0.0)	1 (0.6)	2.117 (0.146)
Activity status, n (%)				
Independent	181 (36.6)	146 (43.5)	35 (22.0)	21.388 (< 0.001)
Required help	266 (53.7)	156 (46.4)	110 (69.2)	22.447 (< 0.001)
Bed ridden status	43 (8.7)	30 (8.9)	13 (8.2)	0.077 (0.781)
Morse fall scale, mean (\pm SD)				
The time of admission	28.27 (\pm 17.451)	29.34 (\pm 16.585)	25.85 (\pm 19.096)	1.848 (0.066)
The time of fall occurrence	54.49 (\pm 18.147)	53.85 (\pm 18.229)	55.85 (\pm 17.954)	-1.144 (0.253)
Use of the restraint band, n (%)				
Yes	14 (2.8)	11 (3.3)	3 (1.9)	
No	481 (97.2)	325 (96.7)	156 (98.1)	0.755 (0.385)

When examining the characteristics based on nursing shifts, patients who experienced falls during night shifts were found to be older than those who fell during day or evening shifts. Furthermore, patients who fell during day shifts had a longer length of stay than those who fell during evening or night shifts. Among fall-risk medications, laxative use was more prevalent during evening shifts. The duration of narcotic analgesic use before a fall was shorter during evening shifts than that during day or night shifts. Similarly, diuretics were administered for a shorter period before a fall during day shifts than that during evening or night shifts (Table 3).

Table 3. Patients classified by nurses' working time.

Variables	Frequency or mean (\pm SD)	Day shift (7 a.m. – 3 p.m.)	Evening shift (3 p.m. ~ 11 p.m.)	Night shift (11 p.m. – 7 a.m.)	Chi-square or T (<i>p</i> -value)
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Demographics					
Sex, male, n (%)					
Age, mean (\pm SD)	67.59 (\pm 14.752)	65.58 (\pm 15.029)	65.79 (\pm 14.908)	70.56 (\pm 13.976)	6.597 (0.001)
Height, mean (\pm SD)	161.807 (\pm 9.349)	162.00 (\pm 9.260)	161.52 (\pm 9.079)	161.87 (\pm 9.658)	0.107 (0.899)
Weight, mean (\pm SD)	60.70 (\pm 12.184)	60.83 (\pm 12.072)	61.22 (\pm 13.072)	60.21 (\pm 11.607)	0.297 (0.743)
BMI, mean (\pm SD)	23.14 (\pm 4.010)	23.16 (\pm 4.072)	23.35 (\pm 4.049)	22.97 (\pm 3.952)	0.371 (0.690)
Length of stay, mean (\pm SD)	27.80 (\pm35.905)	33.27 (\pm49.306)	27.92 (\pm28.496)	23.36 (\pm26.731)	3.299 (0.038)
Department					
Internal medicine	336 (67.9)	135 (69.6)	93 (63.3)	108 (70.1)	2.053 (0.358)
Surgery	159 (32.1)	59 (30.4)	54 (36.7)	46 (29.9)	
Underlying disease					
Cardiovascular disease	275 (55.6)	88 (57.1)	81 (55.1)	106 (54.6)	0.235 (0.889)
Neurological disease	80 (16.2)	19 (12.3)	24 (16.3)	37 (19.1)	2.878 (0.237)
Respiratory disease	82 (16.6)	24 (15.6)	18 (12.2)	40 (20.6)	4.398 (0.111)
Malignancy					
In treatment	87 (17.6)	37 (19.1)	24 (16.3)	26 (16.9)	4.072 (0.396)
End of treatment	34 (6.9)	17 (8.8)	11 (7.5)	6 (3.9)	
No treatment	374 (75.6)	140 (72.2)	112 (76.2)	122 (79.2)	
Musculoskeletal disease	89 (18.0)	26 (16.9)	26 (17.7)	37 (19.1)	0.291 (0.865)
Digestive/urinary system disease	236 (47.7)	76 (49.4)	65 (44.2)	95 (49.0)	1.008 (0.604)
Eye disease (Cataract)	33 (6.7)	20 (10.3)	4 (2.7)	9 (5.8)	7.982 (0.018)
Alcohol					
Present	102 (20.6)	34 (17.5)	37 (25.2)	31 (20.1)	6.711 (0.152)
Past	77 (15.6)	37 (19.1)	15 (10.2)	25 (16.2)	
Not applicable	316 (63.8)	123 (63.4)	95 (64.6)	98 (63.3)	
Smoking					
Present	121 (24.4)	36 (18.6)	44 (29.9)	41 (26.6)	7.652 (0.105)
Past	87 (17.6)	40 (20.6)	20 (13.6)	27 (17.5)	
Not applicable	287 (58.0)	118 (60.8)	83 (56.5)	86 (55.8)	
Number of medications taken	7.56 (\pm4.252)	7.60 (\pm4.075)	7.43 (\pm4.449)	7.62 (\pm4.261)	0.085 (0.918)
Fall risk medications					
Sleep sedative/psychotropic drug	43 (8.7)	12 (7.8)	12 (8.2)	19 (9.8)	0.506 (0.777)
Antidepressants	42 (8.5)	14 (7.2)	12 (8.2)	16 (10.4)	1.141 (0.565)
Anxiolytics	83 (16.8)	31 (16.0)	25 (17.0)	27 (17.5)	0.157 (0.925)
Antipsychotics	118 (23.8)	52 (26.8)	36 (24.5)	30 (19.5)	2.585 (0.275)
Narcotic analgesics	95 (19.2)	46 (23.7)	25 (17.0)	24 (15.6)	4.300 (0.116)
Anticonvulsant	79 (16.0)	33 (17.0)	29 (19.7)	17 (11.0)	4.496 (0.106)
Diuretic	75 (15.2)	24 (12.4)	22 (15.0)	29 (18.8)	2.792 (0.248)
Laxative	123 (24.8)	46 (23.7)	50 (34.0)	27 (17.5)	11.161 (0.004)
Duration of fall-risk medication use up to the time of the fall occurrence					
Sleep sedative/psychotropic drug	7.33 (\pm 12.727)	4.92 (\pm 5.195)	14.58 (\pm 21.483)	4.26 (\pm 5.526)	1.295 (0.295)
Antidepressants	6.88 (\pm 6.444)	5.69 (\pm 4.094)	7.33 (\pm 7.947)	7.86 (\pm 7.430)	0.452 (0.640)
Anxiolytics	7.14 (\pm 6.964)	6.96 (\pm 5.619)	6.48 (\pm 7.200)	7.84 (\pm 7.925)	0.272 (0.762)
Antipsychotics	8.51 (\pm 8.731)	6.90 (\pm 5.604)	10.14 (\pm 9.940)	8.31 (\pm 9.262)	1.153 (0.319)
Narcotic analgesics	5.39 (\pm 5.788)	7.25 (\pm 6.271)	3.44 (\pm 3.969)	5.48 (\pm 6.124)	2.764 (0.068)
Anticonvulsant	11.38 (\pm 13.058)	10.53 (\pm 11.912)	13.00 (\pm 13.792)	10.39 (\pm 13.210)	0.347 (0.708)
Diuretic	8.89 (\pm 12.081)	5.97 (\pm 4.508)	8.14 (\pm 8.351)	13.13 (\pm 18.739)	2.460 (0.093)
Laxative	8.93 (\pm 9.928)	8.48 (\pm 8.881)	8.78 (\pm 10.574)	9.37 (\pm 9.979)	0.077 (0.926)
Mental status (Not included semi-coma)					
Alert	420 (84.8)	159 (82.0)	128 (87.1)	133 (86.4)	2.102 (.350)
Confuse	61 (12.3)	30 (15.5)	14 (9.5)	17 (11.0)	3.072 (0.215)

Drowsy	8 (1.6)	2 (1.0)	4 (2.7)	2 (1.3)	1.644 (0.440)
Stupor	1 (0.2)	1 (0.5)	0 (0.0)	0 (0.0)	1.555 (0.460)
Activity status					
Independent	181 (36.6)	66 (34.0)	54 (36.7)	61 (39.6)	1.159 (0.560)
Required help	266 (53.7)	106 (54.6)	79 (53.7)	81 (52.6)	0.144 (0.931)
Bed ridden status	43 (8.7)	20 (10.3)	13 (8.8)	10 (6.5)	1.582 (0.453)
Morse fall scale					
The time of admission	28.27 (\pm 17.451)	28.33 (\pm 17.542)	27.28 (\pm 17.981)	28.93 (\pm 17.046)	0.327 (0.721)
The time of fall occurrence	54.49 (\pm 18.147)	51.27 (\pm 17.524)	53.32 (\pm 16.808)	57.91 (\pm 19.089)	6.286 (0.002)
Use of the restraint band					
Yes	14 (2.8)	5 (2.6)	5 (3.4)	4 (2.6)	
No	481 (97.2)	189 (97.4)	142 (96.6)	150 (97.4)	0.250 (0.883)

4. Discussion

Falls are common among patients in hospitals. Around 30% of falls result in injuries, such as fractures, head injuries, and soft tissue damage, which can disrupt rehabilitation and contribute to comorbidities [13]. Falls also lead to longer hospital stays and increased discharge rates to long-term care facilities. The financial cost of falls affects both patients and hospitals. Falls may also cause anxiety or guilt among healthcare providers and lead to complaints or legal action from families [14].

This study aimed to examine the characteristics of adult patients aged 18 and older who experienced falls at KNUH over a 6-year period from January 2018 to December 2023. The total number of patients who experienced falls was 336 out of 83,208 internal medicine patients and 159 out of 79,297 surgical patients, representing 0.4% and 0.2%, respectively.

According to a study conducted in South Korea, the fall incidence rate among patients aged ≥ 15 years in a tertiary general hospital over 1 year was reported to be 0.19%, equivalent to 1.9 falls per 1,000 hospitalized patients [15]. In the United States, the large academic hospital fall rate was 3.1 falls per 1,000 patient-days [16]. An evaluation of 6,100 units in 1,263 US hospitals over 27 months indicated a fall rate of 3.56 per 1,000 bed days, with 26.1% of falls resulting in injury [17]. This study demonstrated a fall incidence rate similar to that shown in previous domestic studies.

In patients who experienced falls, surgical patients had a longer length of stay than internal medicine patients. In both groups, the incidence rate was higher during night shifts.

One study found that the occurrence of falls varied significantly by nursing shifts (day, evening, and night) across departments. During night shifts, a greater proportion of falls occurred in the medical and surgical departments than that in the geriatric department [18]. Another study showed that the incidence of falls was the highest in the morning shift, followed by that in the night shift (24:00 to 08:00 h), and was the lowest during the evening shift (16:00 to 24:00 h). The occurrence of falls in the evening and night shifts increased from 39% in 2007 to 57% in 2008 and 64% in 2009 [19].

Among the patients who experienced falls, cardiovascular disease, musculoskeletal disease, and eye disease were more prevalent in surgical patients. In contrast, neurological and respiratory diseases were more common in internal medicine patients. A domestic study showed that among the underlying conditions of patients who experienced falls, malignant neoplasms were the most common, affecting 192 patients (46.1%), followed by digestive and cardiovascular diseases [20]. Although it was not a study analyzing each department, one study that examined comorbidities among 1,033 patients who experienced falls found that hypertension (73.7%), diabetes mellitus (36.3%), and congestive heart failure (23.6%) were the most commonly associated conditions [21].

Regarding medications, the average number of medications taken was higher in the surgical group (9.20 ± 4.328) than that in the internal medicine group (6.83 ± 4.013). Among fall-risk medications, the use of anticonvulsants was higher in the surgical group than that in the internal medicine group, while diuretics were more commonly administered in the internal medicine group. The duration of narcotic analgesic use before the fall was approximately 6.17 d in the internal medicine group and 3.77 d in the surgical group, suggesting a shorter duration of medication use in the surgical group.

One study found that the medications taken by the group that experienced falls were as follows: narcotics (38.0%), antihypertensives (33.6%), bowel softeners (21.3%), and diuretics (19.7%) [22]. Another study demonstrated that medication exposure 24 h before the falls significantly increased the risk of inpatient falls in the four medication groups: benzodiazepine (odds ratio [OR] = 2.63, 95% confidence interval [CI] $\frac{1}{4}$ =1.55–4.46), zolpidem (OR=2.38, 95% CI = 1.04–5.43), narcotics (OR= 2.13, 95% CI =1.16–3.94), and antihistamines (OR= 3.00, 95%CI =1.19–7.56) [23].

When examining the characteristics based on nurses' working hours, it was found that patients who experienced falls during night shifts were older than those who fell during day or evening shifts. Additionally, patients who experienced falls during day shifts had a longer length of stay than those who fell during evening or night shifts. Marcin et al. reported that falls occurred most frequently between 24:00 and 6:00 and were more prevalent in female patients than that in male patients [24]. Another study showed that fall occurrence was higher during the night shift (46%) than that during either the morning (30%) or afternoon (24%) shifts [25].

This study examined the various characteristics of adult patients who experienced falls over a 6-year period; however, it had the following limitations.

First, we used data from just one hospital, resulting in a small study population.

Second, this study was designed as a cross-sectional study targeting patients who experienced falls over a 6-year period. Therefore, to investigate the correlation with falls, future comparative studies with a control group will be necessary. Nonetheless, the strength of this study lies in its analysis of hospitalized patients, taking into account various variables that influence falls.

5. Conclusions

Falls are closely related to patient safety issues. In this study, we examined the characteristics of patients who experienced falls, categorizing them by internal medicine and surgical departments, as well as by nursing shift hours. The incidence of falls was higher in the internal medicine group, with a shorter length of stay and fewer medications than the surgical group. Patients who experienced falls during night shifts were older than those who fell during day or evening shifts. Additionally, those who fell during day shifts had a longer length of stay than those who fell during other shifts. Although we examined the characteristics of high-risk medications for falls, no significant differences were observed. Falls are preventable medical incidents, and further research is needed to explore the characteristics, risk factors, and fall assessments.

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