A Five-Year Evaluation of Patient Falls and Cost Analysis: Acıbadem Healthcare Group Example

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ABSTRACT---
Purpose: This study was conducted to examine patient falls and the costs associated with falls in a private group hospital in the last five years.

Materials and Methods: This is a retrospective study. Data was obtained by examining 637 patient falls in 16 hospitals affiliated with Acıbadem Health Group between 2018 and 2022. Data were collected by examining fall data transmitted through the incident reporting system and pricing department data.

Results: A total of 637 patient falls occurred between 2018 and 2022, and it was determined that 0.38% of the patients evaluated for fall risk had a fall. 48.8% of the patients who fell were patients over the age of 65, it was determined that 61% of the falls occurred during the evening shift or on holidays, and the most patient falls occurred in inpatient services. While the total cost of falls was 83,404 TL in 2018, it is seen that it increased to 201,840 TL in 2022.

Conclusion: Serious falls in hospitals cause patients to stay in the hospital for longer periods of time and increase the cost of hospitalization. It is recommended to take and follow up the necessary precautions to prevent falls, which are of critical importance in terms of patient safety, effective use of healthcare system resources and manpower.

1. INTRODUCTION

According to the World Health Organization, a fall is an event that causes a person to accidentally land on the ground, floor, or other lower levels (1). Patient falls are an important patient safety problem in health care institutions around the world and are among the most common causes of secondary injuries in hospitals (2).

Personal and environmental factors may be effective in falls (3). Foreign hospital environment, gait and balance disorders, psycho-active drug use, physical and mental deficiencies such as dementia in the elderly, vision, hearing loss, decrease in muscle strength and reflexes, or diseases that affect the state of alertness or balance such as the treatment process, and the age of the patient, the risk of falling. It is among the personal risk factors that increase the risk of death (4). Environmental risk factors are; Wet floors, lack of support points near doorways, bathrooms, toilets and beds, insufficient lighting, the presence of unstable objects on the ground and in the environment, and the use of inappropriate shoes (5,6).

The classification of falls-related injuries is made by the American Nurses Association in the National Database of Nursing Quality Indicators as follows:;

- Group 1 injury, no injury (no injury or symptoms as a result of the examinations)
- Group 2 injuries: minor injuries (bruises, abrasions, cold application, situations requiring topical drug application),
- Group 3 injuries: moderately severe injuries (joint-muscle contractions, situations requiring sutures or fixation)
- Group 4 injuries: serious injuries (surgery, plaster cast application, situations requiring neurological examination, internal injuries such as rib fractures, etc., patients with problems such as coagulopathy and ingesting blood and blood products after 4 falls)
- Group 5 deaths (NDNQI 2012).

According to the literature, injuries occur in 15% to 50% of patients who fall, and 10% are reported to have major injuries such as fractures and lacerations, cuts, fractures, and internal bleeding (8, 9). Falls cause injuries and loss of function in the individual, affecting the timeliness, effectiveness and efficiency of care, prolonging the hospital stay, increasing the cost of treatment and decreasing the quality of life (6,10).

The cost of injury treatment for falls is estimated to be $1.08 million annually, or $15,000-$30,000 for each fall, and $32,000 in 2020 (11). In the study conducted by Zecevic et al. (2012), the additional cost due to falls was calculated as 31,000 Canadian dollars, and in the study conducted by Hirose et al. (2015) in two hospitals, the cost of serious falls was calculated as 5,387 dollars in one hospital and 3,636 dollars in the other (12,13). According to the results of a systematic review, the cost of falls in elderly patients requiring hospital healthcare services varies between 5,654 and 42,840 US dollars for each fall. The situation that causes the most direct costs is the fractures seen in elderly patients (14). Due to the increasing need for patient care in patients who fall, care costs and radiological imaging costs are also among the important cost topics. In addition to the additional costs incurred due to injury, lawsuits filed by patients and their relatives also create a significant economic burden for hospitals.

With fall prevention practices, falls can be reduced, if not prevented completely. Determining the risk factors that may cause falls and determining the risk of falling in the diagnostic phase that begins with the admission of the patient, taking necessary care interventions and protective measures will prevent the patient from being harmed and placing an additional financial and labor burden on the healthcare system (15,16).

2. METHOD

It was designed as a retrospective study. It covers falls in 5 different groups that occurred in 16 hospitals affiliated with Acıbadem Health Group (AHG) between January 2018 and December 2022.

Data were collected in two ways; 1- Sentinel Incident System Reports (to determine the number of falling patients) and 2- Patient Services Pricing Department (to identify the cost of treatment). Costs and costing given by the pricing department with a bottom-up approach are calculated from the patient perspective.

Data analysis: Two main ways were used to collect data to conduct analysis; 1- Sentinel Incident Notification System Reports (to determine the number of falling patients) and 2- Patient Services Pricing Department (to identify the cost of treatment).

Population: Falls that have occurred in 16 hospitals affiliated with Acıbadem Health Group since 2018 have been examined..

3. FINDINGS

Tablo.1. Yıllara Göre Düşme Gerçekleşme Durumu

	Number of patients assessed for fall risk	Number of Patients Falling	Falling Patient Rate
2018	106.595	123	0,10%
2019	189.251	133	0,07%
2020	110.929	128	0,10%
2021	202.615	120	0,05%
2022	213.822	132	0,06%

According to our research, the average fall rate throughout the institution was found to be 0.38%.

Table.2. Number of Inpatient Falls by Fall Groups

	2018		2019		2020		2021		2022		Toplam Düşme Sayısı	
	N	%	N	%	N	%	N	%	N	%	N	%
1.Grup Düşme	74	60,2%	69	51,9	71	55,0	51	42,5	57	43,2	322	50,6%
2.Grup Düşme	42	34,1%	55	41,4	52	40,3	63	52,5	69	52,3	281	44,1%
3.Grup Düşme	4	3,3%	3	2,3	3	2,3	4	3,3	5	3,8	19	3,0%
4.Grup Düşme	3	2,4%	6	4,5	3	2,3	2	1,7	1	0,8	15	2,3%
Ölüm	0	0%	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0%

When classified according to the American Nurses Association's fall grouping, 50.6% of all patients who fell at our institution experienced a Group 1 fall without injury. The rate of serious falls, including fractures and injuries requiring surgery and plaster cast, was found to be 2.3%.

Table.3. Data of Patients Falls by Years

	2018		2019		2020		2021		2022		Total Falls	
	N	%	N	%	N	%	N	%	N	%	N	%
Age												
0-18 years	6	5%	11	8%	7	5%	9	7%	12	9%	45	7%
19-65 years	53	43%	60	45%	60	47%	61	51%	47	36%	281	44,2%
65 years and above	64	52%	62	47%	62	48%	50	42%	73	55%	311	48,8%
Total	123	100%	133	100%	129	100%	120	100%	132	100%	637	100%
Fall Time												
During working hours	53	43%	53	40%	53	41%	42	35%	50	38%	251	39%
Off work	70	57%	80	60%	76	59%	78	65%	82	62%	386	61%
Mobilization status	123	100%	133	100%	129	100%	120	100%	132	100%		
Mobile	58	47%	56	42%	82	64%	74	62%	64	48%	334	53%
Mobile with support	53	43%	71	53%	34	26%	39	32%	54	41%	251	39%
Immobile	12	10%	6	5%	13	10%	7	6%	14	11%	52	8%
Total	123	100%	133	100%	129	100%	120	100%	132	100%	637	100%
Department where patients are located												
Hospital wards	102	83%	112	84%	108	83%	104	86,8%	108	82%	534	84%
ICU	5	4%	4	3%	6	5%	2	1,6%	6	4,5%	23	3,6%
Ambulatory	7	5,60%	8	6%	6	5%	3	2,5%	6	4,5%	30	4,7%
Emergency Department	6	4,80%	5	4%	6	5%	2	1,6%	5	3,7%	24	3,7%
Bone marrow/Chemotherapy	3	2,40%	4	3%	3	2%	9	7,5%	7	5,3%	26	4,0%
Total	123	100%	133	100%	129	100%	120	100,0%	132	100%	637	100%

When looking at the age distribution of patients who experienced a fall, it is seen that 48.8% of all patients who fell were 65 years of age or older. When we look at the time period in which the falls occurred, it is seen that 61% of them fell outside of working hours and 53% of them were patients whose first mobilization was done by the nurse and who are now self-mobilized. It was determined that the highest number of patient falls occurred in inpatient services.

Table.4. Fall Costs by Years

	Total Cost	Average Cost of Fall	Average Cost of Fall $	Average Cost of Fall €
2018	83.404	678 TL	$ 140	€ 119
2019	354.013	3.597 TL	$ 634	€ 565
2020	137.089	1.063 TL	$ 151	€ 132
2021	297.990	2.483 TL	$ 281	€ 238
2022	201.840	1.529 TL	92 $	€ 88

*Annual Average USD and EUR Exchange Rates; It is calculated by taking the arithmetic average of the average exchange rates of annual business days. Amounts are prepared for informational purposes based on central bank exchange rates.

While the average cost of a fall in the institution in 2018 was 678 TL, this cost increased to 1,529 TL in 2022.

Table.5 Cost Details of Falls by Years

Fall Groups		Cost Headings	2018	2019	2020	2021	2022
1. Group	The patient is unharmed.	Number of Patients Falling	74	69	71	51	57
		Nurse Care Cost (2 hours)	2.174	3.105	3.266	2703	3363
		Consultation Physician Fee	1090	600	950	650	1240
		Monitoring (EEG, ECG, etc.)	97	2.312	538	13	0
		Emergency Department Patient Monitoring	486	0	700	0	0
	Total		**3.847**	**6.017**	**5.454**	**3.366**	**4603**
2. Group	Whether there is an injury or not, the patient is frequently monitored for complications after a fall.	Number of Patients Falling	42	55	52	63	69
		Nurse Care Cost (4 hours)	2.468	4.950	4.784	6.678	8.378
		Consultation Physician Fee	2.765	6.476	8.679	12.792	23.883
		Monitoring (EEG, ECG, etc.)	92	262	569	1.059	0
		Bed and Room Cost	300	22.236	0	0	0
		Imaging Examination Cost	21.196	51.620	49.897	82.029	113.442
		Laboratory Examinations	149	421	1.860	6.088	2.974
		Emergency Department Patient Monitoring	34	0	15	665	1.278
		Medicine and Consumable Cost	2	0	124	0	145
		Dressing, Cold Application	12	909	1.249	161	332
	Total		**27.018**	**65.115**	**67.177**	**109.472**	**150.432**
3. Group	There is an injury, treatment requires simple surgical intervention.	Number of Patients Falling	4	3	3	4	5
		Nurse Care Cost (5 hours)	294	338	345	530	738
		Consultation Physician Fee	1.550	2.868	474	391	4.050
		Monitoring (EEG, ECG, etc.)	0	0	0	0	0
		Bed and Room Cost	0	327	0	628	0
		Imaging Examination Cost	85	4.804	1.598	3621	12.191
		Surgical Suture Cost	803	2.706	104	44	15.548

		Laboratory Examinations	28	204	234	0	0
		Medicine and Consumable Cost	168	346	46	318	441
		Dressing, Cold Application	0	0	0	15	0
	Total		**2.928**	**11.593**	**2.801**	**5.547**	**32.968**
4. Grup	There is severe trauma involving bone fractures, requiring major surgery.	Number of Patients Falling	3	6	3	2	1
		Nurse Care Cost (7 hours)	308	945	483	371	207
		Consultation Physician Fee	2.150	29.810	1.178	4.480	28
		Monitoring (EEG, ECG, etc.)	0	84	104	2.643	0
		Bed and Room Cost	0	28.277	3.583	0	2.580
		Intensive care follow-up fee	2.275	7.800	0	23.813	0
		Imaging Examination Cost	11.564	4.814	3.766	12.602	2.091
		Surgical operation cost	31.790	152.226	29.297	80.353	5.173
		Laboratory Examinations	549	13.088	5.251	12.127	1.043
		Medicine and Consumable Cost	975	34.295	17.995	43.216	2.715
		Dressing, Cold Application	0	0	0	0	0
	Total		**49.611**	**271.289**	**61.657**	**179.605**	**13.837**
5. Goup	Death			₺0			
		Malpractice cases					

When we look at the cost details according to the fall groups, it is seen that the highest cost occurs in the second group of falls. The most costly items in these decreases were imaging expenses, consultation fees and patient care costs. Nursing care costs are calculated differently for fall groups and include many nursing practices such as evaluation of the patient, preparation for radiological examinations, transfer, positioning, education of the patient and their relatives, preparation for surgical procedures, application of necessary treatments and taking protective measures. The cost of nursing care was calculated as a minimum of 2 hours and a maximum of 7 hours, based on the time the nurse will spend in performing these activities. When the cost details are examined according to the fall groups, it is seen that the falls that cause the most cost are the 2nd Group falls, which are numerically higher. In these fall groups, imaging fees, doctor fees and laboratory fees were the topics that created the most expenses. Although group 4 falls are serious and costly falls that require surgical intervention, their total costs are lower due to the low number of falls.

4. RESULTS

Since falls are the most common event that causes serious injuries in patients and threatens patient safety and can lead to death, this study was conducted on 637 patients in 16 hospitals belonging to private healthcare groups in Turkey in the last five years to examine the patient falls and the costs associated with falls. findings and results were interpreted and discussed in line with similar studies, population and literature.

According to the study conducted by Barış et al., 69.2% of the patients who fell were found to be 60 years or older, and in the study conducted by Bozdemir et al., 56.5% were found to be over 60 years old. In our study, it was determined that 48.8% of the patients who fell were over the age of 65, and this result is parallel to the literature (17).
It is supported by both study results and literature that falls occur more frequently in patients aged 65 and over (18).
Falls, whether unintentional or resulting from an accident, are the second leading cause of death worldwide. Over 64% of people die every year in low- and middle-income countries around the world. This rate is approximately 646,000 people. Falls are among the most common causes of death, especially in individuals aged 65 and over. Approximately 37.3 million people experience falls every year that, although not fatal, require medical intervention. Although it is the biggest cause of morbidity after falls in people aged 65 and over, young adults aged 15-29 and children aged 15 and under are in the next place (19).

In order to prevent falls, the individual's current disease, long-term care status, age (fracture risk), cost, culture, geographical location, etc. Nurses who create and implement care plans, taking into account these factors, need to develop care strategies appropriate to their risks (20).

The economic impact of falling is significant for the family, society and the world. Health care impacts and costs of falls in old age; continues to increase in the world due to the increasing elderly population. There are many studies in which fall costs are calculated in order to measure the economic impact of fatal and non-fatal injuries resulting from falls in the elderly on society (21).

According to the study conducted by Hitcho et al., fall rates were examined according to clinics and were found to be 6.12% in the neurology clinic, 2.18% in the surgery service, and 0.8% in the orthopedics service (22). The findings obtained in the study were similar to the findings of previous similar research.

According to the study conducted by Sözcü et al., it was reported that 55.5% of the patients hospitalized in neurology and neurosurgery clinics had a high risk of falling, and the fall rate in the last three months was 20.9% (23). The findings obtained in the study were the same as the findings of previous similar studies, as the falls occurred on the inpatient floor.

Falls cause an increase in the cost of healthcare services received by patients, physical and psychological damage, an increase in the cost of healthcare services received by patients, and also a loss of resources and workforce in the healthcare sector (19).

In the Center for Disease Control and Prevention (CDC) 2015 fall costs review report, it was reported that fall-related injuries were among the 20 most expensive medical conditions (24).

A systematic review by Carroll et al shows that average costs vary significantly. Cost per fall varies between: 1,059 - 10,913 Dollars, cost per fall: 2,044 - 25,955 Dollars, cost per hospitalization associated with each fall: 5,654 - 42,840 Dollars (25). According to the results of the same study, the average cost of falls starts from $3,476 per person, rising to $10,749 per person for falls with injuries and $26,483 for falls requiring hospital care (26).

According to the research conducted by Barış et al. the cost increase caused by serious falls in hospitals is 8726.94 TL (17).

In a national study conducted in Scotland, where the cost of falls was examined, it was determined that the total cost of falling for one year was 470,662,683 Euros (2010-2011 prices), and the cost per fall in society was 1,721 Euros (27). Since the studies were carried out in different countries and taking into account different criteria and home care services were included in the cost, the study results regarding the cost of falling varied widely. What is recommended in this regard is that each country should conduct studies on the cost of falling and compare their costs according to their own criteria. When the findings obtained in the study are compared with the findings of similar studies conducted previously, it is seen that the average cost of falling is lower.

5. CONCLUSION AND RECOMMENDATIONS

It is necessary to evaluate the risk of patients with an appropriate scale upon admission to the hospital, to use warning figures and wristbands in patients at risk of falling, and to establish standards to prevent patient falls prepared in line with the literature, and to include these standards in the clinic as education for patients and their relatives. It is predicted that identifying risks in patient falls, eliminating risks and taking precautions against risks will reduce the cost rate due to complications after falls. In addition to taking standard precautions, to prevent falls; If the patient is expected to get out of bed without the knowledge of the nurse, or if the patient is expected to make risky movements in the bed that may cause the patient to fall out of bed, it is thought that patient falls can be prevented if the patient is helped at this stage. With developing technology, there is a need to use different applications in terms of preventing patient falls and

complications that may occur after a fall. The purpose of sensor technology, which is one of the technologies widely used to prevent patient falls, is to prevent the fall before it occurs by detecting the patient's risky movements in the bed or getting out of bed without the knowledge of the nurse. The use of technology in preventing patient falls, which is of great importance in patient safety practices due to the serious consequences they cause, is increasing day by day. The use of sensors is recommended in clinics in order to reduce the cost rate after falls occur.

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