RESEARCH ARTICLE
DOI: *10.4274/cjms.2020.3317*

Fall Event Reports of a Tertiary-Care Hospital: A Retrospective Analysis

Usta et al. Fall Event Reports of a Tertiary-Care Hospital

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ABSTRACT

BACKGROUND/AIMS: The current study aims to perform a retrospective analysis of fall events in a tertiary-care hospital and identify the related risk factors.

MATERIALS AND METHODS: The research was conducted in 1160-bed-capacity tertiary-care hospital located in Ankara from June 2016-June 2017. The sample comprised 241 patient falls among 1009 fall events in the facility between 2006-2016. Data were retrospectively collected with patient preassessment forms, daily nursing documentation forms, and daily medication order protocols. Mean-standard deviation for continuous variables, frequency distribution for categorical variables, and the chi-square analysis for the correlation between two categorical variables are used.

RESULTS: Of patients with files investigated, 42.7% were aged from 18-65 years, and 59.3% were male, 74.1% had a chronic disease, 40.3% could complete daily-life activities independently, and 32% were using medication which increased fall risk. Fall events 29.5% occurred in the pediatric clinics, 29.5% in surgery, and 28.2% in internal medicine clinics, 35.2% occurred during the night shift, and 33% occurred within the first three days of admission. Additionally, 35.7% of the fall events happened due to not taking appropriate safety precautions, 20.2% not using the nurse call buttons, 64.7% were in the patient's room, and syncope (32.6%).

CONCLUSION: It was revealed that the riskiest interval for patient falls is the first three days of admission and the night shift. While evaluating fall risk, sociodemographic, medical, environmental, and fall-related independent variables should be considered together. It is recommended that fall risk assessment tools be revised by reviewing patients' specific care needs and clinical conditions.

Keywords: falls, nursing, patient safety, quality of healthcare, risk assessment

To cite this article: Usta D, Altınok Ersoy N, Korkmaz F, Akyar İ, Akyürek Y, Durusu Tanrıöver M. Fall Event Reports of a Tertiary-Care Hospital: A Retrospective Analysis.

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16.09.2020
24.12.2020

INTRODUCTION

Falls are considered the second leading cause of accidental or unintentional deaths and appear to be a critical patient safety problem for patients admitted for treatment to healthcare institutions worldwide (1,2). World Health Organization estimated that each year 646 thousand people died from falls, and fall events mostly occur among individuals older than 65 (2). The National Safety Reporting System in Turkey declared that patient falls are the most frequent patient safety issues, and falls constituted 36,2% of the patient safety issues in 2018 (3). Falls cause lengthened hospital stay duration, increased rehabilitation requirements, anxiety and fear, loss of self-confidence, loss of muscle power and function, reduced activity levels and quality of life, and injuring patients physically and psychologically (4). Also, falls increase health costs creating an economic load on the healthcare system and society (5). According to the United Kingdom National Health Service (NHS), falls occurring in England are estimated to cause costs of more than 2.3 billion pounds sterling to the NHS annually (6), while in Turkey, falls-related injuries cost US$ 3,302.60 and 14.61 hospitalization days for each patient additionally (7).

Falls mostly occur due to many preventable factors linked to the individual or environment. The main factors increasing the risk of falling may be listed as old age, fall history, male sex, amputated extremity, incontinence, anticonvulsant, antihypertensive and tranquilizing medication use, cognitive disorders, reduced visual acuity, peripheral neuropathy, lack of muscle power, posture imbalance, vitamin D deficiency and arthritis (8). Additionally, being in an unfamiliar environment, type of diagnosis, medical treatment, and long duration of hospital stay may increase the risk of falls (9). To prevent falls and reduce the risks, effective, comprehensive, and structured prevention programs are required.

Moreover, identifying fall risk factors and measuring risk levels is a priority for planning preventive interventions because falls are mainly predictable (10). Risk identification for fall events in Turkey commonly uses the İtaki (17 years and older) and Harizmi (0-16 years) risk assessment tools specially developed by the Ministry of Health Quality and Accreditation in the Health and Employee Rights Department. Although the cultural adaptation has not been completed, the Hendrich II Fall Risk Scale and the Morse Fall Scale are commonly used to assess risk assessment. In addition to risk assessment, analysis of fall events' characteristics specific to an organization is recommended to determine preventable risk factors and implement holistic care strategies. To plan effective preventive interventions and create organizational policies, to determine risk areas, assess risk, monitor, and analyze the fall

events' characteristics at first is needed. As a result, this study aimed to analyze fall events retrospectively in a tertiary-care hospital and identify the risk factors related to patient falls.

MATERIALS AND METHODS

Study Design and Setting

The research was completed in a tertiary-care hospital located in Ankara from June 2016-2017. Data were retrospectively collected from fall event report forms and patient files, and fall events' characteristics were analyzed.

The 1160-bed hospital is constituted of three leading hospitals named adult, pediatric, and oncology. The adult hospital serves with 730 bed-capacity of 30 outpatient, 28 inpatient, ten intensive-care units, and two surgery rooms. In this hospital, an average of 2700 patients receives care in inpatient services per month currently. The pediatric hospital comprises 270 beds and delivers healthcare services to an average of 11000 inpatients annually. Finally, the oncology hospital with 160 beds provides outpatient and inpatient healthcare services to approximately 80000 patients per year.

Prevention and Follow-Up Protocol of the Institution Regarding Inpatient Falls

In that direction, the tertiary-care hospital in which the study was conducted follows a standardized protocol for all units (Fall Events Prevention and Monitoring Procedure) in the collaboration of Quality Coordinators. The protocol identifies the fall types, factors increasing the risks, and activities to prevent and monitor falls for the patients admitted to the organization or receiving outpatient healthcare services. As a standardized protocol, nurses assess patients' fall risks using the Hendrich II Fall Risk Scale, plan nursing interventions, and record them on a daily documentation form. During admission to the inpatient clinics, nurses inform the patient and the family about using nurse call buttons in the patient room and ward. Within the standard safety precautions framework, bed rails are elevated, and the bed is kept at the lowest level. Unused medical equipment is removed from the room, and passages between rooms are tidied up, devices used for mobilization (e.g., wheelchairs, trolleys) are kept with wheels locked, and windows are locked. Patient rooms and corridors are well-lit, and wet floor signs are used while cleaning the corridors and rooms.

Additionally, patients keep frequently used personal items (e.g., glasses, water) close to the bed, are encouraged to ask for help with hygiene and excretion needs, and information is given that slippers should not have slippery soles. When situations occur which may increase the risk of falls (e.g., performing interventional implementations, consciousness changes) and during transfer between wards, fall risk is reassessed, and risk assessment is recorded on the daily nursing documentation forms. On the first day of the admission, the responsible nurse delivers the patient a brochure about the definition, causes, and preventions that should be taken to prevent falls. It is ensured that patients with high fall risk are accompanied by a caregiver, if possible.

Sampling

The research population comprised 425,751 patients admitted to adult, pediatric, and oncology clinics in the hospital from January 2006-May 2016. Between these dates, a total of 1009 fall events occurred and were reported to the Quality Coordinator, and files for 666 patients who experienced fall events were able to be reached (66%). In the ten years, the ratio of patients who fell to admitted patients showed that the fall frequency was $p=0.002$. When the tolerance value is accepted as $d=0.006$, the appropriate sample size was 221 according to sample calculations for the known population. Among the accessible 666 patient files, a total of 241 were randomly chosen for data collection (Figure 1).

Data Collection Procedure and Forms

When fall events occur in the hospital, a fall event report form is completed and sent to the Quality Coordinatorship by the nurses. The patients' file numbers are recorded by the Quality Coordinator on a list. This list was reached from the coordinators containing patients who fell

in the ten years, and patient files were obtained from the hospital archive between May-July 2016 by the researchers. The patient preassessment forms, daily nursing documentation forms, and daily medication order protocols were investigated, and the data were recorded into a Microsoft Excel®file.

Sociodemographic Data and Fall Event Characteristics

Sociodemographic data and fall event features were recorded using a data collection form created by the researchers after a literature review (7,11,12) and based on the institution's fall event report form. This form included a total of twenty-two questions about age, gender, shift and weekday when the fall occurred, fall history of the patient, fall risk assessment tool scores for the day of fall, admission ward, the type of admission, presence of chronic disease, type of the chronic disease, use of medications which may cause falls *(antiepileptics and benzodiazepine group medications in medication groups on the Hendrich II Risk Assessment Tool)*, independence level for activities of daily living (ADL), use of assistive devices and type of device used, limitation status of the patient, precautions not taken before the fall event, location of fall, type of fall, injury status and type if present, day of admission of fall event and the number of days since the patient was admitted.

Dependence Level in ADL

Data related to ADL were obtained from the standard patient preassessment form used in the hospital. This form defines these activities as eating/drinking, personal hygiene, balanced walking, getting up from bed, turning in bed, and toilet requirements under the heading of "Daily living activities and functional assessment." The patient's ability to complete activities is assessed as independent, semi-dependent, and dependent.

Fall Risk Assessment

The Hendrich II Fall Risk Assessment Tool was developed by Hendrich et al. in 1995. The highest point obtained from the scale is 20, with five points and above assessed as high risk. The Hendrich II Fall Risk Assessment Tool comprises seven factors named confusion/disorientation, symptomatic depression, changes in excretion, dizziness, gender, antiepileptic and benzodiazepine group medication intake, and chair stand test (13).

Ethical Consideration

The study was approved by the Hacettepe University Non-Interventional Clinical Research Ethics Committee (Decision Number: 2016-14-GO 16/45-32). Informed consent was not received due to the retrospective nature of the study.

Statistical Analysis

Statistical analysis was completed with the IBM SPSS (Statistical Package for Social Sciences) Statistics Data Editor 23 (United States of America) program. For continuous variables, mean ± standard deviation was used, while frequency distribution was used for categorical variables. The chi-square analysis was used to investigate the relationship between two categorical variables. In the 95% confidence interval, $p<0.05$ was accepted as statistically significant.

RESULTS

Within the scope of the research, 241 files were analyzed. In this sample, it was observed that there were deficiencies in recording the data for some independent variables. For this reason, the numbers of independent variables whose data can be accessed among the 241 patient files are given in parentheses as "(n = ...)" in the tables. The data regarding the patients' sociodemographic and clinical characteristics are shown in Table 1, and the characteristics related to falls are presented in Table 2.

When fall risk levels of patients who fell were assessed according to the Hendrich II scale, there were no statistically significant differences found according to age groups (X^2=2.,335; p=0.331), gender(X^2=0.718; p=0.397), use of medication increasing fall risk (X^2=0.206; p=0.650)and presence of chronic disease(X^2=0.351; p=0.554). A statistically significant

difference was identified between the assessed fall risk levels of patients with the ability to complete daily living activities independently (X^2=6.029; p=0.049).

DISCUSSION

Admission to the hospital for any reason brings along the risk of falls. In the current study, fall events in a tertiary-care hospital were retrospectively analyzed. This analysis dealt with the fall events occurring in the healthcare institution and the sociodemographic characteristics of participants. It is expected that the findings of the study may contribute to planning individualized care regarding fall prevention to improve patient safety in the short term.

The study found that fall events mostly occurred in the surgery and internal medicine clinics. Ferreira da Mata et al. suggested that most adult patients in the postoperative period were evaluated as high fall risks (14). In contrast, Hajduchováet al. found that almost half of patients who fell were admitted by the internal medicine units (15). Although there are different perspectives, it is argued that the causes of fall risk differ due to the different characteristics of surgical and internal medicine patients. Accordingly, surgical patients need to be identified in the high fall risk group due to lengthened preoperative fasting, narcotic analgesics used in the postoperative period, and physical activity limitations. Patients admitted by internal medicine clinics have fall risk due to requiring long durations of hospital care and having chronic disease diagnoses, causing physical movement limitations due to effects particularly on muscle, nerve, and circulation systems. Therefore, when assessing the fall risks for patients admitted to internal medicine and surgery clinics, it is necessary to consider individuals with chronic diseases and factors which may increase the risk of falling in the pre-postoperative periods (14,16).

When reporting fall events, recording the time intervals will allow health professionals to determine when patients frequently fall and are exposed to most risks during the day. Besides, this will enable health professionals to take suitable precautions for preventing falls. Majkusová and Jarošová reported that surgical patients fell mostly during the night shift, while McKechnie et al. reported that fall events occurred during the day and evening shifts (16,17). Moreover, in long-term departments, it was suggested that falls frequently occurred in the afternoon when the patients were visited by their families/relatives (16). In our study, most falls were identified to occur on the night shift between 24.00-08.00. This situation is possibly due to the lower number of staff nurses working the night shift than the day and evening shifts. Also, attempting to go alone when urgent toilet requirements without disturbing the nurse or caregiver, short-duration loss of orientation, and orthostatic hypotension occurring after waking may lead to falls at night.

Our study findings showed that patients most frequently fell within the first three days of admission. Hajduchováet al. uncovered that falls were mostly reported in the first week of admission (15). It is suggested that this situation is due to the patient experiencing difficulty orientating to the hospital environment in the early period of admission and using devices they are not familiar with. Moreover, our findings showed that lengthened admission increased the risk of falling. A prolonged hospital stay is among the most critical risk factors for fall events. Majkusová and Jarošová indicated that long-term patients suffered the most falls among other inpatient units (16). Hospitalizing for an extended period may likely cause loss of muscle tonus and result in patients' weakness of preventing themselves during a fall event.

In this study, it was identified that falls most frequently occurred in the patient's room. Similarly, it is reported that fall events frequently occur in environments like the patient's room, corridors, and toilet/bathroom forming the patients' environment in the hospital setting (12). Abreu et al. stated that falls were the most common in the patient's room, which occurred when the nurse was absent, and the patient was attempting to stand up without assistance. Also, patient rooms are the places where patients spend the most time, and falls

from bed are frequently experienced (18). Consequently, it is considered that patients experience difficulties orientating to the room environment during admission and especially to safety precautions related to the bed.

Our study revealed different causes of falls in the adult and pediatric age groups in which adult patients most frequently fall due to syncope, standing up from bed-trolley, and foot slip. In contrast, pediatric patients frequently fall when standing from bed-trolley and chairs. Studies conducted with adult patients show that patients in the hospital have similar causes of falling, in compliance with our results. It was reported that the most common activities during falls by adult patients were standing from bed, ambulation, going to the toilet, and moving to a chair (16). When the causes of falls in pediatric patients are investigated, falls were mostly observed due to rails being broken, lack of attention by family, or not educating the child's primary caregiver about falls (19). Chang et al. revealed that falls occurred among 0-6 age groups due to jumping out of the bed or unelevated bed borders (20). Therefore, it is possible to say that interventions to reduce fall risks differ in age groups, and a proper arrangement of the hospital environment is required.

It is known that falls and related mortality-morbidity rates are higher in childhood and at older ages. However, this study did not identify a significant correlation between age and fall risk levels, with falling patients found to be middle-aged or older on average. Variations occurring with older age like reduced physiological functions and limitations of daily living activities, the increase in multiple medication use, and chronic diseases are independent factors increasing fall risk (20). Additionally, in this study, nearly one-third of fall events were observed in patients in the pediatric age groups. As pediatric patients are still in the development stage for neuromotor, physical, cognitive, and psychosocial processes, falls occur as a part of this development process, different from the adult ages (21). For example, learning to walk at an early age and running while playing cause falls in children. While not requesting help from caregivers or nurses, meeting hygiene and elimination requirements due to excessive importance attached to privacy is among risk factors for falls among adolescents. As a result, when assessing fall risk, it is recommended to focus on specific risk factors related to the individual's developmental period's features.

In the current study, more than half of the patients with high fall risk were men, and gender was not a significant variable for fall risk. The results have been disclosed arguing both gender affected the fall risks or not. Majkusová and Jarošová indicated that falls are expected to happen among females older than 65 since their higher mean age and higher hospitalization rate (16); in contrast, Pereira et al. underlined the high fall rates among the male population (22). Tanrikulu and Sari found no correlation between genders and fall risks (23), and our results are similar to their research. However, it is essential to consider that causes of falls may differ according to gender characteristics, such as hearing loss in males and urinary incontinence, living alone, and repeated fall history in women is associated with increased fall risks (24).

Functional insufficiency in individuals with chronic disease causes an increased risk of falls. In our study, though most patients had chronic disease diagnosis, there was no statistically significant difference found between this situation and fall risk points. In a cross-sectional study, Sibley et al. revealed that elderly patients having at least one or more chronic disease diagnoses had an increased risk of falls (25). Our study revealed that half of the patients with chronic diseases were diagnosed with hypertension and/or diabetes. Gangavati et al. identified that repeated fall risk was 2.5 times higher in elderly patients with hypertension and uncontrolled blood pressure (26); similarly, Sibley et al. revealed that patients with hypertension had significantly high fall risk (25). Acute orthostatic falls in blood pressure reduce blood flow to the brain, and temporary cerebral ischemia creates syncope-related falls. Findings from a meta-analysis by Yang et al. showed increased fall risk for diabetes patients

(27). Berra et al. concluded that increased fall risk in diabetic individuals was due to irregularities in blood glucose levels (28). In line with these results, it was revealed that determining specific risk factors of various chronic diseases is essential.
According to our study, more than half of falling patients could not complete ADL independently, and there was a statistically significant correlation found between dependence level and fall risk. Hajduchová et al. concluded that more than half of falling patients were moderately and highly dependent, according to the Barthel ADL index (15). Similarly, de Souza et al. revealed that as the need for ambulation support increased, the fall risks increased (29). Dependence for ADL occurs when individuals are faced with environmental dangers due to loss of muscle power and physical limitations, which increases the fall risk. Dependence in ADL is revealed by the individual's need to use assistive devices. In our study, some of the patients who fell were identified to use assistive devices (glasses, walker-walking stick, and extremity prosthesis). Choi and Lee emphasized that most individuals requiring physical support when walking had a high risk of falling (30). Similarly, a weakness of visual acuity is among the risk factors, and nearly one-third of falls are reported to be due to visual impairments (31). Additionally, some of our patients were found to fall due to not using the nurse call buttons. Especially fall events occurring in the patient rooms were related to patients who do not receive assistance when standing from the bed-chair or going to the toilet. It is known that the use of the nurse call buttons when attempting to leave a bed or a chair reduces fall events (32).
Medications that increase the fall risks are listed as antihypertensive agents, diuretics, B blockers, sedatives and hypnotics, neuroleptics and antipsychotics, antidepressants, benzodiazepines, narcotics, and nonsteroidal anti-inflammatory drugs (33). Signorovitch et al. highlighted that the use of non-insulin antidiabetic drugs is significantly associated with higher fall risks by resulting in hypoglycemia (34). It was also showed that polypharmacy had become a critical issue among elderly patients contributing to hospital falls (35). On the one hand, the Hendrich II risk evaluation tool only defines antiepileptics and benzodiazepines as medications increasing fall risk. On the other hand, in our study, nearly one-third of patients were using at least one of the medications included in the two groups stated in this risk tool, and there was no statistically significant difference found between medication use and fall risk scores. Thus, it is considered that the assessment tools are needed to include the other medication groups that may increase the fall risks.

Study Limitations

In our study, some limitations are present due to inaccessible data in which the data was collected retrospectively. Consequently, insufficient precautions related to falls are possibly derived from the inadequate written records about interventions in the past.

CONCLUSION

Fall events appear to be a crucial public health problem for all age groups and are commonly used as healthcare service quality indicators. In this study, fall events mostly occurred in the internal medicine and surgery clinics from 24.00 to 08.00, with most patients falling in their room due to syncope, rising from bed, or foot slip. Fall events occurred most frequently in the first three days of admission, with the risk of falls observed to increase as admission duration lengthened. When the causes of falls are investigated, patients frequently did not take appropriate security precautions and did not use the nurse call buttons. Patients who fell were mainly in the middle-age group and male and could not complete daily living activities independently; patients had at least one chronic disease diagnosis and were assessed as having high fall risk.
On the basis, we conclude with the following recommendations as individuals with chronic diseases affecting the muscle, nerve, and circulation systems should be closely monitored; patients in the surgery clinic should have factors which will increase risk in the pre-

postoperative periods defined in detail and included in scale tools; patients with high risk, especially, should be assessed at intervals during the night shift; all patients should be accepted as high risk during care interventions on the first three days of admission; family members should be supported in taking an active role in the patient's room, and orientation in the ward and medication groups forming a risk factor for falls should be defined in detail and included in risk assessment tools.

Acknowledgments: We would like to present our special thanks to Research Assistant Şeyma Adıbelli to contribute to the data collection process.

MAIN POINTS

- Falls are a critical aspect of causing physiological and psychological damage for individuals by reducing their quality of life.
- Patient falls have become an essential indicator of healthcare services quality.
- A set of sociodemographic, medical, environmental, and fall-related independent variables should be considered together when evaluating fall risks.
- Fall risk assessment tools should be revised by reviewing patients' specific care needs and clinical conditions.

REFERENCES

1. Murray E, Vess J, Edlund BJ. Implementing a pediatric fall prevention policy and program. Pediatr Nurs. 2016;42(5):256-60.
2. World Health Organization. Falls. World Health Organization; 2018.
3. Safety Reporting System. National satistics and analysis report. Ankara: National Safety Reporting System; 2018.
4. Hallford DJ, Nicholson G, Sanders K, McCabe MP. The association between anxiety and falls: A meta-analysis. J Gerontol B Psychol Sci Soc Sci. 2017;72(5):729-41.
5. Cameron ID, Dyer SM, Panagoda CE, Murray GR, Hill KD, Cumming RG, et al. Interventions for preventing falls in older people in care facilities and hospitals. Cochrane Database Syst Rev. 2018(9).
6. Improvement N. The incidence and costs of inpatient falls in hospitals. London: NHS Improvement. 2017.
7. Baris VK, Intepeler SS, Yeginboy EY. The cost of serious patient fall-related injuries at hospitals in Turkey: A matched case-control study. Clin Nurs Res. 2018;27(2):162-79.
8. Hempel S, Newberry S, Wang Z, Booth M, Shanman R, Johnsen B, et al. Hospital fall prevention: a systematic review of implementation, components, adherence, and effectiveness. J Am Geriatr Soc. 2013;61(4):483-94.
9. Severo IM, Almeida MdA, Kuchenbecker R, Vieira DFVB, Weschenfelder ME, Pinto LRC, et al. Risk factors for falls in hospitalized adult patients: An integrative review. Rev Esc Enferm USP. 2014;48(3):540-54.
10. Ganz D, Huang C, Saliba D, Miake-Lye I, Hempel S, Ganz D, et al. Preventing falls in hospitals: a toolkit for improving quality of care. Ann Intern Med. 2013;158(5 Pt 2):390-6.
11. Mazur K, Wilczyński K, Szewieczek J. Geriatric falls in the context of a hospital fall prevention program: delirium, low body mass index, and other risk factors. Clin Interv Aging. 2016;11:1253.
12. Kisacik OG, Cigerci Y. Characteristics of inpatient falls in a hospital setting: A retrospective study from Turkey. Int J Caring Sci. 2019;12(2):768.

13. Hendrich AL, Bufalino A, Groves C. Validation of the Hendrich II Fall Risk Model: The imperative to reduce modifiable risk factors. Appl Nurs Res. 2020:151243.
14. Mata LRFd, Azevedo C, Policarpo AG, Moraes JT. Factors associated with the risk of fall in adults in the postoperative period: A cross-sectional study. Rev Lat Am Enfermagem. 2017;25.
15. Hajduchová H, Brabcová I, Tóthová V, Bártlová S, Doseděl M, Malý J, et al. Factors associated with falls in hospitals: Outcomes for nursing care. Kontakt. 2019.
16. Majkusová K, Jarošová D. Falls risk factors in an acute-care setting: A retrospective study. Cent Eur J Nurs Midwifery. 2014;5(2):47-53.
17. McKechnie D, Fisher MJ, Pryor J. The characteristics of falls in an inpatient traumatic brain injury rehabilitation setting. J Clin Nurs. 2016;25(1-2):213-22.
18. Abreu C, Mendes A, Monteiro J, Santos FR. Falls in hospital settings: A longitudinal study. Rev Lat Am Enfermagem. 2012;20(3):597-603.
19. Tung T-H, Liu M-C, Yang J-Y, Syu W-Y, Wu H-P. Useful methods in preventing accidental falls from the bed in children at the emergency department. Eur J Pediatr. 2009;168(11):1323-6.
20. Chang CM, Lin HF, Chiang HH. A study on the relationship between age and inpatient falls in Taiwan. Int J Nurs Pract. 2015;21(5):605-11.
21. Parker C, Kellaway J, Stockton K. Analysis of falls within paediatric hospital and community healthcare settings. J Pediatr Nurs. 2020;50:31-6.
22. Pereira CL, Baptista F, Infante P. Men older than 50 yrs are more likely to fall than women under similar conditions of health, body composition, and balance. Am J Phys Med Rehab. 2013;92(12):1095-103.
23. Tanrikulu F, Sari D. Determining patients' risk of falling in the emergency department. Int J Caring Sci. 2017;10(2):907-14.
24. Gale CR, Cooper C, Aihie Sayer A. Prevalence and risk factors for falls in older men and women: The English longitudinal study of ageing. Age Ageing. 2016;45(6):789-94.
25. Sibley KM, Voth J, Munce SE, Straus SE, Jaglal SB. Chronic disease and falls in community-dwelling Canadians over 65 years old: A population-based study exploring associations with number and pattern of chronic conditions. BMC Geriatr. 2014;14(1):22.
26. Gangavati A, Hajjar I, Quach L, Jones RN, Kiely DK, Gagnon P, et al. Hypertension, orthostatic hypotension, and the risk of falls in a community-dwelling elderly population: the maintenance of balance, independent living, intellect, and zest in the elderly of Boston study. J Am Geriatr Soc. 2011;59(3):383-9.
27. Yang Y, Hu X, Zhang Q, Zou R. Diabetes mellitus and risk of falls in older adults: A systematic review and meta-analysis. Age Ageing. 2016;45(6):761-7.
28. Berra C, De Fazio F, Azzolini E, Albini M, Zangrandi F, Mirani M, et al. Hypoglycemia and hyperglycemia are risk factors for falls in the hospital population. Acta Diabetol. 2019;56(8):931-8.
29. de Souza AB, Röhsig V, Maestri RN, Mutlaq MFP, Lorenzini E, Alves BM, et al. In hospital falls of a large hospital. BMC Res Notes. 2019;12(1):1-3.
30. Choi KW, Lee I-S. Fall risk in low-income elderly people in one urban area. J Korean Acad Nurs. 2010;40(4).
31. Oliver D, Healey F, Haines TP. Preventing falls and fall-related injuries in hospitals. Clin Geriatr Med. 2010;26(4):645-92.
32. Shorr RI, Chandler AM, Mion LC, Waters TM, Liu M, Daniels MJ, et al. Effects of an intervention to increase bed alarm use to prevent falls in hospitalized patients: A cluster randomized trial. Ann Intern Med. 2012;157(10):692-9.

33. De Jong MR, Van der Elst M, Hartholt KA. Drug-related falls in older patients: implicated drugs, consequences, and possible prevention strategies. Ther Adv Drug Saf. 2013;4(4):147-54.
34. Signorovitch JE, Macaulay D, Diener M, Yan Y, Wu EQ, Gruenberger JB, et al. Hypoglycaemia and accident risk in people with type 2 diabetes mellitus treated with non-insulin antidiabetes drugs. Diabetes Obes Metab. 2013;15(4):335-41.
35. Masumoto S, Sato M, Maeno T, Ichinohe Y, Maeno T. Potentially inappropriate medications with polypharmacy increase the risk of falls in older Japanese patients: 1-year prospective cohort study. Geriatr Gerontol Int. 2018;18(7):1064-70.

Table 1. Distribution of patients' sociodemographic and clinical characteristics (n=241)		
Sociodemographic characteristics	**n**	**%**
Age		
1-3	48	19.9
4-17	23	9.6
18-65	103	42.7
66-95	67	27.8
Gender		
Male	143	59.3
Female	98	40.7
Unit of admission (n=161)		
Outpatient clinics	119	73.9
Emergency service	37	23.0
Transferred from external center	5	3.1
Chronic disease (n=135)		
No	35	25.9
Yes	100	74.1
Type of chronic disease* (n=154)		
Cardiovascular system diseases	72	46.9
Type 2 diabetes	23	14.9
Malignancy	5	3.2
Hemiplegia	1	0.6
Arthritis	1	0.6
Other**	52	33.8
Ability to complete daily living activities independently (n=149)		
Independent	60	40.3
Semi-dependent	41	27.5
Dependent	48	32.2
Use of assistive devices (n=142)		
No	120	84.5
Yes	22	15.5
Presence of invasive devices (n=144)		
No	35	24.3
Yes	109	75.7

Type of invasive device* (n=147)**		
Peripheral venous catheter	88	59.9
Central venous catheter	28	19.0
Urinary catheter	25	17.0
Hemovac drain	5	3.4
Nasogastric tube	1	0.7
Physical restrain status (n=156)		
No	148	94.9
Yes	8	5.1
Use of medications increasing fall risk (n=150)		
No	102	68.0
Yes	48	32.0
*Multiple data, one patient may have more than one chronic disease, **Anemia, asthma, goiter, chronic obstructive pulmonary disease, chronic renal failure, epilepsy, hyperlipidemia, benign prostate hyperplasia, hyperparathyroidism, Hashimoto's thyroiditis, multiple sclerosis, Parkinson, cirrhosis, hypothyroidism, ***Multiple data, one patient may have more than one invasive device		

Table 2. Distribution of the characteristics related to fall events (n=241)		
Characteristics related to fall events	**n**	**%**
Clinics		
Pediatrics	71	29.5
Surgical	71	29.5
Internal medicine	68	28.2
Emergency	15	6.2
Psychiatry	10	4.1
Intensive care	6	2.5
Assessment of fall risk (n=139)		
High risk (5 points and above)	93	66.9
No risk (1-4 points)	46	33.1
Shift when fall occurred (n=239)		
Morning (08.00-16.00)	73	30.5
Afternoon (16.00-24.00)	82	34.3
Night (24.00-08.00)	84	35.2
Weekday when fall occurred		
Monday	34	14.1
Tuesday	37	15.4
Wednesday	44	18.3
Thursday	29	12.0
Friday	35	14.5
Saturday	33	13.7
Sunday	29	12.0
Precautions not taken to prevent fall* (n=90)		

No appropriate safety precautions are taken	32	35.7
Not using the nurse call buttons	18	20.2
Caregiver's lack of attention	14	15.4
No appropriate physical restrain precautions are taken	8	8.9
Wet floor	5	5.5
Insufficient information given to patient/caregiver	5	5.5
Unnecessary material left in the clinical area	3	3.3
Lack of assessment of fall risk	1	1.1
Not specified	4	4.4
Location of fall (n=220)		
Patient room	156	70.9
Bathroom	34	15.5
Ward corridor	22	10.0
Outpatient clinic	6	2.7
Surgery room	2	0.9
Type of fall (n=230)		
Syncope	75	32.6
Fall from bed-trolley	65	28.3
Foot slip	49	21.3
Fall from chair-wheelchair	16	7.0
Loss of balance when walking	10	4.3
Fall from mother's lap	5	2.2
Tripping (e.g., cable)	4	1.7
Not specified	6	2.6
Injury due to fall (n=92)		
No	63	68.5
Yes	29	31.5
Type of injury (n=29)		
Head injury	15	51.8
Pain in hip	3	10.3
Not specified	11	37.9
Admission interval (in days) (n=165) (M=17)		
0-3	14	8.5
4-7	15	9.1
8-15	45	27.2
16-30	48	29.1
31-159	43	26.1
Day of fall since the admission (n=185) (M=6)		
0-3	61	33.0
4-7	49	26.5
8-14	29	15.7
15-107	46	24.8
*Multiple data, more than one precaution may be related to one event		

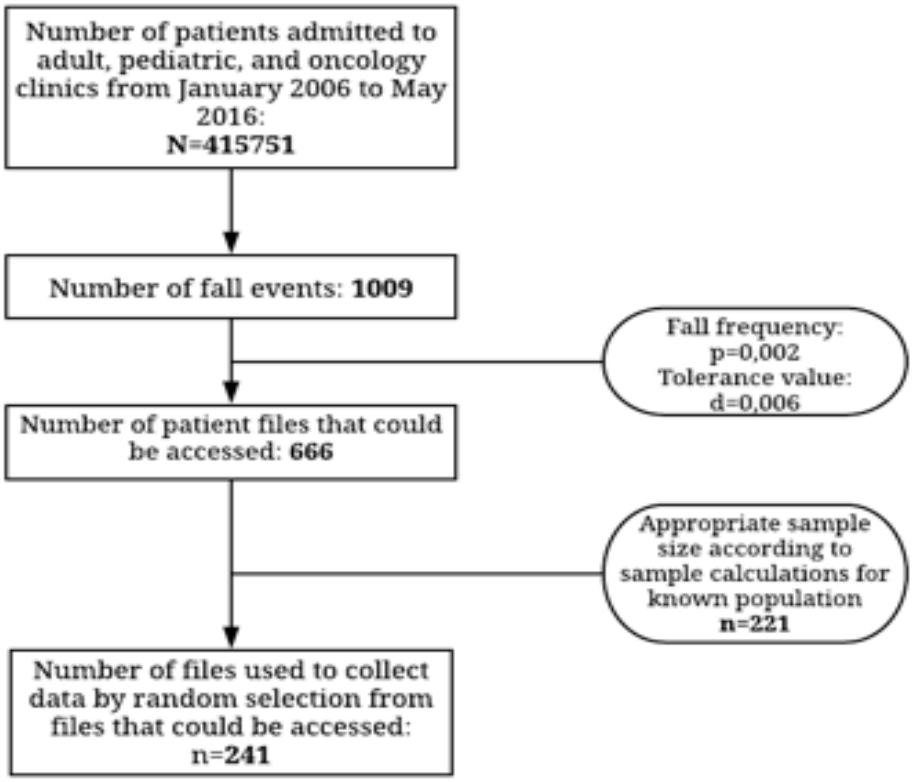

Figure 1. Data collection flow chart