

Analysis of Patient Falls at Clinical Hospital Dubrava

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Article received: 03.10.2024.

Article accepted: 30.12.2024.

https://doi.org/10.24141/2/9/1/10

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Keywords: fall, patient, assessment, education

Abstract

Aim. The aim of the conducted analysis was to determine the frequency of patient falls at the Clinical Hospital Dubrava and to present, based on the data collected, the most common risk factors for falls, causes and consequences of falls, the location and manner of falls, and the need for additional interventions or actions taken after a fall.

Methods. The analysis examined falls in 22,639 patients hospitalized at the Clinical Hospital Dubrava from July 1, 2022, to June 30, 2023. The analysis included the age and gender of patients, fall risk assessment using the Morse Scale, location and manner of falls, falls with and without consequences, and whether patient falls required additional healthcare interventions. Data were sourced from the Hospital Information System (HIS). The study used graphic and tabular methods of presentation through MS Excel.

Results. A total of 144 patient fall cases were reported, which represents an incidence rate of 6.3 falls per 1,000 hospitalizations, or 0.935 falls per 1,000 patient days. A significant clinical issue is the fact that 75% of patients were over 65 years old. Using the Morse Scale for fall risk assessment, 47% of patients were assessed as being at high risk for falls. In terms of internal and external risk factors, 77% of falls were due to internal factors, with the majority of falls occurring in the patient's room (78%). Additional interventions requiring staff time and presence were necessary for 53% of patients.

Conclusion. The long-term goal is to reduce the incidence of falls, which will lead to a reduction in treatment costs and a shorter hospital stay for patients. It is essential to develop a quality system to provide the best possible and reliable care for patients.

Clinical Hospital Dubrava recognizes quality as one of the fundamental values for defining goals and strategies for action in providing healthcare. The Department for Quality Assurance and Improvement of Healthcare at Clinical Hospital Dubrava conducted an analysis of falls among hospitalized patients over a year in order to raise the culture of patient safety. Achieving and improving the quality of healthcare is based on the principles of efficiency, appropriateness and safety for patients, staff and all healthcare procedures. Key elements include systematic monitoring, assessment and planning of activities to improve procedures, with the aim of increasing efficiency, eliminating deficiencies and preventing adverse events. Patient safety, as a key indicator of the quality of the healthcare system, requires effective and coordinated communication between staff members with different levels of education, experience and perspectives on treatments, thus ensuring optimal cooperation and better outcomes for patients. Wellcoordinated cooperation is crucial for reducing adverse events and ensuring safe and effective treatment.

Fall

A fall among hospitalized patients is defined as an unexpected and involuntary descent to the ground, floor, or other lower surface, not due to syncope or external force (1). It is also considered a medical error that requires the elimination of such errors from the hospital environment. Falls in hospital wards, especially among patients older than 65 years, can cause permanent disability, prolonged treatment, increased costs, and death (2). They are a common cause of morbidity and mortality, associated with disability, longer hospital stays, and the risk of transferring patients to other facilities. Falls result from a variety of factors, including the patient's health condition, response to treatment, and the infrastructure and safety of the hospital environment. Therefore, falls in a hospital setting are an important indicator of patient safety (3). They cause functional decline, prolonged hospital stay, and increased institutional liability. Geriatric research focuses on strategies and interventions to prevent falls in institutional settings. Falls with injuries, such as fractures, are a serious health problem, causing other adverse outcomes, such as decubitus or hospital infections (4).

Fall risk factors

Risk factors for falls can be external and internal. External risks include medications that affect the central nervous system, rooms with cluttered furniture, bathrooms, slippery floors or floor mats, beds, inappropriate footwear, walking aids (crutches, walkers), and poor lighting. Internal risks include previous falls, poor vision, unsteady gait, general weakness, fatigue, weakness in the legs, diseases of the locomotor system, changes in mental status (restlessness, confusion), dizziness, acute illnesses (orthostatic hypotension, stroke, fever) and chronic illnesses (diabetes, cataracts, glaucoma, arthritis, dementia). By combining these factors, the risk of falling increases. The increased risk of falls in hospital is also associated with older age and poorer general health condition. Several observational studies on falls in residents of nursing homes revealed an increased risk of falls in patients with gait disorders or frailty (5). Hospitalization of an older adult patient can lead to unwanted harmful consequences of procedures that were originally intended as therapeutic. Prolonged bed rest, polypharmacy, medical procedures (e.g., intravenous lines, urinary catheters), telemetry, various restrictions on movement, sensory deprivation, disruption of normal sleep patterns, and lack of proper nutrition contribute to functional, physical, and cognitive decline. Since many older adults live in a balance between independence and functional dependence, even a small decline in function during hospitalization can place them in a position of newly acquired dependence (6). Medication use may be one of the most common and modifiable risk factors for falls, although observational studies have difficulty disentangling the effects of medications from underlying medical conditions. Medications that target the central nervous system, such as neuroleptics, benzodiazepines, antidepressants, and other sedatives (e.g., zolpidem), appear to be associated with an increased risk of falls (7). Other drug groups associated with an increased risk of falls include: vasodilators, diuretics, beta blockers and drugs for diabetes (8). Recent changes in drug dosages or new drugs, especially benzodiazepines, may also be an important factor risk of falling.

Assessment of fall risk factors

Evaluating the risk of falls is a key aspect of quality control in healthcare. Efforts to minimize adverse events, such as patient falls during hospitalization, focus on developing and utilizing tools to assess and identify patients at risk (9). The most commonly used fall risk assessment instruments are the Morse Fall Scale (MFS), the St. Thomas Risk Assessment Tool in Falling Elderly Inpatients (STRATIFY) and Hendrich II Risk Fall model (HFRM II). For assessing the risk of falling in Clinical Hospital Dubrava, the Morse scale is used as an integral part of the nursing documentation defined by The Regulation on Nursing Documentation in Hospital Healthcare Institutions (Figure 1).

The Morse Fall Scale (MFS) assesses six areas of potential fall risk: previous falls, secondary diagnoses, mobility aids/self-care, intravenous therapy, gait/posture/transfer, and mental status. The range of scores is 0 to 125, with higher scores indicating greater risk of falls (10).

Fall as an indicator of quality

Clinical Hospital Dubrava continuously adjusts its guality system in accordance with the provisions of the Regulation on Accreditation Standards for Hospital Healthcare Institutions ("Official Gazette", No. 92/19) and the Regulation on Quality Standards in Healthcare ("Official Gazette", No. 79/11), aiming to improve healthcare quality. Patient safety is one of the fundamental principles of the quality system, achieved by implementing measures to prevent adverse events that could cause death or harm to patients' health. These measures, based on current knowledge in medical procedures, ensure the best possible treatment outcomes and reduce the risk of negative health consequences (11). Clinical Hospital Dubrava strives to provide top-quality health care, however errors and adverse events can occur in any medical procedures. Adverse events are divided into unexpected events, patient safety indicators and events towards staff, and can occur at all levels of the health system. The quality assurance and improvement system within Clinical Hospital Dubrava enables timely reporting and documentation of adverse events through the patient

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Figure 1. Morse scale for assessing the risk of falling Taken from the Hospital Information System of Clinical Hospital Dubrava. Accessed on 21. 8. 2023 and staff safety system. Reports on patient falls include details of the mechanism of the fall, location, time, injuries, loss of consciousness, relevant environmental information, and strategies for preventing the risk of falls. Clinical Hospital Dubrava has a patient safety management procedure in place, which provides a system for recognizing, reporting, and learning from incidents that affect patient and staff safety, including "near miss" events. The unit where the fall occurred must analyze the causes and submit a report to the quality assistant director within seven days. A multidisciplinary approach is key to continuously improving the quality of healthcare procedures. The Health Care Quality Assurance and Improvement Service has established a system for recognizing, reporting, and learning from adverse events, which includes the cooperation of all employees and patients and the importance of reporting and analyzing all adverse events in order to prevent future problems and improve quality. Nurses/technicians have a duty to report every patient fall by documenting it in e-care system and completing a report in the Hospital Information System (HIS) (Figure 2). Proper documentation must be factual, timely, and in accordance with the requirements of quality standards.

Clinical Hospital Dubrava has established methods for identifying and detecting incidents that affect or threaten the safety of patients and staff, including medical errors and other adverse events, respectively patient safety indicators (PSI). PSI is integrated into HIS, module "Accreditation". In order to obtain credible information, it is the obligation of every healthcare professional to enter patient treatment data into HIS in a timely and accurate manner. Data is automatically retrieved overnight from the daily input of information for individual patients at the level of organizational units.

The descriptive data lists from the Sector for Hospital Health Care and Quality of Health Care of the Ministry of Health include: number of sick days, number of patient falls among cases defined by inclusion and exclusion criteria, as well as the patient age and gender. Inclusion criteria: patients discharged during the reporting period. Exclusion criteria: falls resulting from the application of force, syncope R55 (ICD-10), and epilepsy G40 (ICD-10). The table records data such as: case identification number (which allows the institution to identify the patient), date of birth, gender, date of admission, diagnosis (ICD-10), patient's fall risk at admission, date of the incident (fall), time of the incident, location of the incident, consequence of the fall, and date of discharge from the institution. The descriptive lists for each indicator, including falls, comply with the Manual on Healthcare Quality Standards and their application.

Fall prevention

Fall prevention requires knowledge of risk factors and implementation of preventive measures to reduce exposure or eliminate the risk completely. Fall

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Taken from HIS Clinical Hospital Dubrava. Accessed on 21. 8. 2023

prevention in the elderly is a challenge due to demographic trends of aging populations. It is estimated that, if the necessary preventive measures are not taken, the number of injuries due to falls will double by 2030 (12). This makes fall prevention a very important challenge for hospital risk management and maintaining a culture of patient safety.

Nurses and technicians prevent patient falls by assessing risk, providing information, adjusting beds and wheelchairs, using safety rails, providing physical assistance with getting up, and maintaining a clean and safe environment. They also educate patients on the use of assistive devices such as canes, walkers, glasses, or hearing aids, and ensure adequate lighting, safe floors, bathtubs, and doorbells are within reach. Fall prevention includes educational programs, multidisciplinary collaboration, and the availability of equipment, such as adapted beds and alarms that facilitate the identification of patients at risk. The implementation of interventions aimed at reducing the risk of falls is key.

The Croatian Institute of Public Health, in cooperation with the Ministry of Health, has developed educational material for mature and elderly people with the aim of reducing falls and their consequences. The leaflet contains practical guidelines on regular health checks, adopting healthy habits, increasing stability when moving, and adapting the home to create a safer environment. It is available at the following link: https://www.hzjz.hr/wp-content/uploads/2022/10/ Sprijecite-pad.pdf (13).

Aim

- examine the frequency of patient falls at Clinical Hospital Dubrava in the period from July 1, 2022 to June 30, 2023,
- present the most common risk factors for falls, causes and consequences of falls, place and manner of fall,
- analyze the need for additional interventions/ actions taken after the fall.

Methods

The analysis was conducted at the level of inpatient organizational units of Clinical Hospital Dubrava in the period from July 1, 2022 to June 30, 2023. Data were collected from the HIS reporting system, incident reports, e-care course, medical history and discharge letters. Data collected included age and gender, the patient's risk of falling upon admission to the institution (Morse scale), the location and manner of the fall, time, types of causes and consequences of the fall, and the need for additional interventions, or actions taken after the fall. This paper uses graphical and chart presentation methods using MS Excel.

The rate in relation to the number of hospitalized patients is expressed as follows:

Number of falls/total number of hospitalized patients x 1000.

The rate in relation to the number of sick days is expressed as follows:

Number of patient falls/patient days x 1000.

Ethics

The Ethics Committee of the Clinical Hospital Dubrava approved the conduct of scientific research entitled: "Falls as an indicator of the quality of healthcare; Analysis of falls in the Clinical Hospital Dubrava" at the session held on October 27, 2023. approval number: 2023/2710-05. During and after the research, privacy and confidentiality of data were ensured, in accordance with ethical guidelines and legal regulations on the protection of personal data.

Results

Data from 20 organizational units of Clinical Hospital Dubrava, where patient falls were recorded, were analyzed. A total of 144 cases of patient falls were reported, which represents an incidence rate of 6.3 falls per 1000 hospitalizations, or 0.935 falls per 1000 patient days.

The total number of discharged patients in the period from July 1, 2022 to June 30, 2023 was 22,639, of which 144 were falls, 74 (51%) male subjects and 70 (49%) female subjects. Of the total 144 patients, 110 (76%) were above 65 years of age (Chart 1).





According to the data on the patient's fall risk at admission to the institution, 130 (90%) patients were at risk for falling, 5 (4%) were at no risk for falling, while 9 (6%) patients were not assessed for falling at all. According to the data analysis, according to the Morse risk assessment scale, 57 (42%) patients were assessed as having a high risk for falling, i.e. more than 45 points. Moderate risk for falling was assessed in 44 (33%) patients, i.e. 25 - 44 points, and 29 (21%) of them had low risk of falling, i.e. 1 - 24 points. A total of 5 (4%) patients were assessed as having no risk of falling (Chart 2).

Internal factors were the cause of the fall in 109 (76%) patients, and external factors in 31 (21%) (Chart 3).



Chart 3. Presentation of causes of falls by factors



Chart 2. Presentation of fall risk assessment according to the Morse scale

120



Chart 4. Presentation of the most common locations of patient falls



Chart 5. Number of patient falls by time of day

Falls most often occurred in the patient's room, 112 (78%), 21 (15%) falls occurred in the bathroom, while 8 (6%) falls were recorded in the hallway (Chart 4).

In the period from midnight to 05:00, 34 falls (24%) were recorded, from 05:00 to 11:00, 32 falls (22%), from 11:00 to 16:00, 36 falls (25%), from 16:00 to 20:00, 16 falls (11%), and from 20:00 to midnight, 26 falls, which is 18% (Chart 5). The results obtained by separating the falls by the hour of the fall indicate that the largest number of falls occurred at 6:00 in the morning (Chart 5.1).

We divided the way patients fell into two categories; 47 (33%) patients fell off the bed, while 97 (67%) fell on the floor by slipping, tripping or stumbling (Chart 6).

Falling off the bed led to hematomas, scratches, abrasions and cuts in 22 (47%) patients, while falling from a height in 70 (72%) patients was without consequences (Chart 7).

There was no need for additional interventions by healthcare professionals, i.e. taking actions after a fall in 68 (47%) patients. The need for radiological examinations was required by 44 (31%) falls, while 25 (17%) and 7 (5%) required observation and surgical interventions (Chart 8).

Discussion

The analysis assessed falls in 22,639 patients hospitalized at Clinical Hospital Dubrava in the period from July 1, 2022 to June 30, 2023. Data from 20 organizational units of Clinical Hospital Dubrava where patient falls were recorded were analyzed. A total of



Chart 5.1. Number of patient falls per hour



Chart 6. Fall pattern overview

144 falls were recorded, with 70 (49%) male and 74 (51%) female patients. Out of a total of 144 patients, 110 (76%) were over 65 years of age, as shown by data from the available literature. Therefore, it is concluded that falls represent a significant clinical problem, especially among patients over 65 years of age. All patients who fall are at risk of injury. Age, gender, and health of the individual can affect the type and severity of injury. Age is one of the key risk factors for falls. Older people have the highest risk of death or serious injury due to falls, and the risk increases with age. For example, in the United States, 20-30% of older people who fall sustain moderate to severe injuries such as bruises, hip fractures, or

head injuries (14). According to the Central Bureau of Statistics, as of 2020, the population is continuously aging, with the average age of the total population of the Republic of Croatia being 43.8 years (men 42.0, women 45.5). This places us among the oldest nations in Europe (15). This could represent a major public health problem given the significant impact on falls in people over 65 years of age. Patients over 65 years of age most often have impaired vision and are less mobile, which increases their risk of falling due to their clinical condition, infrastructure, and environment (16). Given that the number of patients at risk of falling increases due to aging, it is necessary to support organizational factors to ensure quality healthcare for patients at risk of falls, which includes an adequate number of nurses/technicians and investment in education and competence enhancement. For the purpose of assessing the risk of falls in Clinical Hospital Dubrava, the Morse scale is used as an integral part of the nursing documentation, and in the conducted study, 57 (42%) patients were assessed as having a high risk of falls, i.e. with more than 45 points. Early identification of patients at high risk of falls at the beginning of their hospital stay is a crucial first step towards implementing proactive prevention strategies within the hospital. Multiple common risk factors for falls have been described among the elderly population in both community and hospital settings, including previous falls, physical impairment, age, altered mental status, and medications (17). It is important and mandatory to categorize all patients, given that in 6% of patients no risk of falls had been assessed at all upon



Chart 7. Type of consequences according to the type of fall



Chart 8. Presentation of additional interventions

hospitalization. Education of nurses/technicians is also necessary regarding procedures for patients assessed to be at high risk for falls. A review of the literature reveals the 6 PACK model for implementing fall prevention programs, which includes the following six interventions: a "fall alert" sign placed above the bed, patient monitoring in the bathroom, ensuring walking aids are within easy reach of the patient, a toileting schedule, providing a low bed, and an alarm for the bed/chair (18). The model mentioned is something that could be considered and introduced into our work process. What could be applied in practice, without requiring significant financial expenditure, is the use of a fall alert sign. In high-risk areas, additional visual and audible warnings are placed to draw attention to the danger. Analyzing all steps of the 6 PACK model requires planned management of the hospital's financial costs and human resources, and the model itself allows for a systematic and strategic approach to cost control, optimization of human and material resources, and improvement of operational efficiency.

According to the division of external and internal risk factors for falls, most patients fell due to internal factors such as dizziness, confusion, disorientation, syncope, leg weakness, and chronic diseases like diabetes. Among external factors, the most common causes of falls were slipping on wet floors, tripping, and stumbling. After conducting the analysis, it was concluded that falls most frequently occur in the patient's room, while smaller percentages of falls were recorded in the bathroom and hallways. Research in the hematology department and in the population with cardiovascular diseases confirms that the patient's room is the most common location for falls. (19, 20). Regarding the frequency of falls by time of day, the results indicate an equal distribution of falls in day and night shifts, with a small increase in the number of falls in the night shift, when patients are often less supervised. Most falls were recorded in the morning hours, which can be associated with the beginning of patients' activities. Patient falls were divided into two categories according to the mode of fall: falls off the bed and falls on level ground. Falls off the bed often caused hematomas, abrasions, and cuts, while falls from a height were mostly without consequences, but some patients sustained hematomas, fractures, and cuts. Each fall required medical intervention, but in many cases, there was no need for additional interventions or actions after the fall. The need for radiological examinations was common, with particular emphasis on CT scans of the head, which were performed in a large number of patients. Falls also required observation and, in a minority of cases, surgical interventions. A study conducted at Tokushima University Hospital also confirms the high incidence of falls in the patient room (21). All additional interventions after a fall require time and staff presence, and research confirms that nurses/technicians are faced with insufficient resources, making it difficult or even impossible for them to meet all the requirements outlined in individual care plans. It is certain that an adequate number of medical staff is crucial for improving patient treatment outcomes and reducing the risk of falls, and therefore, the number of nurses plays a significant role in fall prevention or management in clinical settings. While the absolute number of nurses/technicians is closely linked to patient safety, the competence of nurses/ technicians is also a factor associated with patient safety (18). As previously noted, falls in hospitals are common and pose significant complications in the provision of hospital care, particularly among older patients. Epidemiological studies have found that falls occur at a rate of 3-5 per 1000 hospital days, and the US Agency for Healthcare Research and Quality estimates that 700,000 to 1 million hospitalized patients fall each year. Patients in long-term care facilities are also at very high risk of falls. Approximately half of the 1.6 million nursing home residents in the United States fall each year, and a 2014 report by the Office of Inspector General found that nearly 10% of adverse events experienced by residents of Medicare-gualified nursing facilities were falls that resulted in significant injury (22). Fall reports and adverse event reports, as well as the overall nursing documentation, must be maintained in a timely and complete manner as official evidence of work. The purpose of nursing documentation is to ensure effective communication within the team throughout the entire patient care process, support informatization, allow for monitoring costs relative to efficiency, and serve as a source of information for future nursing research. Nursing documentation represents a comprehensive record of all procedures during treatment, is an integral part of medical documentation, and serves as a part of legal protection.

Conclusion

In conclusion, falls represent a serious clinical problem, especially among older patients who, due to their specific health conditions and related factors, are at a higher risk of injury. Data collected at the Clinical Hospital Dubrava confirm the importance of early identification of patients at high risk of falls and the implementation of preventive measures. In addition to physical and environmental factors, organizational aspects such as the adequate number of medical staff, their competencies, and education play a key role in significantly reducing the risk of falls and improving patient safety. Timely nursing documentation ensures effective communication within the team, monitoring of care efficiency, and legal protection. Given the demographic changes and an aging population, it is essential to invest in the development of resources and strategies for effectively managing the risk of falls, in order to ensure quality healthcare and reduce the frequency of adverse events. The Quality Assurance and Improvement Department of the Clinical Hospital Dubrava actively promotes a safety culture and will continue to improve healthcare quality, contributing to better patient protection and improved treatment outcomes.

"Patient safety is the most reliable measure of the quality of the healthcare system."

Author contributions

All three authors equally contributed to all stages of the manuscript preparation, including the study design, data collection and analysis, as well as writing and editing the manuscript. All authors have read and approved the final version of the manuscript.

Conflict of interest

The authors declare no conflicts of interest.

Acknowledgments

The authors express their sincere gratitude to Clinical Hospital Dubrava for its support and for providing the necessary conditions to conduct this research. Special appreciation is extended to the hospital's then Head Nurse, Ms. Ana Primorac, for her kind cooperation and understanding.

Funding

This research received no external funding.

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