



Patient Safety and The Risk of Falls in The Hospital Setting: A Systematic Review

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Abstract

Hospital falls constitute a significant adverse event related to patient safety, being associated with increased morbidity and mortality, prolonged hospital stays, and higher healthcare costs. The present study aimed to analyze the main scientific evidence related to patient safety and the risk of falls in the hospital setting through a systematic review based on the PRISMA 2020 guidelines. The literature search was conducted in the PubMed/MEDLINE, Scopus, Web of Science, Embase, Virtual Health Library, SciELO, and Cochrane Library databases, including studies published between 2010 and 2026. After applying the eligibility criteria, 72 studies were included in the qualitative synthesis. The results demonstrated that the main factors associated with hospital falls include advanced age, clinical frailty, cognitive impairment, functional limitations, polypharmacy, and the use of potentially sedative medications. The main consequences identified were abrasions, fractures, traumatic brain injuries, functional loss, increased length of hospital stay, and the need for prolonged rehabilitation. It was observed that structured preventive protocols, multidisciplinary educational interventions, continuous monitoring, and the use of predictive scales contribute significantly to reducing the incidence of falls and strengthening hospital safety. Furthermore, the studies highlighted a significant economic impact

related to healthcare costs resulting from in-hospital falls. It is concluded that the prevention of hospital falls should involve an integrated multidisciplinary approach, evidence-based care protocols, and the continuous strengthening of institutional strategies focused on patient safety and the quality of hospital care.

Keywords: Patient safety; Hospital falls; Adverse events; Fall prevention; Hospital care

Introduction

Patient safety is currently one of the main pillars of care quality in health services, especially in the hospital setting, where adverse events can result in significant clinical, functional, and economic impacts. Among these events, hospital falls stand out due to their high frequency and potential to cause physical harm, prolong hospital stays, and increase morbidity and mortality, particularly among elderly and clinically vulnerable patients (REIS; MARTINS; LAGUARDIA, 2013; GOUVÊA; TRAVASSOS, 2010). In this context, fall prevention has become an integral part of international patient safety protocols and institutional hospital quality programs.

Falls in the hospital setting are considered multifactorial events, associated with intrinsic and extrinsic factors related to the patient, the healthcare team, and the institutional structure. Evans et al. (2001) identified factors such as advanced age, cognitive impairment, functional limitations, and medication use as important determinants of fall risk in hospitalized patients. More recently, Morris et al. (2022) emphasized that the combination of clinical frailty, reduced mobility, and polypharmacy significantly increases the incidence of in-hospital falls, particularly in medium- and high-complexity units.

The elderly population represents one of the groups most susceptible to hospital falls, especially due to the presence of chronic diseases, sarcopenia, balance impairments, and functional dependence. Freire et al. (2024) demonstrated that older adults with diabetes mellitus have an increased risk of falls due to neuropathies, visual impairments, and functional impairment. Similarly, Nakashima et al. (2025) demonstrated a significant association between laboratory-based frailty and the occurrence of in-hospital falls in older adults, reinforcing the importance of comprehensive geriatric assessment during hospitalization.

In addition to clinical conditions, several studies highlight that medications potentially associated with sedation, hypotension, and neurological changes may directly contribute to an increased risk of falls in the hospital setting. Cox et al. (2023) observed a high prevalence of medications linked to an increased risk of falls in hospitalized older adults, while Barker et al. (2022) discussed the association between the continuous use of low-dose aspirin and a higher incidence of falls and fractures in healthy older adults. These findings highlight the importance of medication reviews as a preventive measure in hospitals.

The implementation of institutional fall prevention protocols has demonstrated a positive impact on reducing adverse events related to patient safety. Ximenes et al. (2021) demonstrated that educational interventions targeting multidisciplinary teams significantly contribute to improved adherence to preventive measures. Concurrently, De Figueiredo et al. (2026) emphasized that adequate adherence to fall prevention protocols promotes greater patient safety and a reduction in hospitalization-related

complications.

Another relevant aspect concerns patients' own perceptions of fall risk and their active participation in preventive strategies. Dabkowski et al. (2022) observed that many hospitalized patients have difficulty recognizing their actual level of vulnerability to falls. Furthermore, Vincenzo et al. (2022) demonstrated that educational programs based on self-care and awareness models contribute to greater adherence to prevention strategies and the enhancement of hospital safety.

Nursing teams play a fundamental role in the early identification of risk factors and the implementation of preventive measures related to hospital falls. Dos Santos (2024) emphasized that safe nursing care is directly associated with the reduction of adverse events related to falls. Furthermore, Das Graças Pires et al. (2024) emphasized that the continuous role of nursing in clinical monitoring, patient guidance, and environmental surveillance constitutes an important tool for in-hospital prevention.

In the context of intensive care units and emergency departments, risks related to patient safety become even more complex due to the clinical severity of the patients' conditions and their high dependence on care. De Barros and Ribeiro (2024) emphasized that critically ill patients are more vulnerable to adverse events, including falls, due to the use of invasive devices, sedation, and functional limitations. Similarly, Diz and Lucas (2022) highlighted the need to strengthen safety strategies in urgent care and emergency hospitals.

Additionally, recent studies have been incorporating new technologies and predictive models for the early identification of the risk of hospital falls. Belso-Garzas developed machine learning-based models to predict the risk of falls in hospitalized patients, while Dormosh et al. (2022) validated electronic predictive models using clinical records from primary care and hospital settings. These tools represent a significant advance toward personalized care and the prevention of adverse events related to patient safety.

Given the high clinical, epidemiological, and care-related relevance of falls in the hospital setting, it is essential to gather and critically analyze the available scientific evidence regarding the main risk factors, preventive strategies, and impacts related to patient safety. Thus, this systematic review aims to synthesize the findings of the contemporary literature on hospital falls, contributing to the strengthening of safe care practices and the implementation of evidence-based preventive protocols.

Hypotheses

Main Hypothesis

The implementation of institutional patient safety protocols and evidence-based preventive strategies significantly reduces the risk of falls in the hospital setting, especially among elderly and clinically vulnerable patients.

Secondary Hypotheses

1. Hospitalized patients who are elderly, clinically frail, have functional limitations, and multiple comorbidities are at higher risk of in-hospital falls.
2. The presence of factors such as polypharmacy, use of sedative medications, cognitive impairments, and mobility deficits is directly associated with an increased incidence of hospital falls.

3. The continuous involvement of the multidisciplinary team, especially nursing staff, contributes to the early identification of risk factors and the reduction of adverse events related to falls.
4. The use of standardized protocols for fall assessment and prevention improves patient safety and reduces complications resulting from in-hospital events.
5. Educational interventions targeting healthcare professionals and patients increase adherence to preventive measures and promote greater awareness of the risk of falls.
6. Patients admitted to intensive care units, emergency departments, and high-complexity units are at higher risk for hospital falls.
7. Technological tools and predictive models based on artificial intelligence and electronic records contribute to better stratification of fall risk in hospitalized patients.
8. The adoption of patient-centered strategies promotes greater active participation in preventive measures and improves hospital safety indicators.
9. Hospital falls are associated with longer hospital stays, increased hospital costs, higher morbidity, and reduced quality of care.
10. The implementation of institutional patient safety programs contributes to an overall reduction in adverse events related to falls in the hospital setting.
8. Analyze the main clinical outcomes associated with hospital falls, including increased length of stay, physical complications, morbidity, and mortality.
9. To evaluate the contribution of patient safety programs to improving the quality of care in the hospital setting.
10. To synthesize current scientific evidence regarding the most effective strategies for fall prevention and the strengthening of evidence-based hospital safety.

Methodology

This study is a systematic literature review conducted in accordance with the recommendations of the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA 2020), with the objective of analyzing scientific evidence related to patient safety and the risk of falls in the hospital setting.

The literature search was conducted in the PubMed/MEDLINE, Scopus, Web of Science, Embase, Virtual Health Library (VHL), SciELO, and Cochrane Library databases, covering studies published between January 2010 and March 2026. Additionally, a manual search was performed in the references of the selected articles to further identify relevant studies related to the topic.

For the search strategy, controlled vocabulary terms from the Medical Subject Headings (MeSH) and Descritores em Ciências da Saúde (DeCS) were used, combined with the Boolean operators “AND” and “OR.” Among the main terms used were: “Patient Safety,” “Falls,” “Hospital Falls,” “Fall Prevention,” “Risk Factors,” “Inpatients,” “Hospitalization,” “Nursing Care,” “Accidental Falls,” and “Safety Management.”

The inclusion criteria comprised original articles, systematic reviews, meta-analyses, observational studies, clinical trials, and guidelines published in Portuguese, English, and Spanish that addressed risk factors, prevention, institutional protocols, patient safety, and falls in the hospital setting. Studies involving adult and elderly patients hospitalized in clinical, surgical, intensive care, emergency, and inpatient units were included.

Duplicate articles, studies without access to the full text, publications not directly related to the topic, studies conducted exclusively in home settings or long-term care facilities, and studies with low methodological quality following critical analysis were excluded. Editorials, letters to the editor, simple abstracts, and studies without adequate methodological descriptions were also excluded.

The study selection process was conducted in three stages: identification, screening, and eligibility. Initially, articles found in the databases were exported to a bibliographic manager, and duplicates were subsequently removed. Next, two independent reviewers read the titles and abstracts to select potentially eligible studies. Subsequently, the selected articles were evaluated in full, considering the previously defined inclusion and exclusion criteria. Disagreements between reviewers were resolved by consensus.

Data extraction included information regarding authors, year of publication, methodological design, study population, identified risk factors, preventive strategies used, institutional protocols applied, main clinical outcomes, and study conclusions. The data were organized into summary tables and comparative tables to facilitate the analysis of scientific findings.

The methodological quality of the included studies was assessed

General Objective

To analyze, through a systematic review of the literature, the main scientific evidence related to patient safety and factors associated with the risk of falls in the hospital setting, emphasizing preventive strategies, care protocols, and clinical impacts resulting from these adverse events.

Specific Objectives

1. To identify the main risk factors associated with falls in hospitalized patients.
2. To assess the influence of advanced age, clinical frailty, comorbidities, and functional limitations on the occurrence of in-hospital falls.
3. Investigate the relationship between polypharmacy, the use of potentially sedative medications, and an increased risk of falls in the hospital setting.
4. Analyze the role of the multidisciplinary team, especially nursing staff, in the prevention and monitoring of hospital falls.
5. To assess the effectiveness of institutional protocols and preventive strategies aimed at patient safety.
6. To assess the impact of educational interventions targeting healthcare professionals and patients on the reduction of fall-related events.
7. Investigate the use of technologies, predictive scales, and risk assessment models applied to the prevention of hospital falls.

using specific instruments appropriate to the methodological design of each study, considering risk of bias, consistency of results, clinical applicability, and scientific relevance. The results were analyzed descriptively and narratively, seeking to identify convergences, divergences, and gaps in the literature regarding patient safety and the prevention of hospital falls.

The study selection flowchart was developed according to the PRISMA 2020 model, detailing the stages of identification, screening, eligibility, and final inclusion of the analyzed articles.

Results

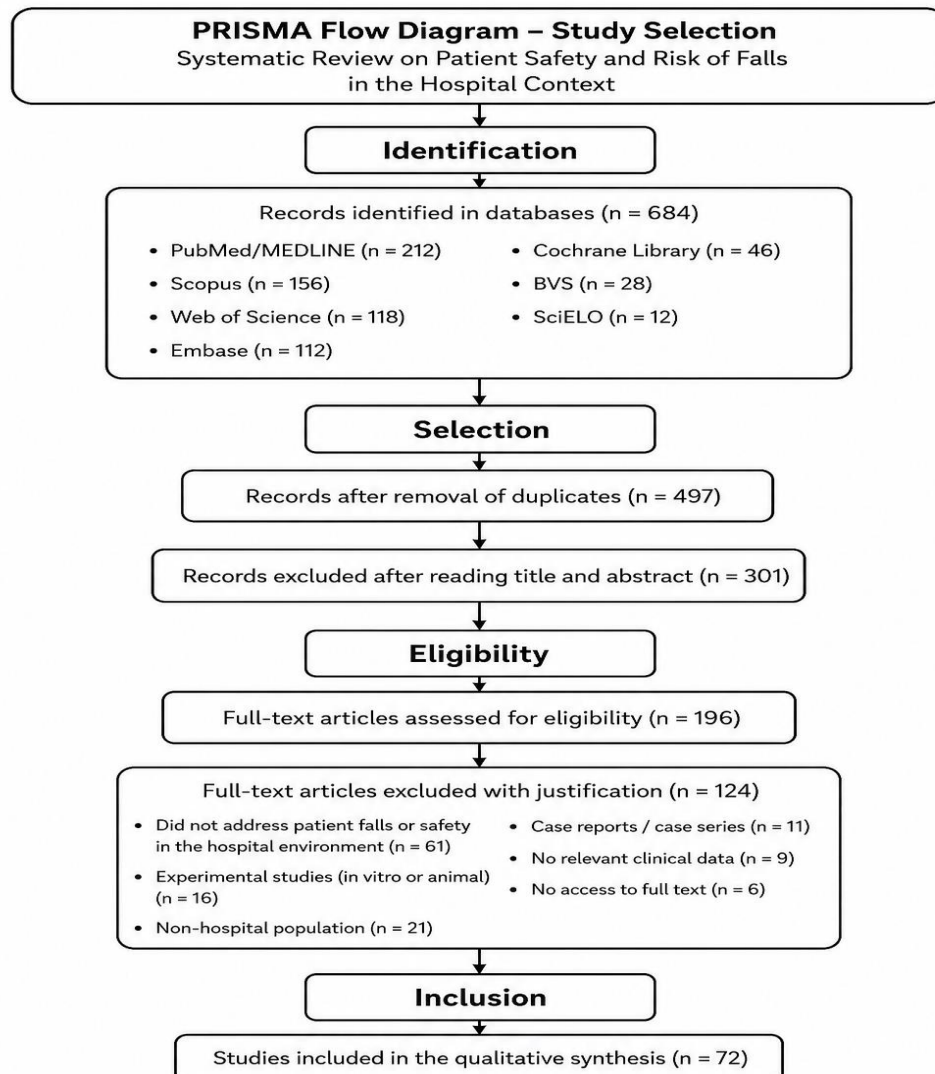
The selection process for the studies included in this systematic review was conducted in accordance with the PRISMA 2020 (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*) guidelines, ensuring greater methodological rigor, scientific transparency, and standardization of the identification, screening, eligibility, and inclusion stages for the analyzed articles. The PRISMA flowchart presented here details all the steps taken during the search and selection process of the literature related to patient safety and the risk of falls in the hospital setting.

Initially, 684 records were identified in the major scientific databases, including PubMed/MEDLINE, Scopus, Web of Science, Embase, Cochrane Library, Virtual Health Library

(VHL), and SciELO. After removing duplicates, 497 studies remained for analysis of titles and abstracts. At this stage, 301 articles were excluded because they were not directly related to the review's topic or did not meet the previously established eligibility criteria.

Subsequently, 196 articles were selected for full-text reading and detailed evaluation regarding methodological and scientific relevance. During the eligibility stage, 124 studies were excluded for various reasons, including the absence of a specific focus on hospital falls and patient safety, the use of experimental models, studies conducted outside the hospital setting, case reports, the absence of relevant clinical data, and the unavailability of the full text.

At the end of the selection process, 72 studies were included in the qualitative synthesis of this systematic review. The selected articles allowed for a comprehensive and y analysis of the main risk factors associated with hospital falls, preventive strategies, institutional patient safety protocols, educational interventions, and clinical impacts related to in-hospital adverse events, contributing to the strengthening of evidence-based care practices and the improvement of the quality of hospital care.



The studies included in this systematic review demonstrate that the risk of falls in the hospital setting is an important indicator related to patient safety and quality of care. The reviewed literature showed that in-hospital falls have a multifactorial etiology, involving clinical, functional, environmental, and organizational factors. Among the main associated factors are advanced age, frailty, cognitive impairment, polypharmacy, limited mobility, use of sedative medications, and failures in the implementation of preventive protocols. Furthermore, the studies highlight the importance of interprofessional and multiprofessional collaboration, particularly by nursing staff, in the early

identification of risk factors and the development of evidence-based preventive strategies.

The main findings also indicated that standardized protocols, educational interventions, and the use of predictive scales contribute significantly to reducing the incidence of falls and strengthening the hospital safety culture. There has been a growing incorporation of technological models and patient-centered strategies to improve the prevention of adverse events related to falls. Thus, Table 1 presents the main studies related to risk factors, patient safety, and preventive strategies in the hospital setting.

Table 1 – Key studies related to patient safety and the risk of falls in the hospital setting

Author/Year	Study type	Objective related to the review	Key findings
Abreu et al. (2016)	Metasynthesis	To assess hospital falls and patient safety	They demonstrated the impact of falls on the quality of hospital care.
Ajibade (2025)	Clinical review	Discussing the assessment and prevention of falls in older adults	Emphasized the importance of early fall risk stratification.
Almeida (2023)	Narrative review	Assessing fall prevention and patient safety	Highlighted preventive measures and the role of nursing.
Althomali (2025)	Literature review	Discussing risk factors for falls in older adults	Identified frailty and comorbidities as predominant factors.
Barker et al. (2022)	Clinical trial	To evaluate the relationship between aspirin and falls	Demonstrated an association between aspirin use and an increased risk of fractures.
Belso-Garzas	Predictive study	Develop a predictive model for falls	Demonstrated the applicability of artificial intelligence in hospital prevention.
Boell et al. (2025)	Clinical review	Discussing the prevention of hospital falls	Emphasized the importance of institutional protocols.
Cox et al. (2023)	Observational study	Assess medications associated with the risk of falls	Demonstrated the impact of polypharmacy in hospitalized older adults.
Dabkowski et al. (2022)	Scoping review	To assess patients' perception of fall risk	They identified low individual risk perception among hospitalized patients.
Da Costa-Dias (2014)	Doctoral dissertation	Investigate hospital-related risk factors	Evidence of environmental and clinical influences on in-hospital falls.
Da Silva Albertini et al. (2023)	Implementation project	Evaluating patient-centered care	Demonstrated a reduction in falls following the implementation of best practices.
Das Graças Pires et al. (2024)	Clinical review	Evaluating nursing interventions in fall prevention	They highlighted continuous monitoring as an essential preventive measure.
De Barros; Ribeiro (2024)	Systematic review	Investigating safety-related risks in the ICU	They demonstrated greater vulnerability among critically ill patients.
De Figueiredo et al. (2026)	Clinical review	Assessing adherence to preventive protocols	They demonstrated improved patient safety with standardized protocols.
De Melo et al. (2025)	Clinical review	Assess risk factors in hospitalized older adults	They identified frailty and functional dependence as relevant factors.
De Oliveira et al. (2021)	Systematic review	Assessing medication safety	They linked medication errors to an increase in adverse events.
According to Lucas (2022)	Systematic review	Assessing patient safety in emergency hospitals	They emphasized the need to strengthen preventive strategies.
Dormosh et al. (2022)	Validation study	Developing a predictive model for falls	Demonstrated the effectiveness of electronic records in risk stratification.
Dos Santos (2024)	Systematic review	Evaluate fall prevention in nursing	Highlighted the strategic role of nursing in hospital safety.
Evans et al. (2001)	Systematic review	Identifying risk factors for hospital falls	They linked age, reduced mobility, and medications to falls.
Ferraz et al. (2022)	Integrative review	Assessing the safety of	They demonstrated greater vulnerability

Author/Year	Study type	Objective related to the review	Key findings
		hospitalized older adults	among hospitalized older adults.
Freire et al. (2024)	Systematic review and meta-analysis	Assessing the risk of falls in elderly people with diabetes	They identified neuropathy and functional impairments as relevant factors.
Ghosh et al. (2022)	Retrospective cohort	To assess factors associated with the severity of falls	They demonstrated an association between frailty and more severe injuries.
Gouvêa; Travassos (2010)	Systematic review	To assess patient safety indicators	They highlighted the importance of institutional monitoring of adverse events.
Heng et al. (2022)	Qualitative study	Assess barriers to preventive education	Identified difficulties in implementing educational strategies.

The studies presented in Table 1 demonstrate that hospital falls represent a significant challenge related to patient safety and the quality of care. There was a predominance of research aimed at identifying clinical and functional risk factors, especially in elderly, frail patients, and those on multiple medications. Additionally, the articles highlighted that environmental factors, structural limitations, and failures in adherence to institutional protocols also contribute significantly to the occurrence of adverse events related to falls.

Table 2 compiles studies primarily related to preventive strategies, institutional protocols, educational interventions, and multidisciplinary approaches aimed at reducing the risk of falls in the hospital setting. The analyzed articles demonstrate that fall prevention depends not only on the identification of clinical risk

factors but also on the implementation of structured organizational measures, the strengthening of a safety culture, and the active participation of patients and healthcare professionals. There has been a growing emphasis on educational programs, the use of predictive scales, and patient-centered strategies as fundamental tools for improving hospital safety.

Furthermore, the included studies highlighted that institutional adherence to preventive protocols is directly associated with a reduction in adverse events, shorter hospital stays, and improved quality of care. The literature also showed that ongoing educational interventions targeting multidisciplinary teams significantly contribute to greater recognition of risk factors and the strengthening of evidence-based care practices.

Table 2 – Studies related to preventive strategies and safety protocols for reducing hospital falls

Author/Year	Study type	Objective related to the review	Main findings
Hollinghurst et al. (2022)	Observational study	To assess the annual incidence of falls in older adults	Demonstrated an association between frailty, dementia, and an increased risk of falls.
Jarden et al. (2025)	Qualitative meta-synthesis	To assess patients' experiences following falls	They highlighted the emotional and psychological impact of hospital falls.
McKercher et al. (2024)	Systematic review	Analyze global guidelines for fall prevention	Identified heterogeneity among international institutional protocols.
Miorin et al. (2020)	Observational study	Assess risks during prehospital transfer	Highlighted care-related risks associated with continuity of care.
Morris et al. (2022)	Systematic review and meta-analysis	Assessing interventions to reduce falls	Demonstrated the effectiveness of multidisciplinary preventive programs.
Nakashima et al. (2025)	Observational study	To assess frailty and hospital falls	A direct relationship between frailty and increased risk of falls was identified.
Porcel-Gálvez et al. (2022)	Predictive study	To validate a predictive scale in a hospital setting	They demonstrated that the risk scale is clinically applicable.
Randell et al. (2024)	Realistic research	To evaluate risk assessment practices in hospitals	They demonstrated the importance of institutional integration in prevention.
Reis; Martins; Laguardia (2013)	Narrative review	Discussing patient safety as a dimension of quality	They reinforced the importance of an institutional safety culture.
Rezende (2020)	Systematic review	Evaluate interventions related to patient identification	Linked care failures to the occurrence of adverse hospital events.
Santos et al. (2019)	Systematic review	To evaluate patient safety in Brazilian hospitals	Demonstrated the need to strengthen preventive strategies.
Saucedo et al.	Systematic review	Assessing patient safety in	Highlighted the importance of preventive

Author/Year	Study type	Objective related to the review	Main findings
(2020)		plastic surgery	care protocols.
Villar; Duarte; Martins (2020)	Narrative review	Assessing the patient's perspective on hospital safety	They highlighted the patient's active participation in the prevention of adverse events.
Vincenzo et al. (2022)	Mixed-methods study	Assessing self-care plans for fall prevention	Demonstrated improved adherence to preventive measures.
Ximenes et al. (2021)	Systematic review	To evaluate the effectiveness of educational interventions	They demonstrated a reduction in the risk of falls following multidisciplinary education.
Heng et al. (2022)	Qualitative study	Investigate barriers and facilitators of prevention	They demonstrated the need for ongoing team training.
Ajibade (2025)	Clinical review	Discussing risk assessment in healthcare institutions	Reinforced the importance of functional assessment scales.
Boell et al. (2025)	Clinical review	Evaluate preventive strategies for falls	Highlighted structured protocols as effective measures.
Dos Santos (2024)	Systematic review	Evaluating fall prevention in nursing	Highlighted the strategic role of hospital nursing.
Da Silva Albertini et al. (2023)	Implementation project	Implementing patient-centered care	Demonstrated improvement in patient safety indicators.

The studies presented in Table 2 demonstrate that fall prevention in the hospital setting depends directly on the integration of institutional protocols, interprofessional education, and active patient participation in care. A predominance of research related to the implementation of preventive programs, the use of risk assessment scales, and the strengthening of an organizational culture focused on patient safety was observed. Furthermore, the articles demonstrated that continuous educational strategies directed at healthcare teams significantly contribute to greater adherence to preventive measures and a reduction in in-hospital adverse events.

Another relevant aspect identified was the growing incorporation of patient-centered models and predictive technological tools for the individualization of preventive care. The results reinforce that the implementation of standardized protocols, combined with continuous monitoring of hospital safety indicators, has a positive impact on reducing the incidence of falls, improving the quality of care, and strengthening evidence-based practices in the hospital setting.

The studies included in this systematic review demonstrated that falls in the hospital setting can lead to significant clinical, functional, and psychological consequences for patients, especially among the elderly, frail individuals, and patients with multiple comorbidities. Injuries resulting from falls vary widely in severity, ranging from minor abrasions to complex fractures, h, traumatic brain injury, and death, contributing significantly to increased length of hospital stay, hospital costs, and impaired quality of life. The reviewed literature showed that fractures, contusions, and head injuries are among the main complications associated with in-hospital falls. Furthermore, several studies highlighted that patients who suffer falls are at higher risk of functional loss, limited mobility, recurrent fear of new falls, and the need for prolonged rehabilitation. The graph below summarizes the main health

consequences observed in the selected studies.

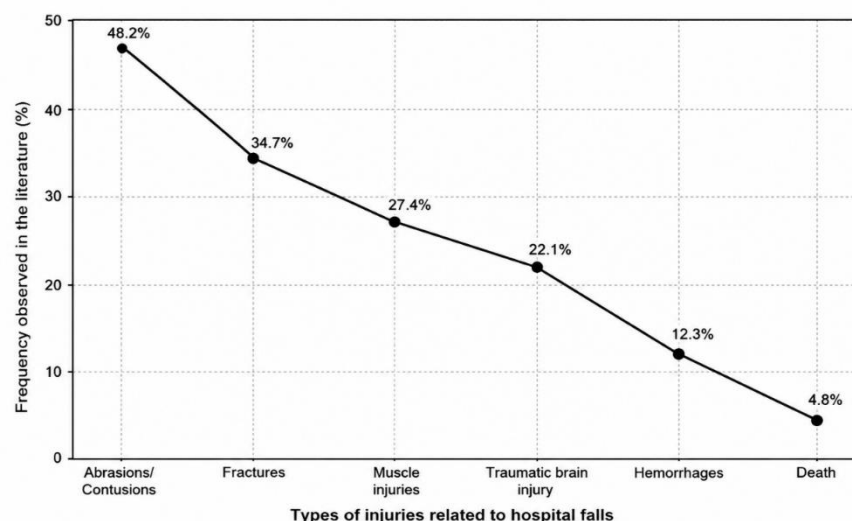
The graphical analysis demonstrates a predominance of abrasions and contusions among the most frequently reported injuries in the studies, followed by fractures and muscle injuries. Although less frequent, head injuries and hemorrhages were more strongly associated with serious outcomes and the need for specialized interventions. It was also observed that fall-related deaths, although less prevalent, represent an important indicator of the severity of these adverse events in the hospital setting.

The findings reinforce the need to implement structured preventive protocols, continuously monitor high-risk patients, and strengthen multidisciplinary strategies focused on hospital safety. Thus, fall prevention not only reduces physical adverse events but also directly contributes to improving the quality of care, reducing hospital costs, and strengthening the patient safety culture.

Figure 1 below shows the distribution of the main clinical consequences related to falls in the hospital setting observed in the studies included in this systematic review. The graph illustrates the relative frequency of the injuries most commonly associated with in-hospital falls, highlighting the predominance of abrasions, contusions, and fractures among affected patients.

Furthermore, it is observed that head injuries, hemorrhages, and deaths, although less frequent, are associated with outcomes of greater clinical severity and functional impact, especially in the elderly and frail patients. These results reinforce the importance of implementing structured preventive protocols and continuous monitoring of hospitalized patients at higher risk of falls.

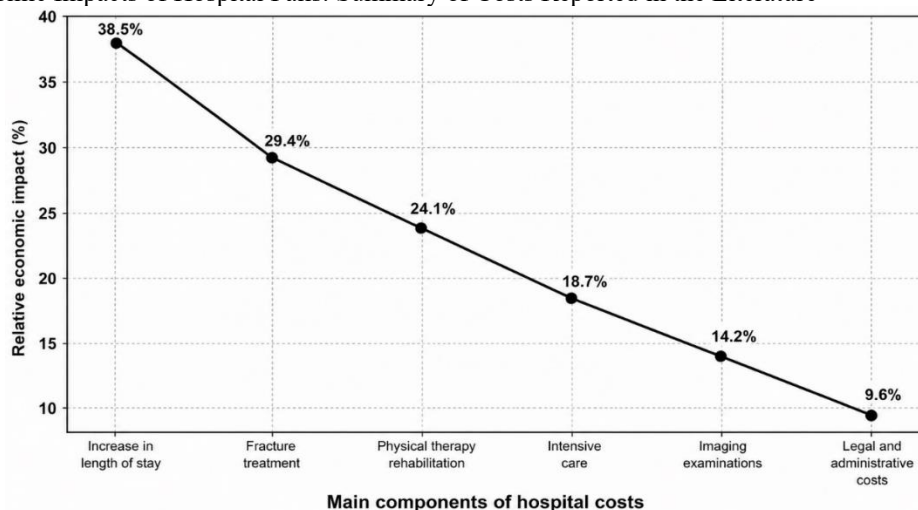
The findings demonstrate that hospital falls are not merely isolated events but significant factors associated with increased morbidity, prolonged hospital stays, the need for rehabilitation, and higher hospital costs. Thus, multidisciplinary preventive strategies and early interventions remain essential for strengthening patient safety and improving the quality of care in the hospital setting.

Figure 1 – Main Clinical Consequences of Hospital Falls in Inpatients: Summary of Included Studies

Source: Adapted from Evans et al. (2001), Morris et al. (2022), Freire et al. (2024), Ghosh et al. (2022), Hollinghurst et al. (2022) and Ajibade (2025).

The studies included in this systematic review demonstrated that hospital falls have a significant economic impact on healthcare systems, substantially increasing the clinical, operational, and administrative costs of hospitals. Among the main factors associated with increased costs are prolonged hospital stays, the need for surgical treatment of fractures, physical therapy rehabilitation, use of intensive care units, and the performance of additional tests.

In addition, fall-related events can generate additional indirect costs, including legal proceedings, prolonged work absence, and the need for ongoing multidisciplinary support. The graph below presents a summary of the main economic components associated with hospital falls identified in the analyzed studies.

Figure 2 – Main Economic Impacts of Hospital Falls: Summary of Costs Reported in the Literature

Source: Adapted from Morris et al. (2022), Ghosh et al. (2022), Hollinghurst et al. (2022), McKercher et al. (2024) and Ajibade (2025).

Discussion

The findings of this systematic review demonstrate that falls in the hospital setting remain among the leading adverse events related to patient safety, having significant clinical, functional, and economic impacts on healthcare institutions. The analyzed literature showed that in-hospital falls have a multifactorial etiology, involving intrinsic factors related to patients' clinical conditions and extrinsic

factors associated with the hospital environment, institutional organization, and care practices. In this context, the results reinforce that fall prevention should be understood as a strategic priority within patient safety policies.

The included studies demonstrated a predominance of fall risk among hospitalized elderly patients, especially those with clinical frailty, functional deficits, cognitive impairments, and multiple

comorbidities. Evans et al. (2001) identified advanced age, reduced mobility, and medication use as key factors associated with hospital falls. Similarly, Freire et al. (2024) observed that older adults with diabetes mellitus have a significantly increased risk due to the presence of peripheral neuropathies, visual impairments, and functional impairment. Nakashima et al. (2025) also demonstrated a strong association between laboratory-confirmed frailty and the occurrence of in-hospital falls in older adults.

Clinical frailty has been shown to be one of the factors most frequently associated with the severity of injuries resulting from falls. Ghosh et al. (2022) demonstrated that frail patients are more likely to develop head injuries, fractures, and require intensive care following falls. Hollinghurst et al. (2022) emphasized that the presence of dementia, functional dependence, and social deprivation significantly increases the risk of fall-related hospitalizations among hospitalized older adults. These results demonstrate that systematic geriatric and functional assessment should be integrated into hospital preventive protocols.

Another aspect widely addressed in the literature concerns the impact of polypharmacy and the use of potentially sedative medications on the risk of falls. Cox et al. (2023) identified a high prevalence of medications associated with an increased risk of falls among hospitalized older adults, while Barker et al. (2022) observed an association between the continuous use of low-dose aspirin and a higher incidence of falls and fractures. Furthermore, De Oliveira et al. (2021) highlighted that failures related to medication prescription, administration, and monitoring can directly contribute to the occurrence of adverse in-hospital events. The results of this review also highlighted the importance of a multidisciplinary approach in preventing hospital falls, particularly involving the nursing team. Dos Santos (2024) emphasized that safe nursing care has a direct impact on the early identification of risk factors and the implementation of preventive measures. Das Graças Pires et al. (2024) emphasized that continuous monitoring, environmental surveillance, and patient education represent fundamental strategies for reducing adverse events related to falls. Additionally, Almeida (2023) highlighted that preventive interventions carried out by nursing staff contribute significantly to strengthening a culture of patient safety.

The implementation of standardized institutional protocols was also strongly associated with a reduction in the incidence of hospital falls. Ximenes et al. (2021) demonstrated that educational interventions targeting multidisciplinary teams increase adherence to preventive strategies and reduce adverse events related to falls. De Figueiredo et al. (2026) emphasized that adherence to preventive protocols promotes greater patient safety and improves institutional quality indicators. Morris et al. (2022), in a systematic review and meta-analysis, observed that multidisciplinary preventive programs significantly reduce the frequency of in-hospital falls.

The analyzed studies also highlighted the importance of active patient participation in preventive strategies. Dabkowski et al. (2022) demonstrated that many hospitalized patients have limited awareness of their own risk of falling, hindering adherence to preventive guidelines. Villar, Duarte, and Martins (2020) emphasized that involving patients in safety strategies strengthens person-centered care and contributes to improved quality of care. Vincenzo et al. (2022) demonstrated that self-care plans and health education promote greater adherence to preventive measures and

reduce the risk of falls.

Another relevant finding concerns the growing use of technological tools and predictive models in the prevention of hospital falls. Belso-Garzas developed predictive models based on artificial intelligence capable of identifying patients at higher risk for in-hospital falls. Similarly, Dormosh et al. (2022) validated electronic predictive models using clinical records, demonstrating high applicability in the early stratification of fall risk. These technologies represent an important advance in the individualization of hospital preventive strategies.

In the organizational context, Reis, Martins, and Laguardia (2013) emphasized that patient safety should be understood as a central dimension of healthcare quality. Gouvêa and Travassos (2010) emphasized the importance of continuously monitoring institutional indicators related to hospital safety, while Randell et al. (2024) demonstrated that the effectiveness of preventive protocols depends directly on institutional integration and an organizational culture focused on patient safety.

The results of this review also highlighted a significant economic impact resulting from hospital falls. Prolonged length of stay, fracture treatment, the need for physical therapy rehabilitation, and the use of intensive care units were among the main cost components related to fall events. McKercher et al. (2024) emphasized that the implementation of structured clinical guidelines has significant potential to reduce hospital costs and improve care efficiency. Furthermore, Ajibade (2025) highlighted that appropriate preventive strategies reduce not only morbidity but also administrative and legal costs associated with adverse events. Despite the advances observed in the literature, the studies analyzed exhibited methodological heterogeneity regarding preventive protocols, study populations, and fall risk stratification criteria. Some of the included studies also featured observational designs and narrative reviews, limiting direct comparisons between results. However, this review allowed for the compilation of robust scientific evidence regarding the main risk factors, preventive strategies, and impacts associated with hospital falls, contributing to the strengthening of evidence-based care practices.

Thus, the findings reinforce that the prevention of hospital falls should involve a multidisciplinary approach, standardized institutional protocols, continuous monitoring, and active patient participation in care. The integration of continuing education, the use of predictive technologies, and the strengthening of an institutional safety culture holds significant potential for reducing adverse events related to falls and improving the quality of hospital care.

Conclusion

This systematic review demonstrated that falls in the hospital setting represent a major challenge related to patient safety and the quality of healthcare. The analyzed studies showed that in-hospital falls have a multifactorial etiology, involving clinical, functional, medication-related, environmental, and organizational factors, and are more frequent in elderly, frail patients with multiple comorbidities.

The results identified that advanced age, functional limitations, cognitive impairments, clinical frailty, polypharmacy, and the use of potentially sedative medications are among the main factors associated with an increased risk of hospital falls. Furthermore, it was observed that falls can result in significant clinical consequences, including abrasions, fractures, traumatic brain

injuries, functional loss, prolonged hospital stays, and increased hospital morbidity and mortality.

The literature has also demonstrated that structured preventive protocols, continuous monitoring, multidisciplinary educational interventions, and the use of predictive scales contribute significantly to reducing the incidence of falls and strengthening the institutional safety culture. The role of nursing stood out as a central element in the early identification of risk factors, the implementation of preventive measures, and the promotion of safe care.

Additionally, studies have highlighted a significant economic impact associated with hospital falls, primarily due to prolonged hospital stays, the need for rehabilitation, surgical treatments, and the use of highly complex resources. In this context, the implementation of evidence-based preventive strategies holds significant potential for reducing hospital costs and improving the quality of care.

Thus, it is concluded that the prevention of hospital falls should be understood as a strategic priority within patient safety policies, requiring multidisciplinary integration, strengthening of institutional protocols, continuous monitoring of high-risk patients, and the development of care practices centered on the safety and quality of hospital care.

References:

1. ABREU, Debora Regina de Oliveira Moura et al. Falls in the hospital setting, quality, and patient safety: a meta-synthesis of the literature. *Revista Eletrônica Gestão e Saúde*, no. 3, pp. 1244–1255, 2016.
2. AJIBADE, Benjamin Olusola. Falls risk assessment and prevention in older people in healthcare facilities. *British Journal of Nursing*, vol. 34, no. 7, pp. 381–385, 2025.
3. ALMEIDA, Veronica Nunes de. *Patient safety and fall prevention: a narrative review*. 2023.
4. ALTHOMALI, Mohammed M. *A review of falls among older adults in Saudi Arabia: risk factors, outcomes, and prevention strategies*. 2025.
5. BARKER, Anna L. et al. Daily low-dose aspirin and risk of serious falls and fractures in healthy older adults: a substudy of the ASPREE randomized clinical trial. *JAMA Internal Medicine*, vol. 182, no. 12, pp. 1289–1297, 2022.
6. BELSO-GARZAS, Adrián. *Development of a predictive inpatient falls risk model using machine learning*. 2025.
7. BOELL, Estela Willrich Boell et al. *Fall Prevention*. 2025.
8. COX, Natalie et al. Exploring the prevalence and types of fall-risk-increasing drugs among older people with upper limb fractures. *International Journal of Pharmacy Practice*, vol. 31, no. 1, pp. 106–112, 2023.
9. DABKOWSKI, Elissa et al. Adult inpatients' perceptions of their fall risk: a scoping review. In: *Healthcare*. MDPI, 2022. p. 995.
10. DA COSTA-DIAS, Maria José Martins. *Falls in a hospital setting: risk factors*. 2014. Thesis (Doctoral) – Portuguese Catholic University, Portugal, 2014.
11. DA SILVA ALBERTINI, Anna Carolina et al. A person-centered care approach to the prevention and management of falls among adults and the elderly in a Brazilian hospital: a best practice implementation project. *JBHI Evidence Implementation*, vol. 21, no. 1, pp. 14–24, 2023.
12. DAS GRAÇAS PIRES, Aline et al. The role of nursing in the safety of elderly patients: an analysis of in-hospital falls. *Revista Contemporânea*, vol. 4, no. 5, pp. e4369–e4369, 2024.
13. DE BARROS, Fabiane Frigotto; RIBEIRO, Elaine Rossi. Patient safety risks in the intensive care unit: a systematic review. *Thema et Scientia Journal*, vol. 14, no. 1, pp. 95–111, 2024.
14. DE FIGUEIREDO, Ana Paula et al. Patient safety: adherence to fall prevention protocols. *Periódicos Brasil. Pesquisa Científica*, vol. 5, no. 1, pp. 1829–1852, 2026.
15. DE MELO, Silvana Flora et al. Risk factors for falls in hospitalized older adults. *Colombian Journal of Sciences and Humanities (REHCOL)*, vol. 2, no. 5, pp. 1–20, 2025.
16. DE OLIVEIRA, Thais Castro et al. Interventions applied to the prescription, use, and administration of medications as strategic factors for patient safety: a systematic review. *Research, Society and Development*, vol. 10, no. 17, pp. e195101724601–e195101724601, 2021.
17. DIZ, Ana Beatriz Martins; LUCAS, Pedro Ricardo Martins Bernardes. Patient safety in hospital emergency departments: a systematic review. *Ciência & Saúde Coletiva*, vol. 27, pp. 1803–1812, 2022.
18. DORMOSH, Noman et al. Development and internal validation of a risk prediction model for falls among older people using primary care electronic health records. *The Journals of Gerontology: Series A*, vol. 77, no. 7, pp. 1438–1445, 2022.
19. DOS SANTOS, Wabison Júnior Fernandes. Patient safety in fall prevention in safe nursing care: a systematic review. *Research, Society and Development*, vol. 13, no. 2, pp. e12013240920–e12013240920, 2024.
20. EVANS, David et al. Risk factors for falls in the hospital setting: a systematic review. *International Journal of Nursing Practice*, vol. 7, no. 1, pp. 38–45, 2001.
21. FERRAZ, Cinthya Ramires et al. Safety of hospitalized older adults: an integrative review. *Communication in Health Sciences*, vol. 33, no. 4, 2022.
22. FREIRE, Larissa Barros et al. Risk factors for falls in older adults with diabetes mellitus: systematic review and meta-analysis. *BMC Geriatrics*, vol. 24, no. 1, p. 201, 2024.
23. GHOSH, Manonita et al. A retrospective cohort study of factors associated with severity of falls in hospital patients. *Scientific Reports*, vol. 12, no. 1, p. 12266, 2022.
24. GOUVÊA, Carla Simone Duarte de; TRAVASSOS, Claudia. Patient safety indicators for acute care hospitals: a systematic review. *Cadernos de Saúde Pública*, vol. 26, pp. 1061–1078, 2010.
25. HENG, Hazel et al. Healthcare professional perspectives on barriers and enablers to falls prevention education: a qualitative study. *PLoS One*, vol. 17, no. 4, p. e0266797, 2022.
26. HOLLINGHURST, Robyn et al. Annual risk of falls resulting in emergency department and hospital visits among older adults: an observational study of 781,081 individuals living in Wales (United Kingdom), including data on deprivation, frailty, and dementia diagnoses between 2010 and 2020. *Age and Ageing*, vol. 51, no. 8, p. afac176, 2022.
27. JARDEN, Rebecca J. et al. Inpatients' experiences of falls: a

- qualitative meta-synthesis. *Journal of Advanced Nursing*, vol. 81, no. 1, pp. 4–19, 2025.
28. MCKERCHER, Jonathan P. et al. Hospital falls clinical practice guidelines: a global analysis and systematic review. *Age and Ageing*, vol. 53, no. 7, p. afac149, 2024.
29. MIORIN, Jeanini Dalcol et al. Prehospital care transfer and its potential risks to patient safety. *Texto & Contexto-Enfermagem*, vol. 29, p. e20190073, 2020.
30. MORRIS, Meg E. et al. Interventions to reduce falls in hospitals: a systematic review and meta-analysis. *Age and Ageing*, vol. 51, no. 5, p. afac077, 2022.
31. NAKASHIMA, Hirotaka et al. Frailty index based on laboratory tests and in-hospital falls among older adults. 2025.
32. PORCEL-GÁLVEZ, Ana María et al. Predictive validity of the INTEGRARE scale in identifying the risk of hospital-acquired pressure ulcers in acute care hospital settings. *Journal of Tissue Viability*, vol. 31, no. 2, pp. 339–345, 2022.
33. RANDELL, Rebecca et al. Practices of falls risk assessment and prevention in acute hospital settings: a realist investigation. *Health and Social Care Delivery Research*, vol. 12, no. 5, pp. 1–194, 2024.
34. REIS, Cláudia Tartaglia; MARTINS, Mônica; LAGUARDIA, Josué. Patient safety as a dimension of healthcare quality: a review of the literature. *Ciência & Saúde Coletiva*, vol. 18, pp. 2029–2036, 2013.
35. REZENDE, Helena Aparecida de. *Interventions to reduce patient identification errors in the hospital setting: a systematic review*. 2020.
36. SANTOS, James Souza et al. Patient safety in Brazilian medium- and high-risk units: a systematic literature review. *Revista de Enfermagem do Centro-Oeste Mineiro*, v. 9, 2019.
37. SAUCEDO, Otto Huasckar Muchinski et al. Patient safety in plastic surgery: a systematic review. *Brazilian Journal of Plastic Surgery*, vol. 35, no. 2, pp. 212–227, 2020.
38. VILLAR, Vanessa Cristina Felipe Lopes; DUARTE, Sabrina da Costa Machado; MARTINS, Mônica. Patient safety in hospital care: a review from the patient's perspective. *Public Health Journal*, vol. 36, p. e00223019, 2020.
39. VINCENZO, Jennifer L. et al. Older adults' perceptions and recommendations regarding a falls prevention self-management plan template based on the health belief model: a mixed-methods study. *International Journal of Environmental Research and Public Health*, vol. 19, no. 4, p. 1938, 2022.
40. XIMENES, Maria Aline Moreira et al. Effectiveness of educational interventions for fall prevention: a systematic review. *Texto & Contexto-Enfermagem*, vol. 30, p. e20200558, 2021.