

## Inpatient Falls: Risk Factors and Prevention Strategies in Healthcare

Anisha Patel BS<sup>1</sup> and Farzana Hoque, MD, MRCP, FRCP, FACP\*<sup>2</sup>

<sup>1</sup>Saint Louis University School of Medicine, St. Louis, MO, USA

<sup>2</sup>Associate Professor of Medicine, Saint Louis University School of Medicine, St. Louis, MO, USA

**Citation:** Patel A, Hoque F. Inpatient Falls: Risk Factors and Prevention Strategies in Healthcare. *J Integrated Health* 2025;4(1): 373-376. DOI: doi.org/10.51219/JIH/farzana-hoque/62

**Received:** 20 February, 2025; **Accepted:** 04 March, 2025; **Published:** 06 March, 2025

\***Corresponding author:** Farzana Hoque MD, MRCP, FACP, FRCP, Associate Professor of Medicine, Saint Louis University School of Medicine, St. Louis, MO, USA, E-mail: farzanahoquemd@gmail.com

**Copyright:** © 2025 Hoque F, et al., This is an open-access article published in J Integrated Health (JIH) and distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

### ABSTRACT

Inpatient falls are a significant healthcare concern, leading to injuries, negatively impacting patient outcomes, delaying discharge, and increasing costs for both patients and hospitals. Identifying high-risk factors and implementing personalized fall prevention plans can help reduce the likelihood and occurrence of falls. This review discusses current findings on factors contributing to fall-related events and examines research on the efficacy of various fall prevention interventions in hospital settings. Each year, approximately one million inpatient falls occur in the United States, with individuals aged 65 years or older experiencing the highest rates. A single fall increases the risk of subsequent falls by heightening fear and reducing mobility and function. Several factors contribute to a higher fall risk, including muscle weakness, cognitive impairment, orthostatic hypotension, certain medications, and hospital-related environmental factors. Fall risk assessments are widely utilized in hospital fall prevention programs. Tailoring prevention plans based on these assessments can help mitigate fall risk. However, the use of bed and chair alarms has not demonstrated a significant reduction in falls, classifying them as relatively low-value interventions. In contrast, strategies such as patient education and video monitoring have shown promising results. While multicomponent fall prevention strategies have been effective in reducing falls, single-component interventions yield variable outcomes and require further research. Nonetheless, with proper implementation and adherence, a comprehensive fall prevention policy remains a crucial strategy for addressing the growing concern of inpatient falls.

**Keywords:** Falls, Inpatient fall, Mobility, Fall-related injuries, Fall risk factors

### 1. Introduction

Falls are a devastating yet common complication of hospital care, requiring greater attention. Older patients are more likely to suffer from a fall and sustain greater injuries. This can lead to a sequela of increased fear of falling, reduced mobility, loss of function, and an overall increased risk of another fall<sup>1</sup>. Inpatient falls create a significant burden on both patients and hospitals. Injuries from falls increase hospital costs and length

of stay. One study found the hospital's average direct cost of a fall to be \$36,766, approximately \$20,000 more than the cost of not falling<sup>2</sup>. Preventive measures can reduce the risks as well as the indirect and direct costs of inpatient falls. As the aging population grows and more elderly individuals fill nursing homes and acute care settings, preventing inpatient fall-related injuries will remain a pressing concern.

This review aims to discuss current findings regarding factors

impacting fall-related events in inpatient settings as well as research on the efficacy of various fall prevention interventions implemented in hospital settings.

## 2. Description of Methods

A literature search was conducted to identify relevant studies and articles on fall prevalence, risk, and prevention strategies in acute care and nursing home settings. The databases and search engines used included PubMed, ScienceDirect, and Google Scholar. The search included peer-reviewed publications between 2009 and 2024. The keywords and Medical Subject Headings (MeSH) terms used in the search included “inpatient falls,” “hospital falls,” “fall-related injuries,” “fall prevalence,” “fall risk assessment,” “fall prevention,” “falls,” “fall risk factors,” and “fall intervention strategies.”

Studies were included if they discussed falls in hospital or nursing home settings in the context of prevalence, risk factors, or prevention. Additionally, research studies and systematic reviews on the effectiveness of fall prevention strategies were included. Studies were excluded if they focused on falls in community settings. A narrative synthesis approach was used to review the articles and discuss the findings and outcomes.

### 2.1. Prevalence

Falls in acute care hospitals and other inpatient settings pose a significant public health concern and risk to patient safety. Patient falls are the most common preventable adverse events reported in hospitals<sup>2,3</sup>. Inpatient fall rates range from 3.3 to 11.5 falls per 1,000 bed-days, equating to approximately one million inpatient falls in the United States per year<sup>4,5</sup>. The rate of falls in patients 65 or older in nursing homes and hospitals is three times higher compared to falls in community-dwelling persons of the same age<sup>6</sup>. However, the prevalence only seems to increase with age, partially due to the inherent fragility of the population. One study analyzing 3,705 inpatient fall cases found that those aged 65–74, 75–83, and ≥84 years were 19.5%, 29.3%, and 39.1%, respectively, more likely to fall at a higher severity level, with the average age of a patient who fell being 68.5 years<sup>7</sup>. The higher fall rates in the elderly population present concern as the aging population grows<sup>8</sup>.

Falls resulting in injury range from 30% to 51%, with 10% resulting in serious injury and up to 11,000 cases resulting in death<sup>3,4</sup>. The proportion of falls resulting in fractures is 1%–3%, while rates of hip fracture specifically are 1.1%–2%<sup>4</sup>. However, even minor injuries can lead to decreased activity, strength, and independence, and instill feelings of anxiety and distress in patients<sup>4,8</sup>. Fall-related injuries increase overall healthcare utilization by increasing lengths of stay and the likelihood of admittance to a long-term care facility. The effects of falls can perpetuate a negative cycle leading to more falls.

### 2.2. Risk factors

The risk factors associated with falls in acute care settings or nursing homes can be divided into intrinsic and extrinsic factors.

**2.2.1. Intrinsic factors:** Intrinsic factors refer to patient-specific factors like age, underlying medical conditions, cognitive impairment, and more. Several studies have noted an increased rate of falling in populations 65 years or older, with the rate increasing as age increases<sup>4,6,7,9</sup>. However, there seem to be

variations in studies regarding the association between gender and falls. Some have identified males as having an excess fall rate<sup>4,10</sup> while others have shown women to be more predisposed to falling and having double the rate of injury compared to men of the same age<sup>6</sup>. More specifically, urinary frequency, orthostatic hypotension, infection, balance/gait disorders, stroke, sensory impairment, and certain drugs are all health-related risk factors for falling<sup>8,11</sup>. Some studies have shown up to 80% of patients in nursing homes present with lower muscle weakness, increasing the risk of falling while standing or walking<sup>6</sup>.

In a retrospective analysis of the impact of mental status deficits on the prevalence of falls, it was found that in 34% of falls, mental status deficit was identified as the dominant issue<sup>12</sup>. Another analysis identified 98% of the fall cases as showing evidence of delirium, although only 18.7% of the patients had a discharge diagnosis of delirium<sup>10</sup>. This suggests that efforts to improve recognition of undiagnosed delirium and cognitive impairment could help better assess fall risk.

Medications are also an important risk factor for falls. Patients prescribed narcotics and sedatives were found to be 16 times more likely to fall<sup>13</sup>. Narcotics and sedatives increase drowsiness, cause orthostatic hypotension, and induce cognitive slowing, reducing alertness and making patients more likely to fall.

**2.2.2. Extrinsic factors:** Extrinsic factors encompass aspects at an organizational and environmental level. Some environmental factors that increase fall risk include poor lighting, trip hazards, suboptimal chair height, and unsafe staffing levels<sup>4</sup>. Additionally, the unfamiliarity of the hospital environment can induce anxiety in patients, resulting in falls.

Studies noting the association between nurse staffing and fall rates are limited, if not inconclusive<sup>9</sup>. However, considering that 10% to 20% of falls occur in bathrooms and 50% to 70% occur from the bed, bedside chair, or while transferring between the two<sup>4</sup>, having staff assist patients during these times could help reduce the risk of falls.

Hospital characteristics are also related to fall rates. Falls in teaching hospitals were 13% less likely to be injurious, and smaller hospitals tend to have more falls<sup>14</sup>. The fewer falls in teaching hospitals could be due to better quality of work, a positive work environment, and increased job satisfaction, which result in higher-quality care and better patient outcomes<sup>9</sup>.

In terms of fall rates between different units, studies have shown variability. While some have previously shown medical units to have higher rates, others indicate surgical units are experiencing increasing fall rates<sup>9,14</sup>. One study found that surgical units were 8% more likely to have injurious falls<sup>14</sup>. This could be a result of early postoperative mobilization, in which patients are likely to feel weaker and have orthostatic intolerance.

**2.2.3. Interventions:** The wide variety of risk factors for falls necessitates the use of multi-component approaches to prevent falls and fall-related adverse events. Fall prevention interventions vary from hospital to hospital; however, a fall risk assessment is often conducted. Fall risk assessments, such as the Morse Fall Scale and STRATIFY, consist of a checklist of risk factors that result in a score defining patients' risk levels. Fall risk requires frequent reassessment, as patient status can change. Thus, while these assessments are commonly used, their efficacy has been

noted to be questionable, and they have been advised against<sup>3</sup>. Individual prevention strategies also include patient education, alarms, sitters, scheduled toileting, bed rails, restraints, alert wristbands and signage, non-slip socks, and more<sup>3,7,8</sup>. Alarms are consistently used in general adult hospital units to alert staff when patients attempt to leave their bed or chair, despite their relatively low value<sup>3,5</sup>. While some studies report a reduction in falls with the use of bed and chair alarms, several randomized

controlled trials have noted that increased use of alarms in medical-surgical nursing units had no statistically significant effect on the number of falls compared to the control group<sup>3,15,16</sup>. Alarms require staff to intervene before a fall occurs. However, a fall may still occur before assistance arrives, reducing their efficacy. Additionally, false alarms are a common issue, causing excessive noise disturbances and leading to “alarm fatigue,” in which staff stop responding to alarm sounds<sup>15,16</sup>.

**Table 1:** Intrinsic and extrinsic factors associated with falls in acute care settings.

Intrinsic Factors	
Age	Increased rate of falling in populations 65 years or older
Gender	Variable results
Medical conditions	Orthostatic hypotension, infection, balance or gait disorders, stroke, sensory impairment, muscle weakness
Cognitive impairment	34% of falls due to mental status deficit; 98% of falls show evidence of delirium
Medication use	Narcotics and sedatives make patients 16 times more likely to fall
<b>Extrinsic Factors</b>	
Environmental hazards	Poor lighting, trip hazards, suboptimal chair height, or unsafe staffing levels
Staffing	While the association between nurse staffing and rate of falls is inconclusive, staff assistance during high-risk times can help reduce falls
Hospital characteristics	Teaching hospitals were 13% less likely to have injurious falls; smaller hospitals have more falls
Unit	Variable results whether medical units or surgical units have more falls

One commonly used intervention in hospital settings is close patient monitoring through sitters and frequent rounding. These methods were noted to be more time-intensive and posed a major implementation burden due to increased workload, competing priorities, lack of staff buy-in, and cost<sup>5</sup>. Specifically, the use of sitters varied across hospital systems, with some studies indicating that they were the most frequently used prevention strategy, while others found them to be the least used method. One study even reported that sitters posed an annual cost of over \$1 million, a figure expected to rise with minimal third-party reimbursements<sup>3</sup>. Similarly, intentional and frequent rounding has shown variable usage due to issues with nonadherence and sustainability, as the technique is often perceived as a restriction on staff autonomy<sup>3</sup>.

Patient education was another method that showed some benefit in fall prevention. One study noted a significant reduction in falls and injurious falls when the intervention was tested in a rehabilitation program<sup>3</sup>. Another study reported a 50% decline in fall rates among cognitively intact patients who received an intervention with added patient education<sup>4</sup>. However, this method has limitations, particularly concerning patients’ cognitive function. Hospitalized patients who present with acute conditions are less likely to be cognitively intact, reducing the potential efficacy of patient education as a fall prevention strategy. The use of video monitoring as an adjunct fall prevention strategy has shown promise. These methods can replace sitters and frequent rounding, lowering costs and increasing employee satisfaction. Fall data collected over four months with the use of video monitoring showed a 45.5% decrease in falls, with

68% of survey respondents, including nurses and patient care technicians, reporting that they prevented between one and three falls using the monitoring system<sup>7</sup>. This method holds promise in both acute and long-term care settings, as it is inexpensive, cost-effective, and easy to implement. In general, evidence shows that inpatient multi-component programs effectively reduce falls<sup>3,4,7,8</sup>. An analysis of 17 multifactorial studies found that 6 of them demonstrated significant reductions in fall rates, although the individual components within each study varied<sup>4</sup>. However, in the successful trials, the most commonly noted interventions included post-fall review, patient education, staff education, footwear advice, and toileting<sup>4</sup>.

The Fall Prevention Toolkit (FPTK) uses a fall risk assessment scale as the foundation for a patient-specific fall prevention plan. A randomized controlled trial assessing the use of FPTK with health information technology (HIT) showed the potential to prevent 1 fall every 4 days, 7.5 falls each month, and about 90 falls each year<sup>1</sup>. The integration with HIT allowed for patient-specific interventions to be identified and facilitated the printing of a patient-tailored bed poster (**Table 2**), a patient education handout, and a plan of care. An analysis of the evidence-based Fall Tailoring Interventions for Patient Safety (TIPS) Program showed a 15% to 25% reduction in inpatient falls and a 0% to 34% reduction in injurious falls<sup>2</sup>. Additionally, it was found to result in total cost savings of \$22 million over five years at intervention sites<sup>2</sup>. With proper implementation and adherence, multifactorial fall prevention programs can significantly reduce inpatient falls.

**Table 2:** Summary of the effectiveness and limitations of various fall prevention strategies.

Prevention Strategy	Effectiveness	Limitations
Risk assessments tools: Morse Fall Scale, STRATIFY	Frequently used despite questionable efficacy	Requires frequent reassessment
Bed and chair alarms	Mixed results: some studies indicated a reduction in falls while others state no statistically significant effect of fall reduction	Alarms require staff to respond quickly, cause noise disturbances, and may lead to “alarm fatigue”
Close patient monitoring: sitters and frequent rounding	Frequently used strategy despite number of challenges	Time-intensive, increases workload, increase hospital costs, staff nonadherence reduces efficacy and sustainability

Patient education	Significant reduction in fall in rehabilitation settings; 50% decline in fall rates in cognitively intact patients	Requires patients to be cognitively intact
Video monitoring	Can replace the use of sitters, providing an inexpensive and time efficient strategy; decreased falls by 45.5%	Requires effective communication between monitoring technicians and hospital staff
Multifactorial programs: FPTK, TIPS program	Significant reduction in fall rates; the FPTK prevents 90 falls each year while the TIPS program causes a 15% to 25% reduction in falls	Requires proper implementation and adherence; difficult to assess the effectiveness of the individual components of the program

### 3. Conclusion

Hospital falls are a major safety concern, particularly for the elderly, posing significant risks to patient well-being and placing a substantial burden on both patients and healthcare systems. Given the wide range of intrinsic and extrinsic risk factors, thorough fall risk assessments and personalized prevention plans are essential. While further research is needed to determine the efficacy of individual fall prevention strategies, multifaceted interventions have proven effective in significantly reducing falls. As the geriatric population continues to grow, prioritizing fall prevention in hospitals will become increasingly critical, requiring consistent adherence and engagement from hospital staff.

### 4. Financial Support and Sponsorship

None.

### 5. Conflicts of interest: None

Consent for publication was obtained from all authors. The manuscript has been read and approved by all the authors, representing honest work and fulfilling requirements for authorship.

### 6. References

- Dykes PC, Carroll DL, Hurley A, et al. Fall prevention in acute care hospitals: a randomized trial. *JAMA*, 2010;304: 1912-1918.
- Dykes PC, Curtin-Bowen M, Lipsitz S, et al. Cost of Inpatient Falls and Cost-Benefit Analysis of Implementation of an Evidence-Based Fall Prevention Program. *JAMA Health Forum*, 2023;4: e225125.
- LeLaurin JH, Shorr RI. Preventing Falls in Hospitalized Patients: State of the Science. *Clin Geriatr Med*, 2019;35: 273-283.
- Oliver D, Healey F, Haines TP. Preventing falls and fall-related injuries in hospitals. *Clin Geriatr Med*, 2010;26: 645-92.
- Turner K, Staggs VS, Potter C, Cramer E, Shorr RI, Mion LC. Fall Prevention Practices and Implementation Strategies: Examining Consistency Across Hospital Units. *J Patient Saf*, 2022;18: e236-e242.
- Ungar A, Rafanelli M, Iacomelli I, et al. Fall prevention in the elderly. *Clin Cases Miner Bone Metab*, 2013;10: 91-95.
- Woltsche R, Mullan L, Wynter K, Rasmussen B. Preventing Patient Falls Overnight Using Video Monitoring: A Clinical Evaluation. *Int J Environ Res Public Health*, 2022;19.
- <https://www.sgm.org/article/falls-among-the-elderly-a-brief-review/>
- Miake-Lye IM, Hempel S, Ganz DA, Shekelle PG. Inpatient fall prevention programs as a patient safety strategy: a systematic review. *Ann Intern Med*, 2013;158: 390-396.
- Zhao YL, Bott M, He J, Kim H, Park SH, Dunton N. Evidence on Fall and Injurious Fall Prevention Interventions in Acute Care Hospitals. *J Nurs Adm*, 2019;49: 86-92.
- Lakatos BE, Capasso V, Mitchell MT, et al. Falls in the general hospital: association with delirium, advanced age, and specific surgical procedures. *Psychosomatics*, 2009;50: 218-26.
- [https://www.advancesinfamilypracticenursing.com/article/S2589-420X\(19\)30033-4/abstract](https://www.advancesinfamilypracticenursing.com/article/S2589-420X(19)30033-4/abstract)
- Tzeng HM. Inpatient falls in adult acute care settings: influence of patients' mental status. *J Adv Nurs*, 2010;66: 1741-1746.
- Cox J, Thomas-Hawkins C, Pajarillo E, DeGennaro S, Cadmus E, Martinez M. Factors associated with falls in hospitalized adult patients. *Appl Nurs Res*, 2015;28: 78-82.
- Zhao YL, Bott M, He J, Kim H, Park SH, Dunton N. Multilevel Factors Associated With Injurious Falls in Acute Care Hospitals. *J Nurs Care Qual*, 2018;33: 20-28.
- Shorr RI, Chandler AM, Mion LC, 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: 692-699.