Research Progress on Environmental Management for Fall Prevention in Elderly Hospitalized Patients

Authors: Huang Li, Huang Li

Date: 2026-03-03T20:22:19+00:00

Abstract

Elderly hospitalized patients are a high-risk population for falls during hospitalization. Falls may result in bodily injury, organ function decline, and in severe cases, can be life-threatening. The occurrence of falls is not merely accidental; rather, it is caused by multiple factors, with adverse environmental factors ranking first among the numerous causes of falls in elderly individuals. Falls are preventable, and environmental high-risk factors leading to falls in the elderly can be avoided through environmental management in hospital settings. This paper reviews the identification of environmental fall risk factors for elderly hospitalized patients, the creation of appropriate safe environments, as well as health education and preventive intervention measures, aiming to provide references for environmental safety management and clinical nursing practice in fall prevention for elderly hospitalized patients.

Full Text

Research Progress on Environmental Management for Preventing Falls in Elderly Hospitalized Patients

Abstract

Elderly inpatients represent a high-risk population for hospital falls, which may result in physical injury, organ function decline, and even life-threatening conditions. Falls are not merely accidental events but result from multiple factors, with adverse environmental factors ranking foremost among the causes of falls in older adults. Falls are preventable, and environmental risk factors leading to falls in elderly patients can be avoided through environmental management. This article reviews the identification of environmental fall risk factors, the creation of suitable safe environments, and health education and preventive inter-

ventions for elderly inpatients, aiming to provide references for environmental safety management and clinical nursing practice in fall prevention among elderly hospitalized patients.

Keywords: Elderly inpatients; Environmental management; Fall prevention

Introduction

With the intensification of population aging in China, the scale of the elderly population is gradually expanding, and the proportion of older adults is steadily increasing [1]. Consequently, the proportion of elderly inpatients among hospitalized patients is also growing. Studies show that approximately 17% of hospitalized elderly patients experience falls during their stay [2]. Falls represent one of the most common safety issues in hospitalized patients, and their occurrence is a significant concern in healthcare. Research indicates that 2–7 falls occur per 1,000 patient-days, with approximately 30% causing single injuries and about 7% resulting in severe injuries [3]. Elderly inpatients are subject to the combined effects of disease and treatment factors, physiological functional status, and passive adaptation to unfamiliar medical environments, resulting in higher fall incidence rates. Environmental management serves as an important means of preventing falls in elderly inpatients and has a crucial impact on the safety and health of older adults [4]. Domestic and international research has focused on optimizing the content, form, and tools of health education to improve fall prevention effectiveness; however, most studies have not addressed the unique behavioral and psychological needs of elderly patients, instead adhering to traditional knowledge transmission methods and lacking attention to patient behavioral motivation. This leads to passive information reception by patients and reduced implementation rates of fall prevention measures. Therefore, fall prevention work for elderly patients in medical institutions still lacks systematic and comprehensive environmental management standards. There is a need to consider patients' perspectives, solicit their opinions on falls, and engage them in environmental management for fall prevention. By identifying fall risks in elderly patients and developing tailored interventions for different risk levels, the feasibility and flexibility of fall prevention measures can be improved [5-6]. Identifying high-risk environmental hazards through fall environmental management and providing necessary support and assistance can effectively reduce the occurrence of falls and fall-related serious injuries among elderly patients, while also improving fall prevention and nursing safety quality, enhancing nursing satisfaction, and improving the physical and mental health and quality of life of elderly inpatients.

1 Risk Factors for Falls

1.1 Hospital Physical Environment

Due to physiological degeneration, disease status, and physical and mental conditions, elderly inpatients have significantly higher fall rates than non-hospitalized

elderly populations. Insufficient or excessive lighting in medical institutions, dim or glaring lights [7], may lead to falls in elderly inpatients. With advancing age, the number of nerve cells decreases, physiological functions gradually decline, and vision and cognitive function deteriorate, reducing the ability to assess the surrounding environment and increasing the risk of accidental falls. Uneven floors, wet or excessively smooth surfaces are closely related to falls in elderly patients [8-9]. When walking on wet and smooth surfaces, elderly individuals tend to be doubly cautious, which can lead to muscle tension, fatigue, and muscle weakness during walking, thereby increasing fall risk. Huang [10] pointed out that slippery bathroom floors account for approximately 17% of environmental fall factors in elderly patients. Bathrooms are areas where elderly individuals are frequently active and most susceptible to injury. Non-slip-resistant bathroom floors and poor drainage, combined with water vapor condensation on tile surfaces during bathing and the use of shower gel, significantly increase the risk of falls in elderly patients. Therefore, bathroom slip resistance has a significant relationship with falls in elderly inpatients and requires focused attention. Unreasonable furniture placement, excessive items in patient rooms, and obstacles in activity areas conversely increase fall risk in elderly patients, consistent with the research results of Jin et al. [11]. Continuous exploration of the effectiveness of environmental management strategies in preventing falls in elderly inpatients is needed, such as optimizing the layout of items in wards and reducing obstacles in activity areas.

1.2 Medical Factors

Accidental falls in elderly patients can cause harm to physical and mental health; if falls are not detected promptly, greater secondary injuries may result. Wang et al. [12] noted that insensitive, lacking, or malfunctioning hospital call devices often prevent elderly inpatients from being discovered promptly after falls, seriously delaying rescue time. Therefore, regular inspection of call system operation is necessary to ensure normal equipment function. Nursing staff have heavy workloads, and their awareness of fall prevention in elderly inpatients still needs strengthening. Clinical nurses' inadequate health education on fall prevention, insufficient subjective initiative, and inappropriate timing, methods, and strategies for education are consistent with the findings of Du et al. [13]. It is necessary to improve clinical nurses' knowledge levels regarding fall prevention and enhance the precision and meticulousness of interventions to strengthen elderly patients' awareness of fall risks, improve compliance with medical advice, and reduce or avoid the occurrence of fall events. Kruschke and Butcher [14] pointed out that elderly inpatients often have multiple underlying diseases; due to disease factors and treatment needs, they have numerous medical device attachments. For example, entangled catheters, ECG leads, and oxygen tubing not only limit limb movement but also increase fall risk. For such situations, lightweight auxiliary equipment should be selected based on the patient' s condition, clothing should be simplified, and complex or cumbersome garments should be avoided to reduce physical burden, improve mobility, and decrease

fall risk. Medications occupy an immeasurable position among fall risk factors in elderly inpatients. Huang et al. [15] noted that the number of diseases and medications in elderly patients shows a positive linear relationship with fall risk; psychotropic drugs increase fall risk. When taking analgesics, antihypertensives, sedatives, psychotropic medications, or when sedative drugs have been used within the past 24 hours, these medications may cause symptoms such as sedation, dizziness, orthostatic hypotension, cognitive dysfunction, or hyponatremia, increasing the risk of falling. Therefore, when introducing medication adverse reactions and preventive measures to patients, clinical nurses should strengthen medication guidance, help patients understand fall risks, encourage their active participation in fall prevention, and reduce fall rates.

1.3 Intrinsic Factors

Gait and balance disorders are among the most common causes of falls in elderly patients. Gait and balance disorders and cognitive impairment are consistent with the research results of Cuevas-Trisan [16]. As elderly individuals age, cognitive abilities decline, various organs undergo aging, and gait gradually develops balance disorders. Elderly individuals with gait and balance disorders are more likely to engage in high-risk fall behaviors. Song et al. [17] pointed out that the five dimensions of intrinsic capacity—sensory, locomotor, vitality, cognitive, and psychological—encompass physiological and psychological factors. As various physiological functions degenerate in elderly individuals, their ability to perceive danger and environmental safety decreases; individuals lacking self-awareness are more likely to engage in high-risk tendency behaviors. Therefore, it is necessary to enhance patients' ability to actively identify safety hazards during activities and risk factors in the surrounding environment, strengthen cognition of high-risk fall factors, and reinforce self-protection awareness to improve compliance with fall prevention plans. Muscle strength is an important factor affecting postural stability in elderly individuals, consistent with the research results of Wang et al. [18]. Elderly individuals with ankle injuries endure considerable pain in daily life, and extensive postural involvement in maintaining balance is directly related to muscle fatigue, which further increases fall risk. For such situations, appropriate clothing and shoes should be selected for elderly individuals, attention should be paid to posture and methods during exercise, and regular rehabilitation training should be conducted to enhance muscle strength. Elderly inpatients affected by disease have poor sensory perception status and insufficient attention to fall issues. Yang et al. [19] noted that patients focus primarily on treatment aspects, leading to underestimation or even neglect of fall risks, resulting in fall perception bias and increased fall risk. Attention should be paid to patients' perceptual biases; correcting these biases can promote reasonable fall prevention behavior. Health perception education should be conducted to promote the establishment of risk awareness at the psychological cognitive level, modify risk behaviors, internalize risk perception into psychological models, externalize it into actions, and ultimately actively prevent falls.

1.4 Other Factors

Women undertake more household chores in families and are frequently exposed to high-risk fall areas such as kitchens. Zhao et al. [20] pointed out that elderly women are a high-risk population for falls, with higher fall risk than men, and women have significantly higher risks of osteoporosis, lower limb muscle strength decline, and balance impairment than men. Therefore, elderly women are advised to reasonably supplement vitamin D to reduce the risk of fractures and other injuries and improve lifestyle by adjusting behaviors in daily life that may affect balance and mobility.

2 Creating a Safe Environment Suitable for Elderly Hospitalized Patients

In accordance with requirements from the National Health Commission [21], medical institutions need to strengthen the construction of age-friendly hospitals and reduce fall incidence caused by environmental factors. Good lighting environments can provide comfortable visual experiences, help elderly individuals perceive their surroundings more clearly, reduce visual fatigue and discomfort, and soft, natural lighting can promote relaxation and emotional relief in elderly patients. Ward lighting should be bright, with non-glare night lights installed beside beds, in corridors, bathrooms, and restrooms [22], and parameters such as light intensity, color temperature, and illuminance should be reasonably designed. Appropriate lighting environments can improve quality of life for elderly patients, enhance comfort and safety, improve comfort and convenience in daily life, and help elderly individuals engage in activities better.

Elderly patients may experience nursing safety issues due to failure to adapt to ward environments and functions, as well as defects in spatial environments and functional facilities. Khalifa [23] noted that improving ward equipment and internal facilities can reduce fall risk. For example, configuring standard-compliant lockers and cabinets, equipping bedside call devices, adjusting bed height to the lowest position, using casters with fixed brakes, and setting bedside guardrails can prevent unstable bed movement, creating safe, comfortable, and warm living environments for elderly patients and making them feel cared for and warm. Liu and Shang [24] pointed out that beds are the focal point of elderly patients' lives; designing specialized medical nursing beds for elderly patients can provide them with restful sleep. Therefore, appropriately adding simple office, dining, and storage functions, with multiple detailed optimizations to improve and meet patient and family needs, comprehensively enhances safe, comfortable, and warm convalescent spaces.

Accessibility construction is one of the foundations for ensuring equal participation of all social members in social life and sharing reform and development achievements, as well as a key element in protecting the rights of elderly and other groups, holding significant importance for promoting social integration and comprehensive human development. Medical institutions should keep ac-

tivity areas or passages free of debris and without thresholds [25], establish barrier-free facilities, such as providing wheelchairs, walkers, and other equipment in diagnosis and treatment areas to facilitate patients with limited mobility. Barrier-free facilities should be designed in restrooms, with convenient wheelchair access and use equipment. Accessibility construction should consider item placement, consistent with the research results of de Souza et al. [26]. Arranging items according to patient habits and frequency of use while avoiding activity areas can reduce fall incidence in elderly patients while conforming to their activity habits, improving hospital service quality and image, and increasing trust and satisfaction among patients and families.

As elderly individuals' physical functions decline and balance ability deteriorates, falls often occur inadvertently. Therefore, fall identification for elderly individuals is becoming increasingly important. If elderly individuals can promptly identify signs of impending falls, their bodies will subconsciously take corresponding measures to avoid falling. He and Zhou [27] noted that nursing staff assess fall risk when patients are admitted, including consciousness, limb activity, living habits, and fall history. Comprehensive assessment of elderly individuals' self-mobility ability evaluation and high-risk fall areas should be conducted, and fall prevention signs should be posted. Meanwhile, nursing staff should inform patients of fall risks, obtain cooperation from patients and families, and improve nursing compliance. Using the Red Dot System to assess patient fall risk, with red dots indicating patient mobility ability, is consistent with the research of Zhou et al. [28]. Considering that patients may experience falls outside wards, special colored wristbands and chest cards should be implemented for high-risk patients to enable non-ward personnel to identify patient fall risk levels and provide prompt support. This measure helps mobilize participation of all medical staff and reduce fall risk among in-hospital patients. Zhang [29] noted that hanging fall warning signs in fall-prone areas allows patients and families to see them at all times, and conducting safety education and guidance for patients and families improves patient safety during hospitalization. Promoting the hanging of fall prevention signs in medical institutions helps reduce secondary injuries to patients and prolong survival.

3 Measures for Preventing Falls in Elderly Hospitalized Patients

Health education is one of the important strategies for fall prevention. Conducting fall prevention health education can effectively improve the coverage rate of fall prevention knowledge and reduce fall risk. Wang et al. [30] noted that diversified education measures should be used to construct specific education mechanisms. Therefore, diversified and easily understandable education measures should be developed, combining patient fall prevention knowledge and preventive measures with pictures to improve patient compliance with education knowledge and cognition of fall prevention systems. Allowing patients to participate in fall environmental management and improving the implementation of

fall prevention plans is consistent with the research results of Montero-Odasso et al. [31]. Through health education for patients, not only can elderly individuals' cognition of fall dangers be enhanced, but they can also be taught how to implement appropriate preventive measures.

Zhu et al. [32] suggested that medical institutions should include fall prevention health education in post-discharge follow-up plans to improve the continuity of fall prevention management. Therefore, a patient-centered approach should fully consider patient needs to improve quality of life and well-being for elderly individuals, enhance nursing safety quality, and improve patient fall prevention care.### 3.2.1 Construction of Intelligent Early Warning Systems

With the continuous development of technological means, early warning systems can automatically monitor elderly individuals' physical conditions and activity status, promptly issuing warning signals to avoid accidental injuries to elderly individuals. In clinical nursing work, fall risk assessment scales are very important content. Yang and He [33] noted that selecting appropriate assessment scales helps correctly assess fall risk in elderly inpatients, such as MFS, STRATIFY, HFRM, JHFRAT, etc. Correct assessment scales can improve the accuracy of fall risk screening and enhance nursing safety vigilance. Therefore, conducting fall assessments for elderly inpatients according to fall risk scales, effectively identifying high-risk fall populations, adopting fall prevention early warning systems and health education, and improving clinical work efficiency. He et al. [34] noted that by constructing efficient and safe fall intelligent early warning systems, capturing risk points for assessment, and promptly initiating fall prevention early warning mechanisms, clinical management models can be made intelligent and scientific. Regarding this measure, efficient and safe fall intelligent early warning systems can improve the accuracy and timeliness of clinical nurses' fall management for patients, promote effective implementation of fall preventive measures, and improve the implementation rate of fall nursing quality management evaluation standards. Using bed/chair alarms and fall risk screening to prevent inpatient falls is consistent with the research results of Melin [35]. Bed and chair alarms achieve precise quality control management based on objective data, enabling patients to perceive fall risks and make fall preventive measures, improving patients' mastery of fall prevention knowledge and coping ability, thereby reducing fall occurrence.

3.2.2 Ensuring Ground Safety

Meulenbroeks et al. [36] noted that intervention from the environmental management aspect, introducing vinyl carpet flooring, reduces ground sliding and ensures ground safety. Regarding this measure, floors treated with anti-slip treatment have greatly increased friction coefficients, which can effectively reduce slip accidents. Meanwhile, installing handrails in high-risk fall areas, using dry mops in ward corridors, and keeping floors dry ensure patient safety during hospitalization, making patients and families more assured and satisfied, and improving hospital image, reputation, and standards.

3.2.3 Encouraging Patient Participation in Safety Management

Liu et al. [37] noted that strengthening comprehensive fall prevention training and supervision feedback systems, promoting multidisciplinary collaboration, and improving hospital fall prevention systems ensure patient safety. Clinical nurses guide patients in correctly using bedside call buttons; through situational simulation and multi-dimensional perspectives promoting participation of multi-role personnel, patient mastery of fall prevention knowledge can be improved, thereby reducing in-hospital fall events. Having patients wear sensors that trigger alarms when dangerous movements are detected to prompt patients of danger is consistent with the research results of Visvanathan et al. [38]. Correctly guiding patients to handle encountered dangers, avoiding dangerous operations, allowing patients to experience fall risk warnings, and participating in fall risk management. Hospital environments are complex and diverse; patients should be encouraged to participate in fall prevention, improving their subjective initiative and practicality, and strengthening attitudes and behaviors toward fall prevention.

Liu et al. [39] noted that based on conventional fall prevention nursing methods, strengthening multi-team cooperation management models involving medical care, nursing, and patients themselves can reduce fall events in hospitalized patients. Currently, most medical institutions' fall prevention work has certain one-sidedness and limitations. Therefore, starting from high-risk factors for falls, surrounding multidisciplinary teamwork, and encouraging multi-department personnel to participate together, such as medical staff, patients, and family members participating in decision-making together, reduces the probability of fall occurrence. Comprehensive prevention of falls in elderly inpatients should adopt multi-department, interdisciplinary teamwork management according to actual medical institution situations, continuously exploring and improving management measures for preventing inpatient falls.

Conclusion

In summary, patient safety management runs through the entire hospitalization period and plays an important role in disease nursing and outcomes. Preventing falls from the aspect of environmental management for elderly inpatients requires joint participation and efforts from medical staff, patients, and their families. Patients should be encouraged to participate in fall prevention environmental management, enhancing their awareness of fall risks, allowing patients to actively participate in the process of seeking help and decision-making, and improving the effectiveness and pertinence of decisions. Fall prevention through environmental management still requires multidisciplinary cooperation management to be refined and effectively operated at various levels, proposing more practical plans, finding effective intervention plans and measures to reduce patient fall rates, and maintaining cost-effectiveness.

References

[1] Seventh National Population Census Bulletin (No. 5) —Population Age Composition[J]. China Statistics, 2021, (05): 1.

[2] Zheng Junling, Feng Rui, Zhang Wenhong. Application of a Nurse-led Multidisciplinary Collaboration Model in Reducing the Incidence of Falls Among Elderly Inpatients[J]. Clinical Medicine Research and Practice, 2021, 6(17): 157-160.

[3] Najafpour Z, Godarzi Z, Arab M, et al. Risk Factors for Falls in Hospital In-patients: A Prospective Nested Case Control Study[J]. Int J Health Policy Manag. 2019, 8(5): 300-306.

[4] Wu Xiaoqun, Huang Feng. Effectiveness Analysis of Fall Risk Management for Inpatients[J]. Journal of Nursing Science, 2018, 33(05): 45-47.

[5] Qiu Lan, Pu Chuan. Study on Fall Risk Levels and Influencing Factors Among Chinese Elderly[J]. Chinese Health Service Management, 2022, 39(11): 874-880.

[6] MONTERO M, KAMKAR N, PIERUCCINI F, et al. Evaluation of clinical practice guidelines on fall prevention and management for older adults: a systematic review[J]. JAMA Network Open, 2021, 4(12): 1-15.

[7] Zhou Meng, Su Li, Ye Jing, et al. Evidence Summary of Fall Prevention Measures for Elderly Inpatients[J]. Chinese Journal of Modern Nursing, 2019, 25(36): 4704-4708.

[8] DAVIS A, HAINES T, WILLIAMS C. Do footwear styles cause falls or increase falls risk in healthy older adults: a systematic review

Note: Figure translations are in progress. See original paper for figures.