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Original Article

Association Between Nurses' Knowledge and Practice Regarding Fall Prevention of Patients in Private Sector Hospital

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ABSTRACT

Background: Falls are common preventable patient-safety events among hospitalized older adults and are influenced by patient-related, environmental, medication-related, and care-process factors. Nurses play a central role in fall-risk assessment, patient education, environmental safety, medication-effect monitoring, and documentation of fall incidents. Objective: To evaluate the effect of an educational intervention on nurses' knowledge and fall-prevention practices in selected clinical units of a private sector hospital in Lahore. Methods: A one-group pretest–posttest quasi-experimental study was conducted over six months among 40 registered nurses working in the Medical Intensive Care Unit, Surgical Ward, Urological Ward, and Emergency Department of Ali Fatima Hospital, Lahore. Data were collected using a structured knowledge questionnaire and fall-prevention practice checklist before and after an educational intervention. Frequencies, percentages, and paired-samples t-test were used for analysis in SPSS version 27. Results: Post-intervention responses showed improvement across most knowledge and practice items, including recognition of previous fall history, polypharmacy, environmental modification, fall-risk assessment on admission, use of safety tools, medication-effect monitoring, patient education, and participation in fall-prevention training. The overall paired comparison showed a significant increase in post-intervention scores compared with pre-intervention scores, with a mean difference of -38.60, 95% CI -44.01 to -33.19, $t(39) = -14.43$, and $p < 0.001$. Conclusion: The educational intervention was associated with significant improvement in nurses' knowledge and fall-prevention practice scores. Regular training and institutional reinforcement may strengthen fall-prevention practices in inpatient care. Keywords: Fall prevention; Nurses' knowledge; Nursing practice; Educational intervention; Patient safety; Hospital falls

INTRODUCTION

Falls remain one of the most frequent and preventable patient-safety problems among older adults, particularly in hospital settings where acute illness, impaired mobility, medication exposure, unfamiliar environments, and dependence on healthcare staff increase vulnerability. A fall is commonly understood as an unintended event in which a person comes to rest on the ground, floor, or another lower level, and its consequences may range from minor soft-tissue injury to fracture, traumatic brain injury, functional decline, prolonged hospitalization, loss of independence, and death. Globally, falls account for a substantial burden of morbidity and mortality among older adults, with hundreds of thousands of deaths reported annually and a large proportion of non-fatal injuries requiring medical attention or hospital admission (1).

Hospitalized older adults are particularly susceptible to falls because clinical care environments expose them to multiple interacting intrinsic and extrinsic risk factors. Intrinsic factors include previous falls, reduced balance, muscle weakness, impaired vision, cognitive impairment, comorbid disease, and medication-related effects, while extrinsic factors include unsafe ward environments, poor footwear, inadequate supervision, absence of assistive devices, and delayed risk recognition by healthcare workers. Polypharmacy is especially important because sedatives, antihypertensives, antidiabetic agents, psychotropic medications, and other drug classes may contribute to dizziness, postural hypotension, altered alertness, and impaired coordination, thereby increasing fall risk in vulnerable patients (2,3).

Nurses have a central role in fall prevention because they remain in continuous contact with patients during admission, routine care, mobilization, medication monitoring, patient education, and discharge preparation. Effective nursing practice requires timely fall-risk screening, accurate identification of high-risk patients, environmental hazard reduction, patient and family education, appropriate use of side rails or assistive devices, monitoring of medication effects, documentation of fall incidents, and escalation of risk-related concerns to the multidisciplinary team. Fall prevention education has therefore been identified as a practical and low-cost strategy for improving healthcare professionals' awareness and strengthening preventive behaviors in hospital and community settings (4,5).

Despite the availability of fall-prevention guidelines, implementation in routine clinical practice remains inconsistent. Previous evidence suggests that gaps in nurses' knowledge, attitudes, institutional support, workload, training access, and availability of safety resources may reduce adherence to recommended fall-prevention practices. In many hospital settings, fall-risk assessment tools and preventive protocols are available but may not be consistently applied, limiting their ability to reduce avoidable patient harm (6,7). Studies from different healthcare systems have shown that nurses' knowledge and practices regarding fall prevention vary considerably, and that structured educational interventions can improve recognition of fall risk factors and increase adherence to preventive care behaviors (8,9). In Pakistan, evidence regarding nurses' fall-prevention knowledge and practice in private hospital settings remains limited, particularly in relation to structured educational interventions. Private sector hospitals provide care to a large patient population, yet nursing training practices, fall-risk assessment routines, and preventive implementation may vary across units. Understanding whether targeted education improves nurses' knowledge and practice is therefore important for strengthening patient safety, standardizing fall-prevention care, and supporting institutional quality-improvement programs. This study aimed to evaluate the effect of an educational intervention on nurses' knowledge and fall-prevention practices among registered nurses working in inpatient units of a private sector hospital in Lahore.

MATERIAL AND METHODS

This study was conducted as a one-group pretest–posttest quasi-experimental study to assess changes in nurses' knowledge and fall-prevention practices before and after an educational intervention. The study was carried out over six months after synopsis approval in the Medical Intensive Care Unit, Surgical Ward, Urological Ward, and Emergency Department of Ali Fatima Hospital, Lahore, Pakistan. These clinical areas were selected because nurses working in inpatient and emergency care units are directly involved in patient admission, mobility support, safety monitoring, risk assessment, and prevention of fall-related incidents.

The study population comprised registered nurses working in direct patient-care roles within the selected hospital units. A total of 40 nurses were included using random sampling from the eligible nursing staff. Nurses were eligible for inclusion if they were registered nurses, currently working in one of the selected inpatient or emergency units, involved in direct patient care, and had at least six months of clinical nursing experience. Nurses who were not involved in direct patient care or were on leave during the data-collection period were excluded. This eligibility criterion was applied to ensure that

participants had sufficient clinical exposure to patient-care situations in which fall-risk identification and preventive nursing practices are relevant.

Data were collected using a structured questionnaire and a fall-prevention practice checklist administered before and after the educational intervention. The questionnaire assessed nurses' knowledge of major fall-risk factors and preventive principles, including increased risk among older adults, previous fall history, multifactorial causes of falls, polypharmacy, environmental safety, physical activity, footwear, and the nurse's role in patient education. The practice checklist assessed fall-prevention behaviors, including fall-risk assessment on admission, patient and family education, removal or reporting of environmental hazards, use of safety tools such as side rails and assistive devices, medication-effect monitoring, encouragement of proper footwear and mobility aids, participation in fall-prevention training, and accurate documentation and reporting of fall incidents. The educational intervention was designed to improve nurses' understanding of fall-risk recognition and evidence-based preventive practices. The intervention focused on common intrinsic and extrinsic risk factors for falls in hospitalized older adults, the importance of fall-risk assessment at admission and during hospitalization, environmental modification, patient and family education, safe mobilization, appropriate use of assistive and safety devices, medication-related fall risks, and documentation of fall incidents. The same participants were assessed before and after the intervention, allowing paired comparison of knowledge and practice scores within individuals.

The main study variables were nurses' fall-prevention knowledge and fall-prevention practice scores measured at two time points: pre-intervention and post-intervention. Demographic and professional variables included gender, age group, educational level, years of nursing experience, and previous fall-prevention training. Knowledge and practice items were measured using Likert-type responses and summarized as pre- and post-intervention scores. The primary outcome was the change in overall knowledge and practice score after the educational intervention. Secondary descriptive outcomes included item-wise response distributions for knowledge and practice statements.

Data was entered and analyzed using Statistical Package for the Social Sciences version 27. Descriptive statistics were used to summarize participant characteristics and item-wise responses. Frequencies and percentages were calculated for categorical variables, while mean and standard deviation were used for continuous or composite score variables where appropriate. Because the same nurses were assessed before and after the intervention, a paired-samples t-test was used to compare pre-intervention and post-intervention scores. A p-value of less than 0.05 was considered statistically significant. Data were reviewed for completeness before analysis, and paired analysis was restricted to participants with both pre- and post-intervention data.

RESULTS

A total of 40 registered nurses working in selected inpatient and emergency units were included in the study. All participants completed the pre-intervention and post-intervention assessments and were included in the paired analysis. Demographic and professional characteristics of the participants are presented in Table 1.

Table 1. Demographic and Professional Characteristics of Participants

Variable	Category	n (%)
Gender	Female	40 (100.0)
Age group	25–30 years	19 (47.5)
	30–35 years	21 (52.5)
Educational level	Nursing diploma	9 (22.5)
	Bachelor's in nursing	31 (77.5)
Years of nursing experience	6 months	15 (37.5)
	1 year	25 (62.5)
Previous fall-prevention training	Yes	18 (45.0)
	No	22 (55.0)

The study sample consisted entirely of female nurses. Most participants were aged 30–35 years, while 19 nurses were aged 25–30 years. Bachelor-level nursing education was reported by 31 participants, and 9 participants had a nursing diploma. Twenty-five nurses had 1 year of clinical experience, while 15 had 6 months of experience. Previous fall-prevention training was reported by 18 nurses, whereas 22 had not received prior training.

Table 2. Pre- and Post-Intervention Knowledge Responses Regarding Fall Prevention

Knowledge Statement	Response Category	Pre-Intervention n (%)	Post-Intervention n (%)
Elderly women are at higher risk of falls due to multiple physiological and social factors.	Strongly disagree	16 (40.0)	0 (0.0)
	Disagree	12 (30.0)	0 (0.0)
	Neutral	8 (20.0)	15 (37.5)
	Agree	4 (10.0)	13 (32.5)
	Strongly agree	0 (0.0)	12 (30.0)
A history of falls is a strong predictor of future falls.	Strongly disagree	18 (45.0)	0 (0.0)
	Disagree	7 (17.5)	0 (0.0)
	Neutral	11 (27.5)	9 (22.5)
	Agree	4 (10.0)	16 (40.0)
	Strongly agree	0 (0.0)	15 (37.5)
Falls in the elderly are usually caused by a combination of internal and external factors.	Strongly disagree	20 (50.0)	3 (7.5)
	Disagree	11 (27.5)	5 (12.5)
	Neutral	8 (20.0)	15 (37.5)
	Agree	1 (2.5)	9 (22.5)
	Unclassified/Missing	0 (0.0)	8 (20.0)
Polypharmacy can contribute significantly to fall risk in elderly patients.	Strongly disagree	18 (45.0)	0 (0.0)
	Disagree	11 (27.5)	0 (0.0)
	Neutral	7 (17.5)	15 (37.5)
	Agree	4 (10.0)	13 (32.5)
	Strongly agree	0 (0.0)	12 (30.0)
Nurses have a primary role in educating elderly patients about fall prevention.	Strongly disagree	19 (47.5)	0 (0.0)
	Disagree	12 (30.0)	0 (0.0)
	Neutral	7 (17.5)	13 (32.5)
	Agree	2 (5.0)	11 (27.5)
	Strongly agree	0 (0.0)	8 (20.0)
	Unclassified/Missing	0 (0.0)	8 (20.0)
Environmental modifications are important in preventing falls among elderly patients.	Strongly disagree	17 (42.5)	0 (0.0)
	Disagree	9 (22.5)	0 (0.0)
	Neutral	9 (22.5)	9 (22.5)
	Agree	5 (12.5)	16 (40.0)
	Strongly agree	0 (0.0)	15 (37.5)
Physical activity helps reduce fall risks in elderly women.	Strongly disagree	17 (42.5)	0 (0.0)
	Disagree	14 (35.0)	0 (0.0)
	Neutral	7 (17.5)	15 (37.5)
	Agree	2 (5.0)	13 (32.5)
	Strongly agree	0 (0.0)	12 (30.0)
Proper footwear can minimize the risk of falling.	Strongly disagree	19 (47.5)	0 (0.0)
	Disagree	10 (25.0)	5 (12.5)
	Neutral	7 (17.5)	15 (37.5)
	Agree	4 (10.0)	9 (22.5)
	Strongly agree	0 (0.0)	8 (20.0)
	Unclassified/Missing	0 (0.0)	3 (7.5)

Pre-intervention responses showed limited knowledge regarding fall-risk factors and preventive responsibilities, with large proportions of participants selecting “strongly disagree” or “disagree” across most items. After the intervention, responses shifted toward “agree” and “strongly agree” for key fall-prevention concepts. Agreement that a previous history of falls predicts future falls increased from 4 nurses before the intervention to 31 nurses after the intervention when “agree” and “strongly agree” responses were combined. Recognition of polypharmacy as a fall-risk factor increased from 4 nurses pre-intervention to 25 nurses post-intervention. Similarly, agreement regarding the importance of environmental modification increased from 5 nurses to 31 nurses after the intervention.

Fall-prevention practice responses also shifted positively after the intervention. Agreement with assessing elderly patients for fall risk on admission increased from 4 nurses before the intervention to 30 nurses after the intervention when "agree" and "strongly agree" responses were combined. Use of safety tools for high-risk patients increased from 4 nurses pre-intervention to 29 nurses post-intervention. Medication-effect monitoring increased from 4 nurses to 25 nurses after the intervention. Participation in or seeking fall-prevention training increased from 2 nurses before the intervention to 30 nurses after the intervention. Documentation and reporting of fall incidents showed no change in the reported distribution, with 22 nurses selecting "agree" or "strongly agree" both before and after the intervention.

Table 3. Pre- and Post-Intervention Practice Responses Regarding Fall Prevention

Practice Statement	Response Category	Pre-Intervention n (%)	Post-Intervention n (%)
I assess elderly patients for fall risk on admission.	Strongly disagree	17 (42.5)	0 (0.0)
	Disagree	10 (25.0)	0 (0.0)
	Neutral	9 (22.5)	10 (25.0)
	Agree	4 (10.0)	16 (40.0)
	Strongly agree	0 (0.0)	14 (35.0)
I educate elderly patients and families about ways to prevent falls.	Strongly disagree	16 (40.0)	0 (0.0)
	Disagree	2 (5.0)	0 (0.0)
	Neutral	9 (22.5)	15 (37.5)
	Agree	3 (7.5)	13 (32.5)
	Strongly agree	0 (0.0)	12 (30.0)
	Unclassified/Missing	10 (25.0)	0 (0.0)
I remove or report environmental hazards to prevent falls.	Strongly disagree	17 (42.5)	3 (7.5)
	Disagree	12 (30.0)	5 (12.5)
	Neutral	8 (20.0)	15 (37.5)
	Agree	3 (7.5)	9 (22.5)
	Unclassified/Missing	0 (0.0)	8 (20.0)
I use safety tools for high-risk patients.	Strongly disagree	16 (40.0)	0 (0.0)
	Disagree	12 (30.0)	0 (0.0)
	Neutral	8 (20.0)	11 (27.5)
	Agree	4 (10.0)	15 (37.5)
	Strongly agree	0 (0.0)	14 (35.0)
I monitor medication effects that may increase fall risk.	Strongly disagree	16 (40.0)	0 (0.0)
	Disagree	12 (30.0)	0 (0.0)
	Neutral	8 (20.0)	15 (37.5)
	Agree	4 (10.0)	13 (32.5)
	Strongly agree	0 (0.0)	12 (30.0)
I encourage use of proper footwear and mobility aids.	Strongly disagree	17 (42.5)	5 (12.5)
	Disagree	13 (32.5)	13 (32.5)
	Neutral	7 (17.5)	11 (27.5)
	Agree	3 (7.5)	8 (20.0)
	Unclassified/Missing	0 (0.0)	3 (7.5)
I participate in or seek fall-prevention training when available.	Strongly disagree	17 (42.5)	0 (0.0)
	Disagree	14 (35.0)	0 (0.0)
	Neutral	7 (17.5)	10 (25.0)
	Agree	2 (5.0)	16 (40.0)
	Strongly agree	0 (0.0)	14 (35.0)
I document and report fall incidents accurately.	Strongly disagree	1 (2.5)	0 (0.0)
	Disagree	3 (7.5)	3 (7.5)
	Neutral	14 (35.0)	14 (35.0)
	Agree	12 (30.0)	12 (30.0)
	Strongly agree	10 (25.0)	10 (25.0)

Table 4. Paired-Samples Comparison of Overall Pre- and Post-Intervention Scores

Comparison	Mean Difference	SD	SE	95% CI Lower	95% CI Upper	t	df	p-value
Pre-intervention score post-intervention score	-38.600	16.919	2.675	-44.011	-33.189	-14.429	39	<0.001

The paired-samples t-test showed a statistically significant increase in overall post-intervention scores compared with pre-intervention scores. The negative mean difference of -38.600 indicates that post-intervention scores were higher than pre-intervention scores. The 95% confidence interval ranged from -44.011 to -33.189, and the paired comparison was statistically significant, $t(39) = -14.429$, $p < 0.001$. These findings indicate that the educational intervention was associated with improved nurses' overall knowledge and fall-prevention practice scores.

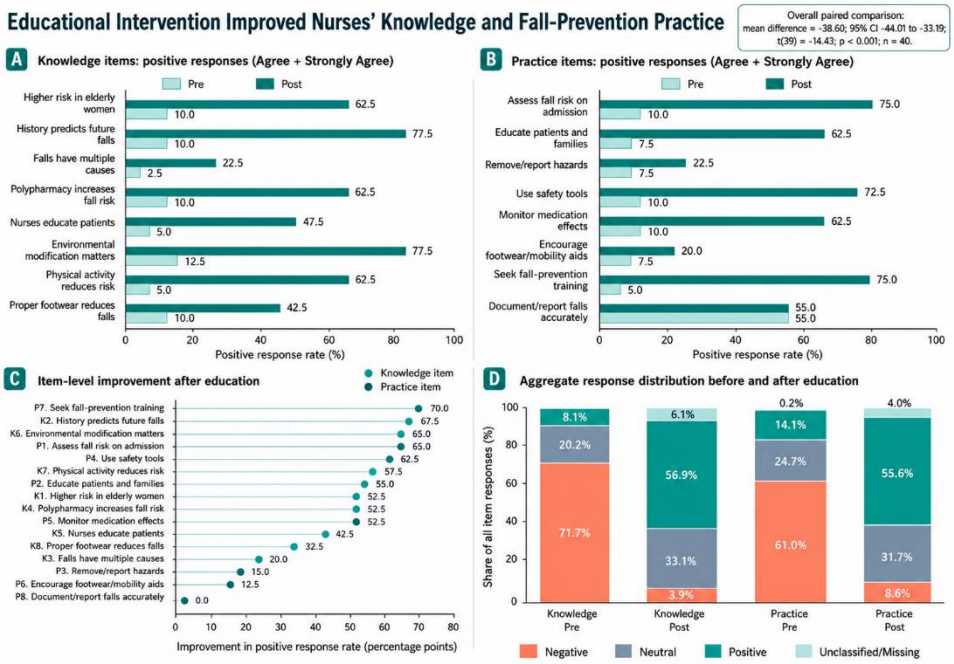

Figure 1 Effect of Educational Intervention on Nurses' Knowledge and Fall-Prevention Practices. This multipanel figure summarizes changes in nurses' fall-prevention knowledge and practice responses before and after the educational intervention. Panel A shows item-wise improvement in knowledge-related positive responses, defined as "Agree" plus "Strongly Agree." The largest post-intervention knowledge gains were observed for recognition of previous fall history as a predictor of future falls and the importance of environmental modification, both reaching 77.5% positive responses after the intervention. Panel B presents practice-related positive responses, showing marked improvement in fall-risk assessment on admission, use of safety tools, medication-effect monitoring, patient/family education, and willingness to seek fall-prevention training. Panel C ranks item-level improvement in positive response rates, with the greatest gains observed for seeking fall-prevention training, history of falls as a risk predictor, environmental modification, fall-risk assessment on admission, and use of safety tools. Panel D displays the aggregate response distribution across knowledge and practice items, demonstrating a substantial shift from negative responses before the intervention toward positive responses after the intervention. The overall paired comparison showed a statistically significant improvement in post-intervention scores compared with pre-intervention scores, with a mean difference of -38.60, 95% CI -44.01 to -33.19, t(39) = -14.43, p < 0.001, n = 40. These findings indicate that the educational intervention was associated with improved nurses' knowledge and reported fall-prevention practices.

DISCUSSION

This study evaluated the effect of an educational intervention on nurses' knowledge and fall-prevention practices in selected clinical units of a private sector hospital. The findings showed a clear post-intervention improvement in nurses' responses across most knowledge and practice items, supported by a statistically significant paired comparison of overall pre- and post-intervention scores. The overall mean difference of -38.60, with a 95% confidence interval from -44.01 to -33.19 and $p < 0.001$, indicates that post-intervention scores were substantially higher than pre-intervention scores. These findings suggest that structured fall-prevention education can improve nurses' recognition of fall-risk factors and strengthen self-reported or checklist-based preventive practices in hospital settings.

Before the intervention, several knowledge gaps were evident. Many nurses did not demonstrate adequate recognition of key fall-risk factors such as previous fall history, polypharmacy, environmental hazards, physical activity, footwear, and the nurse's role in patient education. These findings are clinically important because effective fall prevention depends on early identification of multiple interacting risks rather than reliance on a single factor. Previous evidence has similarly emphasized that falls in older adults are multifactorial and require comprehensive assessment of patient-related, medication-related, environmental, and care-process contributors (6). In the present study, post-intervention responses shifted toward agreement or strong agreement for most knowledge items, indicating improved awareness of evidence-based fall-risk concepts.

Recognition of polypharmacy as a fall-risk factor improved notably after the intervention. This is an important finding because medication-related fall risk is frequently underestimated in routine care, despite evidence that drug classes affecting blood pressure, alertness, balance, cognition, and coordination can contribute to falls among older adults. Previous research has highlighted the importance of incorporating medication-related fall risk into fall-risk assessment, particularly in geriatric and inpatient care settings (19,23). The improvement observed in this study suggests that educational reinforcement can help nurses better identify medication-related risks and monitor patients more proactively.

Practice-related responses also improved after the intervention, particularly for fall-risk assessment on admission, patient and family education, use of safety tools, medication-effect monitoring, and seeking fall-prevention training. These domains are directly relevant to bedside nursing care and institutional patient-safety practice. Similar findings have been reported in studies showing that nurses' knowledge, attitude, and fall-prevention practices improve when structured training and clinical protocols are emphasized (8,18). The increase in agreement with assessing fall risk on admission is especially important because early risk identification allows timely implementation of environmental modification, supervision, assistive devices, and patient-specific preventive measures.

The largest item-level improvements were observed in seeking fall-prevention training, recognition of previous fall history, environmental modification, admission fall-risk assessment, and use of safety tools. These findings indicate that the intervention influenced both cognitive awareness and practical readiness. However, improvement was not uniform across all domains. Lower post-intervention gains were observed for removing or reporting hazards, encouraging footwear and mobility aids, and documenting or reporting falls accurately. The limited change in documentation and reporting may indicate that this practice was already relatively stronger at baseline or that documentation behaviors require system-level reinforcement beyond education alone. Previous literature has shown that barriers to fall-prevention guideline implementation may include workload, institutional culture, staffing patterns, communication gaps, and limited integration of protocols into daily workflow (25,28,29).

Although the statistical improvement was strong, the findings should be interpreted cautiously. The one-group pretest–posttest design can demonstrate change over time but cannot fully exclude alternative explanations such as testing effect, short-term recall, social desirability bias, Hawthorne effect, or increased awareness from repeated measurement. Because no control group was included, the observed improvement cannot be attributed to the educational intervention with the same level of certainty as a randomized controlled design. In addition, the study measured nurses' knowledge and fall-prevention practice responses rather than actual patient fall incidence. Therefore, the findings support improvement in nurse-level educational and practice outcomes but do not directly prove reduction in hospital fall rates.

The study also had limitations related to sample size, setting, measurement, and reporting. The sample included 40 nurses from a single private sector hospital, which may limit generalizability to other public and private hospitals with different staffing structures, patient populations, training systems, and safety cultures. Some item-level frequencies in the original dataset required verification because several reported percentages were inconsistent with the stated sample size. Future studies should use validated instruments with reported reliability coefficients, clearly defined scoring systems, larger multicenter samples, longer follow-up, and objective audit-based measures of fall-prevention behavior. Further research should also assess whether improvements in nurses' knowledge and practice translate into lower inpatient fall rates and reduced fall-related injuries over time.

Despite these limitations, the study provides useful local evidence that structured educational intervention may improve nurses' fall-prevention knowledge and selected preventive practices in a private hospital setting. The findings support the need for regular refresher training, integration of fall-risk assessment into admission protocols, improved documentation systems, environmental safety

audits, and institutional monitoring of fall-prevention compliance. Education alone may not be sufficient, but it remains an important foundation for strengthening patient-safety culture and improving fall-prevention practices among frontline nursing staff.

CONCLUSION

This study found that an educational intervention was associated with significant improvement in nurses' knowledge and fall-prevention practice scores in selected clinical units of a private sector hospital. After the intervention, nurses showed better recognition of fall-risk factors, including previous fall history, polypharmacy, environmental hazards, physical activity, proper footwear, and the importance of patient education. Practice-related responses also improved, particularly for fall-risk assessment on admission, use of safety tools, medication-effect monitoring, patient and family education, and willingness to participate in fall-prevention training. These findings suggest that structured and repeated educational programs can strengthen nurses' preparedness for fall prevention in inpatient care. However, because the study used a one-group pretest–posttest design and did not measure actual patient fall rates, the findings should be interpreted as improvement in nurse-level knowledge and practice outcomes rather than direct evidence of reduced fall incidence.

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