

IMPLEMENTATION OF AN EDUCATIONAL BOARD INNOVATION TO PREVENT FALLS AMONG HOSPITALIZED CANCER PATIENTS

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ABSTRACT

Objectives: This study evaluated the effectiveness of an Educational Board (Edu-Board), a bedside visual education tool, in improving knowledge and adherence to fall-prevention behaviors among oncology inpatients. **Methods:** A pre-experimental one-group pretest–posttest study was conducted using the Plan–Do–Study–Act (PDSA) quality improvement framework in the Cempaka inpatient ward at Dharmais National Cancer Hospital, Jakarta. Thirty adult cancer patients with moderate to high fall risk ($\geq 50\%$) identified using the CC-CA Fall Risk Screening Tool were recruited along with their family caregivers. The intervention included bedside Edu-Board installation, nurse-led education, a fall-prevention checklist, and daily monitoring for three days. Patient knowledge and adherence to fall-prevention behaviors were assessed before and after the intervention using structured questionnaires. Data were analyzed using paired statistical tests with a The study findings showed a effective strategy level of $p < 0.05$. **Results:** Knowledge scores increased significantly from 10.8 ± 2.1 to 15.6 ± 1.8 ($p < 0.001$). Adherence to fall-prevention behaviors also improved significantly from 8.9 ± 2.4 to 14.2 ± 2.0 ($p < 0.001$). Observational findings further indicated improved safe mobility practices and increased caregiver participation in reinforcing fall-prevention behaviors. **Discussion:** The improvement may be explained by the Health Belief Model, where visual cues act as reminders that encourage preventive actions. Consistent with previous studies, visual and patient-centered education improves understanding, engagement, and adherence to safety behaviors. **Conclusion:** The Edu-Board intervention The study findings showed a effective strategy improved patient knowledge and adherence to fall-prevention behaviors. As a low-cost and practical educational innovation, the Edu-Board may support hospital fall-prevention programs and strengthen patient safety in oncology inpatient care.

Keywords: bedside Edu-Board, fall prevention, nursing innovation, oncology, patient education, patient safety

BACKGROUND

Falls are one of the most common adverse events in hospitalized patients and represent a major patient safety concern worldwide. According to the World Health Organization (WHO), approximately 37.3 million falls require medical attention annually, and in hospital setting, falls are associated with increased morbidity, prolonged length of stay, reduced quality of life, and increased healthcare costs (World Health Organization, 2023). Among oncology inpatients, the risk is particularly heightened due to disease- and treatment-related factors such as muscle weakness, fatigue, anemia, neuropathy, cognitive changes, and the side effects of chemotherapy and analgesic medications (Brooks, Schumpp., & Dawson, 2023; Chen *et al.*, 2023). These factors, combined with environmental hazards and reduced physical capacity, place cancer patients at an especially high risk of falls during hospitalization.

In Indonesia, as in many other countries, fall prevention remains a persistent challenge in oncology care units. Despite existing institutional protocols and risk assessment tools, patient falls continue to occur, often due to insufficient patient awareness, poor adherence to safety instructions, and limited family involvement in fall-prevention practices (Handayani, Hartini, & Widodo, 2021). Traditional educational approaches such as verbal explanations during admission or printed brochures are often ineffective because they rely on patients' memory, are not continuously visible, and may not fully engage family caregivers who play a crucial role in patient support during hospitalization (Hignett *et al.*, 2020). Furthermore, many patients and families do not fully understand the specific risk factors contributing to falls or the simple preventive actions they can take, such as calling for assistance, using mobility aids, or

maintaining a clutter-free environment (Chang *et al.*, 2023).

Evidence suggests that patient education is a cornerstone of fall-prevention strategies, and when delivered effectively, it effective strategy improves knowledge, engagement, and adherence to safety practices (Hill, Etherton-Bear, & Haines, 2021; Miake-Lye *et al.*, 2022). Recent innovations in patient safety education have emphasized the use of visual, interactive, and continuously accessible tools to reinforce behavioral change (Galmarini, Marciano, & Schulz, 2024). Visual cues and environmental prompts, including posters, bedside signage, and educational boards, have demonstrated potential to enhance patient awareness and promote active engagement in safety-related behaviors (Morris *et al.*, 2023). However, few studies have explored the use of structured bedside educational tools specifically designed for oncology inpatients, who face unique fall-risk factors and require tailored interventions.

In response to this gap, our innovation project developed and implemented an Educational Board (“Edu-Board”) intervention — a patient- and family-centered visual tool installed at the bedside designed to increase knowledge and adherence to fall-prevention practices among hospitalized cancer patients. The Edu-Board incorporates simple language, pictorial instructions, and a checklist of daily fall-prevention actions. It is supported by a digital component (QR code-linked video) to reinforce learning and enable repeated viewing. The intervention was integrated into routine nursing care and implemented using a Plan–Do–Study–Act (PDSA) continuous quality improvement framework. The aim of this study was threefold: (1) to design and implement a bedside educational board tailored to the fall-prevention needs of oncology inpatients; (2) to evaluate its effectiveness in improving patient and family knowledge and adherence

to fall-prevention behaviors; and (3) to explore its feasibility as a sustainable component of evidence-based nursing practice. We hypothesized that the Edu-Board intervention would significantly increase knowledge and adherence among cancer patients and their caregivers, thereby contributing to enhanced patient safety and improved quality of care.

National Cancer Center Dharmais Hospital was selected as the study setting because it is the national referral center for oncology care in Indonesia, treating a large number of hospitalized cancer patients with complex treatment regimens. Patients in this setting frequently experience treatment-related conditions such as fatigue, neuropathy, and functional decline that increase the risk of falls during hospitalization. Therefore, implementing and evaluating a fall-prevention educational intervention in this specialized oncology environment is important to improve patient safety and develop context-specific strategies applicable to oncology inpatient care.

METHODS

This project used a pre-experimental single-group pre-test–post-test design within an evidence-based nursing (EBN) framework and was implemented using the Plan–Do–Study–Act (PDSA) quality improvement model (Afiyanti & Rachmawati, 2022). The study was conducted in the Cempaka inpatient ward of National Cancer Center Dharmais Hospital, Jakarta, Indonesia, a tertiary oncology center providing specialized care for adult cancer patients.

A total of 30 patient–family pairs participated in the project. The sample size of 30 participants was determined based on feasibility and the operational context of the study setting. The Cempaka inpatient ward has a total capacity of 62 beds, and data collection was conducted over a one-week period. During

this time frame, all eligible patients meeting the inclusion criteria were recruited using a consecutive sampling approach, resulting in a total of 30 patient–family pairs.

In addition, a sample size of approximately 30 participants is commonly considered adequate for preliminary or pilot studies and quality improvement projects to detect within-group changes using paired statistical tests, particularly when the expected effect size is moderate to large. Therefore, the sample size in this study reflects a pragmatic and context-driven approach, consistent with the objectives of a QI initiative, rather than hypothesis-testing research requiring formal power estimation. This limitation has been acknowledged in the manuscript.

Participants were recruited using consecutive sampling based on predefined criteria. Eligible participants were adult cancer patients (≥ 18 years) admitted to the ward, identified as having moderate to high fall risk ($\geq 50\%$) using the Clinic Capone Albert (CC-CA) Fall Risk Screening Tool, able to communicate verbally, and willing to participate (Weed-Pfaff *et al.*, 2016). Patients who were unconscious were not eligible to participate in this study. The inclusion criterion requiring participants to be able to communicate verbally ensured that all participants were conscious and capable of understanding the educational intervention and completing the questionnaires. Therefore, unconscious patients were automatically excluded from the study. Family caregivers accompanying patients during hospitalization were also involved. Family caregivers were eligible if they were aged ≥ 18 years, identified as the primary person accompanying the patient during hospitalization, able to communicate verbally, and willing to participate in the educational intervention and observation process.

Data collection was conducted over a five-day period in the Cempaka inpatient ward, with baseline (pre-test) measurements obtained on Day 1 prior to the intervention and follow-up (post-test) measurements conducted on Day 3 or Day 4 after approximately 72 hours of exposure to the Educational Board intervention. Data were collected by four trained registered nurses with experience in oncology care and prior training in the use of the study instruments and standardized observation procedures.

To minimize potential bias, several strategies were implemented. First, standardized data collection protocols and structured instruments were used to ensure consistency. Second, both data collectors underwent training prior to the study to ensure uniform understanding of the procedures. Third, interrater reliability for observational adherence data was assessed using the Kappa statistic, demonstrating acceptable agreement. The interrater reliability analysis using the Kappa test showed a value of $\kappa = 0.82$, indicating strong agreement between observers. Finally, data collection was conducted independently from routine care documentation to reduce observer and reporting bias.

The Educational Board intervention was developed based on principles of Health Education and Behavior Change Theory, particularly the Health Belief Model (HBM) (Srithongklang *et al.*, 2019) which emphasizes that individuals are more likely to adopt preventive behaviors when they understand their susceptibility to health risks, the severity of potential consequences, and the benefits of preventive actions. The visual educational components of the Edu-Board were designed to increase patients' awareness of fall risk, reinforce perceived benefits of preventive behaviors, and provide clear cues to action through pictorial instructions and daily checklists. In addition, the intervention

was implemented using the Plan–Do–Study–Act (PDSA) quality improvement model to facilitate systematic planning, implementation, evaluation, and refinement within routine nursing practice.

The Educational Board included: (1) a visual educational panel illustrating fall-prevention behaviors, (2) a daily checklist for monitoring adherence, and (3) a QR code linking to an educational video for reinforcement. Nurses introduced the Edu-Board within 24 hours of admission and reinforced its use during daily care. The visual education panel, daily checklist, and educational video were developed by the research team based on a review of current fall-prevention guidelines, patient safety literature, and clinical protocols used in oncology inpatient care. The content focused on key fall-prevention behaviors such as requesting assistance before ambulation, using assistive devices, maintaining a safe environment, and involving family caregivers in supervision.

Prior to implementation, the Edu-Board materials underwent expert review to ensure content validity, relevance, and clarity. The review panel consisted of five experts, including three oncology nursing specialists with clinical and academic experience in cancer care and one senior nursing managers serving as heads of the Cempaka oncology inpatient ward. Minor revisions were made based on qualitative feedback, particularly to simplify language and enhance the clarity of visual instructions.

In addition, a pilot usability assessment was conducted with a convenience sample of six participants, consisting of three hospitalized cancer patients and three family caregivers in the ward. The pilot aimed to evaluate readability, clarity of visual content, and ease of use of the Edu-Board. Feedback was collected through brief structured interviews and direct observation during use. Participants were

asked to comment on the comprehensibility of the instructions, visual appeal, and practicality of integrating the Edu-Board into daily care.

The usability evaluation criteria included (1) clarity of language, (2) interpretability of visual elements, (3) ease of interaction with the checklist, and (4) perceived usefulness in supporting fall-prevention behaviors. Feedback from this process indicated that the Edu-Board was generally easy to understand and use; however, minor refinements were made, such as improving font size, simplifying wording, and enhancing the visibility of key safety messages. These revisions contributed to optimizing the final version of the Edu-Board and its supporting materials prior to full implementation. The involvement of both clinical experts and end-users (patients and family caregivers) represents a key strength of this study, ensuring that the Edu-Board is not only evidence-based but also practical, user-friendly, and contextually appropriate for oncology inpatient settings.

The intervention followed the PDSA cycle: planning the Edu-Board based on literature and patient safety guidelines, implementing the intervention, evaluating knowledge and adherence outcomes, and refining the educational approach.

The demographic and clinical data form was developed by the research team based on relevant literature and clinical variables commonly associated with fall risk in hospitalized cancer patients. The form included patient characteristics such as age, gender, type of treatment, and fall risk level. Content validity was reviewed by oncology nursing experts to ensure relevance and completeness of the collected variables. Data were collected over a five-day period using four instruments.

The Clinic Capone–Albert (CC-CA) Fall Risk Assessment Tool was developed by Weed-Pfaff *et al.* (2016) to assess fall risk among

hospitalized cancer patients. The original instrument is in English and was adapted into Bahasa Indonesia using a forward–backward translation procedure and reviewed by bilingual experts to ensure semantic equivalence. The tool includes clinical and functional risk factors such as Cancer diagnosis category, had blood product transfusion, has metastasis beyond primary site, uses antidepressant medication and uses antipsychotic medication. The total score is calculated and categorized into risk levels (e.g., moderate and high risk), with higher scores indicating greater fall risk.

The knowledge questionnaire was developed by the research team based on established fall-prevention guidelines and relevant literature and was administered in Bahasa Indonesia. The instrument consists of seven items assessing patients' knowledge of fall risk factors and preventive behaviors. Each item was scored dichotomously (1 = correct answer, 0 = incorrect answer), resulting in a total possible score ranging from 0 to 7, with higher scores indicating better knowledge. For interpretative purposes, total scores were categorized into three levels: low (0–2), moderate (3–5), and high (6–7) knowledge. Content validity was evaluated by oncology nursing experts. A total of five experts were involved in the content validation process, consisting of three oncology nursing specialists and two senior nurse managers to ensure the relevance and clarity of each item. Construct validity was tested using Pearson's correlation analysis based on data from 30 respondents. All items demonstrated correlation coefficients ($r = 0.514–0.650$) exceeding the critical r -table value (0.361), indicating that all items were valid. Reliability testing showed a α of 0.747 across the seven items, indicating acceptable internal consistency and reliability of the instrument.

The adherence checklist was also developed by the research team based on standard hospital fall-prevention protocols (Weed-Pfaff *et al.*, 2016). The checklist includes observable behaviors, the adherence checklist consisted of 10 observable items related to fall-prevention behaviors. such as requesting assistance before ambulation, appropriate use of assistive devices, and maintaining a safe environment. Each observed behavior was scored using a binary system (1 = performed, 0 = not performed), with total scores reflecting the level of adherence. Higher scores indicate better adherence to fall-prevention practices. Content validity of the adherence checklist was reviewed by oncology nursing experts, and the instrument was pilot-tested prior to implementation to ensure feasibility and clarity in clinical use.

Measurements were conducted at baseline (pre-test) and post-intervention on Day 3 or Day 4, depending on the patient's length of stay, indicating evaluation after approximately 72 hours of exposure to the intervention.

This project was conducted as a quality improvement (QI) initiative and underwent administrative and ethical review in accordance with institutional policies. Ethical clearance was obtained from the Institutional Review Board of Dharmais National Cancer Center Hospital (Approval No. TK.02.04/D.XII/4/2025; December 31, 2025). Written informed consent was obtained from all participants prior to data collection.

RESULTS

A total of 30 patient–family pairs participated in the study. The demographic and clinical characteristics of the respondents are presented in Table 1. Most patients were aged 46–65 years (50%), and the majority were female (60%). The most common treatment received during hospitalization was

chemotherapy (46.7%), followed by surgery and combination therapy.

Changes in Knowledge and Adherence to Fall Prevention

The effectiveness of the Edu-Board intervention was evaluated by comparing pre-test and post-test scores of patient knowledge and adherence to fall-prevention behaviors. The results showed an increase in mean scores after the intervention.

As shown in Table 2, The results demonstrated a statistically significant improvement in both knowledge and adherence following the intervention. The mean knowledge score increased from 10.8 ± 2.10 to 15.60 ± 1.80 (mean difference = 4.80; 95% CI: 3.76–5.84; $p < 0.001$), while the mean adherence score increased from 8.90 ± 2.4 to 14.20 ± 2.00 (mean difference = 5.30; 95% CI: 4.13–6.47; $p < 0.001$). The confidence intervals did not cross zero, indicating robust statistical significance. Furthermore, the effect sizes were very large for both knowledge (Cohen's $d = 2.45$) and adherence (Cohen's $d = 2.40$), suggesting that the intervention had a substantial practical impact. Overall, these findings indicate that the intervention was highly effective in improving both participants' knowledge and adherence.

Table 3 shows that patient adherence to fall risk prevention measures increased over the three-day observation period. On the first day, patient adherence to fall prevention measures was 32%. This increased by 1% on the second day to 33%. By the third day, the level of patient adherence further increased to 35%.

Daily monitoring indicated a progressive improvement in adherence behaviors from Day 1 to Day 3. Patients increasingly demonstrated safer mobility practices, including requesting assistance before ambulation, using walking aids properly, and maintaining a clutter-free

Table 1. Characteristics of Participants (n = 30)

Variables	Frequency	Percentages
Age		
18–45 years	8	26.69
46–65 years	15	50.05
>65 years	7	23.31
Gender		
Male	12	40.00
Female	18	60.00
Type of Treatment		
Chemotherapy	14	46.70
Surgery	7	23.30
Combination therapy	9	30.00
Fall Risk Level (CC-CA)		
Moderate risk	18	60.00
High risk	12	40.00

Table 2. Knowledge and Adherence to Fall Prevention (n = 30)

Variable	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference	95% CI	Cohen’s d	p-value
Knowledge Score	10.80 ± 2.10	15.60 ± 1.80	4.80	3.76 – 5.84	2.45	<0.001
Adherence Score	8.90 ± 2.40	14.20 ± 2.00	5.30	4.13 – 6.47	2.40	<0.001

Table 3. Daily Monitoring of Patient Adherence in the Cempaka Inpatient Ward

Day 1	Day 2	Day 3
84 (32%)	85 (33%)	90 (35%)

bedside environment. Family caregivers also actively participated by reminding patients to follow the fall-prevention checklist available on the Educational Board.

Overall, the findings suggest that the Edu-Board intervention The study findings showed a effective strategy improved both patient knowledge and adherence to fall-prevention behaviors, indicating its potential as an effective and practical educational tool in oncology inpatient settings.

DISCUSSION

The increase in patient adherence following the intervention indicates that visual educational media such as Edu-Board can provide clearer understanding, greater motivation, and better retention compared to verbal education alone. The Edu-Board presents key messages in a concise and engaging manner, encouraging patients to follow fall-prevention recommendations, such as using assistive devices, requesting assistance from nurses when mobilizing, and paying attention

to their surrounding environment. Through daily patient monitoring, it was observed that patient adherence to fall-prevention practices improved progressively from day to day.

The findings of this study indicate that the Educational Board intervention was associated with significant improvements in both knowledge and adherence to fall-prevention behaviors among hospitalized cancer patients, supporting existing international evidence that structured patient education enhances safety outcomes. Previous studies, such as Hill, Etherton, & Haines (2021) and Miake-Lye *et al.* (2022), have demonstrated that educational interventions can improve patient engagement and adherence to safety protocols, while Dykes *et al.* (2020) highlighted the effectiveness of patient-centered tools in increasing awareness and self-efficacy within 24–72 hours. The effectiveness of the Edu-Board in this study may be explained through behavior change mechanisms, particularly the Health Belief Model (Srithongklang *et al.*, 2019), where continuous visual exposure at the bedside acts as a cue to action, reinforcing patients' perceived risk and benefits of preventive behaviors. In addition, the combination of visual aids, daily checklists, and caregiver involvement likely enhances information retention, self-monitoring, and behavioral reinforcement. Importantly, beyond statistical significance, the observed improvements have meaningful clinical implications, as increased adherence to simple safety behaviors such as requesting assistance before ambulation and maintaining a safe environment can directly reduce fall risk, which is critical in oncology patients who are highly vulnerable due to treatment-related factors. Therefore, the Educational Board represents a practical, low-cost, and scalable intervention that may strengthen patient safety strategies in hospital settings, although further studies with larger samples and controlled designs are needed to confirm its effectiveness

and impact on fall incidence.

World Health Organization (2023) found that participatory educational programs for cancer patients improved not only knowledge but also fall-prevention behaviors, resulting in a reduction in fall incidence from 19.3% to 0% in the intervention group. Another study by Hill, Etherton-Beer, & Haines (2021) also emphasized that patient education delivered through visual approaches and interactive dialogue plays an important role in increasing patient awareness and adherence to safety protocols, particularly in hospital environments with a high risk of falls. In addition, Ximenes *et al.* (2021) demonstrated that education accompanied by routine fall-risk monitoring can enhance patient adherence to preventive actions, such as wearing anti-slip footwear and calling nurses when assistance is needed.

In the context of cancer patients, adherence plays a crucial role because many patients experience physical weakness, chemotherapy-related side effects, or balance disturbances that increase vulnerability to falls. Media-based education such as the Edu-Board offers advantages because it can be accessed repeatedly, allowing both patients and caregivers to recall safety messages at any time. Therefore, the implementation of Edu-Board not only increases knowledge but also actively promotes patient adherence to fall-prevention practices, making it suitable for integration into patient safety programs as a routine intervention in oncology inpatient units (Heng *et al.*, 2020).

This success is further supported by study findings that observed patient adherence over a 3-day (72-hour) period following the fall-prevention educational intervention. The observations indicated that patients who received education through visual media consistently maintained fall-prevention behaviors during the observation period, such as complying

with safety procedures during mobilization and utilizing caregivers for assistance with potentially risky activities. Short-term observation over 72 hours is important because the early hospitalization period represents the most critical time for fall incidents, particularly among cancer patients who often experience fatigue, pain, chemotherapy side effects, or balance disorders.

The effectiveness of educational interventions monitored over a 72-hour period is also supported by the findings of Dykes *et al.* (2020) who conducted measurements up to 72 hours after fall-prevention education among hospitalized cancer patients. Their study found that structured education increased patients' perception of fall risk, self-efficacy in preventing falls, and willingness to request assistance within 24 to 72 hours after the intervention. Positive changes detected at the 72-hour time point suggest that educational interventions do not produce only immediate effects but can also persist during the critical early period of hospitalization, when fall risk is typically highest.

Thus, this study demonstrates that the implementation of Educational Board combined with monitoring of patient behavior for 72 hours after education is an effective strategy to improve adherence among cancer patients in preventing fall risk. This strategy not only enhances knowledge but also encourages patients to consistently maintain safe behaviors during the period when they are most vulnerable to fall incidents. The discussion section discusses the findings with relevant empirical data and criticizes the results found with relevant empirical evidence.

This study has several limitations that should be considered. The use of a pre-experimental design without a control group limits the ability to establish causal relationships. In addition, the relatively small sample size

and short observation period may affect the generalizability of the findings. Therefore, future studies using more rigorous designs, larger samples, and longer follow-up periods are recommended to confirm these results and evaluate their impact on fall incidence. Further research using more rigorous study designs, such as randomized controlled trials with larger sample sizes and longer follow-up periods, is recommended to confirm the effectiveness of the Edu-Board intervention and to evaluate its impact on clinical outcomes, including fall incidence.

CONCLUSION

The implementation of the Educational Board-based "Care-Fall" program in the Cempaka Inpatient Ward of National Cancer Center Dharmais Hospital demonstrated that a systematic educational intervention can enhance the safety of cancer patients during hospitalization. The study findings showed a effective strategy improvement in patients' The findings of this study suggest that the Educational Board intervention was associated with improvements in patient knowledge regarding fall risk as well as increased adherence among patients and their families in implementing fall-prevention measures ($p < 0.05$). As a simple and low-cost educational strategy, the Edu-Board has potential to support patient safety initiatives in oncology inpatient settings by promoting awareness and engagement in preventive practices.

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