SCHOLARLY PROJECT GUIDE

CAMERA ASSISSTED MONITORING DEVICE AS A TOOL TO REDUCE FALLS IN IMPATIET ADULTS: AN INTERGRATIVE REVIEW

A Scholarly Project

Submitted to the

Faculty of Liberty University

In partial fulfillment of

The requirement for the degree

Of Doctor of Nursing Practice

By

Pamela Oriaifo

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Lynchburg, VA

7/7/2023, 2023

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Scholarly Project Chair Approval:

Dr. Kristene Diggins

Type Chair Legal Name, Credentials Here (Chair must sign and date online above). Date

ABSTRACT

Background: Adult inpatient falls remain a significant challenge in many hospitals, resulting in poor quality of life and severe financial burden. There have been tremendous efforts to curb the number of falls ranging from environmental modification, clinician education, review of medications, and use of assistive devices. One such assistive device is the use of camera monitoring systems. This systemic review scopes camera/video-assisted fall prevention programs in hospitals. It was hypothesized that camera/video-assisted fall prevention programs would reduce adult inpatient fall and costs significantly. The outcomes of camera or video-assisted fall prevention programs were considered in some hospital settings.

Method: The Iowa Model of Evidence-based Framework and Preferred Reporting Items for Meta-Analysis (PRISMA) were used. Five databases, including PubMed, Cochrane, Google Scholar, Scopus, and Web of Science, were searched from 2017-2023 utilizing the Jerry Farwell Library. The articles were appraised using the critical appraisal worksheet for systemic review.

Results: Eight articles met the predefined inclusion criteria, covering 2017-2022. One common theme identified in these studies was visual assistance to minimize inpatient falls. The appellation varied from patient-engaged video surveillance, video cameras, and video monitoring to video assistive devices. Some devices were fixed, while others were portable. All randomized control trials reported that video-assisted devices effectively prevented hospital falls. Nursing staff and patient/family engagement in surveillance significantly reduced inpatient falls.

Conclusion: There is evidence that video or camera-assisted fall prevention programs can significantly reduce adult inpatient falls. The falls may even be more reduced for adults if nursing staff and patients/family engage in overall surveillance.

Keywords: camera, fall, prevention, monitoring, hospital

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I have no known conflict of interest to disclose.

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SECTION ONE: INTRODUCTION

Background

There is a global recognition that falls in hospitals are a significant concern, with varying rates from hospital to hospital and country to country (Heng et al., 2020). For instance, in Australia, between 2015-2016, more than 3400 separations were recorded in which inpatients were treated for injuries from falls at an average rate of 3.2 per 1000 separations (AIHW, 2018). In the United Kingdom, it is reported that about 6.63 falls per 1000 occupied bed days occur annually (RCP, 2020). In the United States of America, about one million falls in hospitals are reported yearly (Woltsche et al., 2022).

Although inpatient fall is common among all age groups, those aged 65 years and older have a higher risk of falling (Moreland et al., 2020). The consequences of all can impact the quality of life, such as injuries, hip fractures, problems with mobility, depression, bruises, head trauma, and skin tears (Haddad et al., 2019; Ghosh et al., 2022). In addition to the negative impact on the quality of the patients who fall in hospitals, the economic cost of inpatient falls is also a significant challenge (Woltsche et al., 2022).

Single and multifactorial fall prevention programs exist in many hospitals (Tucker et al., 2019). Such programs include clinician and patient/family education, environmental modification, medication management, assistive devices, hospital systems, and policies (Gettens et al., 2018). According to Heng et al. (2020), patient education is vital in preventing inpatient falls.

Problem Statement

Despite enormous investments, both material and policy-wise, to prevent falls in hospitals, the rate of falls, particularly amongst older people, is still increasing. Many hospitals have fall prevention guidelines designed from evidence-based practices, yet the fall rates are still high. It is recognized that a multifactorial approach that includes clinician and patient/family education and video-assisted fall management can prevent falls in hospitals among adults and geriatric patients.

Purpose of study

This project aimed to assess the role of patient/family education, video-assisted fall prevention implementations, and other existing techniques in reducing falls in adult hospitalized patients.

Clinical question

Patient education and monitoring (using monitoring cameras) could reduce fall events and cost over time compared to restraints and sitters for adults in the medical-surgical unit.

SECTION TWO: LITERATURE REVIEW

Search Strategy

In this research, keywords such as fall, prevention, and adults/elderly were searched in some search engines from 2018 to 2023. The search engines include PubMed, the CINAHL database, and the Cochrane Database of Systematic Reviews. Randomized controlled trials and quasi-trials were searched in these search engines. A manual search was performed using Google Scholar, and the studies included were those related to fall prevention in hospitals, of which many focused on the elderly.

Critical Appraisal

All articles were appraised using the Critical Appraisal Worksheet for Systematic Reviews. The articles were included if they had a clear literature search, an indication of exclusion, and inclusion criteria. The author screened the titles, abstracts, and full text, as well as a critical appraisal. A critical appraisal table of the article is provided (Appendix 1).

Synthesis

Besides traditional fall prevention activities, such as strainers and bells, patient education, and technologies, such as using cameras, can significantly reduce falls. The studies reviewed so far demonstrate that patient education about falls can tremendously reduce fall events. In addition, camera-assisted prevention schemes have the potential to reduce falls.

Conceptual Framework

The Iowa Model of Evidence-Based Practice was used conceptual model (Iowa Model Collaborative, 2017). They were developed in 1994 by Marita G. Tilter, a faculty member of the University of Iowa College of Nursing, and some nurses from the University of Iowa Hospital. The Iowa model of EBP is one of the most widely used in the USA (Duff et al., 2020).

The Iowa Model was developed to guide nurses to utilize research findings and translate them into clinical practice to improve patient outcomes. The model is specific to clinical practice and is used within the clinical health organization. This model provides a step-by-step approach to match clinical problems with interventions based on research outcomes to make a departmental or organizational change to practice. It implies that the Iowa Model can assist nursing departments in focusing their limited financial and personnel resources on important EBP activities (Brown, 2016). In this model, clinicians focus on two triggers: knowledge-focus and problem-focus, evaluate current nursing practices, and explore avenues where improvements can be made using current research findings. Seven steps are involved in applying the Iowa Model of EBP: (1) Identify a trigger (knowledge-focus or problem-focus) where an EBP change is warranted. This project considers increased fall rates in hospitalized adults as the trigger. (2) Determine whether the problem identified is a priority for the organization, practice, department, or unit. In this project, falls in elderly hospitalized patients constitute a significant problem as they affect the quality of life and burden the healthcare system financially. (3) Form a team with an interdisciplinary membership that will develop, evaluate, and implement the EBP change. The author does this with help from supervisors. (4) The team must gather and analyze relevant research on the desired practice change. They are expected to form good research questions using PICO methods. (5) Analyze and synthesize the research discovered during the literature search.

(6) Stop and decide whether sufficient evidence supports practice change. If not, review the research; if yes, step 7. (7) Implement change in a small pilot study with small and progressive change for evaluation in small areas/units and eventually across the department, practice, and organization. After this change's introduction, observations and evaluations are expected to continue, bearing in mind that new technological changes may warrant a change. (5), (6), and (7) are handled in the project.

Summary

The current literature search suggests that a multifactorial approach that includes patient education and assistive camera devices can significantly reduce falls in elderly inpatients.

SECTION THREE: METHODOLOGY

Design

The design of this study was to search the literature for evidence-based practice on the use of cameras to prevent falls in inpatients. The study design used the preferred Reporting Items for Systemic Reviews and Meta-Analysis (PRISMA).

Consequently, some research questions were asked: i) What are the results of the current literature about fall prevention using cameras? More specifically, i) What different camera systems are operational in hospitals? ii) who used the cameras, and iii) what was the perception from nurses and patients/families? and iv) what were the significant outcomes?

Finding Relevant Literature

The studies included systemic reviews, quasi-experiments, and randomized control trials. All the articles described studies that enhanced our understanding of the role of cameras in fall reduction in inpatient adults. All study designs were included in the search for relevant literature. There were no country limitations. Only articles published in English were considered.

Many search engines were used in the current study. PubMed was used to identify keywords. In addition to PubMed, the other search engines included Web of Science, Scopus, Cochrane, and Google Scholar.

A data chart was developed (extra Excel sheet) was used to identify the significant characteristics of each study. The relevant information regarding camera-assisted fall prevention for inpatients was summarized. The articles considered current articles published from 2017 to date.

The number of falls reported was assessed pre-and post-interventions. The number of falls was expressed as described by Woltsche et al. (2022) as the proportion of the number of bed days in

each ward. ‘Bed days’ is the number of beds occupied at midnight on each date within the study period.

Measurable outcomes

The number of falls reported was assessed pre-and post-interventions. The number of falls was expressed as described by Woltsche et al. (2022) as the proportion of the number of bed days in each ward. ‘Bed days’ is the number of beds occupied at midnight on each date within the study period.

Settings

The setting of this study incorporated the Iowa Model of Evidence-Based framework and the preferred Reporting Items for Systemic Reviews and meta-analysis Extension for Scoping reviews PRISMA (Tricco et al., 2018). PRISMA contains 20 essential reporting items necessary for a scoping review. The objective of a scoping review was to synthesize evidence and evaluate the literature on the scope of patient education and video assisted devices on their role in reducing adult falls in hospitals.

Participants

The literature reviewed were those that reported fall intervention for adult inpatients hospitalized. Extra attention was given to patients described as high fall risk patients (HFR).

Ethical considerations

The study proposal was submitted to competent government agencies for review and approval. Other ethical considerations are described in the respective literature used in this study.

Data collection

Bed occupancy was obtained from the literature. The number of falls was coded for pre-and post-intervention. Data was also collected on the types of intervention implemented.

Tools

The current study examined the use of sensitive cameras and monitors, and other visual assisted devices. In addition to these gadgets, any source of education to patients and family such as folders containing valuable information were considered.

Intervention

The interventions in the current study were patient and family education, and video assisted fall prevention. These compared with any other fall prevention methods available such as sitter nurse, call bells and more.

Data Analysis

The studies considered in this study were grouped based on their design, characteristics of the type of education, and outcomes. Descriptive statistics were applied to summarize patients'/families' opinions on the innovation. A two-independent sample t-test was used to compare the proportion of falls pre- and post-intervention.

SECTION FOUR: RESULTS

Study characteristics

The database results amounted to 1234 citations on fall prevention within the timeframe (2016-2023), with a total of 164 articles. The articles came from the United States of America, Canada, Australia, the United Kingdom, and India. After reading the complete text, a total of 8 articles were included in the current study, seven from the United States of America and one from Australia.

Two (25.5%) of the articles included were systemic reviews (Johnson, 2017; Quigley et al., 2021), 4 (50%) were randomized controlled trials (Sand-Jecklin et al., 2018; Quigley et al., 2019; Woltsche et al. (2022), 1 (12.5%) was a quasi-experiment (Sand-Jecklin, 2016) and 1 (12.5%) was a clinical update (Bradley, 2016).

The articles studied had common themes that were observed, as well as differences.

One common theme that appeared was visual assistance to minimize inpatient falls. The appellation varied from patient-engaged video surveillance (Quigley et al., 2019), video cameras (Sand-Jecklin et al., 2016), video monitoring, etc.

All the randomized controlled trials reported that video-assisted devices effectively prevented hospital falls. Quigley et al. (2019) reported that falls were reduced more in older patients than in younger patients when patients engaged in the surveillance of their overall activities. Sand-Jecklin et al. (2018) reported the perception of nursing staff, video monitoring technicians, and patients/families on the importance of video monitoring to prevent falls. Nursing staff and video monitoring technicians opined that video monitoring effectively prevented falls. The patient and family were concerned about patient privacy. Woltsche et al. (2022) reported a significant reduction in overnight hospital falls due to the use of portable video devices.

Camera use methods

Camera use was reportedly different in the different studies. It was common to find terms like video monitoring and video camera etc. However, the method of use varied. Some of the studies presented a fixed video camera in control rooms with a video monitoring technician, who eventually alerted a nurse in case of any unusual activity of the patients, especially described as those with a high risk of falling. In others, portable video devices are used.

Fall outcomes.

The studies reported different parameters to mean fall outcomes. Some studies reported the fall rates per 1000 days, and others reported the direct fall numbers. The proportion of the number of bed days in each ward was also reported. ‘Bed days’ is the number of beds occupied at midnight on each date within the study period.

Some reported falls rate on a scale: low, moderate, and high.

SECTION FIVE: DISCUSSION

Implication for Practice

It is evident that there is an increasing risk of falls, especially in the older population, and nurses and patients play an essential role in fall prevention. Video monitoring or camera-assisted fall prevention has demonstrated that it can reduce hospital fall outcomes. Therefore, nurses and patients are recommended to take some training and be able to use video-assisted fall prevention. The current study does not present camera or video fall prevention as a 'one quick-fix all' causing high hospital fall rates. Instead, it provides innovations that significantly reduce fall outcomes if adequately incorporated into fall prevention protocols.

Sustainability

Video or camera-assisted fall prevention has reduced cost effects in the long run. Setting up cameras, training staff, maintenance, and other related expenses will be costly. However, camera-assisted fall prevention will be very sustainable with the shortage of nurses to act as sitters and the high cost associated with that.

Dissemination plan

Apart from a public defense of the current study, this work is intended to be published in a reputable journal.

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Critical appraisal (Appendix 1)

Article Title, Author, etc. (Current APA Format)	**Study Purpose**	**Design, sample, method**	**Level of Evidence (Use Melnyk Framework)**	**Results**	**Study strengths and Limitations**
Example, A. (2015) Title etc. per Current APA	To identify the need for technology to prevent falls	A convenience sample of 44 nurses in an acute care hospital A non-experimental, descriptive survey	Level 6: descriptive design	Findings indicate that fall rates decreased by 2% with the introduction of technology into the care setting	Conducted in only one setting, small sample size. Does provide some good foundational information even though the level is a 6.
Article 1 Heng, H., Slade, S. C., Jazayeri, D., Jones, C., Hill, A. M., Kiegaldie, D., Shorr, R. I. and Morries, M. E (2021). Patient perspective on hospital falls education.	To understand the perspectives and preferences of hospitalized patients about falls prevention education	A phenomenological approach was used with three focus groups in Australian hospitals. Descriptive survey	Level 6: descriptive design	Most inpatients did not realize their own risk of falling. Fall prevention education was inconsistent	Just two hospitals were involved in the study. Provides information that patient education on fall prevention is vital.

Article Title, Author, etc. (Current APA Format)	**Study Purpose**	**Design, sample, method**	**Level of Evidence (Use Melnyk Framework)**	**Results**	**Study strengths and Limitations**
Frontiers in Publich Health. 9:592440					
Article 2 Dabkowski, E., Cooper, S., Duncan, J. R. and Missen, K (2023). Exploring Hospital inpatientss' awaereness of their falls risk: A qualitative exploratory study. *International Journal of Environmental* Research and Public Health. *20*(1), 454	To explore the perceptions and experiences that influence a patient's understanding of their fall risk.	40 years and older Semi-structured questionnaire	Level 6: descriptive design	Participants are aware of the hazardous nature of hospitals	It was not clear how many people participated. The study highlights the need for patient education

Article Title, Author, etc. (Current APA Format)	**Study Purpose**	**Design, sample, method**	**Level of Evidence (Use Melnyk Framework)**	**Results**	**Study strengths and Limitations**
Article 3 Woltsche, R., Mullan, L., Wynter, K. and Rasmussen, B (2022). Preventing patient falls overnight using video monitoring: A clinical evaluation. International Journal of Environmental Research and Public Health. 19(21), 13735	To assess the effectiveness of overnight portable video monitoring as an adjunct fall prevention strategy	Nurses in hospitals Nurses gave the opinions after using the overnight portable video monitoring device	Level 4: correlational design	There was a significant reduction in fall events	Small sample size of 31 nurses Very useful information on the importance of video monitoring in fall prevention
Article 4 Ghosh, M., O'Connell, B., Afrifa-Yamoah, E., Kitchen, S. and Conventry,	Identify factors associated with the severity of falls in hospitalized patients	Used hospital data between 4014 - 2019. Univariate and multivariate analysis were done	Level 6: descriptive design	Women are 15% more likely to fall than men	Study duration is short. Useful information on where and when fall occurs

Article Title, Author, etc. (Current APA Format)	**Study Purpose**	**Design, sample, method**	**Level of Evidence (Use Melnyk Framework)**	**Results**	**Study strengths and Limitations**
L (2022). A retrospective cohort study of factors associated with severity of falls in hospital patients. Scientific Report, 12, 12266					mostly was revealed.
Article 5 Dykes, P. C., Burns, Z. and Adelman, J (2020). Evaluation of patient-centered fall prevention tool kit to reduce falls and injuries. A nonrandomized controlled trial. JAMA Network	To assess whether a fall prevention tool kit that utilizes patients and families in fall-prevention will reduce falls and injuries	All adult inpatients participated in the study. Nonrandomized controlled trial	Level 3: Quasi-Experimental design	Falls and injuries reduced when a patient-centered plan is used	Morse Fall scale was the only scale used. Useful information on the need for patient-centered treatment

Article Title, Author, etc. (Current APA Format)	**Study Purpose**	**Design, sample, method**	**Level of Evidence (Use Melnyk Framework)**	**Results**	**Study strengths and Limitations**
Open, 3(11): e2025889					
Article 6 Montero-Odasso, M., Kamkar, N., Pieruccini-Faria, et al (2021). Evaluation of clinical practice guidelines on fall prevention and management for older adults. A systematic review	Identity the consistent recommendation in fall prevention clinical practice guidelines.	15 guidelines Review	Level 4: correlational design	All guidelines agreed on fall risk stratification. However, patient education was inconsistent.	Only 15 guidelines were used. More should have been used. Useful information on consistent fall prevention guidelines
Article 7 Vincenzo, J. L., Patton, S. K., Lefler, L. L., McElfish, P. A., Wei, J. and Curran (2022). Older adults'	To assess older people's perception on self-management fall plan	Adults aged 78 years and more. Mixed methods	Level 6: descriptive design	Older people are indeed very concerned about what may happen to them if they fall.	Number of patients was small Useful information the factor many patients do not have any

Article Title, Author, etc. (Current APA Format)	Study Purpose	Design, sample, method	Level of Evidence (Use Melnyk Framework)	Results	Study strengths and Limitations
perception and recommendation regarding a fall prevention self-management plan template based on the health belief model: A mixed-method study. International Journal of Environmental Research and Public Health. 19(4) 1938					education on how to manage falls.
Article 8 Montero-Odasso, M., van der Velde, N., Martin, F. C., Petrovic, M. et al 2022). World guidelines for	To create evidence-based fall prevention guidelines with a global use	Committee members were experts from all related disciplines and adults. Final recommendations were made by voting.	Level 4: correlational studies	Patient education on fall prevention was highly voted	All recommendations would have been accepted. Useful information on recommendations for management

Article Title, Author, etc. (Current APA Format)	Study Purpose	Design, sample, method	Level of Evidence (Use Melnyk Framework)	Results	Study strengths and Limitations
falls prevention and management for older adults: a global initiative. Age and Ageing, 51(9). afac205					with a global touch.
Article 9 Natora, A. H., Oxley, J., Barclay, L., Taylor, K., Bolam, B. and Haines, T. P (2022). Improving policy for the prevention of falls among community-dwelling older people – a scoping review and quality	To identify gaps in current guidelines and plan for fall managements in hospitals.	Policy between 2005 - 2020 Scoping review	Level 5: systematic reviews	Of the policies from 14 countries studied, only 54% of them met the World Health Organization recommendations.	The number of countries is small Many countries do not have sufficient policies to limit fall outcomes.

Article Title, Author, etc. (Current APA Format)	Study Purpose	Design, sample, method	Level of Evidence (Use Melnyk Framework)	Results	Study strengths and Limitations
assessment of international, National, and state level public policies. International Journal of Public Health. 67: 1604606					
Article 10 Shaari, M, S., Wahab, M. S. A., Zaki, I. A. H., Alias, R., Zulkifli, M. H., Ali et al. (2022). Development and pilot testing of a booklet concerning medications that can increase risk of falls in older people. International	Was to create awareness to caregivers and patients on fall risk increasing drugs	Patient and the family caregivers The provided care to patients before and after using the booklet with information on fall risk increasing drugs	Level 2: well-designed randomized trials	Participants perceived the booklet as use	Patient caregiver number was small. Need for education of patients and their caregivers on fall risk increasing drugs.

Article Title, Author, etc. (Current APA Format)	**Study Purpose**	**Design, sample, method**	**Level of Evidence (Use Melnyk Framework)**	**Results**	**Study strengths and Limitations**
Journal of Environmental Research and Public Health. 20(1) 404					