Tailoring Fall Prevention Videos for Medical-Surgical Inpatients: A Randomized Controlled Trial

K. Renee Twibell
Lori Delaney
Debra Siela
Gena Coers
Christine Davis
Caitlin Drown
Kelly Kring
Jessica Duncan
James A. Jones

Fall prevention is vital to the safety of medical-surgical patients. This study supported the effectiveness of a tailored video intervention in engaging hospitalized adults in fall prevention activities and provides nurses with an educational strategy to enhance patient safety.

Falls are one of the most common adverse events among hospitalized patients (Kobayashi et al., 2017; LeLaurin & Shorr, 2019). An estimated one million inpatients fall in the United States each year (Guirguis-Blake et al., 2018; Venema et al., 2019). Falls can result in injury and death, with the annual cost of hospital falls in the United States nearing $50 billion (Centers for Disease Control and Prevention, n.d.; Florence et al., 2018). Hospitals worldwide prioritize fall prevention and invest significant resources into multi-faceted interventions (Kafantogia et al., 2017). However, falls remain a major cause of harm during hospitalization (Agency for Healthcare Research and Quality, 2021). Falls are a nurse-sensitive indicator of overall patient care quality, and nurses hold primary responsibility for fall prevention during hospitalization (Oner et al., 2021). Medical-surgical patients are at risk for falls due to unfamiliar hospital environments, effects of medications and treatments, illness-related changes in mobility, and a desire to maintain personal independence when mobilizing (Barrett et al., 2017; Cuttler et al., 2017; Radecki et al., 2020.)

Medical-surgical nurses typically educate inpatients on fall prevention, yet even alert patients may fail to engage and falls may result (Bolton, 2019; Duckworth et al., 2019). The Joint Commission (2021) recommended engaging patients as active participants in fall prevention through verbal and visual education. Studies have yielded mixed results concerning the effectiveness of fall prevention education with and without video components (Heng et al., 2020; Hill et al., 2009; Hill et al., 2015). More rigorous research is needed to determine the effect of a video intervention on the engagement of medical-surgical inpatients in fall prevention activities.

Hypothesis

This study tested the following hypothesis: Alert medical-surgical inpatients at risk for falls will demonstrate higher engagement in fall prevention activities after receiving a tailored video intervention compared to at-risk inpatients who did not receive the intervention. An associated aim was to examine the effect of a tailored video intervention on three indicators of engagement: number of falls, percentage of participants who exhibited high-risk, fall-related behaviors, and patient scores on perceptual scales related to engagement in fall prevention. A second

K. Renee Twibell, PhD, RN, CNE, is Nurse Researcher, Indiana University Health, East Central Region, Muncie, IN, and Associate Professor, School of Nursing, Ball State University, Muncie, IN.

Lori Delaney, MS, APRN, ACNS-BC, MEDSURG-BC, is Med/Surg Clinical Nurse Specialist, Indiana University Health, East Central Region, Muncie, IN.

Debra Siela, PhD, RN, ACNS-BC, CCRN-K, CNE, RRT, is Associate Professor, School of Nursing, Ball State University, Muncie, IN.

Gena Coers, BS, RN, is Clinical Nurse, Indiana University Health, East Central Region, Muncie, IN.

Christine Davis, MS, RN-BC, is Diabetes Educator, Indiana University Health, East Central Region, Muncie, IN.

Caitlin Drown, MSN, RN, CMSRN®, is Clinical Operations Manager, Indiana University Health, East Central Region, Muncie, IN.

Kelly Kring, BS, RN, is Clinical Nurse, Indiana University Health, East Central Region, Muncie, IN.

Jessica Duncan, MS RN, is Assistant Clinical Lecturer of Nursing, Ball State University, Muncie, IN.

James A. Jones, PhD, is Director, Research and Academic Effectiveness, Ball State University, Muncie, IN.

Note: Supported by a research grant from the Academy of Medical-Surgical Nurses.

Background

Falls are a leading harm event during hospitalization, especially among medical-surgical patients. Nurses hold primary responsibility for fall prevention and typically educate patients as part of fall prevention plans. However, research has not clarified the effectiveness of specific educational strategies to prevent falls among at-risk inpatients.

Aim

Evaluate the effectiveness of a tailored video intervention in increasing engagement in fall prevention activities among alert medical-surgical inpatients. Examine scores on fall-related perceptual measures among at-risk medical-surgical patients.

Method

A randomized controlled trial sampled 124 patients in a teaching hospital in the midwestern United States. Shortly after hospital admission, participants in the intervention group received standard fall prevention education from nurses and viewed a 3-minute video tailored to patient age and gender. Participants in the control group received only standard fall prevention education. The video depicted scenarios of medical-surgical patients engaging or not engaging in fall prevention plans, with subsequent positive or negative sequelae. Outcomes after viewing the video were number of falls, percentage of patients who exhibited high-risk fall behaviors, and scores on fall-related perceptual measures.

Results

Six participants in the control group fell, while one participant who received the intervention fell. Scores on two perceptual scales significantly increased in the intervention group, specifically *intention to engage in fall prevention* and *anticipated negative outcomes of falling*. No significant differences in high-risk behaviors were noted between groups.

Limitations and Implications

Findings supported the implementation of tailored videos to increase inpatient engagement in fall prevention activities. The single-hospital setting reduced extraneous variance but limited generalizability. Future research should include race and ethnicity as demographic variables for tailoring.

Conclusion

Video education tailored to age and gender is recommended to reduce falls among medical-surgical inpatients and improve scores on fall-related perceptual measures.

aim was to examine psychometric properties of measures of fall-related perceptions among medical-surgical inpatients at risk for falls.

Review of the Literature

A literature review was completed through Pub Med, Google Scholar, and CINAHL databases for 2009-2021. Due to the small number of research publications pertinent to this study, relevant and credible evidence from the past 12 years was included. Key words in the search included *falls during hospitalization, fall prevention, fall prevention education, video and video-based education, adult medical-surgical inpatients,* and *patient engagement in fall prevention.* Of 130 reviewed publications, 56 informed this report. They were primarily reports of original research or quality improvement initiatives, and documents from healthcare organizations.

A small number of studies explored the effect of fall prevention videos. Authors found reduced falls or increased awareness of fall risk among inpatients (Chan et al., 2018; Cuttler et al., 2017; Hill et al., 2009; Hill et al., 2015; Opsahl et al., 2017). However, the studies lacked methodological rigor, had limited generalizability, or measured the effect of video education in combination with other elements of a prevention bundle. Video content commonly recited facts and displayed static visuals or animations rather than live persons in real-time scenarios.

Tailoring of fall prevention education typically has required interventions matched with patients' unique risk factors and personal life circumstances, which nurses are responsible for assessing (Dykes et al., 2020; Hill et al., 2009; Spano-Szekely et al., 2019). While research has suggested age and gender may be related to falls (Kiyoshi-Teo et al., 2019; Sandlund et al., 2017), few studies have examined the effect of tailoring video education for fall prevention to inpatients' age and gender. Thus, the first gap in knowledge addressed in this study was the need for rigorous testing of a video intervention tailored to age and gender of medical-surgical inpatients with varied diagnoses.

The second gap in nursing knowledge addressed in this study pertained to the nature of dependent variables in interventional research for fall prevention. Commonly, the dependent variable is the gross number of falls or falls per 1000 patient days. If the number of falls in a setting is low, large samples are needed to power studies. However, large samples are hard to recruit from vulnerable, acutely ill patients. Thus, interventional evidence on fall prevention has arisen primarily from single-site quality improvement projects rather than original research (LeLaurin & Shorr, 2019). No prior studies measured

exhibition of fall-risk behaviors as a dependent variable. Fall-related perceptions among inpatients have been measured in a small number of studies, usually in specialized populations (Kiyoshi-Teo et al., 2019; Knox, 2018; Lim et al., 2018; Patton et al., 2021; Twibell et al., 2015). To address this gap, engagement in fall prevention in the current study was measured not only as number of falls but also as exhibition of high-risk behaviors and fall-related perceptions, including intention to engage in prevention plans.

A third gap in knowledge was the lack of psychometrically sound instrumentation for measuring fall-related perceptions. Although experts recommend nurses assess fall-related perceptions (Radecki et al., 2018; The Joint Commission, 2021), few clinical tools or research instruments exist (Christiansen et al., 2020). Instrumentation in this study was determined previously to be reliable and valid in samples of inpatients with cancer, cardiac, or orthopedic conditions (Twibell et al., 2015; Twibell et al., 2019). This study extended the psychometric assessment to medical-surgical inpatients with diverse medical diagnoses.

Ethics

This study was approved by the institutional review board of the hospital where data were collected (January 2017-June 2019). A registered nurse (RN) co-investigator conducted a two-step informed consent process, first for screening and then for study participation. Code numbers were assigned to participants. Data were double locked for storage; only researchers had access to study data.

Sample Selection

A power analysis using G* power 3.1 software was computed (Faul et al., 2007). With power at 80%, alpha of .05, and a medium effect size based on a prior study (Hill et al., 2009), a sample size of 128 was planned with 64 participants per group (Cohen, 2013). Complete data were available for 60 participants in the intervention group and 64 in the control group (see Figure 1). The primary reasons eligible participants did not consent or complete data collection were too much discomfort, desire to sleep or spend time with family, or unavailable due to tests or therapies.

The target population was medical-surgical inpatients in six medical-surgical units in a midwestern, Magnet®-designated hospital with standardized fall prevention precautions. Number of participants enrolled from each unit ranged from 10 to 44. Inclusion criteria were non-pregnant adults age 45 or older admitted to a target unit for less than 24 hours. Participants had to understand English, and be cognitively alert, medically stable, and at risk for falls as assessed by the primary RN and researcher. Patients were excluded if they transferred into a target unit from another treatment location because fall prevention education could have occurred already.

Design and Method

The study was a two-group, pre- and post-test, randomized controlled trial. Participants were assigned randomly to the intervention or control group. All participants completed instrumentation before and after the intervention or control condition. Confounding variables included any fall prevention education or coaching provided by staff or family, or in written materials.

Intervention

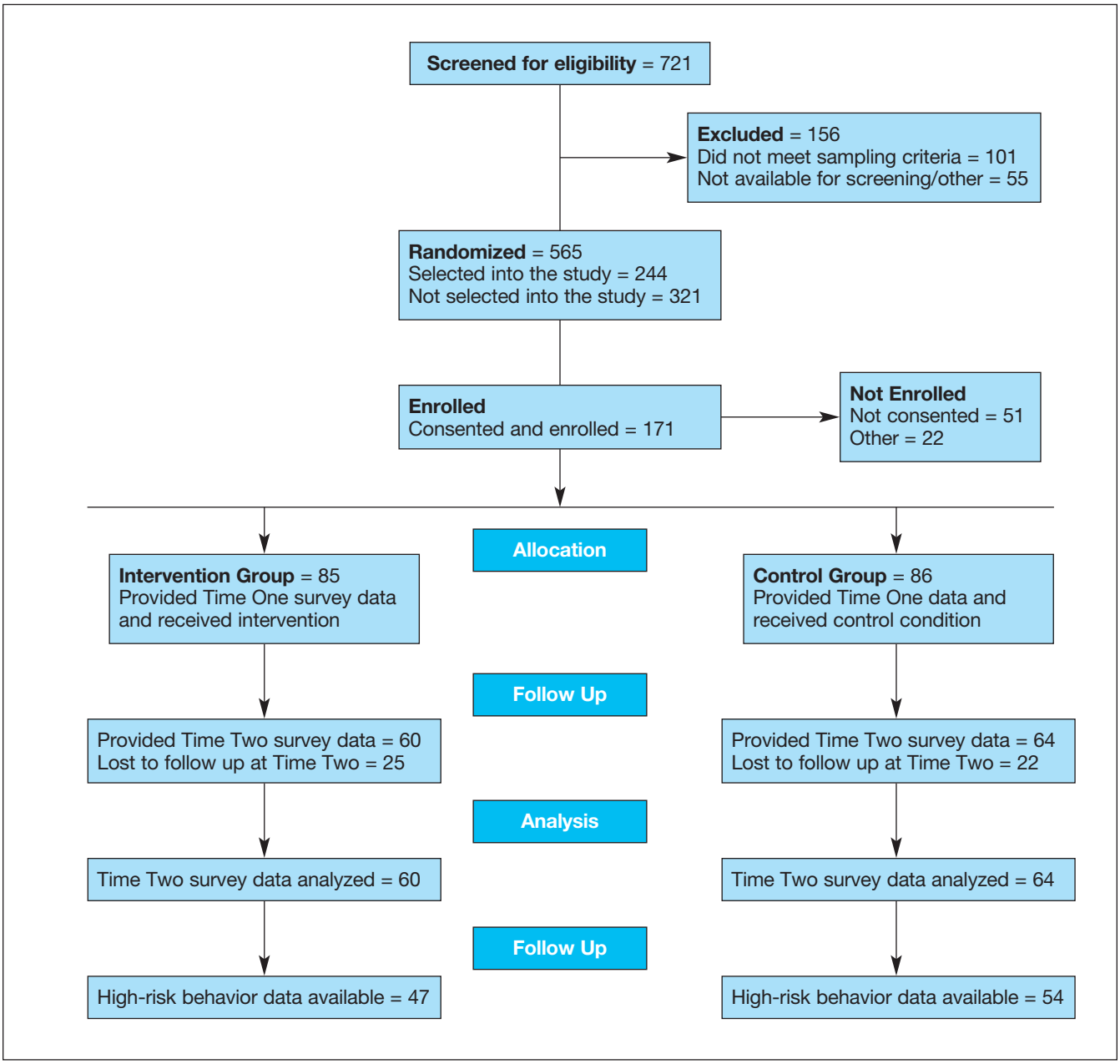
The tailored video intervention for fall prevention presented real-life scenarios in two segments. In the first segment, patient-actors made decisions to not engage in fall prevention plans, mobilized without assistance, and then fell; they suffered painful injuries that prolonged hospitalization. In the second segment, patient-actors engaged with staff and asked for assistance, mobilized safely, and later discharged to resume meaningful activities. All participants in the intervention group viewed both segments of the 3-minute video on a bedside hospital computer. The narrated video also included closed captions.

This study tailored the intervention to age and gender to try to enhance engagement when modeled by similar patient-actors. Four identical versions featured a male patient age 45-65 (middle-aged), a male patient over age 65 (older), a female patient age 45-65 (middle-aged), and a female patient over age 65 (older). Participants viewed the version matched to their age and gender. Race and ethnicity were not selected as demographic variables for tailoring because over 90% of the target population at the study site was non-Hispanic White. The theory-guided script was based on conceptual frameworks of social cognitive theory (Bandura, 2004) and protection motivation theory (Rogers, 1975). Videos were produced by an affiliated academic institution.

Outcome Measures

Dependent variables included number of falls, percentage of participants who exhibited high-risk fall-related behaviors, and fall-related perceptions. *Number of falls* was defined as the number of participants who fell during study enrollment, as self-reported or recorded in participants' electronic medical record (EMR). *High-risk fall-related behaviors* were actions demonstrated by participants that increased risk of falling, such as mobilizing without staff assistance or disarming bed or chair alarms. High-risk behaviors were recorded by clinical nurses on the Nurses' Recording Form for Participants' Engagement in Fall Prevention Plan and Mental Alertness. Once during a 12-hour shift, nurses circled *yes* or *no* on the bedside form to indicate if participants were alert and followed fall prevention plans for the shift. Nurses, who were blinded to group assignments, could write comments on the form. The form had been trialed for usability in previous studies (Twibell et al., 2015; Twibell et al., 2019).

FIGURE 1
Participant Flow Diagram



Fall-related perceptions were participants' perspectives that could influence engagement in fall prevention, as measured by the Falls Perceptions Survey. The 30-item survey consisted of three scales and two single items. The 9-item Intention to Engage in Fall Prevention Scale (Intention Scale) measured participants' intention to follow the fall prevention plan. The 7-item Confidence to Mobilize without Falling Scale (Confidence Scale) measured participants' efficacy expectations, or perceived confidence they could safely perform high-risk activities. The 12-item Consequences of Falling Scale (Consequences Scale) measured outcome expectations, or perceptions of potentially negative outcomes of falling. Single items measured patients' perceived likelihood of falling while hospitalized and perceived fear of falling. The intervention group also reported the perceived relevance of the video intervention. All items had a 4-point or 5-point Likert response format. In prior studies, construct and criterion-related validity were supported, and internal consistency reliabilities were high (Twibell et al., 2015; Twibell et al., 2019).

Data Collection

Three researchers conducted participant recruitment, data collection, and delivery of the intervention, and conferred regularly to ensure consistency and intervention fidelity. All participants completed the Time One pre-intervention instrumentation by pen and paper at the bedside. If participants preferred, the researcher read the survey items aloud, and participants selected responses from large yellow laminated cards with black print. Immediately following Time One data collection, the intervention group received the matched intervention. No dialog about fall prevention occurred between participants and researchers. The control group did not receive the intervention. Both groups received standard fall prevention education and interventions from staff, consisting of verbal instruction, a fall-risk armband, directions for safe mobility, and reasons for fall risk written on communication boards in patients' rooms. Standard education did not include a video component.

The researcher collected participant information from the EMR at Time One, including age, gender, the first three medical diagnoses cited on admission, history of recent falls, and medications known to increase fall risk. Clinical nurses began recording data on the Nurses' Recording Form for Engagement in Fall Prevention Plan and Mental Alertness.

Participants in both groups completed the Falls Perceptions Survey at Time Two post-intervention (18-32 hours after Time One). Participation in the study ceased approximately 72 hours after enrollment, or sooner if participants were discharged, transferred, or assessed as not alert for two consecutive shifts. A researcher collected the Nurses' Recording Form and reviewed the EMR for recorded falls. Falls were categorized as falls without injury or falls with minor to major injury.

Data Analysis

Data were entered into SPSS version 27 for analysis. Descriptive statistics were computed to explore demographic characteristics of the sample. Chi-square and t-tests were used to evaluate baseline differences between groups. Frequencies, percentages, means, and standard deviations were computed as appropriate for the dependent variables. Through a series of factorial analyses of variance (ANOVA), interactions between pre-post scores and group scores were examined to address the study hypothesis. Post hoc analyses were computed as appropriate, and profile plots were examined. Internal consistency coefficients were computed for the multi-item fall-related scales. Pearson r correlations provided statistical evidence of the extent to which the fall-related perceptions were interrelated. Significance level (alpha) was set at $p<0.05$.

TABLE 1.
Sample Demographics (*N*=124)

	Control (*n*=64)	Intervention (*n*=60)	*p* value
Age: Mean	68.47	71.95	0.96
Gender			
Male	29	20	0.173
Female	35	40	
Fell past 6 months			
Yes	33	31	0.991
No	31	29	
Received opioids			
Yes	34	21	0.034
No	30	39	
Medical diagnosis			
Fracture/injury from fall	18	10	—
Infection	14	7	
Pneumonia	6	5	
Surgical	5	6	
Hypoxia/SOB/asthma	3	7	
Stroke/CVA/TIA	4	3	

CVA = cerebrovascular accident, SOB = shortness of breath, TIA = transient ischemic attack

Findings

The majority of 124 participants were female (*n*=75, 60.5%), with a mean age of 70.2. Of 43 different medical diagnoses listed on admission, most common were fractures, injuries from falls, infection, and pneumonia. At baseline, the only significant difference between groups was more participants in the control group received opioids than in the intervention group (see Table 1).

Participants who received the tailored video intervention demonstrated higher engagement in fall prevention activities (as reflected on two dependent variables) compared to participants in the control group. The study hypothesis was supported. Seven participants fell

TABLE 2.
Perceptual Mean Scale Scores and Item Scores for Control and Intervention Groups (*N*=124)

Scale	Control Time 1 Pre	Control Time 2 Post	Intervention Time 1 Pre	Intervention Time 2 Post	Difference between Groups Post-Intervention
Confidence in ability to mobilize	3.16	3.45	3.05	3.21	NS
Anticipated negative consequences of falling	2.39	2.32	2.39	2.56	$p<0.001$
Intention to engage in fall prevention plan	3.84	3.64	3.84	4.07	$p<0.001$
Likelihood of falling	1.85	1.88	2.02	2.20	NS
Afraid of falling	2.09	2.08	2.49	2.53	NS

during study enrollment. One fall was extracted from the EMR. Six participants self-reported to the researcher a fall between Time One and Time Two; none of these falls was recorded in the EMR. Although not statistically significant (p=0.12), six of the seven falls involved participants in the control group; only one involved a participant in the video intervention group. No injuries were reported. Five participants who fell had fallen at home in the past 6 months, with two falling 10-15 times.

Results concerning the percentage of participants who exhibited high-risk behaviors for falls did not reveal a significant difference between participants who did and did not receive the intervention. Of the total sample, 29% (n=36) exhibited high-risk behaviors for falls. Nurses often did not describe the nature of the high-risk behaviors on the data form.

Results pertinent to fall-related perceptions revealed significant differences between groups. Interactions of time by group showed participants who received the intervention scored significantly higher on the Intention to Engage Scale ($F_{(1,118)}$=13.73, $p<$ 0.001, *Cohen's f*=0.33) and the Consequences of Falling Scale ($F_{(1,121)}$=12.11, p=0.001, *Cohen's f*=0.31), compared to the control group. Scores on the Confidence Scale, likelihood of falling item, and fear of falling item did not differ significantly between groups (see Table 2). Receiving opioids was not correlated significantly with scores on perceptual scales. All participants in the intervention group perceived the video as moderately-to-very relevant.

For the total sample, the mean score on the item measuring likelihood to fall was 1.98 (*SD*=1.23); on afraid of falling, the mean score was 2.29 (*SD*=1.52), indicating participants overall perceived a *slight* likelihood of falling and were *slightly* afraid of falling. Similarly, of the seven participants who fell, six perceived pre-fall they were *not at all* or *slightly* likely to fall.

Results pertinent to the psychometric properties of the fall-related instrumentation revealed high internal consistency for the three multi-item scales. Specifically, the Cronbach alphas were Confidence to Mobilize (0.93), Anticipated Consequences of Falling (0.87), and Intention to Engage in Fall Prevention (0.85). Criterion-related validity was supported by the moderate, significant inter-correlations of the three scales (range 0.30-0.60, $p<0.01$) in the expected direction and magnitude. Similarly, five of the six intercorrelations among the three multi-item scales and the two single items measuring perceived likelihood of falling and afraid of falling ranged from 0.33 to 0.50 ($p<0.01$) in the expected direction and magnitude.

Discussion

This study was the first randomized controlled trial of a fall prevention video intervention consisting of real-life scenarios crafted for middle-aged and older medical-surgical inpatients with a wide range of medical diagnoses. It was also the first test of a video intervention tailored to participants' age and gender. In supporting the hypothesis, findings contributed new knowledge for nursing practice by demonstrating the effectiveness of a tailored video-based approach to fall prevention. Specifically, compared to the control group, participants who received the intervention experienced fewer falls, were more aware of potentially negative outcomes of falling, and reported an elevated intention to engage in fall prevention activities.

Data suggest medical-surgical nurses are unaware of some inpatient falls. The mismatch between patient-reported falls and nurse-recorded falls raises the question of how often inpatients may be falling without staff knowledge. Studies conducted in Australia and England found 50%-85% of falls were unwitnessed or not recorded by staff (Haines et al., 2011; Hill et al., 2015). While the number of documented falls will continue as an important outcome measure in research, the true number of inpatient falls may be notably higher than the EMR reflects. The validity of fall prevention studies can be improved by collecting data on falls from multiple sources.

Participants who viewed the video exhibited a similar number of high-risk behaviors as participants in the control group. Nearly one-

third of participants had at least one instance of non-engagement. Nurses described the most common high-risk behavior as mobilizing for toileting without assistance. A prior study also found the need for urgent toileting prompted participants to disengage from fall prevention plans (Twibell et al., 2020).

The video intervention elevated participants' perceptions of negative consequences of falling and intention to engage in fall prevention. However, the intervention did not influence perceived confidence to mobilize, likelihood of falling, or fear of falling. Single item measures may not detect subtle changes in perceptions. Confidence may be a complex concept, not directly impacted by a 3-minute intervention.

In baseline comparisons, more participants in the control group received opioids than the intervention group, as more participants in the control group had experienced fractures or injuries from falls on admission. Opioid consumption did not influence perceptual scores overall but may have contributed to more falls in the control group (Zhao et al., 2019). A replication of this study with patients not receiving opioids could clarify the effectiveness of the intervention.

All participants were evaluated by two RNs as being at-risk for falling, yet overall participants perceived their fall risk as *slight* at Time One. Other studies noted a similar mismatch between nurses' assessment of fall risk and patients' perception of risk (Knox, 2018; Radecki et al., 2020; Tucker et al., 2019; Twibell et al., 2015). Patients may not share nurses' concern and may not engage in fall prevention unless there is a strategy, such as a tailored video, to elevate awareness of fall risk.

Experiencing a fall during study enrollment did not influence fall-related perceptions. Of participants who fell, the majority had fallen at home before admission and perceptions did not change after falling during the study. After falling, participants were not more intentioned to engage in fall prevention and did not foresee more negative consequences. Some patients may perceive falling as normal and resist engagement in fall prevention.

Findings added support for the psychometrics of the perceptual measures in an adequately powered sample of medical-surgical inpatients with varied diagnoses. Psychometric outcomes were highly consistent with findings in prior studies (Twibell et al., 2015; Twibell et al., 2019).

Limitations

The study was conducted at a single site with an inpatient population that was over 90% non-Hispanic White, thus limiting generalizability of results to other settings. Furthermore, patients who consented to be in the study could have differed from patients who did not consent. For example, non-participants may have been more acutely ill than participants.

Measurement of exhibition of high-risk fall-related behaviors in this study was somewhat rudimentary. The pen-and-paper tool was designed to be completed easily by busy nurses at the bedside. However, the *yes-no* response options did not provide specificity about high-risk behaviors, such as the nature and frequency of the behaviors, the degree of risk represented by the behaviors, and the extent to which patients ceased high-risk behaviors when instructed to do so. In addition, because patients were not within nurses' line of sight continuously, nurses could have missed witnessing high-risk behaviors. In future studies, measurement of high-risk behaviors should be expanded to reflect more detail about the specific behaviors.

Recommendations for Future Research

Because the effect of ethnicity on fall prevention engagement has been examined in only one study (Sa et al., 2020), this study should be replicated in a more diverse sample with race and ethnicity added as variables for tailoring. Multi-item measures of likelihood of falling and fear of falling could replace the single items in this study and more fully explicate these important theoretical concepts (Arkkukangas et al., 2021; Bandura, 2004). In addition, videos could be displayed on an in-room television screen rather than a laptop computer, and could be replayed more than once. The effectiveness of this intervention could be evaluated more fully when integrated by design into multi-faceted fall prevention plans.

Nursing Implications

Medical-surgical nurses, educators, and managers can be encouraged to create fall prevention videos. The benefit to patient outcomes may justify the cost. Key points to consider when purchasing or producing videos would be keeping the length short, providing closed captioning and audio stream, and focusing on real-life enactments and storytelling rather than reciting rote facts. Participants in a recent study of community-dwelling elders recommended videos for fall prevention be highly engaging and relevant to target populations (de Jong et al., 2019).

Strategies to engage patients are especially vital when patients do not perceive their own fall risk. If they lack video as an option, medical-surgical nurses can tailor verbal messages to optimize engagement. For example, nurses might comment, "I have cared for several patients this month about your age and gender who were receiving medications and treatments like yours, and they got out of bed without assistance and fell. They were harmed and could not return home. I care about you and want to keep you safe." Simply telling patients "Don't get up" or "call for help" may not be as engaging as dialogue tailored to specific demographic factors and medical contexts (Ambutas, 2017).

Ideally, tailored video can be incorporated into multi-faceted prevention plans. For example, nurses can dialog with patients after the video to reinforce the tailored messages. Furthermore, embedding

fall prevention video education in trusting nurse-patient relationships may elevate engagement (Twibell et al., 2020). If patients perceive nurses care about them, patients may engage more readily and be more likely to confess unwitnessed falls.

Conclusion

In this study, use of a video intervention tailored to medical-surgical patients' age and gender reduced falls and elevated patients' intention to engage in fall prevention activities. Although evaluated by nurses as at-risk for falls, most participants did not perceive they were at risk. Most participants' falls were not reported to nurses. Medical-surgical nurses and educators can personalize fall prevention education to reduce adverse effects of falls among medical-surgical inpatients. MSN

REFERENCES

Agency for Healthcare Research and Quality. (2021). *Reducing hospital-acquired conditions.* https://www.ahrq.gov/hai/hac/index.html

Ambutas, S. (2017). Continuous quality improvement. Fall reduction and injury prevention toolkit: Implementation on two medical-surgical units. *MEDSURG Nursing*, *26*(3), 175-180.

Arkkukangas, M., Eriksson, H.-G., & Dension, E. (2021). Risk factors for fall-related injuries among community-dwelling men and women over 70 years of age, based on social cognitive theory: Results from a population study. *European Journal of Physiotherapy*, *23*(4), 221-226. https://doi.org/10.1080/21679169.2019.1706631

Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behavior, 31(2)*, 143-164. https://doi.org/10.1177/1090198104263660

Barrett, M.B., Vizgirda, V.M., & Zhou, Y. (2017). Registered nurse and patient care technician perceptions of toileting patients at high fall risk. *MEDSURG Nursing*, *26*(5), 317-323.

Bolton, L. (2019). Preventing fall injury. *Wounds: A compendium of clinical research and practice*, *31*(10), 269-271.

Centers for Disease Control and Prevention. (n.d.). *Older adult fall prevention*. https://www.cdc.gov/falls/index.html

Chan, D.K., Sherrington, C., Naganathan, V., Xu, Y.H., Chen, J., Ko, A., ... Cumming, R. (2018). Key issues to consider and innovative ideas on fall prevention in the geriatric department of a teaching hospital. *Australasian Journal on Ageing*, *37*(2), 140-143. https://doi.org/10.1111/ajag.12528

Christiansen, T.L., Lipsitz, S., Scanlan, M., Yu, S.P., Lindros, M.E., Leung, W.Y., ... Dykes, P.C. (2020). Patient activation related to fall prevention: A multisite study. *The Joint Commission Journal on Quality and Patient Safety*, *46*(3), 129-135. https://doi.org/10.1016/j.jcjq.2019.11.010

Cohen, J. (2013). *Statistical power analysis for the behavioral sciences*. Academic Press.

Cuttler, S.J., Barr-Walker, J., & Cuttler, L. (2017). Reducing medical-surgical inpatient falls and injuries with videos, icons and alarms. *BMJ Open Quality*, *6*(2), e000119. https://doi.org/10.1136/bmjoq-2017-000119

de Jong, L.D., Francis-Coad, J., Wortham, C., Haines, T.P., Skelton, D.A., Weselman, T., & Hill, A.-M. (2019). Evaluating audiovisual falls prevention messages with community-dwelling older people using a World Cafe forum approach. *BMC Geriatrics*, *19*, Article 345. https://doi.org/10.1186/s12877-019-1344-3

Duckworth, M., Adelman, J., Belategui, K., Feliciano, Z., Jackson, E., Khasnabish, S., ... Dykes, P.C. (2019). Assessing the effectiveness of engaging patients and their families in the three-step fall prevention process across modalities of an evidence-based fall prevention toolkit: An implementation science study. *Journal of Medical Internet Research*, *21*(1), e10008. https://doi.org/10.2196/10008

Dykes, P.C., Burns, Z., Adelman, J., Benneyan, J., Bogaisky, M., Carter, E., ... Bates, D.W. (2020). Evaluation of a patient-centered fall-prevention tool kit to reduce falls and injuries: A nonrandomized controlled trial. *JAMA Network Open*, *3*(11), e2025889-e2025889. https://doi.org/10.1001/jamanetworkopen.2020.25889

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175-191. https://doi.org/10.3758/bf03193146

Florence, C.S., Bergen, G., Atherly, A., Burns, E., Stevens, J., & Drake, C. (2018). Medical costs of fatal and nonfatal falls in older adults. *Journal of the American Geriatrics Society*, *66*(4), 693-698. https://doi.org/10.1111/jgs.15304

Guirguis-Blake, J.M., Michael, Y.L., Perdue, L.A., Coppola, E.L., & Beil, T.L. (2018). Interventions to prevent falls in older adults: Updated evidence report and systematic review for the US Preventive Services Task Force. *JAMA*, *319*(16), 1705-1716. https://doi.org/10.1001/jama.2017.21962

Haines, T.P., Hill, A.-M., Hill, K.D., McPhail, S., Oliver, D., Brauer, S., ... Beer, C. (2011). Patient education to prevent falls among older hospital inpatients: A randomized controlled trial. *Archives of Internal Medicine*, *171*(6), 516-524. https://doi.org/10.1001/archinternmed.2010.444

Heng, H., Jazayeri, D., Shaw, L., Kiegaldie, D., Hill, A.-M., & Morris, M.E. (2020). Hospital falls prevention with patient education: A scoping review. *BMC Geriatrics*, *20*, Article 140. https://doi.org/10.1186/s12877-020-01515-w

Hill, A.-M., Hill, K., Brauer, S., Oliver, D., Hoffmann, T., Beer, C., ... Haines, T.P. (2009). Evaluation of the effect of patient education on rates of falls in older hospital patients: Description of a randomised controlled trial. *BMC Geriatrics*, *9*, Article 14. https://doi.org/10.1186/1471-2318-9-14

Hill, A.-M., McPhail, S.M., Waldron, N., Etherton-Beer, C., Ingram, K., Flicker, L., ... Haines, T.P. (2015). Fall rates in hospital rehabilitation units after individualised patient and staff education programmes: A pragmatic, stepped-wedge, cluster-randomised controlled trial. *The Lancet*, *385*(9987), 2592-2599. https://doi.org/10.1016/S0140-6736(14)61945-0

The Joint Commission Center for Transforming Health Care. (2021). *Preventing patient falls*. https://www.centerfortransforminghealthcare.org/products-and-services/targeted-solutions-tool/preventing-falls-tst/

Kafantogia, K., Katsafourou, P., Tassiou, A., & Vassou, N. (2017). Falls among hospitalized patients. *Journal of Frailty, Sarcopenia & Falls*, *2*(3), 53-57. https://doi.org/10.22540/JFSF-02-053

Kiyoshi-Teo, H., Northrup-Snyder, K., Cohen, D.J., Dieckmann, N., Stoyles, S., Winters-Stone, K., & Eckstrom, E. (2019). Older hospital inpatients' fall risk factors, perceptions, and daily activities to prevent falling. *Geriatric Nursing*, *40*(3), 290-295. https://doi.org/10.1016/j.gerinurse.2018.11.005

Knox, A. (2018). Fall risk perceptions: A study of hospitalized patients with hematologic malignancies. *Clinical Journal of Oncology Nursing, 22*(6), E159-E165. https://doi.org/10.1188/18.CJON.E159-E165

Kobayashi, K., Imagama, S., Ando, K., Inagaki, Y., Suzuki, Y., Nishida, Y., ... Ishiguro, N. (2017). Analysis of falls that caused serious events in hospitalized patients. *Geriatrics & Gerontology International*, *17*(12), 2403-2406. https://doi.org/10.1111/ggi.13085

LeLaurin, J.H., & Shorr, R.I. (2019). Preventing falls in hospitalized patients: State of the science. *Clinics in Geriatric Medicine*, *35*(2), 273-283. https://doi.org/10.1016/j.cger.2019.01.007

Lim, M.L., Ang, S.G.M., Teo, K.Y., Wee, Y.H.C., Yee, S.P., Lim, S.H., & Ang, S.Y. (2018). Patients' experience after a fall and their perceptions of fall prevention: A qualitative study. *Journal of Nursing Care Quality*, *33*(1), 46-52. https://doi.org/10.1097/ncq.0000000000000261

Oner, B., Zengul, F.D., Oner, N., Ivankova, N.V., Karadag, A., & Patrician, P.A. (2021). Nursing-sensitive indicators for

nursing care: A systematic review (1997-2017). *Nursing Open*, *8*(3), 1005-1022. https://doi.org/10.1002/nop2.654

Opsahl, A.G., Ebright, P., Cangany, M., Lowder, M., Scott, D., & Shaner, T. (2017). Outcomes of adding patient and family engagement education to fall prevention bundled interventions. *Journal of Nursing Care Quality*, *32*(3), 252-258. https://doi.org/10.1097/NCQ.0000000000000232

Patton, S., Vincenzo, J., & Lefler, L. (2021). Gender differences in older adults' perceptions of falls and fall prevention. *Health Promotion Practice*, *23*(5), 785-792. https://doi.org/10.1177/15248399211009783

Radecki, B., Keen, A., Miller, J., McClure, J.K., & Kara, A. (2020). Innovating fall safety: Engaging patients as experts. *Journal of Nursing Care Quality*, *35*(3), 220-226. https://doi.org/10.1097/NCQ.0000000000000447

Radecki, B., Reynolds, S., & Kara, A. (2018). Inpatient fall prevention from the patient's perspective: A qualitative study. *Applied Nursing Research*, *43*(5), 114-119. https://doi.org/10.1016/j.apnr.2018.08.001

Rogers, R.W. (1975). A protection motivation theory of fear appeals and attitude change. *The Journal of Psychology, 91*(1), 93-114. https://doi.org/10.1080/00223980.1975.9915803

Sa, G.G.D., dos Santos, A.M.R., Neto, N.M.G., de Carvalho, K.M., Feitosa, C.D.A., & Mendes, P.N. (2020). Building and validating an educational video for elderly individuals about fall risks. *Revista Brasileira de Enfermagem*, *73*(3). https://doi.org/10.1590/0034-7167-2020-0010

Sandlund, M., Skelton, D.A., Pohl, P., Ahlgren, C., Melander-Wikman, A., & Lundin-Olsson, L. (2017). Gender perspectives on views and preferences of older people on exercise to prevent falls: A systematic mixed studies review. *BMC Geriatrics*, *17*, Article 58. https://doi.org/10.1186/s12877-017-0451-2

Spano-Szekely, L., Winkler, A., Waters, C., Dealmeida, S., Brandt, K., Williamson, M., ... Wright, F. (2019). Individualized fall prevention program in an acute care setting: An evidence-based practice improvement. *Journal of Nursing Care Quality*, *34*(2), 127-132. https://doi.org/10.1097/NCQ.0000000000000344

Tucker, S., Sheikholeslami, D., Farrington, M., Picone, D., Johnson, J., Matthews, G., ... Cullen, L. (2019). Patient, nurse, and organizational factors that influence evidence-based fall prevention for hospitalized oncology patients: An exploratory study. *Worldviews on Evidence-Based Nursing*, *16*(2), 111-120. https://doi.org/10.1111/wvn.12353

Twibell, K.R., Delaney, L., Siela, D.L., Avila, P., Coers, G.B., & Spradlin, A. (2019). *Test of a brief tool to assess fall-related perceptions of medical-surgical inpatients*. Academy of Medical-Surgical Nurses Annual Convention, Chicago, IL.

Twibell, K.R., Siela, D., Delaney, L., Avila, P., Spradlin, A.M., & Coers, G. (2020). Perspectives of inpatients with cancer on engagement in fall prevention. *Oncology Nursing Forum*, *47*(4), 457-468. https://doi.org/10.1188/20.ONF.457-468

Twibell, R.S., Siela, D., Sproat, T., & Coers, G. (2015). Perceptions related to falls and fall prevention among hospitalized adults. *American Journal of Critical Care*, *24*(5), e78-e85. https://doi.org/10.4037/ajcc2015375

Venema, D.M., Skinner, A.M., Nailon, R., Conley, D., High, R., & Jones, K.J. (2019). Patient and system factors associated with unassisted and injurious falls in hospitals: An observational study. *BMC Geriatrics*, *19*, Article 348. https://doi.org/10.1186/s12877-019-1368-8

Zhao, Y.L., Bott, M., He, J., Kim, H., Park, S.H., & Dunton, N. (2019). Evidence on fall and injurious fall prevention interventions in acute care hospitals. *JONA: The Journal of Nursing Administration*, *49*(2), 86-92. https://doi.org/10.1097/NNA.0000000000000715