Reducing Falls Utilizing a Fall Prevention Toolkit, Tailored Interventions for Patient Safety

by

Flor M. Morales

Under Supervision of

Bridgitte Gourley

Second Reader

Sandra Lucci

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School of Nursing, University of Maryland at Baltimore

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Abstract

Problem: Despite the use of numerous evidence-based interventions, in 2019, a medical surgical unit at a community hospital had a higher fall rate than its peers. The average fall and fall with injury rates were 2.6 and 1.17 per 1,000 patient days.

Purpose: To implement and evaluate the effectiveness of the Tailored Interventions for Patient Safety (TIPS) fall prevention toolkit (FPTK) in an inpatient medical-surgical unit.

Methods: The intervention is a three-step evidence-based tool which provided individualized universal fall precautions. Nurses completed a fall risk assessment on every admission and transfer to the floor. Then, they completed a falls poster at the bedside with the patient, educating them on their individualized fall risks and fall prevention interventions. The poster was hung at the door as a reminder tool for staff and patients. Data collected during the project included staff education, poster completion audits, and the organizations reported monthly fall rates. The data was analyzed using run charts and bar graphs. Reminders, morning huddles, and staff education were used to promote compliance.

Results: Nurses and patient care technicians (100%) were all educated prior to intervention implementation. The average compliance rate of completed TIPS posters was 67%. The fall rate increased during the intervention phase by 18% compared to the pre-interventions phase. There were no changes in fall with injury rates post intervention when compared to pre-intervention. Despite an increase in falls during the implementation phase, there was a positive trend that showed that as compliance rates increased from October to December, fall rates decreased.

Conclusions: The compliance rate was not met and fall rates were higher post-intervention. Additional reminders, weekly huddles, and meetings could be held to re-educate staff and allow for discussion of barriers and facilitators. October and November's low rate of poster completion

may correlate with the higher fall rates. In December, there were less falls and compliance rates were higher. Strategies and tactics should be utilized in order to increase intervention compliance, increase sustainability, and decrease fall and fall with injury rates in the future. Limitations included a COVID pandemic and forgetfulness in completing the poster.

Introduction

Preventing patient falls in hospitals has been a challenge for years, especially on inpatient units. Although evidence-based research has increased extensively with intervention recommendations to help prevent falls within the hospital setting, falls continue to be a critical issue. In the United States, approximately 700,000 to one million hospitalized patients fall every year (AHRQ, 2013). Inpatient falls can cause fractures, head injuries, lacerations, psychological stress, and even death. An estimated 30% to 50% of hospital falls result in an injury and about $14,000 is spent on each fall-related injury (The Joint Commission [TJC], 2015). Falls with injury are included as one of the top ten sentinel events reported by TJC, with the majority of those falls occurring in hospitals (TJC, 2015). Medicare does not reimburse hospitals for fall-related costs, because falls are considered preventable.

A medical-surgical unit at a community hospital in Maryland has higher fall rates than its peers. In 2019 the average fall rate for the unit was 2.6 falls per month. Despite the use of numerous evidence-based interventions including bed alarms, hourly rounding, chair alarms, non-skid socks, fall-risk identification armbands, and an environmental assessment, the unit continued to struggle with a high fall rate compared to other units. There were several potential barriers and causes for the falls occurring on the medical-surgical unit which include the proximity of the nurses' station to patients' rooms, the failure to utilize equipment properly, budget constraints, medication side effects, chronic diseases, lack of communication, non-adherence to policy, and failure to use fall risk interventions. The purpose of this quality improvement (QI) project was to implement and evaluate the effectiveness of the TIPS fall prevention toolkit (FPTK) in an inpatient medical-surgical unit. The anticipated outcome was to

prevent inpatient falls as evidenced by reducing inpatient falls and falls with injury on the medical-surgical unit.

Literature Review

A thorough literature review was conducted in order to find evidence-based interventions proven effective in decreasing fall rates on similar units. Four articles supported the use of individualized patient-centered interventions to decrease fall rates. Choi et al. (2011) found that multiple patient-targeted interventions resulted in decreased falls or fall-related injuries. Since patient-specific interventions varied, the researchers conducted an in-depth analysis of the interventions utilized and identified three distinct characteristics of the interventions employed (the physical environment, the care process/culture, and technology-related interventions). Additionally, medication review and modification, patient education, volunteer programs and bedrail reduction programs were all found to reduce falls. The Choi et al. (2011) study was deemed level I, B quality.

Dykes et al. (2010) and Ang et al. (2011) discovered that patient-tailored interventions based on a fall risk assessment and fall prevention patient/family education decreased fall rates compared to usual care, which consisted of standard non-patient-specific interventions without education. One additional intervention the Dykes et al. (2010) study used was a poster reminder at the head of the bed with the patient's tailored fall risk plan. The poster included the patient's individualized fall risks and fall interventions to be utilized. Both articles measured fall rates and falls with injury rates and took place among eight inpatient units in the hospital setting, with most of the units being medical units. Additionally, Dykes et al. (2010) measured adherence to the FPTK poster. Dykes et al. (2010) observed that the FPTK, TIPS, decreased falls significantly by 1.03 falls per 1,000 patient days compared to usual care. Adherence to printing

completed individualized fall plans and placing an individualized fall prevention plan poster at the head of the bed was high. Among the intervention group, 93.2% of patients had posters printed, and an 89% adherence rate occurred when placing posters at the head of the bed. However, no significant change was seen between groups when comparing fall-related injuries. Ang et al. (2011) found that multiple targeted interventions among high fall-risk patients were significantly lower in the intervention group (p=0.018). The intervention group had a total of 4 falls, while the control group had a total of 14 falls during the study period. Most of the patients that fell during the study period had no injury or minor injury. Both the Dykes et al. (2010) and Ang et al. (2011) studies were deemed level II, B quality.

Dykes et al., (2017) noticed that the average fall rates decreased at one hospital while the rates increased at the other hospital using the FPTK, TIPS. The FPTK consisted of a bedside poster with individualized patient falls risks and interventions and patient/family fall prevention education, like the Dykes et al. (2010) study. The hospital in which falls increased only had 36 beds in the study, while the hospital with a decreased fall rate had seven units (94 beds). The average compliance rate in utilizing the FPTK bedside poster was 82% and 90.5% respectively. This study was deemed a level V, quality C. While there are varying degrees of success, the literature supports patient-centered interventions for falls.

Theoretical Framework

The middle range theory utilized to implement the DNP project was King's Theory of Goal Attainment. King's theory explains the nature of nurses interacting with clients to create goals and come to an agreement on ways to attain goal achievement (King, 1992). Mutual goal setting is built on the nurses' assessment of the clients' interests, issues, conflicts in health, client's perceptions of issues, and their sharing of information to lead to goal fulfillment (King,

1992). The nurse-client interaction and mutual goal setting supported the goal of using a fall prevention toolkit (FPTK) to prevent falls. Park et al. (2019) developed and determined the effectiveness of a fall program in high-risk elderly patients based on the theory of goal attainment and discovered a significant decrease in falls among the intervention group that used the theory program versus the control group.

The theory uses a three-step approach in order to reach a desired goal. The major concepts in King's theory that aided in the understanding and guided the TIPS, FPTK implementation. These concepts included perception, communication, interaction, and transaction (King, 1992). First, the perception/judgement of both individuals was shared, the nurse perceived the patient's fall-risk based on clinical judgment and fall-risk scale completion. The nurse shared their thoughts with the patient and the patient shared their own perception of fall risk. Nurse judgment was then used to help the nurse choose interventions to help prevent falls. Afterward, the patient and nurse interacted to develop mutual goals and choose individualized fall-prevention interventions using the FPTK. Finally, in the transaction phase, the FPTK was implemented to meet the goal of preventing falls.

Methods

The DNP project was implemented on a 32-bed medical-surgical inpatient unit at a community hospital. The unit population consisted of patients aged 19 years and older with a wide variety of acute illnesses, and patients requiring surgical procedures. There was a total of seventy-four clinicians affected by the DNP project. These clinicians belonged to various groups, including registered nurses, patient care technicians, the unit educator, and patient sitters. The average monthly number of patients admitted and transferred onto the unit is 870. Therefore, an estimated 3,045 patients were expected to receive the intervention during the fourteen-week

DNP implementation phase. There were no patient exclusions; every patient transferred or admitted to the unit received the intervention since the goal was to prevent patient falls in order to reduce the unit fall rate and keep patients safe.

The TIPS toolkit is a three-step evidence-based fall prevention tool which provides universal fall precautions to all patients. The nurse conducted a bedside fall risk assessment upon admission, transfer to the unit, and daily as part of their required patient documentation using the John Hopkins Fall Risk Assessment Tool (JHFRAT) to identify at risk patients. Then, utilizing the fall risk assessment score and their judgment, the nurse and patient conducted an individualized fall prevention plan and completed the TIPS FPTK poster. There are three sections to the poster, patient identification, and date when the TIPS poster was updated, falls risks, and fall interventions. The nurse completed this poster at the bedside with the patient. The fall prevention plan was individualized, fall prevention education could occur, and everyone had a mutual understanding and goal of fall prevention. The poster was hung at the patient's door for easy visibility of staff members upon entering the room. The tool requires assessing the patient, and therefore, only nurses completed the TIPS FPTK. However, all staff providing patient care were educated on the TIPS FPTK to utilize the interventions effectively and reduce patient falls. The tool served as a reminder for nurses to implement fall-risk interventions that fall short of implementing.

To track implementation progress and assess the impact of the intervention, data were collected and analyzed. Training and baseline data collection were completed from August 30th through September 30th. The TIPS FPTK implementation phase began on October 1st and ran through December 30th. During the implementation phase auditing and transparent data sharing was practiced. The data collected through spot observation audits twice weekly included: the

number of staff educated on the TIPS FPTK, the number of patients with a completed TIPS poster at the patient's door entrance, and the number of patient falls and number of falls reported by the organization. The data was analyzed to assess the effectiveness of using the TIPS FPTK. Tracking if practice changes were utilized for each patient in the medical-surgical unit helped establish whether the observed outcomes of fall and fall with injury rates were due to the intervention.

Implementation strategies and tactics utilized for the measures included bi-weekly huddles, meetings, and reminders. Bi-weekly huddles were used to discuss barriers and facilitators for project implementation and adherence. Getting the input of the staff conducting the intervention kept staff up-to-date and engaged them on what needed improvement. The DNP student project lead held bi-weekly meetings with unit champions to gain their insight into the intervention and what seems to work for the unit when improving patient care and compliance to fall prevention intervention initiation. Reminders were used throughout the implementation period since they have been found helpful to increase compliance on using the TIPS FPTK correctly to reduce fall rates. Adherence incentives were provided for decreased fall rates and compliance.

Run charts and bar graphs were used to analyze the final data. To analyze compliance, random spot observations were conducted twice per week and a run chart was created to track changes. To assess falls and falls with injury rates, comparison bar graphs were created. Falls per 1,000 patient days were calculated for the three months post-intervention (October-December, 2020) and compared to the same three months pre-intervention the previous year (October-December, 2019). To protect confidentiality and privacy of individuals, only room numbers were provided on posters, patient identifiers were not published on posters.

Results

Random audits were completed twice per week to monitor compliance rates of completion for the individualized TIPS FPTK posted on each patient's door with an occupied bed. The goal of 100% completion rate of the TIPS FPTK was not met; however, compliance rates increased every month. The average compliance rate for completing the TIPS poster was 67% during the intervention phase from October through December. In October, the average compliance rate was 50%. Further education at morning huddles was done to stress the importance of the tool and encourage completion of the FPTK. In November, the compliance rates increased by 19% to a 69% average TIPS completion rate. In the last month of the intervention, December, the average completion rate for the tool was 80%. Since there were positive outcomes from morning huddle reminders, more extensive education at morning huddles and posted reminders throughout the unit could be utilized to increase compliance rates further.

There was not a significant change in fall and fall with injury rates when comparing pre-intervention and post-intervention data. The number of patient falls and falls with injury rates were calculated using the National Database of Nursing Quality Indicators (NDNQI, 2010). This calculation yields the number of falls or falls with injury that occur in one month out of the number of patients who are being cared for on the inpatient unit during that same month per 1,000 patient days. The equation is as follows: (Total number of patient falls/patient days) X 1000 (NDNQI, 2010). Fall and fall with injury rates during the intervention period (October-December, 2020) were compared to the pre-intervention period in the same months for the previous year (October-December, 2019). Falls per 1,000 patient days increased from 3.42 in 2019 to 4.29 in 2020. The number of falls in 2020 increased by 18% compared to the previous

year (4.29 vs 3.42). Falls with injury per 1,000 patient days increased from 1.14 in 2019 to 1.95 in 2020.

During the intervention phase some facilitators and barriers were encountered. The unit change champions helped facilitate reminders during morning huddles and encouraged completion of the TIPS FPTK, increasing compliance rates. Barriers encountered included a shortage of nurses, which forced the unit to hire travel nurses throughout the intervention period, and travelers had limited training on the TIPS FPTK. The COVID-19 pandemic was also a barrier since the unit became a COVID designated unit. Being designated a COVID unit limited fast entry into patient rooms to allow medical staff to attend to patient needs, and for donning proper isolation equipment prior to entry into the room. Other barriers included resistance to change and forgetfulness by staff when completing the TIPS posters. The TIPS FPTK is designated to be in the room to allow the patient and nurse to complete together and as a visual reminder of fall prevention interventions. However, the poster was hung outside the patient's door due to management preference. When the door was opened the patient and nurse could clearly see the poster but when closed this prevented them from visualizing the poster.

Discussion

There were varying degrees of success in the literature; however, they all supported multiple targeted interventions to help reduce the fall rates. Most studies had positive outcomes with the interventions and decreased fall rates with the intervention group. During this quality improvement project, the fall and fall with injury rates did not decrease when compared to the previous year's fall rates from October through December. In fact, there was an 18% increase in fall rates during the intervention phase and no significant change in the falls with injury rates. The time constraint of the project could have influenced the differences between the observed

and anticipated outcome to reduce falls. The study was only conducted for three months as instead of several months noted in the literature. Compliance rates when utilizing the TIPS FPTK increased and fall rates decreased during the later months. If the trend would have been followed for a year or more, the fall and fall with injury rates had the potential of decreasing over time.

Conclusion

Fall rates continue to be a struggle among hospitalized patients, however new evidence in the literature to prevent inpatient falls is always emerging. The literature supported the use of the TIPS FPTK in order to prevent falls by outlining an individualized fall prevention plan of care for each patient on a poster at the patient's bedside, to serve as a reminder the patient's fall risks and fall prevention interventions. However, in this QI project the goal of preventing falls and having a 100% compliance rate for the TIPS FPTK poster were not met. Using a patient-centered approach to reducing falls shows promising results. Decreasing fall and fall with injury rates has the potential to decrease hospital costs, increase monetary reimbursement for quality care, and improve patient care and satisfaction.

Several limitations in this project could be improved upon moving forward to reduce fall and fall with injury rates. Compliance could be increased in future projects with extensive reminders at unit huddles and reminders posted at nurses' stations and computers. Placing TIPS FPTK posters at the patient's bedside rather than on the door could improve visibility of the tool as a reminder for hospital staff and patients/families. For sustainability, it is recommended to continue to mobilize unit champions to remind nurses of the intervention and continually educate staff and travel nurses on the proper way to complete and use the tool effectively.

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University of Maryland School of Nursing
Evidence Review Table

Citation: Dykes, P. C., Duckworth, M., Cunningham, S., Dubois, S., Driscoll, M., Feliciano, Z., … Scanlan, M. (2017). Pilot testing fall TIPS (Tailoring Interventions for Patient Safety): a patient-centered fall prevention toolkit. *The Joint Commission Journal on Quality and Patient Safety*, *43*(8), 403–413. https://doi-org.proxy-hs.researchport.umd.edu/10.1016/j.jcjq.2017.05.002					Level V
Purpose/ Hypothesis	**Design**	**Sample**	**Intervention**	**Outcomes**	**Results**
The purpose of this study was to determine the adherence rate of using a fall prevention toolkit (FPTK) and to explore if the use of a FPTK among hospitalized patients in two medical centers decreased fall rates and falls with injury rates.	Pre-and-post, pilot study design	**Sampling Technique:** Convenience **Eligible Participants:** Patients hospitalized at Bringham and Women's Hospital (BWH) and Montefiore Medical Center (MMC) pre- and post-implementation of the intervention on units that elected to participate **Excluded:** No participants excluded from study **Accepted:** Total of 43 beds from 3 Neuroscience Intermediate Care Units at BWH, total of 31 beds from 2 Medical Intermediate Care Unit at BWH, total of 20 beds from 2 oncology units at BWH, and a total of 36 beds on the Medical Intermediate Care Unit at MMC	**Control:** Use of standard fall prevention interventions without the use of a FPTK. **Intervention:** At bedside, the nurse utilizes a FPTK, Tailoring Interventions for Patient Safety (TIPS) to determine if the patient is at high risk for falling, the patients fall risks, and the fall interventions individualized for that patient based on fall risks to prevent a fall while hospitalized. **Intervention fidelity (describe the protocol):** Practice council members served as champions, which assisted with training nurses on how to complete and use the FPTK. These champions attended a continuing education competency program	**DV:** 1. Adherence to fall TIPS protocol defined as a completed tool found in the patient's room in a visible location 2. Monthly fall rates 3. Monthly fall with injury rates **Measurement tool (reliability), time, procedure:** 1. Adherence- Monitored via weekly spot checks on each unit to observe whether fall TIPS was complete with patient name, correct date, risk factors, and prevention plan. No instrument or tool utilized for outcome measure; no reliability data; no inter-reliability data documented for visual observation of chart completion. 2. Fall rates per 1,000 patient days defined as (total number of patient falls/patient days) X 1,000. In a study that	**Statistical Procedures(s) and Results:** Units at BWH had an averaged compliance rate of 82% with using the fall TIPS toolkit. The mean fall rate decreased from 3.28 pre-intervention to 2.80 falls post-intervention per 1,000 patient-days from January through June 2015 versus 2016, and the mean fall with injury rate for these periods decreased from 1.00 to 0.54 per 1,000 patient-days. At MMC, an averaged compliance averaged rate of 90.5% was seen, but the mean fall rate did not differ between groups. However, the mean fall with injury rate decreased from 0.47 to 0.31 per 1,000 patient-days.

			and were trained as "super users" during the go-live week of TIPS. Upon every patient admission, the nurse was expected to complete a fall risk assessment on the computerized chart. That assessment and the nurse's clinical judgement was then used at the bedside with the patient to complete the fall TIPS toolkit to prevent falls and the poster was placed in the patient's room, visible to everyone. The poster includes the patient's name, individualized fall risks, and individualized fall prevention interventions.	tested the reliability of NDNQI's patient day measurements in US hospital units, an intraclass correlation coefficient (ICC) above 0.97, showed excellent reliability (Simon et al., 2011). 3. Fall with injury rates per 1,000 patient days defined as (total number of patient falls with injury/patient days) X 1,000. In a study that tested the reliability of NDNQI's patient day measurements in US hospital units, an intraclass correlation coefficient (ICC) above 0.97, showed excellent reliability (Simon et al., 2011).	Statistical analysis were not completed.
		Control: All patients hospitalized and admitted to the participating units at both medical centers from January through June 2015 **Intervention:** All patients hospitalized and admitted to the participating units at both medical centers from January through June 2016 **Power analysis:** Not provided within study. Unable to calculate based on data **Group Homogeneity:** Unable to determine, no patient demographics provided.			

Citation: Dykes PC, Carroll DL, Hurley A, Lipsitz S, Benoit A, Chang F, … Middleton. (2010). Fall prevention in acute care hospitals: a randomized trial. *JAMA: Journal of the American Medical Association*, *304*(17), 1912–1918. https://doi-org.proxy-hs.researchport.umd.edu/10.1001/jama.2010.1567 — Level II

Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
The purpose of this study is "to investigate whether a FPTK using health information technology (HIT) decreases patient falls in hospitals."	Cluster randomized experimental design	**Sampling Technique:** Convenience **Eligible Participants:** Patients admitted or transferred during the study period, from January 1, 2009	**Control:** Use of standard fall prevention interventions without the use of a FPTK. **Intervention:** At bedside, the nurse utilizes a FPTK,	**DV:** 1. Patient fall defined as "an unplanned descent to the floor during the course of their hospital stay." 2. Patient falls with injury	**Statistical Procedures(s) and Results:** The intervention unit had a significantly lower (p=0.04) averaged fall rate per

		through June 30, 2009, to selected 16 units in four hospitals.	Tailoring Interventions for Patient Safety (TIPS) to determine if the patient is at high risk for falling, the patients fall risks, and the fall interventions individualized for that patient based on fall risks to prevent a fall while hospitalized.	3. Adherence of utilizing FPTK poster at the head of the bed. **Measurement tool (reliability), time, procedure:** 1. Patient falls per 1,000 patient days defined as (total number of patient falls/patient days) X 1,000. In a study that tested the reliability of NDNQI's patient day measurements in US hospital units, an intraclass correlation coefficient (ICC) above 0.97, showed excellent reliability (Simon et al., 2011).	1,000 patient days (3.15 [95% confidence interval {CI}, 2.54-3.90]) than the control unit (4.18 [95% confidence interval {CI}, 3.45-5.06]).
		Excluded: Eight units excluded because they did not meet inclusion criteria.			There was no statistical difference between the fall rates with injuries (p=0.64).
		Accepted: Eight Units in four hospitals were randomized to the intervention group (5,160 participants) or the control group (5,104 participants).	**Intervention fidelity (describe the protocol):** Upon every patient admission or transfer, the nurse was expected to complete a morse-fall risk assessment on the computerized chart. That assessment and the nurse's clinical judgement of the patient was then used to complete the fall TIPS toolkit to prevent falls and the poster was placed above bed for all patients at risk. The poster includes the patient's name, individualized fall risks, and individualized fall prevention interventions. The nurse then educated the patient/family using the tailored handout.		The adherence to utilizing the FPTK poster was high. A total of 93.2% of patients had posters printed out and 89% adherence was found on placing the bed poster at the head of the bed.
		Control: Four units (1 in each hospital) randomized to usual care, with a total of 5,104 participants.		3. Fall with injury reported by an event reporting system in all units by the clinician caring for the patient. No instrument or tool used for outcome measure; no reliability data or inter-rater reliability documented.	
		Intervention: Four units (1 in each hospital) randomized to use the FPTK, with a total of 5,160 participants.		4. Random assessment of completed printed TIPS poster placed above bed. No instrument or tool used for outcome measure; no reliability data or inter-rater reliability documented.	
		Power analysis: In both groups, a target sample of 5,100 was needed (1275 patients in each of the 8 units) was estimated to provide 80% power (with α=.05) to detect a decrease in fall rate. Sample size had			

| | | insufficient power to examine whether the FPTK was effective in preventing repeat falls or falls with injury.

Group Homogeneity: Patient characteristics are summarized in Table 2. Patients in control and intervention units were similar, but patients in the control units were more likely to be younger, of white race, and tended to have commercial insurance**.** | | | |

Citation: Ang, E., Mordiffi, S. Z., & Wong, H. B. (2011). Evaluating the use of a targeted multiple intervention strategy in reducing patient falls in an acute care hospital: a randomized controlled trial. *Journal of Advanced Nursing (John Wiley & Sons, Inc.)*, *67*(9), 1984–1992. https://doi-org.proxy-hs.researchport.umd.edu/10.1111/j.1365-2648.2011.05646.x	Level II

Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
The purpose of this study was to determine "the effectiveness of a targeted multiple intervention strategy in reducing the number of patient falls in an acute care hospital."	Prospective randomized controlled trial	**Sampling Technique:** Convenience **Eligible Participants:** All patients admitted to eight medical units that met the inclusion criteria of ≥21 years old and a score of ≥5 on the Hendrich II fall risk assessment tool. **Excluded:** Patients that were admitted to the medical units before the start of the study or	**Control:** Usual care that consists of general fall prevention measures, which include falls risk assessments, placing the call bell and bed locker within the patient's reach, raising the bed rails, and keeping the bed at its lowest position. **Intervention:** Patients in the intervention group received usual care plus targeted	**DV:** 1. Patient fall defined as "an unplanned descent to the floor during the course of their hospital stay." 2. Patient falls with injury **Measurement tool (reliability), time, procedure:** 1. Number of patients falls based on nurse documentation in electronic occurrence report obtained and counted by researcher.	**Statistical Procedures(s) and Results:** The intervention group had a total of 4 falls, while the control group had a total of 14 falls during the study period. The number of high-risk patients that fell was significantly lower in the intervention group when compared to the control group (p=0.018).

		who had a fall prior to the fall-risk assessment. **Accepted:** N= 1,822. All patients admitted to the medical units during the study period of April 2006 and December 2006. **Control:** n= 912. All patients hospitalized and admitted to the participating units from April 2006 to December 2006, which are a high fall risk and were randomized to the control. **Intervention:** n= 910. All patients hospitalized and admitted to the participating units from April 2006 to December 2006, which are a high fall risk and were randomized to the control. **Power analysis:** 900 subjects were required for both the intervention and control groups to attain a 96% confidence interval of 1.4-2.8%. The goal was achieved minimizing a type II error.	multiple interventions based on their individual fall risk factors found on their fall risk assessment. Additionally, a bedside educational session was provided to the patient/ family members on the fall risks and associated interventions to prevent falls individualized for the patient. **Intervention fidelity (describe the protocol):** The targeted multiple interventions were carried out by two research nurses that had no direct involvement with the subjects. Extensive training was provided to the research nurses. Falls were documented on the electronic hospital occurrence reports and researchers were able to retrieve them. The researcher scanned all electronic hospital occurrence reports daily during weekdays for any fall incidences that were reported by the nurses in the medical units if the patients were a part of the study. The researcher then		Most of the patients that fell during the study period sustained no injury or had minor injuries.

			gathered further information on the patient's fall and entered it into a falls data form.		
		Group Homogeneity: Patient characteristics for the intervention and control groups were homogenous for age, race, current condition, and fall risk assessment scores.			

Citation: Choi, Y.-S., Lawler, E., Boenecke, C. A., Ponatoski, E. R., & Zimring, C. M. (2011). Developing a multi-systemic fall prevention model, incorporating the physical environment, the care process and technology: a systematic review. *Journal of Advanced Nursing (John Wiley & Sons, Inc.)*, *67*(12), 2501–2524. https://doi-org.proxy-hs.researchport.umd.edu/10.1111/j.1365-2648.2011.05672.x — Level I

Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
The purpose of this review is "to evaluate the effectiveness of interventions implemented throughout all relevant hospital domains on primary outcomes of interest (i.e. a reduction or no reduction in inpatient falls and fall-related injuries); to determine the characteristics of interventions that can later facilitate the identification of the underlying mechanisms of interventions attributable to the primary outcomes in hospital settings; and to develop a hypothesis-generating multi-systemic model that	Quantitative systematic Review (SR) without meta-analysis	**Search Strategy:** A search was conducted using "Medline, CINAHL, PsycINFO and the Web of Science for references in peer-reviewed journals published between January 1990 and June 2009 that pertained to interventions targeting adult hospital inpatient populations with the aim of reducing falls and fall-related injuries. The search applied combinations of the search terms 'falls', 'injury', 'intervention', 'prevention', 'hospital design', 'physical environment' and 'ergonomics'. In addition, a search for secondary references	**Control:** Controls differed between studies included in the SR (fall risk assessment plus targeted interventions for high-risk patients, staff education, carpet flooring, bedrail reduction, medication review and modifications, volunteer programs, and bed alarms). **Intervention:** Interventions in the SR were predominantly fall risk assessments plus targeted interventions for high-risk patients. **Intervention fidelity (describe the protocol):** Not	**DV:** The primary outcome that was researched was number of falls or fall-rate and fall-related injuries. **Measurement tool (reliability), time, procedure:** Measurement tools varied between studies included in the SR. Some of the measurement methods included number of falls pre-and-post intervention, falls per 1,000 patient days, falls per 100 patient days, and count of falls with injuries.	**Level of Measurement:** Researchers used a narrative summary to report findings. **Outcome Data Retrieval:** The researchers merged data from all articles and provided findings in table format and extended their findings in narrative format. **Analysis:** 12 of the 14 articles that tested multiple patient-targeted interventions resulted in a decrease in falls or fall-related injuries. Since patient-specific interventions varied, the researchers conducted an in-depth

establishes a practical framework in which hospital executives and nursing administrators can operate to develop a balanced fall prevention strategy that acts upon the physical environment, the care process and the culture and technology."		from acquired papers, review articles and authoritative texts was completed." A two-phase search strategy was utilized. "In the first phase, it included studies that (1) tested an intervention aimed at reducing falls and fall-related injuries in adult hospital inpatient populations and (2) reported the primary outcomes – a reduction or no reduction in falls and fall-related injuries. In the second phase, it included studies that (1) tested an environment-related intervention or factor whose purpose was to reduce falls and fall-related injuries in three adult populations (i.e. hospital inpatients, long-term care inpatients and the elders) and (2) reported either the primary outcomes or any associated intermediate outcomes." **Eligible Studies:** Randomized controlled, quasi-experimental randomized controlled, controlled before-and-after, historically	applicable to SR critique		analysis of the interventions utilized and found three distinct characteristics of the interventions employed (the physical environment, the care process and culture, and technology-related interventions). A table was provided to depict which interventions fit in which category in the analysis (please refer to table S3). Additionally, medication review and modification, patient education, volunteer programs and bedrail reduction programs were found to all reduce falls. **Conclusions:** Multiple targeted interventions for patients at high-risk for falling, medication review and modification, patient education, volunteer programs, bedrail reduction programs, and bed alarms were more likely to decrease falls among hospitalized and patients in long-term care.

		controlled and cohort studies that tested an environment-related intervention or factor whose purpose was to reduce falls and fall-related injuries. **Excluded Studies:** Studies irrelevant to the purpose of the SR or which failed to give sufficient details about the research design or the components of the interventions. Additionally, studies with duplicate hits and studies published in languages other than English were excluded. **Included Studies:** 34 studies that met the inclusion and exclusion criteria were evaluated. The first phase search yielded 25 studies and the second phase search yielded 9 studies that focused on interventions to decrease falls among hospitalized and long-term care inpatients. **PRISMA:** Included a PRISMA flow chart depicting decision making criteria for			**SR Bias Risk:** Low bias risk, based on methodology described.

		including/excluding studies from the SR. **Power Analysis:** Not applicable in SR critique. **Group Homogeneity:** Not applicable in SR critique.			

University of Maryland School of Nursing
DNP Project Identification
Evidence Synthesis Table

Evidence Based Practice Question (PICO): Does the use of a fall prevention toolkit (FPTK), with patient-tailored fall interventions, compared to usual care, reduce patient falls and increase nurse adherence to utilize fall interventions on a medical surgical with telemetry unit?			
Level of Evidence	**# of Studies**	**Summary of Findings**	**Overall Quality**
I	1	Choi et al. (2011) found that articles that tested multiple patient-targeted interventions resulted in a decrease in falls or fall-related injuries. Since patient-specific interventions varied, the researchers conducted an in-depth analysis of the interventions utilized and found three distinct characteristics of the interventions employed (the physical environment, the care process and culture, and technology-related interventions). Additionally, medication review and modification, patient education, volunteer programs and bedrail reduction programs were found to all reduce falls.	Choi et al. (2011)- Overall Quality of B: The review had a large sample size and majority of the articles were controlled studies utilizing multiple interventions and a fall assessment. Not all articles reviewed in the review were randomized, decreasing internal validity. The results were consistent and recommendations were clear.
II	2	Dykes et al. (2010) and Ang et al. (2010) found that patient-tailored interventions based on a fall risk assessment and fall prevention patient/family education decreased fall rates compared to usual care, which consisted of standard non-patient-specific interventions without education. One additional intervention the Dykes et al. (2010) study used was a poster reminder at the head of the bed with the patient's tailored fall risk plan, which included the patient's individualized fall risks and fall interventions to be utilized. Both of the articles measured fall rates and falls with injuries and took place among eight units in the hospital setting, with most of the units being medical units. Additionally, Dykes et al. (2010) measured adherence to the FPTK poster.\n\nDykes et al. (2010) found that the FPTK, TIPS, decreased falls significantly by 1.03 falls per 1,000 patient days compared to usual care. Additionally, adherence to printing completed individualized fall plans and placing an individualized fall prevention plan poster at the head of the bed was high. Among the intervention group, 93.2% of patients had posters printed and an 89% adherence rate was found in placing the posters at	Dykes et al. (2010)- Overall Quality of B: Adequate power, randomization, and a controlled design strengthened internal validity. Blinding was not conducted in the study increasing the risk for selection bias. Results and measures were reasonably consistent and conclusions were definitive. The sample size was large from 8 units at 4 different hospitals and no patients were noted to be excluded from study since patients did not have option to opt out of study, increasing generalizability. Although some scientific evidence was provided a comprehensive literature review was not conducted.\n\nAng, Mordiffi and Wong (2011)- Overall Quality of B: Adequately powered, randomization with stratification, partial blinding (nurses were blinded to the intervention but patients were not), and controlled design strengthen internal validity. The blinding was likely to be compromised if patients communicated to their primary nurse the interventions and fall risks the research nurse educated the patient on. A large sample size reduces type II error and increases generalizability. Results and conclusions were consistent and definitive. However, this was a single-center study decreasing generalizability to other patient groups or settings.

		the head of the bed. However, no significant change was seen between groups when comparing fall-related injuries. Ang et al. (2010) found that multiple targeted interventions among high fall-risk patients was significantly lower in the intervention group (p=0.018). The intervention group had a total of 4 falls, while the control group had a total of 14 falls, during the study period. Most of the patients that fell during the study period had no injury or minor injury, therefore no significant differences were found between groups.	Additionally the study utilized research nurses to conduct the interventions, decreasing generalizability. Consistent recommendations were made based on an extensive literature review that included thoughtful reference to scientific evidence.
V	**1**	Dykes et al., (2017) found that the average fall rates decreased at one hospital while they increased at the other hospital with the use of the FPTK, TIPS. However, the hospital in which they increased only had 1 unit (36 beds) in the study while the hospital that had a decreased fall rate had a total of 7 units (94 beds) in the study. The averaged compliance rate in utilizing the FPTK bedside poster was 82% at BWH and 90.5% at MMC.	Dykes et al. (2017)- Overall Quality of C: Lack of randomization makes the study vulnerable to selection bias and decreases internal validity. The pre-and-post study design decreases internal and external validity. No power analysis was reported to assure the sample size was adequate. In fact no sample size was documented in the study, it just stated that the study was done among 8 units in 2 hospitals, which could have allowed for a diverse population and increased generalizability. Results were inconsistent, since 1 out of the 8 units had a slight increase in falls when utilizing the intervention, the patients in this unit was predominantly Spanish-speaking patients, therefore a language barrier and understanding of the toolkit could have been an issue among this group. Conclusions were definitive and some scientific evidence was provided.

Melnyk, B.M. & Fineout-Overholt, E. (2014). *Evidence-based practice in nursing & healthcare: A guide to best practice* (3rd ed.). New York: Lippincott, Williams & Wilkins.

Newhouse, R.P. (2006). Examining the support for evidence-based nursing practice. *Journal of Nursing Administration, 36*(7-8), 337-40.

Table 1

Staff Trained

Training Date	# of Staff Educated and Trained on TIPS FPTK	# of Staff Caring for Patients	Weekly Total % of Staff Trained
9/1/2020	15	74	20%
9/8/2020	23	74	31%
9/15/2020	41	74	55%
9/22/2020	68	74	92%
9/29/2020	74	74	100%

Table 2

Tips Spot Observation Audit Tool

Date/Observation	# of TIPS FPTK Posters Completed at Door	# of Unit Beds Occupied
10/2/2020	10	29
10/5/2020	10	29
10/9/2020	23	32
10/12/2020	13	29
10/16/2020	12	30
10/19/2020	15	30
10/23/2020	14	28
10/26/2020	18	29
10/30/2020	18	31
11/2/2020	18	31
11/6/2020	17	28
11/9/2020	20	29
11/13/2020	22	28
11/16/2020	20	29
11/20/2020	20	28
11/23/2020	21	29
11/27/2020	20	30
11/30/2020	23	30
12/4/2020	24	30
12/7/2020	22	28
12/11/2020	23	27
12/14/2020	21	29
12/18/2020	22	31
12/21/2020	23	28
12/25/2020	24	26
12/28/2020	25	30

Figure 1

TIPS Poster Completion
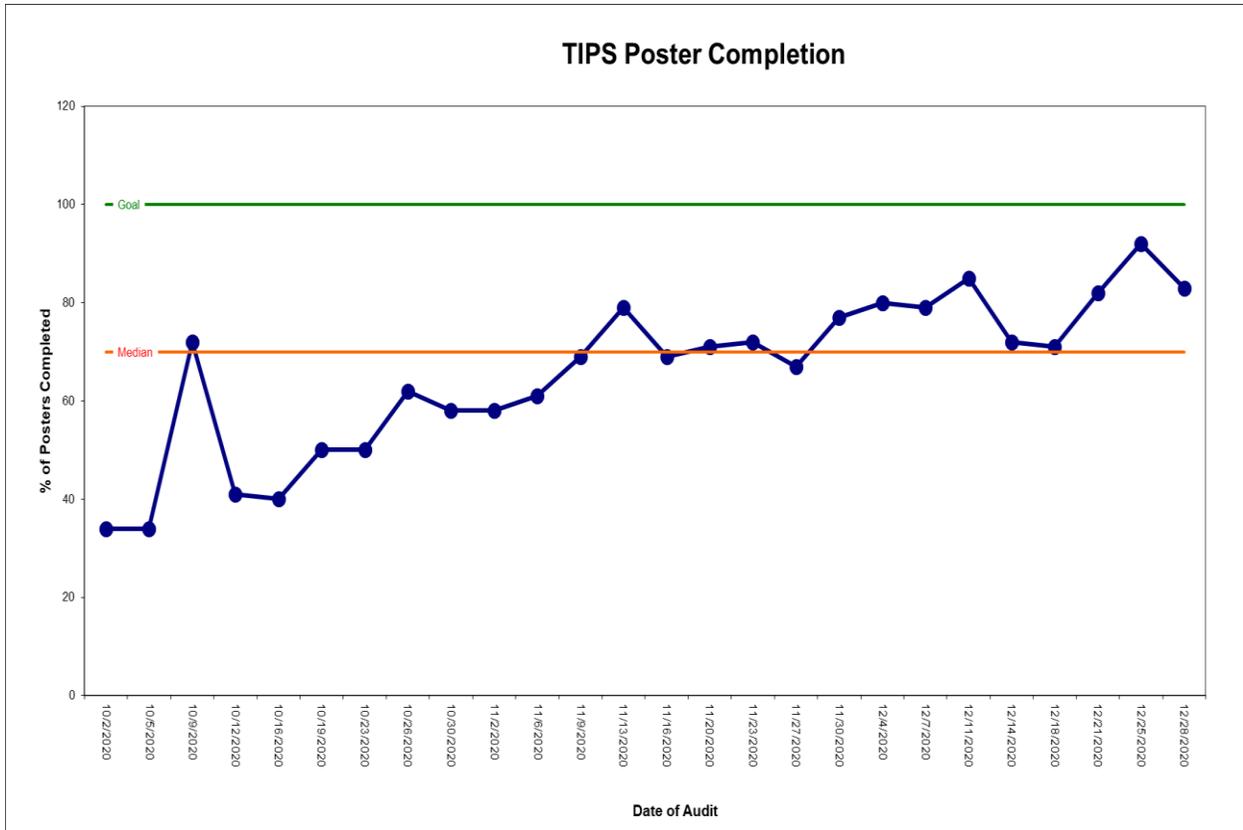
Figure 2

Falls Pre and Post Intervention per 1,000 Patient Days

Anne Arundel Medical Center, 4 Medical
Falls Pre and Post Intervention

(Chart: Total Falls per 1k Patient Days by Month, comparing 2019 and 2020)

- August: 2020 = 1.13
- October: 2019 = 1.1, 2020 = 5.58
- November: 2019 = 4.93, 2020 = 4.6
- December: 2019 = 4.39, 2020 = 2.51

■ 2019 ■ 2020

Figure 3

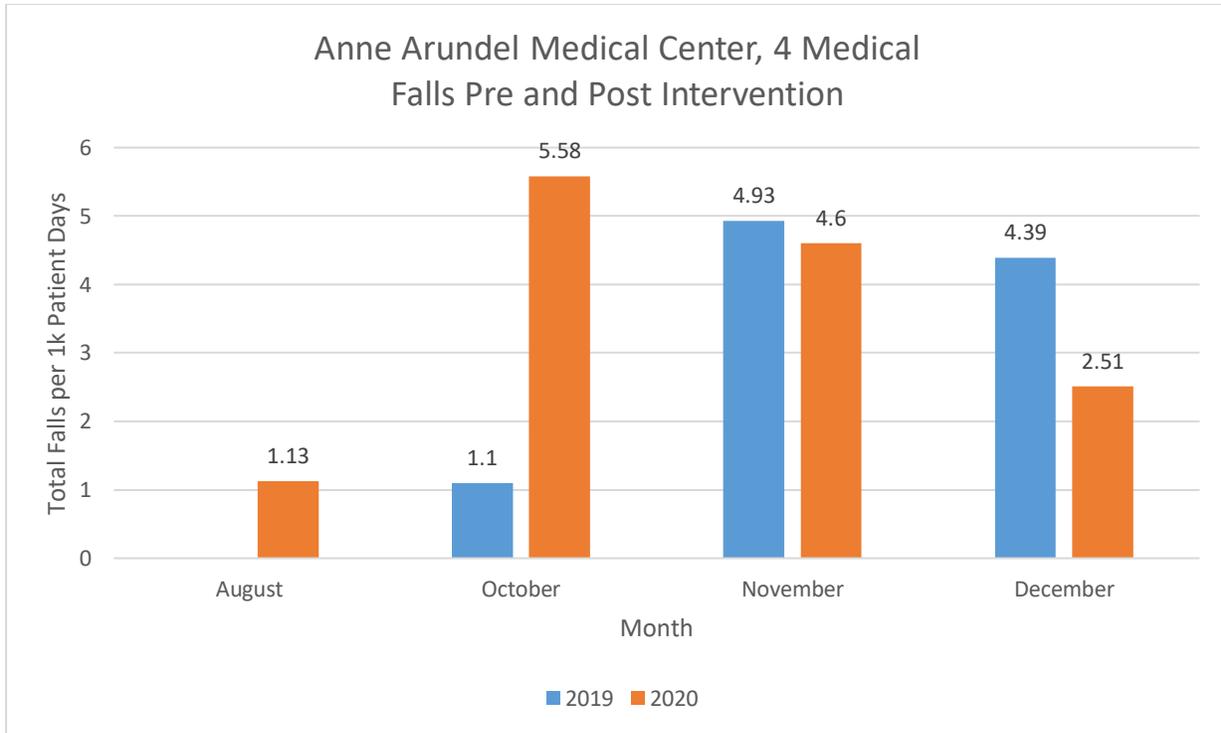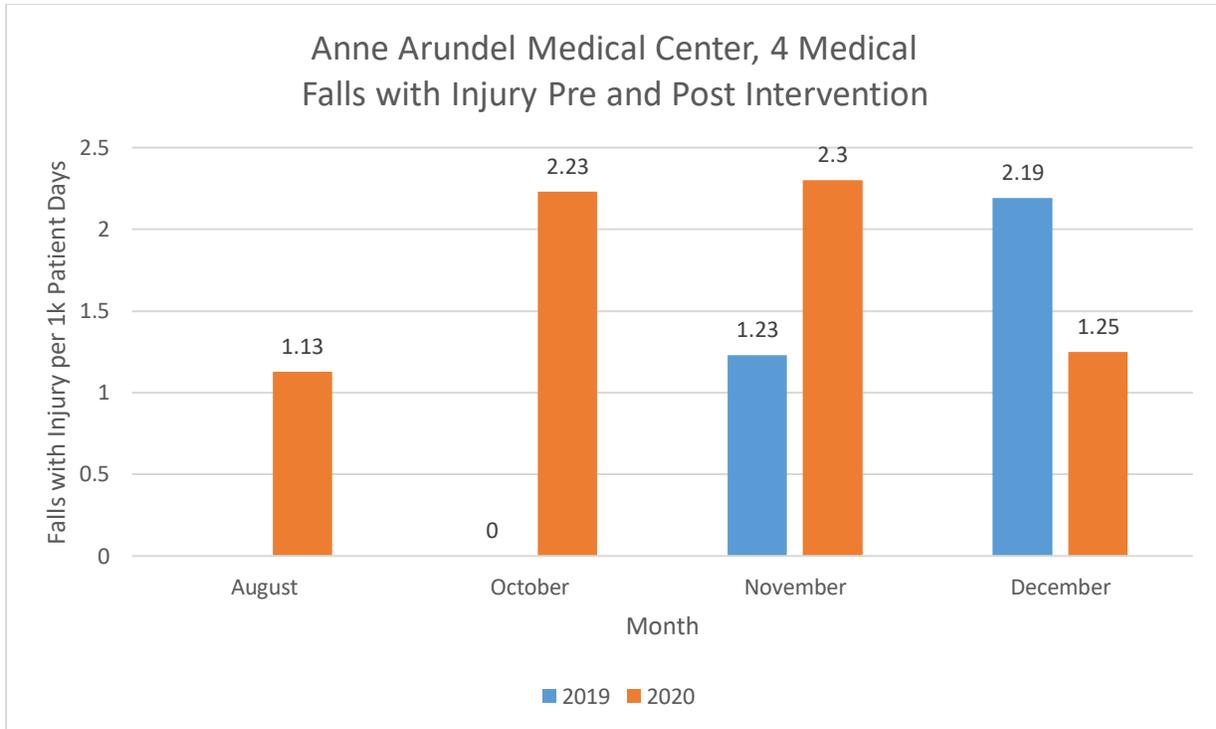*Falls with Injury Pre and Post Intervention per 1,000 Patient Days*

Anne Arundel Medical Center, 4 Medical
Falls with Injury Pre and Post Intervention

Appendix A: Educational Tool for TIPS

WOMEN'S HOSPITAL

Patient-Centered Fall Prevention Toolkit
Paper Fall TIPS Instruction Sheet for Nurses

Overview

Preventing falls is a three step process[ ]: 1) identifying risk factors; 2) developing a tailored or personalized plan to decrease risk; and 3) consistently carrying out the plan. The paper Fall TIPS tool is designed to support nurses in partnering with patients and their family members **in the 3-step fall prevention process.**

How To Use:

[1] Patient Name:	[1] Date:

[2] **Fall Risks** (Check all that apply) — [3] **Fall Interventions** (Circle selection based on color)

Fall Risks:
- History of Falls ☐
- [4] Medication Side Effects ☐
- Walking Aid ☐
- [5] IV and/or Equipment ☐
- Unsteady Walk ☐
- May Forget or Choose Not to Call ☐

Fall Interventions:
- Communicate Recent Falls
- Walking Aids: Crutches, Cane, Walker
- [5] IV and/or Equipment Assistance When Walking
- [6] Toileting Schedule: Every _____ hours — Bed Pan, Assist to Commode, Assist to Bathroom
- Bed Alarm On
- Assistance Out of Bed: 1 person, 2 people

1. **Write the patient's first name and last updated date.** Erase all information when patient is discharged
2. **Left column lists all fall risk factors** from the Morse Falls Scale (MFS). Go through assessment with the patient and check off any risks that apply to patient. These risk factors should match your MFS documentation completed in the EHR and be updated at all times.
3. **Right column lists all evidence-based interventions** and matches them by color to the appropriate risks. Selecting the interventions that match the color associated with each risk factor will result in a plan that is most likely to prevent a fall for a patient with that particular risk profile. However, you should also use your clinical judgment to tailor the interventions to your patient. Based on individual patient differences, you may choose more interventions or you may choose not to select a recommended intervention.
4. Corresponding MFS item refers to multiple co-morbidities. Patient with multiple co-morbidities are often on many medications that can increase the risk for falls. Some of these medications may increase the need for frequent toileting.
5. If patient **has a heplock and does not have equipment attached,** check off the risk factor "IV and/or Equipment" without circling the corresponding intervention "IV Assistance When Walking". As always, use your clinical judgment.
6. Both the "Medication Side Effects" and the "IV and/or Equipment" risk factors have the "Toileting Schedule" as a recommended intervention. **Toileting schedule should be ordered for every 1 or 2 hours based on your clinical judgment.**

For any questions, please contact Patricia Dykes RN PhD via pdykes@partners.org