Fall 11-30-2021

Evidence-Based Change Benchmark: Implementing Intervention Strategies Aimed at Reducing Patient Falls

Victoria Nix
vnix2@patriots.uttyler.edu

Evidence-Based Change Benchmark:

Implementing Intervention Strategies Aimed at Reducing Patient Falls

Victoria A. Nix

School of Nursing, The University of Texas at Tyler

NURS 5382.061: CAPSTONE

Dr. Katherine Hensley

December 5th, 2021

Contents

Executive Summary

Benchmark Study

1. Project Rationale
2. Literature Synthesis
3. Project Stakeholders
4. Project Implementation
5. Timetable/Flowchart
6. Data Collection Methods and Planned Evaluation
7. Costs/Benefit Discussion

Discussion/Results

Recommendations

References

Appendices

Executive Summary

The Evidence-Based Project [EBP] is a framework for fall management and prevention processes aligning with practices that have proven to provide the most promising results for reducing falls in hospitalized patients. Milestones include formulating policies, assigning responsibilities, developing procedures for identifying high-risk patients, assessing fall risk factors, establishing fall prevention intervention guidelines, outlining procedures for recording incident details, and defining appropriate post-accident communication workflows. The EBP change will offer an opportunity for inter-professional involvement in the form of an Implementation and Oversight Team [IOT]. Staff members of various disciplines will form the IOT and work together toward the development and rollout of the EPB change initiative.

The EBP will first roll out to the intensive care unit [ICU], where fall rates are highest, for a 12-week test run. Compliance and outcomes will be closely monitored on a shift-by-shift basis for the first two weeks, and feedback from patients and staff will be solicited daily. Doing so will give the IOT an opportunity to take corrective actions as soon as possible and adjust EBP accordingly. Once the first two weeks have passed, evaluation of results and feedback solicitation will shift to a weekly occurrence. At the end of the 12-week period, outcomes will be compared to quarterly patient fall incidents for the past five (5) years to show a definitive link between an increased focus on fall prevention and a decline in falls and fall injuries.

Success of the evidence-based change relies on everyone's buy-in and active participation. This includes stakeholders such as the Nursing Director who ensures the implementation of the fall policy and collaborates with other disciplines to maintain a safe environment with properly maintained equipment, the CEO who champions safety and ensures resources are allocated for such, the patients who participate in fall prevention education with an

expectation they adhere to fall prevention interventions, and Unit Nurses who implement and oversee individualized patient fall prevention care.

1. Project Rationale

The rationale for evidence-based change revolves around the fact that falls are common in hospital settings and can significantly increase the morbidity and mortality of patients, especially elderly patients (Burns et al., 2020; Cameron et al., 2018; Gustavsson et al. , 2018). It is estimated that 700,000 to 1 million hospitalized patients fall each year, and more than one-third of them cause injuries (Ranji, 2019). Such preventable incidents can and do place a significant financial burden on both the patient and health care system (Burns et al., 2016; Stevens et al., 2006). Research points to the fact falls and/or the severity of injuries from falls can be mitigated through fall prevention interventions; specifically risk assessment with bedside tools and education for both the patient and care providers. Fall prevention toolkits consisting of patient fall risk assessment and patient-specific bedside tools have shown to be instrumental in reducing patient falls.

According to the Texas Health and Human Services Commission (2021), “effectiveness of fall risk management interventions should be evaluated periodically, and the care plan revised as necessary to reflect changes in the fall risk assessment.” Organizations that fail to consider and implement evidence-based changes when necessary to improve the effectiveness of fall risk management interventions will face the risk of regulatory fines, tainted public relations, litigation, and license revocation. Achieving a fall rate of zero is the goal of any fall mitigation and prevention program; however, evidence-based change resulting in decreased injurious and non-injurious falls is viewed as progress and further demonstrates the organization's commitment to patient safety.

2. Literature Synthesis

In the past 10 years, a number of studies have been carried out on the fall prevention and management of hospitalized patients, and the research results have been published. Studies have focused on strategic elements such as patient risk assessments, prevention tools, and education initiatives to understand and mitigate falls in patients. An extensive search was conducted for primary sources related to the topic at hand and the content of these primary sources was thoroughly reviewed and assessed. This effort netted twelve (12) peer-reviewed publications that support a case for EBP change with regard to fall prevention strategies. See Appendix A for an evaluation table of the twelve (12) selected primary sources.

These articles all point out that the severity of falls and/or fall injuries can be reduced by fall prevention interventions; in particular, the use of bedside tools for risk assessment and education of patients, their family, and hospital staff. Employing well developed assessment tools such as the Morse Fall Scale and the Fall TIPS toolkit, have shown to correctly identify [>88%] at risk patients with a statistically significant [15%] reduction in overall inpatient falls and a [34%] reduction in injurious falls (Dykes et al., 2020; Callis, 2016). With regard to intervention through education initiatives, research shows coupling of education was statistically superior in fall reduction vis-a-vis usual care and a cluster-randomized controlled trial found fewer falls, injurious falls, and fallers in the intervention period compared with the control group (Hill et al., 2015; Hill et al., 2016; Tricco et al., 2019). While education provides patients, family members, and hospital staff with information about fall risks and how best to prevent such, data has shown it has the ability to curb patient fears while boosting confidence and increasing one's self-efficacy (Heng et al., 2020; Hill et al., 2016).

Although the twelve selected articles differ in their approach to fall risk intervention, their goal is effectively the same – to prove or disprove fall risk intervention effectiveness. The approach of the proposed evidence-based change project will consist of creating a fall risk prevention program that incorporates what has shown to be two of the most effective intervention methods – education and assessment with specific bedside tools.

3. Project Stakeholders

The stakeholders for this project are those potentially affected by or can influence the implementation of the EBP initiative. The immediate stakeholders consist of at-risk patients, their family members, and hospital staff who interact with the at-risk patient. The project itself will be managed by the Implementation and Oversight Team [IOT] which will be comprised of, at minimum. a unit nurse manager, unit charge nurse, safety/risk manager, unit staff nurse, and the training/development manager. The Director of ICU is a significant stakeholder as well due the fact this unit has the highest rate of falls and is the chosen unit to test the pilot program. In a broader sense, all hospital current and future patients and hospital personnel are stakeholders. The rationale behind this statement is that patient falls come at a [financial] cost which can have negative indirect impacts. Such impacts could include an increase in service costs and insurance premiums for both the patient and hospital or cost-cutting measures such as workforce reduction, hiring freezes, or minimal cost-of-living increases for hospital employees.

4. Project Implementation

The project's implementation will begin on the third week of the 12-week timeline. It will be proceeded by mandatory training for effected nursing staff. Training is expected to take two days and will include a thorough explanation of the need for change, exactly what those

changes are, what the changes mean for the employee in terms of job duties, how to perform those duties, and what upper management's expectations are.

Once nursing personnel has gained an understanding of why increased focus is placed on fall prevention and an overview of what those changes are, training will begin. Training personnel will provide nursing staff with a presentation on packets built to educate the patient and their family on fall risk and prevention. Educating nursing staff on what they will be using to educate a patient and their family with will increase the likelihood nursing staff adequately cover the material and reinforce the message in their day-to-day interaction with the patient and family.

The education-packet presentation/training will be followed by a thorough review of the revised Fall Risk Assessment and Intervention Protocol. [FRAIP] This protocol consists of nineteen (19) steps nurses must take with each patient at the beginning of their shift or anytime a change in a patient's status or level of care occurs. This protocol is the cornerstone of the Fall Prevention and Management Program. Compliance is mandatory and is tracked through the EPIC System. Each nurse will be supplied a laminated FRAIP flowchart for reference to aid them in the process. See Appendix B - Fall Risk Assessment and Intervention Protocol [FRAIP] Flowchart, for details of each step.

Once FRAIP training concludes, nursing personnel will be introduced to and thoroughly trained on the Post-Fall Assessment Protocol [P-FAP]. This protocol consists of twelve (12) steps nursing personnel must take in the event they discover a fallen patient or personally see a patient fall. While staff rarely witness falls occur, prompt action upon discovery of a fallen patient is vital in order to lessen the risk of injury. The P-FAP is designed to guide personnel through steps that ensure the fallen patient is receiving the proper treatment/observations and

captures necessary information that will aid in an incident investigation. See Appendix C - Post-Fall Assessment Protocol [P-FAP] Flowchart, for details of each step.

The implementation of and adherence to these newly developed protocols will run for ten (10) weeks. Compliance and outcomes will be closely monitored on a shift-by-shift basis for the first two weeks, and feedback from patients and staff will be solicited daily. Once the first two weeks have passed, evaluation of results and feedback solicitation will shift to a weekly occurrence. At the end of the 10-week implementation period, outcomes will be compared to quarterly patient fall incidents for the past five (5) years. A decision will be made to either:

a) Extend the timeframe for implementation and evaluation within the Intensive Care Unit in an effort to gather more data.
b) Integrate and maintain change in practice throughout all business units.
c) Forego the evidence-based change and return to how things were previously done.

These decisions are to be made based on such things as observed outcomes, compliance rate, and cost.

5. Project Timeline / Flowchart

The timeline for EBP implementation stands at 12 weeks – see Table 1. The evidence based change will occur across six steps (see Figure 1) that will guide the IOT through defining outcome targets, establishing measurement methods, identifying practices supported by evidence, educating and training, and measuring the impact associated with implementation of the EBP change (Melnyk & Fineout-Overholt, 2019).

Table 1: Timeline for EBP implementation and outcome assessment

STEP	Week											
	1	2	3	4	5	6	7	8	9	10	11	12
1												
2												
3												
4												
5												
6												

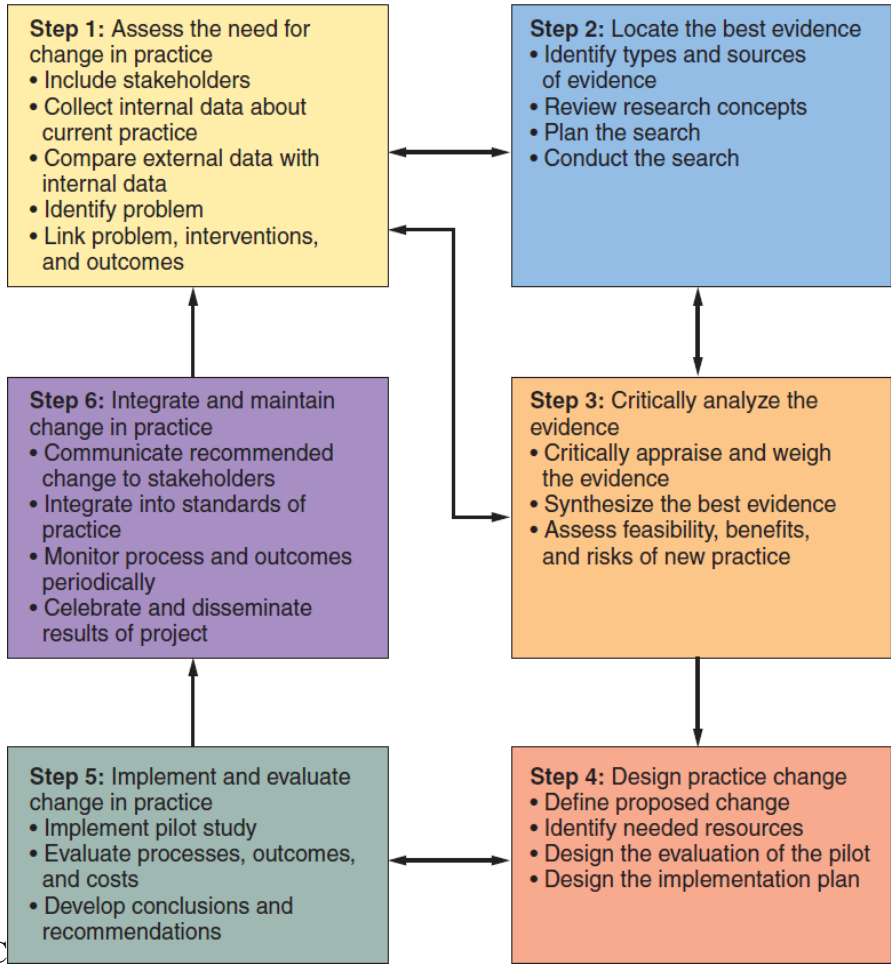


Figure 1: A model of evidence-based practice change. (Larrabee, J. H. (2009). Nurse to nurse: Practice. McGraw-Hill Education.)

6. Data Collection Methods and Planned Evaluation

The fall prevention project falls within the Descriptive statistic category rather than Inferential. The relevant data that differentiates descriptive vs inferential within this project is that of specific population, measure of outcomes using chart/graph, and using outcomes to make an evidence-based decision. Once all steps have been completed and evaluated the descriptive statistics will allow the hospital to make an informed decision on continuation of the protocol.

As a direct result of resource constraints brought about from the ongoing global pandemic, the evidence based change project was not implemented. With that said, had the project been implemented, ordinal and nominal level data would be used in evaluating the evidence-based change with consideration given to increased emphasis on patient-centered quality care. Process measures in terms of percentages would be taken weekly to evaluate evidence-based change. Measurements would include observation chart reviews, the completion of intentional patient-rounding, and assigned/administered interventions for those at risk for falls and fall related injuries. In addition, the following data would be used to determine the effectiveness of the evidence-based change:

- Data on patient falls (fall rate + injury rate)
- Nurse-to-Patient staffing levels
- Type/Frequency of Fall Prevention Tools employed
- P-FAP Compliance Data/Rate
- Qualitative Survey/Interview – Patient
- Qualitative Survey/Interview – Staff
- Training records
- FRAIP Compliance Data/Rate

Once the data is collected, the patient fall rate within the unit for the given month would be compared to the previous 24 months. One would then assess other elements such as patient and staff training, patient, and environmental rounding, fall prevention tools employed at time of

incident, and nurse-to-patent staff levels. See Appendix D for an explanation as to how staff-to-patient levels are evaluated.

7. Costs/Benefit Discussion

Various resources are required to carry out the evidence-based change and overcome any potential barriers. These include, but are not limited to, satisfaction/feedback survey literature, patient/family education packages, staff education and training, expanded use of fall prevention tools (gait belts, patient alarms, fall mats, etc.), and EPIC System user interface modifications. The use of consultants, technical writers, and media production outlets are required. The budgetary estimate associated with fully implementing the evidence-based change is $185K for the first year. This is an appropriation for expenditure [AFE] quality estimate which means it has a 90% confidence level of being within +/- 8% ($14,800).

The cost of implementation is safely assumed to decrease during the subsequent years as implementation maintenance cost will primarily be comprise of longer on-board training and education and survey literature, fall prevention tool maintenance and replacement. Given that costs incurred by the hospital due to an injurious or fatal fall can far exceed $185K for a single event, the benefit of establishing a more rigorous Fall Prevention Program outweighs the upfront costs and those related to maintaining the program.

Discussion/Results

As previously stated, full development and implementation of the evidence-based change project did not come to fruition due to a number of factors driven by the global COVID-19 pandemic. Although the change project could not be implemented in the 2021 calendar year, there are several steps that can be taken to promote a positive impact on the subject of patient falls. For example, staff can bring awareness to the Patient Safety Committee concerning

standards for adequate patient care and effects of certain medical interventions, or lack thereof, that can negatively impact a patient's well-being and increase fall risk. In addition, increased vigilance in collecting proper medical history prior to staff admitting a patient to the unit will improve the relevance and accuracy of various employed fall risk assessment tools.

Recommendations

As medical professionals, there exists a duty to ensure patient safety and increase their chance for recovery. One would be derelict in their duty if they did not educate their patients and self on the dangers associated with falling and what steps one can take to mitigate falls from occurring. For this reason, I would recommend implementing the change project as soon as possible. At this juncture, the next step is to be an walking-talking advocate for fall prevention and management change to ensure a best-in-class program is in place and people leaders are enforcing compliance of procedures/policies. Leading by example by talking about fall risks during safety meetings/huddles as well as promoting proactive mitigation behavior will also be a top priority.

As a [future] Family Nurse Practitioner, I will undoubtedly examine and treat a wide range of patients; of which, many will be subject to moderate-to-high risk of falls due to being elderly or medicated. I will work hard to educate patients and their families about fall risk and prevention while encouraging my colleagues to do the same. Of course, as technology and medicine advances, so must one's understanding of the impact it may have on fall risk and prevention strategies. As such, I will work to stay informed of the latest research while encouraging my colleagues to do so as well.

References

Burns, E. R., Stevens, J. A., & Lee, R. (2016). The direct costs of fatal and non-fatal falls among older adults — United States. *Journal of Safety Research*, *58*, 99–103. https://doi.org/10.1016/j.jsr.2016.05.001

Burns, Z., Khasnabish, S., Hurley, A. C., Lindros, M. E., Carroll, D. L., Kurian, S., Alfieri, L., Ryan, V., Adelman, J., Bogaisky, M., Adkison, L., Ping Yu, S., Scanlan, M., Herlihy, L., Jackson, E., Lipsitz, S. R., Christiansen, T., Bates, D. W., & Dykes, P. C. (2020). Classification of Injurious Fall Severity in Hospitalized Adults. *The Journals of Gerontology*, *75*(10), 138–144. https://doi.org/10.1093/gerona/glaa004

Callis, N. (2016). Falls prevention: Identification of predictive fall risk factors. *Applied Nursing Research*, *29*, 53–58. https://doi.org/10.1016/j.apnr.2015.05.007

Cameron, I. D., Dyer, S. M., Panagoda, C. E., Murray, G. R., Hill, K. D., Cumming, R. G., & Kerse, N. (2018). Interventions for preventing falls in older people in care facilities and Hospitals. *Cochrane Database of Systematic Reviews*. https://doi.org/10.1002/14651858.cd005465.pub4

Dykes, P. C., Burns, Z., Adelman, J., Benneyan, J., Bogaisky, M., Carter, E., Ergai, A., Lindros, M. E., Lipsitz, S. R., Scanlan, M., Shaykevich, S., & Bates, D. W. (2020). Evaluation of a Patient-Centered Fall-Prevention Tool Kit to Reduce Falls and Injuries. *JAMA Network Open*, *3*(11), 1–15. https://doi.org/10.1001/jamanetworkopen.2020.25889

Gustavsson, J., Jernbro, C., & Nilson, F. (2018). There is more to life than risk avoidance – elderly people's experiences of falls, fall-injuries and compliant flooring. *International*

Journal of Qualitative Studies on Health and Well-Being, *13*(1). https://doi.org/10.1080/17482631.2018.1479586

Heng, H., Jazayeri, D., Shaw, L., Kiegaldie, D., Hill, A.-M., & Morris, M. E. (2020, April 15). *Hospital falls prevention with patient education: a scoping review*. BMC Geriatrics. https://doi.org/10.1186/s12877-020-01515-w.

Hill, A.-M., McPhail, S. M., Waldron, N., Etherton-Beer, C., Ingram, K., Flicker, L., Bulsara, M., & 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

Hill, A.-M., Francis-Coad, J., Haines, T. P., Waldron, N., Etherton-Beer, C., Flicker, L., Ingram, K., & McPhail, S. M. (2016). 'My independent streak may get in the way': how older adults respond to falls prevention education in hospital. *BMJ Open*, *6*(7). https://doi.org/10.1136/bmjopen-2016-012363

Larrabee, J. H. (2009). *Nurse to nurse: Practice*. McGraw-Hill Education.

Melnyk, B. M., & Fineout-Overholt, E. (2019). The Role of Outcomes and EBQI in Enhancing and Evaluating Practice Change. In *Evidence-based practice in nursing & healthcare: a guide to best practice* (4th ed., pp. 293–312). essay, Wolters Kluwer.

Ranji, S. (2019, September). *Falls*. PSNet. https://psnet.ahrq.gov/primer/falls

Stevens, J. A., Corso, P. S., Finkelstein, E. A., & Miller, T. R. (2006). The costs of fatal and non-fatal falls among older adults. *Injury Prevention*, *12*(5), 290–295. https://doi.org/10.1136/ip.2005.011015

Texas Health and Human Services Commission. (2021). *Fall Prevention & Management*. Texas Health and Human Services. https://www.hhs.texas.gov/doing-business-hhs/provider-portals/long-term-care-providers/nursing-facilities/quality-monitoring-program/evidence-based-best-practices/fall-prevention-management.

Tricco, A. C., Thomas, S. M., Veroniki, A. A., Hamid, J. S., Cogo, E., Strifler, L., Khan, P. A., Sibley, K. M., Robson, R., MacDonald, H., Riva, J. J., Thavorn, K., Wilson, C., Holroyd-Leduc, J., Kerr, G. D., Feldman, F., Majumdar, S. R., Jaglal, S. B., Hui, W., & Straus, S. E. (2019). Quality improvement strategies to prevent falls in older adults: a systematic review and network meta-analysis. *Age and Ageing*, *48*(3), 337–346. https://doi.org/10.1093/ageing/afy219

Appendices

Appendix A – Evaluation Table of Primary Sources

Citation: (i.e., author(s), date of publication, & title)	Conceptual Framework	Design/Method	Sample/ Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Strength of Evidence
Burns, E. R., Stevens, J. A., & Lee, R. (2016). The direct costs of fatal and non-fatal falls among older adults — United States. Journal of Safety Research, 58, 99–103. https://doi.org/10.1016/j.jsr.2016.05.001	This study sought to estimate the incidence, average cost, and total direct medical costs for fatal and non-fatal fall injuries in hospital, ED, and out-patient settings among U.S. adults aged 65 or older in 2012, by sex and age group and to report total direct medical costs for falls inflated to 2015 dollars.	Incidence data came from the 2012 National Vital Statistics System, 2012 Healthcare Cost and Utilization Project-Nationwide Inpatient Sample, 2012 Health Care Utilization Program National Emergency Department Sample, and 2007 Medical Expenditure Panel Survey.	All analyses were limited to adults aged 65 years and older. Sample weights were applied to generate nationally representative estimates	Independent: Fall injures Dependent: All analyses were limited to adults aged 65 years and older. Sample weights were applied to generate nationally representative estimates	This study updates the estimates calculated by Stevens et al (Stevens et al., 2006). by adjusting for inflation and the aging U.S. population. Specifically we estimate the costs of fatal and non-fatal falls among persons aged 65 years and older using updated incidence data to calculate average and overall costs stratified by treatment setting (hospitalizations, ED visits, office-based and outpatient visits), sex, and age group.	All analyses were limited to adults aged 65 years and older. Sample weights were applied to generate nationally representative estimates.	Direct medical costs totaled $616.5 million for fatal and $30.3 billion for non-fatal injuries in 2012 and rose to $637.5 million and $31.3 billion, respectively, in 2015. Fall incidence as well as total cost increased with age and were higher among women	Level I Evidence: No risk or harm if interventions/findings implemented into practice
Burns, Z., Khasnabish, S., Hurley, A. C., Lindros, M. E., Carroll, D. L., Kurian, S., Alfieri, L., Ryan, V., Adelman, J., Bogaisky, M., Adkison, L., Ping Yu, S., Scanlan, M., Herlihy, L., Jackson, E., Lipsitz, S. R., Christiansen, T., Bates, D. W., & Dykes, P. C. (2020). Classification of Injurious Fall Severity in Hospitalized Adults. The Journals of Gerontology, 75(10), 138–144. https://doi.org/10.1093/gerona/glaa004	The purpose of this project was to refine the Major injury classification to derive a valid and reliable categorization of the types and severities of Major inpatient fall-related injuries.	Systemic review	Of the Major injuries, the distribution of Major A, B, and C was 40.3%, 16.1%, and 43.6%, respectively. These subcategories enhance the National Database of Nursing Quality Indicators categorization	Independent: fall related injures Dependent: Literature of injurious fall reports	Costs for fatal falls were derived from the Centers for Disease Control and Prevention's Web-based Injury Statistics Query and Reporting System; costs for non-fatal falls were based on claims from the 1998/1999 Medicare fee-for-service 5% Standard Analytical Files.	Based on published literature and ranking of injurious fall incident reports (n = 85) from a large Academic Medical Center, we divided the National Database of Nursing Quality Indicators Major category into three subcategories: Major A—injuries that caused temporary functional impairment (eg, wrist fracture), major facial injury without internal injury (eg, nasal bone fracture), or disruption of a surgical wound; Major B—injuries that caused long-term functional impairment or had the potential risk of increased mortality (eg, multiple rib fractures); and Major C—injuries that had a well-established risk of mortality (eg, hip fracture).	The team tested and validated each of the categories which resulted in excellent interrater reliability (kappa = .96). Of the Major injuries, the distribution of Major A, B, and C was 40.3%, 16.1%, and 43.6%, respectively.	Level II evidence: No risk or harm if interventions/findings implemented into practice

Citation: (i.e., author(s), date of publication, & title)	Conceptual Framework	Design/Method	Sample/ Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Strength of Evidence
Callis, N. (2016). Falls prevention: Identification of predictive fall risk factors. Applied Nursing Research, 29, 53–58. https://doi.org/10.1016/j.apnr.2015.05.007	This study aims to provide a detailed review of the literature to identify and synthesize research evidence on risk factors that may contribute to patient falls in the adult inpatient hospital setting that are not captured by current fall risk assessment tools.	Scope Review	Inclusion criteria were predetermined to be (1) English language publications, (2) description of 1 or more predictive fall risk factor,(3) adult patient (18 and older) in acute care hospital setting, (4) detailed description of qualitative or quantitative study design, (5) peer reviewed primary research report, (6) studies published within the last 5 years (unless landmark study) and (7) studies within and outside the United States.	Independent: decrease fall risk Dependent: Fall assessment toolool	Inclusion criteria were predetermined to be (1) English language publications, (2) description of 1 or more predictive fall risk factor,(3) adult patient (18 and older) in acute care hospital setting, (4) detailed description of qualitative or quantitative study design.	Selected articles were published between 2010 and 2013.Overall the studies included10, 479 patients in acute care hospital settings who were followed for the investigation of predictive fall risk factors.	Among the twenty risk factors that emerged as statistically significant in at least one of the eight reviewed articles, eleven factors were not included in the three most commonly used fall risk assessment tools.	Level IV Evidence from well-designed case-control or cohort studies
Cameron, I. D., Dyer, S. M., Panagoda, C. E., Murray, G. R., Hill, K. D., Cumming, R. G., & Kerse, N. (2018). Interventions for preventing falls in older people in care facilities and hospitals. Cochrane Database of Systematic Reviews. https://doi.org/10.1002/1465 1858.cd005465.pub4	The study is composed of RCT(s) for interventions to prevent falls in older patients.	RCT – Randomized Clinical Trials	This study considered 95 trials in total. Sampling techniques utilized were of the RCT type – both cluster randomized and individually- randomized. Overall, there were 138, 164 participants. Of these, 40,374 were in care facilities with a mean age of 84 years and 75% female. The remaining participants (97,790) were in hospitals with a mean age of 78 years and 52% female. (p.6)	Independent: Fall reduction interventions Dependent: evaluating systemic reviews of falls in hospitals	Dependent (outcome) Variable(s): Care Facilities (p. 7) • Effect of Exercise on fall rate – little to no difference to fall risk or rate. • General Medication Review – little to no difference to fall risk or rate. • Prescription of Vitamin D – likely to reduce the fall rate; however, little to no difference to fall risk. Hospitals (p.7) • Physiotherapy – very low-quality evidence. Uncertain as to effect on fall rates or reduction to risk • Bed Alarm – very low- quality evidence. Uncertain as to effect of bed alarms on rate or risk of falls.	The study was quantitative in nature. Rate Ratios (RaR) and Risk Ratios (RR) were calculated using a confidence interval (CI) of 95%. GRADE (Grading of Recommendations, Assessment, Development and Evaluations) was used to assess the quality of evidence (p. 5). Pairs of review authors independently extracted data using a pre-tested data extraction form for studies (p.21).	Risk of fracture and adverse events were generally poorly reported and, where reported, the evidence was very low-quality, which means that we are uncertain of the estimates. Only the falls outcomes for the main comparisons are reported here.	Level 1 Evidence No risk or harm if interventions/findings implemented into practice. Recommend more thorough research for better outcomes/results

Citation: (i.e., author(s), date of publication, & title)	Conceptual Framework	Design/Method	Sample/ Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Strength of Evidence
Dykes, P. C., Burns, Z., Adelman, J., Benneyan, J., Bogaisky, M., Carter, E., Ergai, A., Lindros, M. E., Lipsitz, Evaluation of a Patient-Centered Fall-Prevention Tool Kit to Reduce Falls and Injuries. JAMA Network Open, 3(11), 1–15. https://doi.org/10.1001/jamanetworkopen.2020.25889	To assess whether a fall-prevention tool kit that engages patients and families in the fall-prevention process throughout hospitalization is associated with reduced falls and injurious falls	Non-Randomized RCT	This nonrandomized controlled trial using stepped wedge design was conducted between November 1, 2015, and October 31, 2018, in 14 medical units within 3 academic medical centers in Boston and New York City. All adult inpatients hospitalized in participating units were included in the analysis.	Inedpendent: Decrease falls Dependent: Fall prevention tool kit	A nurse-led fall-prevention tool kit linking evidence-based preventive interventions to patient-specific fall risk factors and designed to integrate continuous patient and family engagement in the fall-prevention process. Statistical significance was set at P < .05 using a 2-sided test. We used SAS statistical software, version 9.4 (SAS Institute), for the analyses	During the interrupted time series, 37 231 patients were evaluated, including 17 948 before the intervention (mean [SD] age, 60.56 [18.30] years; 9723 [54.17%] women) and 19 283 after the intervention (mean [SD] age, 60.92 [18.10] years; 10 325 [53.54%] women).	Non-randomized controlled trial including 37 231 patients from 14 medical units within 3 academic medical centers, an interrupted time series found that implementation of a fall-prevention tool kit was associated with a statistically significant 15% reduction in overall inpatient falls and a 34% reduction in injurious falls.	Level I Evidence: No risk or harm if interventions/findings implemented into practice
Gustavsson, J., Jernbro, C., & Nilson, F. (2018). There is more to life than risk avoidance – elderly people's experiences of falls, fall-injuries and compliant flooring. International Journal of Qualitative Studies on Health and Well-Being, 13(1), 1479586. https://doi.org/10.1080/17482631.2018.1479586	The aim of this study is to explore the experiences of falls, the risk of fall-injury, prevention in general and specifically compliant flooring as an injury preventative measure amongst frail elderly people living in a residential care facility with compliant flooring.	We used the grounded theory method and conducted semi-structured in-depth interviews with eight elderly people in residential care (data collected between February and December 2017).	The participants were recruited from two residential care units with compliant flooring, one in a rural area of Sweden. We used a purposive sampling method (Palinkas et al., 2015) and the inclusion criteria were: individuals with sufficient cognitive ability for participating in an interview.	Independent: Fall risk prevention Dependent: In this qualitative interview study with elderly people, residing in a geriatric residential care unit with compliant flooring the overall design of grounded theory according to Glaser (1978); Glaser and Strauss (1967) was chosen.	method of theoretical sampling was applied to guide the data collection.	The data collection and analyses were performed parallel using grounded theory (Glaser, 1978), during the time period February until December 2017. Data collection was performed using semi structured in-depth interviews (Kvale & Brinkmann, 2009). The interviews were carried out individually by one of the authors (JG) in the informants' apartments at the residential care units.	Compliant flooring is a passive fall injury measure that does not require the target group to make decisions, adapt or actively participate in the program and the participants appreciate this potentially protective capacity of compliant flooring.	Level II evidence: No risk or harm if interventions/findings implemented into practice

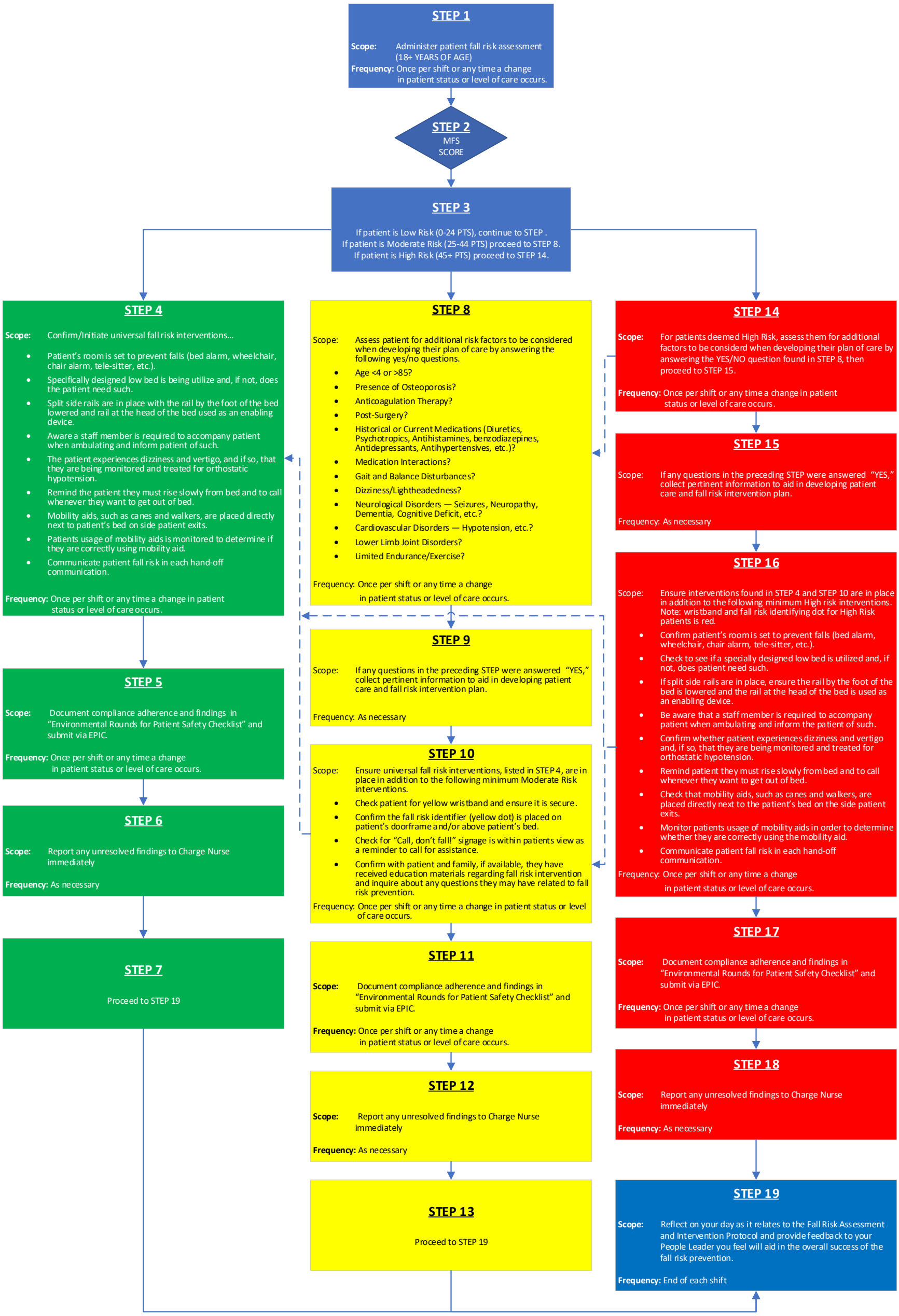
Citation: (i.e., author(s), date of publication, & title)	Conceptual Framework	Design/Method	Sample/ Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Strength of Evidence
Heng, H., Jazayeri, D., Shaw, L., Kiegaldie, D., Hill, A.-M., & Morris, M. E. (2020, April 15). Hospital falls prevention with patient education: a scoping review. BMC Geriatrics. https://doi.org/10.1186/s12877-020-01515-w	This critical review scopes patient falls education interventions for hospitals. The quality of the educational designs under-pinning patient falls education programmes was also evaluated.	Scope Review	The Arksey and O'Malley (2005) framework for scoping reviews was adapted using Joanna Briggs Institute and PRISMA-ScR guidelines. Eight databases, including grey literature, were searched from January 2008 until February 2020.	Independent: Fall prevention Dependent: Scope review over education	Eight databases, including grey literature, were searched from January 2008 until February 2020. Two reviewers independently screened the articles and data were extracted and summarised thematically.	The interventions included: (i) direct face-to-face patient education about falls risks and mitigation; (ii) educational tools; (iii) patient-focussed consumer materials such as pamphlets, brochures and handouts; and (iv) hospital systems, policies and procedures to assist patients to prevent falls.	The included studies assessed falls or education related outcomes before and after patient falls prevention education. Few studies reported incorporating education design principles or educational theories. When reported, most educational programs were of low to moderate quality from an educational design perspective	Level IV Evidence from well-designed case-control or cohort studies
Hill, A. M., McPhail, S. M., Waldron, N., Etherton-Beer, C., Ingram, K., Flicker, L., Bulsara, M., & 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. Lancet (London, England), 385(9987), 2592–2599. https://doi.org/10.1016/S014 0-6736(14)61945-0	The purpose of the study is to examine the effectiveness of fall-prevention education for patients, supported by training and feedback for staff. (p.1). The study is composed of RCT(s) for interventions to prevent falls in older patients.	RCT – Randomized Clinical Trials	The sampling technique utilized was that of a stepped- wedge, cluster-randomized controlled study. A total of eight (8) rehabilitation units took part in the study which spanned a 50-week period. During this time, some 3,606 patients were admitted, of which 1,983 were during the control period and 1623 were during the intervention period. Patients were eligible to receive individualized education if they were over the age of 60, had a projected length of stay of at least 3 days, had basic cognitive functioning	Independent: Patient education and employee training Dependent:Evaluating falls rates	The intervention-by- time analysis revealed there was a significant cumulative unit-level reduction in falls and injurious falls rates and the proportion of fallers over time on units during the intervention period. During period to, a period where no intervention occurred at any of the rehab units, the median fall rate (per 1000 bed-days) stood at 13.1; however, during the final months (t4), when intervention was conducted on all participants across all 8 units, the median site fall rate stood at 5.9 per 1000 bed-days. In summary, the study shows a direct correlation between patient education coupled with employee training and the reduction in falls	The study was quantitative in nature. The primary analyses used to compare outcomes between intervention period and that of the control period included: (a) negative binomial regression for the rate of falls per 1000 patient days, (b) logistic regression for the proportion of patients who had one or more falls versus no falls resulting in injury, and (c) negative binomial regression for the rate of falls resulting in injury.	The intervention- by-time analysis revealed there was a significant cumulative unit- level reduction in falls and injurious falls rates and the proportion of fallers over time on units during the intervention period. During period t0, a period where no intervention occurred at any of the rehab units, the median fall rate (per 1000 bed- days) stood at 13.1.	Level 1 Evidence No risk or harm if interventions/findings implemented into practice. Recommend more thorough research for better outcomes/results

Citation: (i.e., author(s), date of publication, & title)	Conceptual Framework	Design/Method	Sample/ Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Strength of Evidence
Hill, A.-M., Francis-Coad, J., Haines, T. P., Waldron, N., Etherton-Beer, C., Flicker, L., … Mcphail, S. M. (2016). 'My independent streak may get in the way': how older adults respond to falls prevention education in hospital. BMJ Open, 6(7). https://doi.org/10.1136/bmjopen-2016-012363	Older patients who were eligible, received fall prevention education and were surveyed using questionnaires to gain their response to in- hospital education and their perceived barriers to engaging in falls prevention strategies (p.1)	The study design is a prospective qualitative survey.	This study considered 757 participants in total. Sampling technique utilized was the RCT type – cluster-randomized. Participants had a mean age of 81.4 ± 9.3 years, a median LOS (length of stay) of 12 days, and an abbreviated mental test score (>7/10).	Independent: Fall prevention education Dependent: Assessing older adult responses to fall prevention	Dependent (outcome) Variable(s): Participants who responded stated the education raised their awareness, knowledge, and confidence to actively engage in fall prevention strategies, such as asking for assistance prior to mobilizing. Participants' thoughts and feelings about their recovery were the main barriers they identified to engaging in safe strategies, including feeling overconfident or desiring to be independent and thinking that staff would be delayed in helping. The most common task identified as potentially leading to risk-taking behavior was needing to use the toilet (p.1)	The study was qualitative in nature. All participant data collected was through a post-education prospective qualitative survey. Deductive content analysis was used to map responses against conceptual frameworks of health behavior change and risk taking.	Participants who responded stated the education raised their awareness, knowledge, and confidence to actively engage in fall prevention strategies, such as asking for assistance prior to mobilizing. Participants' thoughts and feelings about their recovery were the main barriers they identified to engaging in safe strategies, including feeling overconfident or desiring to be independent and thinking that staff would be delayed in helping.	Level V Evidence No risk or harm if interventions/findings implemented into practice.
Lusardi MM;Fritz S;Middleton A;Allison L;Wingood M;Phillips E;Criss M;Verma S;Osborne J;Chui KK; Determining Risk of Falls in Community Dwelling Older Adults: A Systematic Review and Meta-analysis Using Posttest Probability. Journal of geriatric physical therapy (2001). https://pubmed.ncbi.nlm.nih.gov/27537070/.	A systematic review and network meta-analysis using posttest probability	Systemic review	Sampling technique using systemic review and meta-analysis. This study had a sampling size of at least 30 ambulatory adults older than 65 and tracked fall occurrences for a minimum of 6 months. Searches were done using Medline/Pubmed and CINAHL. Ninety-five articles met inclusion criteria; 59 contained necessary data for calculation of PoTP. Key words: accidental falls, older adults, functional assessment	Independent: Decreasing the risk of falls Dependent:Assessing fall risk by calculating and comparing posttest probability values for individual test/measures	Berg Balance Scale score (≤50 points), Timed Up and Go times (≥12 seconds), and 5 times sit-to-stand times (≥12) seconds are currently the most evidence-supported functional measures to determine individual risk of future falls. Shortfalls identified during review will direct researchers to address knowledge gaps	The study os quantatative in nature. A search strategy was used using CINAHL, pubmed/medline. Study design and QUADAS score determined the level of evidence. Data for calculation of sensitivity (Sn), specifi city (Sp), likelihood ratios (LR), and PoTP values were available for 21 of 46 measures used as search terms. An additional 73 history questions, self-report measures, and performance-based measures were used in included articles; PoTP values could be calculated by 35.	Berg Balance Scale score (≤50 points), Timed Up and Go times (≥12 seconds), and 5 times sit-to-stand times (≥12) seconds are currently the most evidence-supported functional measures to determine individual risk of future falls. Shortfalls identified during review will direct researchers to address knowledge gaps	Level 1 Evidence No risk or harm if interventions/findings implemented into practice

Citation: (i.e., author(s), date of publication, & title)	Conceptual Framework	Design/Method	Sample/ Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Strength of Evidence
Stevens, J. A., Corso, P. S., Finkelstein, E. A., & Miller, T. R. (2006). The costs of fatal and nonfatal falls among older adults. Injury Prevention, 12(5), 290–295. https://doi.org/10.1136/ip.2005.011015	To estimate the incidence and direct medical costs for fatal and non-fatal fall injuries among US adults aged >or=65 years in 2000, for three treatment settings stratified by age, sex, body region, and type of injury.	Incidence data came from the 2000 National Vital Statistics System, 2001 National Electronic Injury Surveillance System-All Injury Program, 2000 Health Care Utilization Program National Inpatient Sample, and 1999 Medical Expenditure Panel Survey.	adults aged ⩾65 years in 2000, for three treatment settings stratified by age, sex, body region, and type of injury.	Independent: Direct medical costs for fatal and non-fatal falls. Dependent: A complete description of the methodology to assess incidence and costs of fatal falls is provided	Incidence and cost estimates were derived from a number of different data sources because no single nationally representative data set would allow us to estimate fatal and non-fatal fall incidence and direct medical costs.	The age specific costs differed for men and women. For people aged 65–74, men's costs were 44% higher than women's ($18 million v $12 million); for ages 75–84, costs for men and women were similar ($32 million v $32 million). For people aged 85 and older, men's costs remained essentially unchanged ($31 million) while women's costs increased 67% (to $53 million)	all related injuries among older adults, especially among older women, are associated with substantial economic costs. Implementing effective intervention strategies could appreciably decrease the incidence and healthcare costs of these injuries.	Level I Evidence: No risk or harm if interventions/findings implemented into practice
Tricco, A. C., Thomas, S. M., Veroniki, A. A., Hamid, J. S., Cogo, E., Strifler, L., … Straus, S. E. (2019). Quality improvement strategies to prevent falls in older adults: a systematic review and network metaanalysis. Age and Ageing, 48(3), 337–346. https://doi.org/10.1093/agein g/afy219	A systematic review and network meta-analysis was conducted to elucidate effective quality improvement (QI) strategies for falls prevention. Multiple databases were searched (inception−April 2017). Randomized controlled trials (RCTs) of falls prevention QI strategies for participants aged ≥65 years were included. Two investigators screened titles and abstracts, full-text articles, conducted data abstraction, and appraised risk of bias independently (p.337).	Systemic Review	This study considered 126 trials in total. Sampling technique utilized was of the RCT type – cluster-randomized. Overall, there were 84,307 participants. The mean age of participants across studies ranged between 65 and 88 years. Most RCT's included a high proportion of female participants (89%).	Independent: Quality improvement strategies Dependent (outcome) Variable: systemic review analysis of fall prevention strategies	A combination of case management, patient reminders, and staff education may reduce risk of falls. Results can be tailored to decision-maker preferences and availability of resources	The study is quantitative in nature. The study was quantitative in nature. A search strategy was developed and peer-reviewed using PRESS (Peer Review of Electronic Search Strategies). The Cochrane Effective Practice and Organization of Care (EPOC) Group's risk-of-bias tool was used to appraise the internal validity of included RCTs. All analyses were conducted by an experienced statistician who used the metafor and netmeta packages in R statistical software and the netfunnel command in STATA.	A combination of case management, patient reminders, and staff education may reduce risk of falls. Results can be tailored to decision-maker preferences and availability of resources.	Level 1 Evidence: No risk or harm if interventions/findings implemented into practice

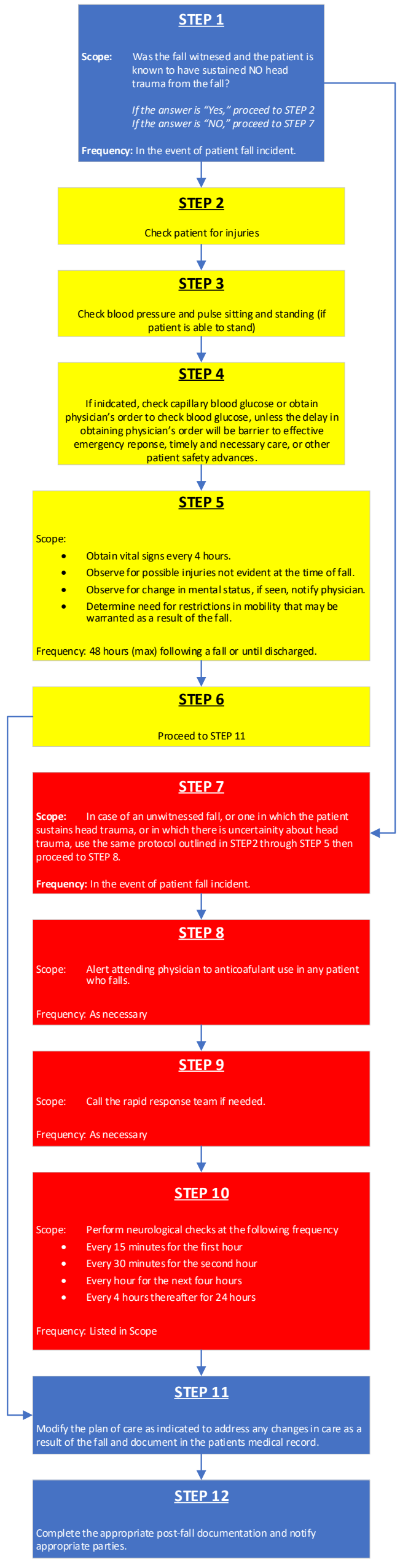
Appendix B - Fall Risk Assessment and Intervention Protocol [FRAIP] Flowchart

Fall Risk Assessment and Intervention Protocol [FRAIP] Flowchart



Appendix C – Post-Fall Assessment Protocol [P-FAP] Flowchart

Post-Fall Assessment Protocol [P-FAP] Flowchart



Appendix D – Evaluation Steps for Staff-to-Patient Levels

Step 1:

Find number of falls that occurred during the given month. This can be gleaned from the Fall Incident Reports.

Example: There were two (2) reported fall incidents in November.

Step 2:

Find the number of bed days for the given month. This can be calculated by taking the total number of bed hours of all patients in the unit for the given month and dividing it by 24.

Example: (total daily bed hours in November) / 24

(21,600) / (24) = 900 bed days for November

Step 3:

Calculate the fall rate by dividing the number of falls in November by the number of occupied bed days in November and multiply by 1000.

Example: (# of falls in November) / (# of bed days in November) * 1000 bed days

(2) / (900) * 1000 = 2.2

Thus, November had a fall rate of 2.2 falls per 1,000 occupied bed days

Once the fall rate is calculated, it can be charted against the previous 24 months to determine if there is a noticeable decline in fall rate.

Step 4:

Calculate daily number of hours of care per resident/day (PPD). Add total number of direct care nursing staff hours for each 24-hour period, using actual number of hours each person worked. Divide the total hours for each 24-hour period by the total census for each day to calculate PPD.

Step 5:

Calculate the average daily number of hours of care per resident/day for the month of November. This is achieved by adding up each days PPD and dividing by the number of days in the month (November has 30 days). Once the average PPD is calculated, it can be charted and compared to the previous 24 months to see if there is any correlation between staffing and falls.

Step 6:

November's training and rounding compliance rates can be charted and compared with the previous 24 months to see if there is any correlation between non-compliance and falls.