Project Title: Generalizability and Spread of an Evidenced-based Fall Prevention Toolkit: Fall TIPS (Tailoring Interventions for Patient Safety)

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Structured Abstract Max 250 words

Purpose: To evaluate the long-term effectiveness of the Falls TIPS program with regards to inpatient falls and fall-related injuries.
Scope: Testing of a nurse-led fall prevention toolkit across three diverse healthcare systems
Methods: The toolkit was implemented within the existing institutional framework at three large academic medical centers in the Northeast. A nonrandomized, stepped wedge trial was conducted between June 2013 and August 2019 in 12 hospitals within three large Boston and New York Hospital systems. All adult inpatients on our study units for >24 hours were included in the analysis.
Results: Analysis of the intervention's impact on inpatient falls is underway. Impact on injurious falls incidence and associated costs are also outcomes of interest. The Fall TIPS toolkit has been widely disseminated to prevent falls in hospitalized patients across the globe. Tools available on our website can be incorporated into diverse workflows.
Key Words: innovation science, patient safety, quality, clinical decision support, fall risk assessment, fall prevention, information technology

Purpose

Specific Aim 1: Evaluate perceived effectiveness of the Fall TIPS implementation process and stakeholders' views of adherence with the toolkit.

Specific Aim 2: Evaluate the effectiveness of the Fall TIPS program on reducing falls and injurious falls in three large, diverse healthcare systems.

Specific Aim 3: Conduct an economic analysis to evaluate the costs and benefits associated with implementing and using Fall TIPS. Generate recommendations for dissemination.

Scope

Background: In the United States, up to one million hospitalized patients fall annually, with 30% of these falls resulting in injury. We previously developed an evidenced-based fall prevention toolkit, Fall TIPS (Tailoring Interventions for Patient Safety),[1-3] based on the three-step fall prevention process of 1) screening and assessing risk, 2) developing a tailored plan to mitigate specific areas of risk, and 3) consistently and accurately executing the plan. The evaluation of the Fall TIPS toolkit in a randomized control trial with over 10,000 patients in four hospitals revealed a 25% reduction in patient falls. In an initial study of a refined Fall TIPS toolkit based on end-user feedback, the toolkit was associated with a statistically significant 15% reduction in overall patient falls and a 34% reduction in injurious falls.[1]

Context: This R18 project leveraged an opportunity to study "real-world efficacy" of the Fall TIPS program as well as the implementation process; issues related to generalizability and spread, such as program fidelity evaluation and facilitators/barriers; and cost.

Settings: The Fall TIPS program was been implemented within three large hospital systems: Mass General Brigham (MGB), New York Presbyterian (NYP), and Montefiore Medical Center (MMC).

Participants: Adult inpatients on all Fall TIPS study units *(excluding previously evaluated medical and surgical units[1])* across three large hospital systems' medical, surgical, oncology, and neurology units with length of stay (LOS)/unit of at least 24 hours.

Incidence: Our team was interested in the incidence of falls per 1000 patient-days. We also gathered data to evaluate the incidence of injurious falls per 1000 patient-days.

Methods

*Study Design***:** The project incorporates metrics to address each component of the RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance)[4] framework to evaluate the efficacy of the Fall TIPS program, including implementation, adoption, diffusion, and dissemination across 12 hospitals in three large healthcare systems with diverse patients and EHR systems: MGB, NYP, and MMC. The quantitative evaluation was conducted using a stepped wedge design among MGB, MMC, and NYP as well as a staggered roll-out within MGB. Fifteen months of data in the preintervention, intervention development/refinement/piloting period, and 15 months of postintervention Fall TIPS implementation data related to patient falls and injurious falls were collected between June 2013 and August 2019 to evaluate long-term efficacy of the Fall TIPS program.

All adult patients admitted to medical, surgical, oncology, and neurology units at each participating hospital received the Fall TIPS program, and each unit served as its own control.

Specific Aim 1:

We conducted 64 stakeholder interviews to evaluate the perceived effectiveness of Fall TIPS implementation. We competed 11 focus group interviews with nursing staff and 53 individual patient interviews the first round of interviews (MGB: four staff focus groups, 30 individual patient interviews; MMC: three staff focus groups, 15 individual patient interviews; NYP: four staff focus groups, eight individual patient interviews). Second round interviews included three focus group sessions with nursing staff and 22 individual patient interviews. The interviews were conducted at the same three hospital sites listed previously (MGB: one staff focus group, eight individual patient interviews; MMC: one staff focus group, six individual patient interviews; NYP: one staff focus group, six individual patient interviews).

Prior to interviewing staff and patients, verbal consent was obtained from participants upon review of the Interview Information sheet. Interviews were recorded, transcribed, and imported into Nvivo for coding and analysis. This process was followed for both Round 1 Interviews and Round 2 Interviews. Interviews were coded based on consensus between researchers. First, two experts in qualitative analysis and two researchers read interviews to identify open codes to capture meaningful points in the data. This initial review included one interview from each of the three healthcare systems included in the study. This process was followed for both clinical staff and patient/family interviews. Upon consensus of the open codes, two researchers completed the open coding process for all interviews. Upon reaching consensus on the coding process, one researcher completed the open coding in Nvivo. Closed coding was based on questions in the interview guides developed for conducting clinical staff and patient/family interviews. One researcher completed the closed coding in Nvivo. Two researchers also compiled a list of "gems" from paraprofessional and patient/family interviews. Based on the open coding process, two experts in qualitative analysis and two researchers created a list of themes. The themes were incorporated into the Interview Guide by a qualitative analysis expert and used for Round 2 interviews, the purpose of which was to validate themes extracted from the Round 1 Interviews. The clinical staff Interview Guide was also updated to include questions regarding perceptions of time use associated with Fall TIPS implementation and use. The purpose of this revision was to build a qualitative database on perceptions of nursing time associated with Fall TIPS. Two researchers extracted codes related to time from both rounds of interviews and assigned 43 codes.

Fall TIPS Efficiency Scale (FTES): 1) A qualitative phase to elicit and categorize nurses' views of time spent implementing Fall TIPS was followed by 2) a series of steps using nurses' quotes to develop items,

research team inputs to refine and organize items into provisional scales, clinical nurses' evaluation and suggestions for wording and formatting, and prototype scale development, and 3) a quantitative psychometric evaluation phase.[5]

During the analysis of the quotes from the staff focus groups on Fall TIPS implementation, multiple quotes emerged that represented nurses' perceptions of which components saved versus wasted time. Based on these quotes, we created a survey that we further validated with focus groups before dissemination. The FTES was disseminated in two phases for validation at MGB and MMC. The final survey was a 13-item questionnaire that is available on www.falltips.org/resources and was administered via REDCap.[6]

Fall Prevention Knowledge Test (FPKT): A literature review was performed to identify assessments of clinicians' baseline knowledge of fall prevention practices with the idea that it would aid in the assessment of Fall TIPS knowledge in workshop attendees. When the team discovered no such tool existed, we developed the Fall Prevention Knowledge Test. We confirmed the FPKT's conceptual framework, identified the content domain, drafted test items, devised the format, selected items for empirical examination, and conducted the psychometric evaluation. We randomly divided a 209-subject data set into test and validation samples to make item reduction decisions and then examine reliability and validity.[7]

Fall TIPS Audit Tool: To measure patient/family engagement and Fall TIPS adherence from all three sites (12 hospitals total) since October 2017 using the Fall TIPS audit tool. At Montefiore Medical Center, we collected audit data from four hospitals at NYP, three hospitals at MMC, and five hospitals at MGB. The different healthcare systems involved in this study had their own systems for collecting, processing, and reporting the data. The Fall TIPS audit tool is composed of three questions: 1) Is the patient's Fall TIPS poster hanging at the bedside? 2) Can the patient/family verbalize the patient's fall risk factors? 3) Can the patient/family verbalize the patient's personalized fall prevention plan? We encouraged the champions conducting the audit to provide peer-to-peer feedback on the results (positive and negative) and to use the audit as an opportunity to improve local fall prevention practice. Fall TIPS champions were responsible for submitting at least five audits per unit to their hospitals' reporting system (e.g., REDCap survey).[6]

Specific Aim 2:
A Priori Power Analysis (Patient Falls/Falls with Injury) is being conducted. The intervention was on the unit level within the hospitals, and the outcome was measured at the patient level. We had five hospitals in MGB, four hospitals in NYP, and three hospitals in MMC. The intervention was implemented at different time points at different sites (e.g., the postintervention time period was different at each site due to the planned rollout of the electronic medical record and other competing projects at the hospitals). Therefore, the intervention is being evaluated using an interrupted time series design. Although the post period started at different time points at each site, we collected 15 months of preintervention and postintervention data. We are analyzing the data rigorously to account for secular time trends while estimating the treatment effect. The main outcomes are rates of patient falls and rates of falls with injury.

To test the null hypothesis of no Fall TIPS program effect on the fall rates (and falls with injury rates), we fit Poisson regression models (for rates) via generalized estimating equations (GEE) to account for clustering and overdispersion within site. For Poisson regression, the outcome is whether or not the patient falls and includes an 'offset' of the log patient length-of-stay in days in order to model the fall

rates and fall with injury rates per 1000 patient-days. The main predictor is the time-varying dichotomous covariate corresponding to whether the Fall TIPS program was implemented at the hospital during a patient's stay ("0" if preintervention period for that hospital and "1" if postintervention period for that hospital). We are adjusting for patient diagnosis at the time of admission, demographic variables, and linear and higher-order powers of time (month) to account for secular time. If we exponentiate the coefficient of the Fall TIPS program in the Poisson regression, we get the estimate Rate Ratio (RR), and we will test if RR=1.

Injurious Falls Classification: As a sub-project relevant to Specific Aim 2, we revised the National Database of Nursing Quality Indicators (NDNQI) classification to quantify the severity of injurious falls. Many hospital systems in the United States report injurious falls using the National Database of Nursing Quality Indicators (NDNQI) five categories: None, Minor, Moderate, Major, and Death. The Major category is broad, including injuries ranging from a wrist fracture to a potentially fatal subdural hematoma. The purpose of this project was to refine the major injury classification to derive a reliable assessment and categorization of the types and severities of major inpatient fall-related injuries. Based on published literature and ranking of injurious fall incident reports (n=85) from Brigham and Women's Hospital, we subdivided the NDNQI Major category into three subcategories: major A - injuries that caused temporary functional impairment (e.g., wrist fracture), major facial injury without internal injury (e.g., nasal bone fracture), or disruption of a surgical wound; major B - injuries that caused long-term functional impairment or had a slight risk of increased mortality (e.g., multiple rib fractures); and major C - those that had a well-established risk of mortality (e.g., hip fracture). Based on research team consensus, literature, and expert opinion, we developed an administration manual to facilitate classifying major injuries into one of the subcategories. Twelve clinician co-investigators from Montefiore Medical Center, New York-Presbyterian, and Brigham and Women's Hospital achieved excellent inter-rater reliability with a set of testing cases (n=85) from 2010-2015 (kappa=0.93). Six pairs of two investigators independently validated sets of 40 injurious falls (n=232) recorded between 2016 and 2018 at three large hospital systems and achieved excellent inter-rater reliability (kappa=0.96).[8]

Specific Aim 3: We will conduct an economic analysis to evaluate the costs and benefits associated with implementing and using Fall TIPS to generate recommendations for dissemination. We are examining the costs/benefits of Fall TIPS from two perspectives: hospital and society. We have collected and are currently analyzing total costs, total indirect costs, and total direct costs for patients.

Data Sources/Collection: Data sources include the electronic health record (EHR) database, incident reports related to all injurious falls, and interviews/focus groups with clinicians. In addition, all participating hospitals conducted audits on adherence with the Fall TIPS program protocol by champions throughout the implementation period. This data was be used to evaluate "dose" of the Fall TIPS program intervention.

Fall and injurious fall data previously analyzed in initial study units[1] were excluded from our R18 dataset.

Interventions: The nurse-led Fall TIPS toolkit was implemented in either its paper or electronic modality at each site.[1] The Fall TIPS toolkit provides clinical decision support to link a patient's specific risk factors for falling with actionable, evidence-based interventions. It serves as a communication tool between team members as well as patients and families and requires continual engagement of patient and families in the three-step fall prevention process.[1, 3]

Measures: We used the following numbers to rank falls and their severity based on incident reports from each hospital: 0: no fall; 1: fall, no injury; 2: fall, minor injury; 3. fall, moderate injury; 4: fall, major injury; 5: fall, fatal. Fall with injury was defined as any fall that has a severity score of $\geq$2. Patient falls and falls with injury were measured as follows:

$$\text{Falls incidence:} \frac{\text{Number of inpatient falls} \times 1,000}{\text{Total number of inpatient days}}$$

$$\text{Falls with injury incidence:} \frac{\text{Number of inpatient falls with injuries} \times 1,000}{\text{Total number of inpatient days}}$$

A cost-benefit analysis was performed. Types of costs used to evaluate Fall TIPS' effect on hospitals and society are listed in the table below and are reported in 2020 USD.

Cost Type	Example	Data Available
Direct	Cost of integration with EHR	TotalDirectCostAmount from ESPI TotalCostAmount from ESPI Literature on costs on injuries from falls
Indirect	Operating Costs	TotalIndirectCostAmount (cost to the hospital) from ESPI
Monetized Hospital Benefits	Costs of avoided tests and lengthened hospital stay	
Nonmonetized Hospital Benefits	Improvements in process outcome	FTEs (time associated with Fall TIPS is neutral)
Societal Benefits	Monetized quality adjusted life years	Literature on harm from falls and injurious falls QOLY lit review

Limitations: Cost data from NYP costs were excluded due an excess of negative values, indicating that we may have received charge data instead of cost data. Fewer than 1% of cost values for MMC and MGB databases were zero or negative. These were set to missing and included in the multiple imputation. Because MGB switched EHR systems partially through the intervention development/refinement/piloting period, several data sources needed to be reconciled and pieced together to form our dataset. This was time consuming and required manual confirmation with chart review. Furthermore, we previously evaluated the efficacy of Fall TIPS on fall and fall with injury rates from

the originally enrolled medical surgical units at MGB.[1, 3] These medical/surgical units had the highest fall rates in the preintervention period, so their removal from this analysis impacted the volume of falls and injurious falls in this study. We expect inclusion of these units' data would have increased the effect of the intervention in reduction of falls.

Results
Principal Findings:
Professional/paraprofessional interviews: Participants from all three healthcare systems had diverse demographic characteristics. Staff (professional nurses, physicians, physical therapists, occupational therapists, pharmacists, and para-professionals) varied by position, education, years of experience, shift rotation, and unit type. After completing both rounds of interviews with professional and paraprofessional staff, the research team agreed on the following themes:

- Pre-Fall TIPS – This theme encompassed aspects of a pre-Fall TIPS fall prevention protocols and included the following codes: inconsistency, lack of clinical decision support, bundle (one set of interventions, not tailored, one size fits all), variable, generic (not actionable), Morse Fall Scale Use, universal precautions, and the quest for an effective fall prevention protocol.
- Aspects of Implementation – This theme encompassed the following codes: champions, ownership, self-investment, teamwork, staff education, and management attitudes.
- Challenges to Implementation – This theme highlighted that there were challenges to implementation, which included misconceptions, engaging staff in the rollout, updating/discarding plans, educating night staff, addressing potential gaps, and establishing the workflow.
- Staff Cognitive Experience – This theme identified management attitudes, messaging, and type of Fall TIPS modality used (screen saver, paper, or EHR generated) as important aspects of the staff cognitive experience related to Fall TIPS implementation.
- Impediments – This theme included the following types of barriers to implementation: logistical, geographic, and printer related. Other barriers included competing priorities and forgetting to update the Fall TIPS posters.
- Facilitators – This theme included the following codes to identify facilitators to implementation, which included staff education, leveraging the existing workflow, reinforcement, leadership support, champions, and availability of resources like markers.
- Workarounds – This theme included workarounds that were developed, such as printing two Fall TIPS signs to increase patient engagement and highlighting the EHR-generated Fall TIPS poster to increase patient engagement.
- Secondary Benefits – This theme included the following codes: positive impacts of personalization and EHR documentation.
- Three-Step Fall Prevention – This theme referred to where nurses were conducting the fall risk assessment.
- Engagement – This theme referred to engagement on the leadership, staff, and patient levels. It also encompassed the value of patient engagement, patient education, and how Fall TIPS is a trigger for the conversation between staff and patients about their fall prevention plan.
- Sustainability – This theme emphasized how the following aspects of implementation promote Fall TIPS sustainability: audits, feedback, and peer coaching.
- Wish List – This theme included the following codes to address what staff would put on their Fall TIPS wish list: use of technology for reminders and displaying Fall TIPS on the TV screens in patient rooms.

- Time – This theme included the following codes: time conserved verses wasted with Fall TIPS use, aspects of implementation that were efficient versus inefficient, and time as a barrier to implementation.

Patient/Family interviews: Patients/family members varied by reason for and duration/course of hospitalization and fall status while hospitalized. After completing both rounds of interviews with patient/family members, the research team agreed on the following themes:

- Patient Cognitive Experience – This theme highlighted aspects of the patient cognitive experience related to Fall TIPS, which included: patient perception, patient perception of staff awareness, patient confidence in staff consistently carrying out the plan, patient awareness of risk factors, interventions, and change in practice, and lastly universal fall precautions.
- Family Cognitive Experience – This theme included family perception of Fall TIPS and staff awareness. In addition, family mentioned the peace of mind about the patient's care when Fall TIPS is used.
- Sustainability (Process → Implementation → Continuous Quality Improvement) – This theme encompassed the following codes: messaging (tailored to the patient age group), carrying out the plan, progress/improving the plan, patient adherence, and safety as a priority.
- Three-Step Fall Prevention Process – This theme highlighted aspects of the process that patients addressed, including engagement, patient education, status change, effective assessment, intervention appropriateness, and effective implementation of interventions.
- Fall TIPS Modality – This theme referred to patient perceptions associated with one of the three Fall TIPS modalities, which are 1) the laminated paper poster, 2) the EHR-generated printout, and 3) the screen saver that displays Fall TIPS icons.
- Practice Change – This theme referred to practice changes associated with Fall TIPS, which included positive impacts of personalization, Fall TIPS as a catalyst that opens the door for patient engagement, personalized education multidisciplinary education, teamwork, and establishing patient buy-in.
- Impediments – This theme referred impediments to Fall TIPS from the patient perspective, including potential gaps, accurate Morse Fall Scale risk assessment, barriers to patient education, patient recommendations for education, and education across disciplines.

Fall TIPS Efficiency Scale: Four themes coded as "time" emerged from 47 text segments: 1) efficiency, 2) inefficiency, 3) balances out, and 4) valued. A 20-item prototype Fall TIPS Efficiency Scale (FTES) administered at two academic medical centers (N=383 clinical nurses who used Fall TIPS for about 2 years) was reduced to 13 items. Four factorially derived subscales endorsed the "time" themes, providing empirical support for the FTES' conceptual basis, and were validated by acceptable internal consistency values when examined as subscales in the test, validation, and paired (test and retest) samples. Individual items demonstrated robust retest stability values.[5]

Fall Prevention Knowledge Test: The typical respondent was a white, 42-year old female nurse with a bachelor's degree and 7 years of experience. Subjects were confident in their ability to prevent patients from falling, rating themselves as 8 on a 10-point self-efficacy scale of 1 (not at all) to 10 (very). The 11-item FPKT scale (range 0-11) attained a tetrachoric coefficient of .73; confirming initial reliability. FPKT mean (standard deviation) scores obtained before and after fall prevention education improved from 5.1 (1.8) to 6.6 (1.7). Statistically significant differences (paired-t = 12.4, p >.001) confirmed validity.[7]

Fall TIPS Audit Tool: When averaged from November 2018 through January 2020, the percentage compliance for the three-question Patient Engagement Audits across all five Mass General Brigham hospitals that implemented was as follows: 75% for question 1 (is the Fall TIPS poster updated and hanging at the bedside, with the correct patient name and date), 80% for question 2 (can the patient or family members verbalize their risk factors), and 79% for question 3 (can the patient or family members verbalize their fall prevention plan). For the four hospitals reporting data from New York-Presbyterian, the average percentage compliance was 94% for question 1, 94% for question 2, and 95% for question 3. For the three hospitals reporting data from the Montefiore Medical Center system, the average audit data for question 1 was 96% and 90% for question 3 (question 2 was not recorded for Montefiore Medical Center).

Injurious Falls Classification: Of the major injuries, the distribution of major A, B, and C was 40.27%, 16.11%, and 43.62% ,respectively. These subcategories enhance the NDNQI categorization. Using the administration manual, trained personnel can rate injurious fall severity with excellent reliability. Increasing the accuracy of injury classification will allow for more precise assessment of the costs of fall-related injuries for Specific Aim 3.[8]

Efficacy Analysis: We developed databases to collect information on fall and fall with injury rates from the three participating health systems. The data variables in our database include the following: MRN, age, gender, race, ethnic group, primary insurance, length of stay (hospital and study unit), admission date/time (hospital and study unit), occurrence fall/date/location, occurrence of fall with injury/date/location, and Charlson comorbidity score. Based on these data variables, we are evaluating differences in Fall TIPS effectiveness among the three healthcare systems based on differing patient characteristics and EHRs. We pulled preintervention and postintervention data to evaluate the extent to which Fall TIPS reduces the incidence of falls and injurious falls. We included an intervention development/refinement/piloting period between the pre- and postintervention periods to reduce the likelihood of our extensive training efforts affecting the results of our study.

The research team is currently performing a statistical analysis as well as an economic analysis to evaluate the effect of Fall TIPS on fall and injurious fall rates and will publish the results of the evaluation elsewhere.

Outcomes:
The information gained from Round 1 and Round 2 interviews regarding Fall TIPS implementation was the basis for the development of an Implementation Guide to facilitate generalizability and spread of this fall prevention program. The Implementation Guide is a comprehensive five-step guide written for implementation leaders and available on the Fall TIPS website (www.falltips.org).[6] The five steps are as follows:
1. Secure Buy-In from Hospital Leadership
2. Secure Buy-In from Nurses
3. Training Champions
4. Plan Implementation
5. Communicate Consistently

This guide was written for implementation leaders, who would be planning and organizing Fall TIPS rollout at their hospital. The guide was written with help from Complex Stories and reviewed by all team members at each study site. This ensured generalizability of the guide so that it can be used for planning at any hospital interested in implementing Fall TIPS.

The Fall TIPS Toolkit is available online at www.FallTIPS.org and includes the following[6]:
- Fall TIPS Training Slides
- Fall TIPS Super-User Training Slides
- Patient Engagement Exercises
- Fall TIPS Instruction Sheet for Nurses
- Fall TIPS Instruction Sheet for Nursing Assistants
- Fall TIPS Information Sheet for Patients
- Fall TIPS Audit and Audit Instructions
- Fall TIPS Audit Reliability Guide
- Peer Feedback Exercises
- Fall TIPS Laminated Poster (English, Arabic, Chinese, German, French, Haitian Creole, and Spanish)
- Fall TIPS Instructions
- Fall TIPS Common Misconceptions – Assessment Planning
- Fall TIPS Nursing Assistant Training Slides
- Fall TIPS Laminated Poster (additional languages added this year are Vietnamese and Russian)
- Morse Fall Scale Rationale
- Videos – recording of Fall TIPS Monthly Webinar and how to conduct Fall TIPS audits
- Rationale for Using the Morse Fall Scale
- Morse Fall Scale Risks and Evidence-Based Interventions

In addition to the online Implementation Guide,[6] we created the following three documents to support Fall TIPS implementation:

1. Readiness for Implementation Checklist – A checklist to assess if hospitals/units are ready to implement Fall TIPS and identify deficiencies that need to be addressed.
2. Process Evaluation Form – A form hospitals/units can use to rate implementation progress and to identify processes that are working well or need adjustment.
3. Classification of Adoption Success Rating System – A form that will allow hospitals/units to identify successes and potential issues that should be remedied after the initial implementation period.

Outcomes related to Specific Aim 3 include the Fall Prevention Knowledge Test. Because we quantified the number of minutes nurses were using before and after Fall TIPS implementation, we will be able to calculate the dollars associated with nursing time saved.

A key outcome, as evidenced by the large volume of Fall TIPS Patient Engagement Audit data, is that the auditing process has been integrated into nursing workflow at Mass General Brigham, New York-Presbyterian, and Montefiore Medical Center.

Discussion: One of the most useful tools to members of our collaborative, made up of 216 hospitals around the world, is the Fall TIPS Audit Tool. According to the Institute for Healthcare Improvement's Framework for Spread, continuous monitoring and feedback are important to sustain implementation of any new protocol. Our audit tool helps nurses develop a habit of assessing for compliance regularly and sharing the results of these assessment with staff and leadership. Our previous research emphasized the need for patient engagement to ensure that the fall prevention plan is followed; therefore, integrating the three-question patient engagement audits in the nurse workflow was necessary. By conducting frequent rounding and by training Nurse Champions to conduct audits and peer coaching, we leveraged existing

structures to integrate Fall TIPS into the pre-existing workflow. Preliminary data from the audits showed that this tool is effective at assessing Fall TIPS implementation, providing meaningful feedback to hospital stakeholders involved in fall prevention, and can promote program sustainability. Using the resources available on our website[6], clinicians can easily learn how to conduct the audits, provide peer feedback, and share audit results with their team. Buy-in from nurse champions proved invaluable to compliance with the intervention.

The Fall Prevention Knowledge Test we developed as a subproject under Specific Aim 1 is a robust means to assess nurses' knowledge of fall prevention is needed to inform effective educational programs. Addressing gaps in validated fall prevention knowledge tests provides an opportunity to inform and evaluate more effective fall prevention programs. This work has the potential to improve the assessment of nurses' knowledge of fall prevention of hospitalized older adults.

Nurses had difficulty quantifying the number of minutes spent on each component of Fall TIPS, this indirectly shows how Fall TIPS use has been integrated into their workflow as opposed to being isolated from it. The Fall TIPS Efficiency Scale has excellent psychometric properties, is suggested for use by all hospitals using Fall TIPS and can be modified to learn nurses' opinions of time spent when using another fall prevention program.[5]

Through the Injurious Falls Classification Project, our team refined the NDNQI major injury classification to derive a reliable assessment and categorization of the types and severities of major inpatient fall-related injuries. The major subcategories enhance the NDNQI categorization, currently used by one third of large hospital systems nationwide. Using the administration manual (IFCAM), trained personnel can rate injurious fall severity with excellent reliability.[8]

Conclusion: Our efficacy and economic analyses of the Fall TIPS Toolkit are underway. We will publish impact Fall TIPS has on inpatient fall as well as injurious fall incidence and associated costs. The Fall TIPS Toolkit has been widely disseminated to prevent falls in hospitalized patients and we have a robust collection of resources available online at www.FallTips.org.[6] Using the resources created and validated with this grant (e.g., FPKT, Implementation Guide, printable paper posters, Fall TIPS Audit Tool, FTES), diverse hospitals are successfully integrating Fall TIPS into existing workflows around the globe; 216 hospitals have joined the collaborative thus far.

Significance: This project has allowed us to evaluate the "real-world" dissemination of an evidence-based fall-prevention toolkit to diverse patient populations, nursing workflows, and electronic health systems in various geographic areas.

Implications: Consistent patient/family engagement in all three steps of the fall prevention process are vital to ensuring an adequate "dose" of our fall prevention intervention. Support from leadership and continual peer-to-peer coaching by nurse champions is key to integrating the intervention into existing workflows and sustainability. Our team has produced and disseminated the materials necessary to spread Fall TIPS to any interested hospital. Findings of the efficacy analysis are underway and will be published elsewhere.

List of Publications and Products
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