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Evidence-based Falls Prevention in Critical Access Hospitals

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This brief is one in a series of policy briefs identifying and assessing evidence-based patient safety and quality improvement interventions appropriate for use by state Flex Programs and CAHs.

Background

Inpatient falls are a serious patient safety and quality problem. Statistics indicate that patient falls occur in approximately 1.9 to 3% of all acute care hospitalizations¹ with anywhere from 2-15% of inpatients experiencing at least one fall.² An estimated 30% of inpatient falls result in serious injury.³ According to the Institute for Healthcare Improvement (IHI), falls are a leading cause of death in people 65 years of age or older and 10% of fatal falls for the elderly occur in hospitals.⁴ The majority of falls occur in patients' rooms and in bathrooms.⁵⁻⁷ Hospital environmental conditions and medication related issues also put patients at risk for falls.⁷ Falls in the elderly can contribute to a downward spiral, negatively impacting physical and emotional health, long term function, and quality of life. Additionally, a fall can often result in a fear of falling which may lead to an increased risk for a future fall.⁸⁻¹⁰

Injuries from falls are costly for the patient and the hospital.^{1,11-12} Patients injured in a fall incur increased hospital costs due to additional treatment and longer lengths of stay. It is estimated that these patients sustain upwards of 60% higher total charges than other hospitalized patients.¹³⁻¹⁵ The estimated cost to an acute care facility to treat the 30% of falls resulting in serious injury is expected to reach \$54.9 billion in 2020 [in 2007 dollars].¹⁶

Falls prevention within the context of patient safety culture

Because falls are among the significant adverse events experienced in hospitals, falls prevention is a critical component of any patient safety strategy. Effective communication among staff, patients, and their families enhance information transfer, build relationships, and increase capacity for positive patient safety culture change. Aberg, et al.⁸ state that "the staff's active participation in the fall event reporting system and in the subsequent follow-up process constitutes an essential part of a fall preventive safety culture".^{p.1038}

Key Findings

- Hospital falls are a serious patient safety problem, accounting for nearly 84% of all inpatient incidents. Most falls commonly occur as a result of medication related issues, toileting needs, and hospital environmental conditions.
- Effective falls interventions target both intrinsic (e.g. physiologic) and extrinsic (e.g. environmental) risk factors.
- Effective falls prevention teams are interdisciplinary and are imbedded in a culture of patient safety.
- Education for and communication across all staff contributes to successful falls prevention programs.

The Joint Commission frames falls prevention in the context of organizational patient safety culture, encouraging hospitals to assess the communication issues as well as environmental modifications that may be needed to help prevent falls.¹⁰ When all staff, from CEOs to Certified Nursing Assistant (CNAs) to custodians¹⁷ are attuned to the situations that may predispose patients to fall, they will be better prepared to make the hospital a safer place and help prevent avoidable inpatient falls. One CAH in Maine began posting the number of days without a fall on the wall in the hospital lobby which served to raise staff awareness and build teamwork in maintaining its low fall rate. This hospital also found that recognizing the involvement and importance of the CNA in the prevention of falls contributes to the positive culture of safety in their hospital.

In one rural hospital in Texas, the inpatient fall rate was significantly reduced as the result of a culture change,¹⁸ and a small community hospital in Canada reduced its fall rate to 2% per 1,000 bed-days as part of a larger change management process resulting in a transformed patient safety culture.¹⁹ Staff at all levels of a small rural hospital in Australia reported that the process of their Falls Prevention Program was a way to build teamwork and a safe practice environment.²⁰

Importance to CAHs and the Flex Program

The Flex Monitoring Team has identified falls prevention as an important patient safety intervention given the large number of rural elders served by CAHs and the number of CAHs with swing and long-term care beds (approximately 42% CAHs have SNF services and nearly 90% CAHs have swing beds).²¹ National surveys of CAHs conducted by the Flex Monitoring Team in 2004 and 2007 indicated that falls prevention ranked second and eighth respectively among CAH patient safety and quality improvement initiatives.²²⁻²⁴ CAH initiatives for prevention of patient falls included tracking and analysis of falls; identifying and monitoring patients at high risk of falls; education programs for staff; use of special equipment (e.g. bed/chair alarms, lift devices); and increased use of physical therapy and exercise programs.²³ Challenges and obstacles to implementing and sustaining a falls prevention program may include: other pressing quality improvement initiatives; insufficient staff and

resources to oversee and sustain a falls prevention program; not actively involving a pharmacist; and a lack of alignment between a reporting mechanism for tracking falls and programs of education and training. One rural hospital consultant suggested that, while an important quality issue, falls prevention may not be formalized as a quality improvement initiative in some small and rural hospitals because it is built directly into their nursing assessment. For some smaller hospitals, the fall rate may be so close to zero that it doesn't warrant full scale system-level change. Small environmental changes such as moving the patient closer to the nurses' station may be enough.

Falls Prevention Programs

Definitions of falls vary which can limit the comparability and benchmarking of falls data

There is no universally accepted standard definition for a fall. However, the most commonly used definition for a fall comes from the Joint Commission's Implementation Guide for the National Quality Forum Endorsed Nursing-Sensitive Care Performance Measures (updated in 2009): falls are an "unplanned descent to the floor (or extension of the floor, e.g., trash can or other equipment) with or without injury to the patient".²⁵ This includes both assisted and unassisted falls. The Joint Commission stresses the importance of a standard falls definition in order for hospitals to accurately and consistently track and trend fall data and states that "to reduce the number of falls and improve overall safety, it is important that the starting point for all reporting and analysis begins with an organization's clear, consistent, and fully communicated definition of falls."^{3, p.14} Having a standard falls definition that is interpreted and reported consistently within the organization is key to improvement. In a study of falls and injuries from falls in nine Midwestern hospitals, three of which were rural, the authors suggested that differences in fall circumstances between types of hospitals may be a result of differences in interpretations in the definitions of falls and internal hospital reporting practices.¹²

Internal reporting and analysis are helpful and important, but hospitals that also report their falls data to an external organization have the added benefit of benchmarking their data against national

or peer organizations. One example is the *National Database for Nursing Quality Indicators* (NDNQI) which uses the Joint Commission definition of falls, and provides benchmarking reports for hospitals with fewer than 100 beds. Over 700 CAHs and other small rural hospitals nationwide currently report falls data to the *Quality Health Indicators website* (<https://www.qualityhealthindicators.org>).^{*} QHI provides reports on unassisted falls for regional networks as well as individual facilities.

Risk factors for falls

Inpatient falls are a persistent problem and are frequently caused by a combination of risk factors that are specific to patients and their conditions (i.e., intrinsic factors) and the hospital environment (i.e., extrinsic factors)²⁶⁻²⁷ (See Table 1). Understanding these risk factors helps to identify appropriate prevention strategies.

- **Intrinsic factors:** Factors related to the patient's physiology such as age-related changes (decreased vision and mobility/gait issues),^{1,7,20,28-31} urinary incontinence,^{6, 9,26} chronic illness,¹⁰ and confusion.^{14,31,32} Fall risk for elders increases by as much as 4% for each year of age.³³ Polypharmacy, the use of five or more medications, significantly increases the fall risk for elderly patients.^{10,27,34,35} Additional fall risk factors for elderly patients include length of hospital stay, fear of falling, and history of falls.^{3,6,9,26,27,32,36-38}
- **Extrinsic factors:** Factors related to the physical environment such as lack of grab bars, poor condition of floor surfaces, inadequate or improper use of assistive devices.³⁹⁻⁴¹

Effective falls prevention programs include risk assessment (e.g. identification of the patients at high risk for falling, including physiologic/medication factors).^{3,9,39,42-44} Morse classified falls into three categories: accidental, anticipated physiologic, and unanticipated physiologic.^{45,46} She suggested that since 78% of falls are related to anticipated physiologic conditions, these can be identified early and safety measures applied to prevent the fall. The Joint Commission, based on research by Morse, notes that

“because the majority of falls can be anticipated and linked to particular risk factors, it is essential to use reliable and valid instruments for fall risk in order to implement corresponding interventions”.^{3, p.87}

The most commonly used risk assessment tools are the Morse Fall Scale, the Hendrich II Fall Risk Assessment, and the STRATIFY Risk Assessment Tool.^{37,44,47-48} In a recent survey of Nebraska CAHs and small rural hospitals, the majority use the Morse Fall Scale.⁴⁹ CAHs in Illinois use either the Morse Fall Scale or the Hendrichs II Fall Risk. Reliance on a valid risk assessment tool alone, however, is not sufficient to predict and prevent all falls. In their systematic review of risk factors and risk assessment, Oliver and colleagues⁵⁰ conclude that “even the best, validated tools will fail to predict a significant number of falls” and hospital staff should focus on an integrated approach that incorporates using a validated risk assessment during admission, targeting common falls risk factors, modifying the environment, and conducting post-fall assessments.

Additional components to an effective falls prevention program include root cause analysis to determine factors contributing to falls,⁵¹ interventions including modification of the environment,⁵⁰⁻⁵⁴ and education and training of staff, patients, and caregivers.^{3,8,11,17,20,30,42,54-55}

Strategies and Interventions: Evidence from the Literature

Relatively little is known about the extent to which falls prevention interventions can be successfully implemented in small rural hospitals. This is due primarily to the fact that systematic reviews and meta-analyses of falls in the elderly largely rely on randomized controlled trials, which are difficult to perform in small or rural hospitals⁵⁶⁻⁶⁰ and the fact that the evidenced-based literature on falls and falls prevention focuses more on community settings rather than hospitals.⁶¹⁻⁶⁶

Notwithstanding these limitations in the evidence base, we identified falls prevention strategies in peer-reviewed literature and through State Flex Programs which are applicable to Critical Access Hospitals (CAHs) and other small rural hospitals. (See Table

* The QHI website was developed through the Kansas Rural Health Options Project, a partnership between the Kansas Department of Health and Environment Office of Local and Rural Health, the Kansas Hospital Association, the Kansas Board of Emergency Medical Services, and the Kansas Medical Society, and is managed by the Kansas Hospital Association.

2 for additional information about these strategies/interventions.) In a recent study of nursing practices on fall prevention in 51 community, academic, Critical Access Hospitals, and Department of Veterans Affairs facilities, the most common interventions reported were bed alarms, rounding, sitters, and moving the patient closer to the nurses' station.⁴⁸ Successful interventions are those that utilize a variety of strategies, targeting the individual patient's fall risk, rather than focusing on just one aspect of falls prevention.^{7,27,44,48-49,52-54,57,59,67-69} A common barrier to a sustainable falls prevention program, especially for small rural hospitals, is that these programs are not often recognized as a high priority.¹⁸

The literature shows that effective falls prevention interventions are interdisciplinary, ideally involving pharmacy, nursing, medical, physical therapy, and quality officers.⁵⁸ Environmental changes are the easiest to make in a falls prevention program.^{3,15,20,27,30,49,58} The following list describes the broad categories the evidence-based interventions used in falls prevention programs and specific initiatives within those categories:

Physiologic Changes

- *Toileting regimens* are essential for elderly patients who may be cognitively impaired or incontinent^{6,70}
- *Medication review* is highly recommended for patients assessed as high fall risk.^{27,50,68,71}

Environmental Changes

- *Alarms*: The use of bed alarms and personal alarms is widespread as one intervention in the prevention of inpatient falls.^{39,72-74}
- *Restraints (including bedrails)*: Strategies recommended for injury prevention for acute care patients include: limiting restraint use, lowering bedrails, and using floor mats.^{1,10,39,48,69} Many hospital fall prevention programs minimize or disallow the use of restraints. However, the published evidence on the use of bedrails is conflicting, with some studies finding their use increases the risk of a fall^{72,75} and others concluding the opposite, that drastic reduction or discontinuation in the use of bedrails may increase the risk of falls.⁷⁶⁻⁷⁷ The use of bedrails as a falls prevention strategy needs to be targeted to

the fall risk of the patient: e.g. patients who are visually impaired or confused but mobile enough to be at risk for climbing over bedrails should not have their bedrails raised.⁷⁶

Education and Training

- *Staff education*, from CNAs to Nurse Managers, is a critical component of any falls prevention program.^{3,17,42,51,78}

Experience in CAHs

This section highlights the experience of several Critical Access Hospitals (CAHs) which are working with their State Office of Rural Health or as individual hospitals to provide falls prevention programs. The selection is not all-inclusive, and CAHs and State Flex Programs are encouraged to share their successes and strategies with the federal Office of Rural Health Policy.

In **Nebraska**, preliminary results from the Fall Risk Reduction Survey of 65 CAHs (response rate 86%, n= 56) conducted by Jones and colleagues⁴⁹ indicate that over half of the CAHs use a valid risk assessment tool and include a specific definition of falls in their policies and procedures. The most frequently reported universal intervention reported by 98% of respondents was to ensure that the patient's call light was within reach; the most frequently reported targeted (70%) intervention involved the use of an elevated toilet seat. Interventions are generally used in combination, with hospitals reporting use of a median number of four evidence-based targeted fall risk reduction interventions.⁴⁹

Nearly half of the responding Nebraska CAHs have an organized team to conduct fall risk reduction activities, and 35% indicated that they always or frequently "integrate evidence from multiple disciplines" (e.g. medical, nursing, physical therapy, and pharmacy).⁴⁹ Approximately 39% of the CAHs modify their policies and procedures based on the collection and analysis of data; additionally these 39% also conduct root cause analyses (RCA) of harmful falls.⁴⁹

In **West Virginia**, a pilot study conducted by the Patient Safety Improvement Corps[†] in two facilities (a small rural hospital and a CAH) showed a significant

[†] The Patient Safety Improvement Corps is a national training program co-sponsored by the Agency for Healthcare Research and Quality (AHRQ) and the U.S. Department of Veterans Affairs.

decrease in initial falls and 100% decrease in repeat falls using root cause analysis. Based on these positive results, a statewide training program on performing RCAs was initiated for any West Virginia health care facility or home health agency wishing to participate and a State Falls Prevention Collaborative was established. Six of the 11 facilities in this Collaborative were CAHs. Among the 11 participating facilities, total falls per 1,000 patient days decreased by 45 percent.⁵¹

The **Montana Performance Improvement Network**, formed in 2002 with State Flex grant funding, conducted a study in 2009 on reducing preventable falls for CAH inpatients. Performance measures focused on initial patient fall risk assessment, intervention planning to reduce fall risk, implementation of interventions, and patient outcomes for the stay. Findings from the study showed that 75% of participating CAHs completed the fall risk assessment within 24 hours of admission. Additionally, 100% of participating CAHs reported that risk reduction interventions are included in the nursing care plans. Over half reported that medications are reviewed by a pharmacist or provider,⁷⁹ which is important since one of the barriers to implementing a falls prevention intervention lies in the need for medical staff buy-in. Some of the CAHs do not have an in-house pharmacist to conduct medication assessments at admission and after a fall, so they need to rely on staff physicians to perform medication review which, for some, requires a solid evidence base before the medical staff will agree. Environmental changes, on the other hand, are built into the culture of the hospitals since many have swing-bed patients and staff are attuned to the specific needs of this patient population.

The **Maine Quality Forum** (MQF) tracks the number of inpatient falls with and without injury per 1,000 inpatient days (<http://www.mqf-online.com/summary/intro.aspx>). Thirteen of Maine's 16 Critical Access Hospitals report data to the MQF and are able to use these reports as a benchmarking tool. Maine also has a Critical Access Hospital Patient Safety Collaborative (<http://www.maineacahpatientsafety.net/>), where falls prevention is an important quality improvement topic. Like most hospitals, Maine's CAHs struggle with staffing turnover and shortage of both nurses

and CNAs. One CAH in Maine has initiated a "Patient Companion Program", a paid sitter program, to help overcome the problem of unattended patients who are at high risk for falls. Although Tzeng and colleagues¹³ question the cost-effectiveness of a sitter program, it is a solution that some hospitals, including CAHs in Maine and elsewhere are trying with success, some hiring CNAs as sitters, and some using volunteers.⁸⁰

How Can State Flex Programs Help CAHs?

State Flex programs can assist CAHs in addressing the problem of patient falls by:

- *Encouraging CAHs to use the Joint Commission's definition of falls;*
- *Providing technical assistance and support to help CAHs establish a consistent falls reporting system;*
- *Encouraging CAHs to benchmark their performance against other CAHs;*
- *Supporting the implementation of education and training programs for CAH nurses and staff on risk assessment and falls prevention strategies;*
- *Providing technical assistance and support to assist CAHs in implementing evidence-based falls prevention initiatives.*

Table 2 summarizes the falls prevention literature. While these studies are primarily from larger hospitals (due to the patient volume needed to conduct randomized control trials), the strategies reviewed, along with the results of these studies, are likely applicable in hospitals of all sizes. State Flex Programs can use these studies, as well as the resources identified in the Tools and Resources List, as a basis for working with the Flex Coordinators and CAHs to educate and train hospital staff in implementing a successful falls prevention program. Below are highlights from the Montana and Illinois State Flex Programs.

The **Montana State Flex Program** provides resources to the state's 48 CAHs including the Morse Fall Scale, the Hendrich II Fall Risk Assessment tool, and best practice evidence on falls as reported in the literature. Montana's CAHs do not all use the same falls definition, but because many of the Montana CAHs have swing beds, the State Flex Program encourages them to use CMS' guidelines for falls prevention in long-term care. The State Flex Program also provides tools for documentation, and opportunities to share

best practices, protocols, and educational materials with each other through day-long regional meetings. They collect baseline data using a tool which covers risk assessment, interventions, and post-fall follow-up. Information collected is tabulated and provided to each CAH with tables that compare the hospital's performance to the aggregate performance of its peer hospitals. This information is analyzed and compared across five peer groups facilitating benchmarking across like-sized facilities. A summary sheet with a composite score is made available to the hospital board, a strategy that also encourages an organizational approach to improving patient safety culture.

The **Illinois Critical Access Hospital Network** (ICAHN) uses a scorecard approach to gather data on inpatient acute, inpatient swing, and long-term care falls and injuries from falls. Many Illinois CAHs use either the Morse Fall Scale or the Hendrich II Fall Risk Assessment tools. ICAHN maintains an active listserv to communicate data across reporting CAHs. ICAHN's challenge is to make the information useful to CAHs affiliated with larger systems as well to the smaller CAHs. The Director of Quality Services at ICAHN noted the need to be consistent with education and to encourage best practices across the CAHs. She would like to see State Flex Program dollars used for future education and training sessions or to send CAH staff to the National Patient Safety Foundation conference which will allow them to share evidence-based practices within and across their hospitals.

Conclusion

The literature and the falls prevention activities of CAHs suggest no single intervention makes or breaks a falls prevention program. Rather, it is important that hospital staff view falls risk and prevention as an integral part of the overall patient safety culture and the overall patient care process. An advanced practice nurse at an academic hospital in Minneapolis articulates this well:

"Through our various quality improvement efforts, we have learned that the introduction of virtually any evidence-based fall prevention measure appears to reduce fall rates and injury rates. Based on my experience, simply raising awareness among staff has been shown to reduce falls."^{78, p.1776}

The number of inpatient falls at one Critical Access Hospital in Maine was significantly reduced over the course of a year through a combination of strategies which included education and training across all hospital staff, communication with patients and their families/caregivers, assigning fall risk levels based on a valid risk assessment tool, hiring CNAs as sitters, and hourly rounding with a checklist. In rural Texas, the Wise Regional Health System was able to consistently and successfully reduce patient falls by developing quality indicators to better identify patients at risk for falls, and using that data to provide more proactive and targeted interventions.¹⁸

The evidence is clear that a falls prevention program that utilizes a standard definition of a fall, links falls assessments to patient-specific intervention strategies (utilizing a combination of interventions), and reports and communicates falls data across staff can reduce the number of hospital falls and injuries from those falls. State Flex Programs and CAHs that build upon this evidence base by formally targeting falls prevention as a quality improvement and patient safety initiative have an opportunity to make a difference in patient safety.

For more information on this study, please contact Karen Pearson at karenp@usm.maine.edu or 207-780-4553.

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Table 1. Fall Risk Factors

Intrinsic Risk Factors in Order of High to Low Risk*
<p>Lower extremity weakness History of falls Gait/Balance deficits Use of assistive devices Vision deficit Arthritis Impaired ADLs Depression</p> <p><i>* Source: Gray-Miceli³⁰</i></p>
Additional Intrinsic Risk Factors
<p>Chronic illness Orthostatic hypotension Postural hypotension Urinary incontinence Mental/Cognitive deficit Medication/Polypharmacy</p> <ul style="list-style-type: none"> • Antidepressants • Antipsychotics: zolpidem • Benzodiazapine • Calcium channel antagonists • Diuretics • Hypoglycemics • Laxatives • Nonsteroidal anti-inflammatory agents • Sedatives/hypnotics
Extrinsic Risk Factors
<p>Lack of grab bars in the bath or toilet Poor lighting Height of bed or chairs Improper use of assistive devices Inadequate assistive devices Poor condition of flooring surfaces Improper footwear</p>

Resources and Tools

American Academy of Family Physicians (AAFP). (2011, December). Tips for Preventing Falls. <http://www.aafp.org/afp/2011/1201/p1277.html>

American Nurses Association. (2010, May). National Database of Nursing Quality Indicators (NDNQI). Guidelines for Data Collection on the American Nurses Association's National Quality Forum Endorsed Measures: Nursing Hours per Patient Day, Skill Mix, Falls, Falls with Injury. Kansas City, KS: ANA. <https://www.nursingquality.org/> [click on sidebar link for "ANA's NQF-Endorsed Measure Specifications"]

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Health Care Improvement Foundation, ECRI Institute, and Partnership for Patient Care. (2007). Proactive Risk Assessment Research Summary: Falls Prevention. http://www.hcifonline.org/files/893_file_Falls_Prevention_Research_Summary_FINAL.pdf

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Montana Performance Improvement Network. Reduce Preventable Falls Clinical Study Baseline Report. <http://www.mtpin.org/index.php?p=cis-active-studies>

Partnership For Patients. Preventing Serious Fall Injuries and Immobility. <http://www.healthcare.gov/compare/partnership-for-patients/safety/injuries.html>

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Table 2. Evidence-based Falls Prevention Strategies*						
Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
Single Interventions: Physiological						
Root Cause Analysis (RCA)	Agency for Healthcare Research and Quality (AHRQ) & U.S. Department of Veterans Affairs	Training program (Patient Safety Improvement Corps) in West Virginia provided learning sessions for over 300 health care workers and development of a state-wide Falls Prevention Collaborative to collect and report falls data.	Not given. 11 hospitals, 2 rural, 6 CAHs	<ul style="list-style-type: none"> • 60% decrease in initial falls, 10% decrease in repeat falls; • Aggregate decrease of 45% in falls in Collaborative. 	Yes, 6 of the 11 study hospitals were CAHs.	Ruddick, 2008. ⁵¹
Root Cause Analysis (RCA)	Aged Care Services at Calufield General Medical Centre, Melbourne, Australia	<p>QI project to determine if multi-strategy prevention approach reduces rate of falls and injuries. RCA used to identify systems and processes contributing to falls.</p> <p>Study conducted in four units of 96-120 beds per unit.</p>	Aged care service wards for acute care, geriatric evaluation and management and restorative	<ul style="list-style-type: none"> • RCA found that 82% falls not observed; 60% occurred around the bed; • 19% reduction in falls per 1000 bed days over 2 year study period. 	No	Fonda et al., 2006. ⁵³

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Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
			care. 2/3rds of admissions for elderly patients were acute and unplanned			
Restraints	Princess Margaret Hospital, Christchurch, New Zealand	Prospective “before & after” study. Intervention included educational training on restricting the use of bedrails. Study undertaken in five wards of 25-30 beds each, with a total of 135 beds.	Rehabilitation unit for older adults. No demographic information provided	<ul style="list-style-type: none"> • Falls reduced from 30% to 11% post-intervention; • Reduction in number of beds without bedrails after policy was introduced, but fall rate did not change significantly. 	No	Hanger, Ball & Wood, 1999. ⁸³

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Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
Medication Review	Aventis Pharmaceuticals	Retrospective Study in an urban rehabilitation center. Fall-focused pharmaceutical intervention plan to determine whether there is an association between falls among the elderly and specific medication classes. Intervention used the American Society of Consultant Pharmacists MDS- MedGuide and included complete review of all medications by a consultant pharmacist	Patients ≥ 65 had 1 year stay for diagnoses of orthopedic, respiratory, neurology, infection or cardiovascular issues.	<ul style="list-style-type: none"> • 47% reduction in the number of patient falls post-intervention. • Use of medications decreased post-intervention: <ul style="list-style-type: none"> ➢ cardiovascular ➢ analgesic ➢ psychoactive ➢ sedatives & hypnotics • Number of patient falls decreased as use of medications decreased. 	No	Haumschild et al., 2003. ⁷¹
Medication Review	Geisinger Health Systems (GHS). GHS serves a 40-county area	Prospective randomized study to evaluate an Electronic Medical Record (EMR)-based intervention to reduce polypharmacy and falls. Falls data obtained from	620 patients aged ≥ 70 , 4 or more active prescriptions and 1 or	<ul style="list-style-type: none"> • No change in overall number of medications; • Negative association between new medication starts and 	No	Weber et al., 2007. ⁸¹

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Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
	of over 2.5 million persons in largely rural and north-eastern Pennsylvania	inpatient hospitalizations, ED visits, outpatient visits, and self-reported falls. Intervention: clinical pharmacist reviewed patients' medication record and sent message via EMR alerting PCP to fall risk.	more psycho-active medications.	number of psychoactive medications <ul style="list-style-type: none"> • Reduced risk for fall-related diagnoses. 		
Medication Review	Royal Bournemouth Hospital, United Kingdom	Prospective observational study of 1025 patients admitted to 3 general rehabilitation units in a non-acute geriatric hospital. Aim of study was to identify associations of tranquilizer use (benzodiazapine or antipsychotic medications) and risk of fall in confused and nonconfused patients	Rehabilitation hospital, elderly patients aged ≥ 80	<ul style="list-style-type: none"> • Confused patients and patients on tranquilizers were more likely to fall; • Confused patients on tranquilizers more likely to have recurrent falls. 	No	Vassallo et al., 2006. ⁸²

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Table 2. Evidence-based Falls Prevention Strategies*						
Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
Toileting Regimen	Flinders Medical Centre, South Australia	Pre-post test, 450-bed urban teaching hospital. Intervention group were provided toileting assistance every 2 hours (whether or not they indicated a need).	Intervention group: Patients admitted to the medical or surgical wards over the age of 70 with confusion and mobility problems	<ul style="list-style-type: none"> • 16% falls in the intervention group; 84% falls in the control group; • 53% fewer falls during shifts in which risk assessment and toileting intervention was used. 	No	Bakarich, McMillan & Prosser, 1997. ⁷⁰
Toileting Regimen	University of Michigan, School of Nursing	Qualitative study in a community hospital to determine prevalence of inpatient falls associated with toileting. Study used content analysis of incident reports. Suburban hospital with 109 medical beds; 53 surgical beds, and 34 med-surg beds	Adult patients, with mean age of 75.59 (78.2% aged 65 or older)	<ul style="list-style-type: none"> • 42.2% falls related to toileting, with the most common occurring on the way from the bed or chair to the bathroom; • 58.3% falls occurred on the medical units; • Author recommends 	No	Tzeng, 2010. ⁶

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Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
		(combined unit).		training and promotion of safe patient transfers.		
Single Interventions: Environmental						
Low-rise Beds	Allied Health Clinical Research Unit, Australia	Pragmatic, matched cluster randomized trial in 18 public hospital wards. Intervention: 1 low-rise bed provided for every 12 beds on a ward, with written instructions for identifying patients at greatest risk for falls. Study wards included acute medical, rehabilitation and orthopedic.	Intervention population included patients with neurological impairment (Parkinson's disease or dementia) or impulsive behavior (especially the tendency to mobilize without needed	<ul style="list-style-type: none"> • No significant difference in fall-related outcomes between the 2 groups. 	No	Haines, et al., 2010. ⁸⁴

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Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
			assistance)			
Low-rise Beds	University of Michigan, School of Nursing	Intervention: Bed height measurements taken at regular intervals to determine relationship between staff working height for patient beds, time, and whether patients were on falls precaution. Study conducted in a 32-bed acute medical ward.	Patient demographics not given.	<ul style="list-style-type: none"> Average bed height was significantly higher for patients on fall precautions than for those not on precautions, suggesting that nursing staff may be consciously or unconsciously keeping the beds in a higher position as a passive restraint and so that patients will have to use the call bell to get out of bed. 	No	Tzeng, 2008. ⁸⁵

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Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
Flooring	Gloucestershire Royal Hospital, United Kingdom	Comparison of two flooring types in the bed areas for falls avoidance. Intervention: randomized group of patients assigned to ward with carpeting. Study conducted in a 28 bed elderly care ward in a community hospital.	Patients aged >80 years. n=54; 44 female, 9 with severe confusion, 10 with fall on admission, 20 with stroke on admission.	<ul style="list-style-type: none"> • Rate of falls: <ul style="list-style-type: none"> ➢ Carpet: 63% (n=10) ➢ Vinyl: 6% (n=1). • Use of carpeted flooring at bedside did not lead to reduced incidence of falls. 	Unsure	Donald et al., 2000. ⁴¹
Colored ID bracelets	Royal Victoria Hospital, Quebec, Canada	Randomized Controlled Trial conducted in a rehabilitation hospital. Intervention: Colored identification wristbands given to randomized group of patients	Patients aged ≥ 80 years, with 1 or more risk factors for falls or for	<ul style="list-style-type: none"> • 41% (n=27) in the intervention group vs. 30% (n=20) in the control group fell at least once, suggesting that colored 	No	Mayo et al., 1994. ⁸⁶

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Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
		at high risk for falls.	fractures. Admitting diagnosis of stroke or ataxia, history of multiple falls, or incontinence.	wristbands as the sole intervention was of no benefit in preventing falls.		
Non-slip socks	Princess Alexandra Hospital Physiotherapy Gait Laboratory, Queensland Health, Australia	Two-phase testing of compression socks and non-slip footwear marketed for use in hospitals. Phase I: laboratory testing Phase II: in-situ testing on healthy adults	Phase II patients aged 29-31. Age of study participant noted as a limitation since many hospitalized patients are older and	<ul style="list-style-type: none"> Non-slip socks performed varied in traction performance, with barefoot conditions consistently resulting in the highest levels of traction, suggesting that non-slip socks are not an adequate alternative to well-fitting rubber-soled 	No	Chari et al, 2009. ⁸⁷

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Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
			more frail.	footwear or bare feet. <ul style="list-style-type: none"> The author also notes that poorly fitting socks or misaligned socks could constitute a fall hazard and that cognitively impaired patients need attention of nursing staff for proper alignment of socks. Thus the risks outweigh the minimal benefit of non-slip footwear. 		

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Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
Multifactorial Intervention						
Falls Prevention Program	Wise Regional Health System, Texas. Study conducted in the 148-bed facility, which until 2004 was a 50-bed facility	Review of data to determine quality indicators for identification of high fall risk patients. Evaluation and improvement process included creating a statistical demographic profile of the patient and implementing fall prevention tools: <ul style="list-style-type: none"> • toileting rounds, • verbal reports at shift change, • staff training and education, • involvement of patient and family, • increased caregiver involvement, signage throughout the hospital. 	Review of data included patients aged <33 to 93 with patients aged 59-60 experiencing the highest number of falls, a high Braden Scale score, and a Fall Risk Score of 10-13 on the Hendrich II Fall Risk Assessment.	<ul style="list-style-type: none"> • Patient falls decreased from 4.37 to 0 falls per 1,000 patient days in the 3 month study period. 	Yes	Wayland et al., 2010. ¹⁸

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Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
Falls Prevention Program	Northern Rivers Area Health Service, New South Wales	Evaluation of effectiveness of Falls Prevention Program which included: <ul style="list-style-type: none"> • Falls Prevention Assessment Form; • Non-slip mat • Call bell and assistive devices within reach • Education & training of nursing staff, patients and families Environmental assessments	Patients aged 65 or older who were admitted to the general (med-surg) ward. High risk patients identified by colored armband and dot on chart/care plan, given full supervision, non-slip mats, bedrails as	<ul style="list-style-type: none"> • Reduced the incidence of falls (percentage not given) and was found to be effective for those patients requiring minimal assistance with walking. • However, it was less effective for those using pick-up frames or forearm support frames. 	Yes	Hathaway et al., 2001. ²⁰

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Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
			deemed necessary, bed alarms and paging systems.			
Fall Prevention Protocol (FPP)	Evanston Hospital, Evanston, Illinois	Fall Prevention Protocol developed by 325 bed hospital which included <ul style="list-style-type: none"> • risk assessment at shift changes, • hourly rounding, • staff, patient, and family education, • alarms, • nonskid footwear, • toileting regimens, signage 	Patients aged ≥ 65 years, accounting for 12.5% of inpatient admissions and 70% inpatient falls.	<ul style="list-style-type: none"> • Annual decline in falls from 4.04 to 2.27 per 1000 patient days. • Results attributed to adherence and updating of Fall Prevention Protocol (adding nursing interventions in response to quarterly fall data) and communication to all hospital staff. 	No	Dacenko-Grawe, 2008. ⁴³

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Fall Prevention Protocol (FPP)	Tucson Medical Center, Tucson, Arizona	Evaluation of the Fall Prevention Protocol (FPP) in a 550-bed acute care facility. FPP included: <ul style="list-style-type: none"> • Fall definition • Fall assessment • Communication (including signage) • Education (including in-services, post-fall assessment skills workshops, reporting and reviewing falls data on the hospital intranet) • Interventions: non-skid footwear, toileting regimen, limited use of restraints Phase I: Hospital-wide education stressing	Patient demographics not given. Fall risk assessed at admission and shift changes.	<ul style="list-style-type: none"> • Average number of hospital falls during the 3-year study period: 4 per 1,000 patient days • 44% falls identified as preventable • 37% falls related to toileting needs. 	No	McCarter-Bayer, 2005. ⁵

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Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
		<p>identification of patients at risk for falls, the use of the FPP, and correct completion of the FPP reporting tool.</p> <p>Phase II: Staff training to distinguish between preventable and non-preventable falls and creating strategies for post-fall assessments.</p> <p>Phase III: Staff education focused on using clinically relevant patient info to implement fall prevention strategies specific to individual nursing units.</p>				

* Arranged by Single Interventions (Physiological, Environmental) and Multifactorial Interventions. Studies that included CAHs or small rural hospitals are listed first within the category.

Table 2. Evidence-based Falls Prevention Strategies*						
Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
Targeted Risk Factor Reduction	National Patient Safety Agency, United Kingdom	Randomized controlled trial. Intervention: Targeted care plan including falls risk assessment and their related interventions in the form of a pre-printed care plan. Targeted intervention options: <ul style="list-style-type: none"> • Medication review • Orthostatic blood pressure • Eyesight check • Mobility assistance • Environmental check: bedrails, footwear, bed height, position in ward (e.g. moving closer to nursing station), environmental cause of fall, call bell within reach). 	Patients aged ≥ 75 years. Population served by this health agency included rural residents	<u>6 months post-intervention:</u> <ul style="list-style-type: none"> • 30% reduction in risk of falls; • No significant difference between groups in overall effect on injury rate. 	No	Healey et al., 2004. ⁶⁸

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Table 2. Evidence-based Falls Prevention Strategies*						
Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
Targeted, Multiple Intervention Falls Prevention Program	Victorian Department of Human Services, Australia	Randomized controlled trial in a metropolitan hospital, sub-acute ward. Intervention included: <ul style="list-style-type: none"> • Falls risk alert card (placed above the patient's bed) with information brochure for families and patients; • Tailored exercise program • Education sessions (30 min, twice weekly) Hip protectors	626 patients aged 38-99, with average age = 80 years.	<ul style="list-style-type: none"> • Intervention group experienced 30% fewer falls than control group and 28% reduction of falls with injury • This randomized controlled trial showed that the incidence of falls in hospitalized elderly patients can be reduced, providing valuable evidence for hospital administrators and practitioners of subacute hospitals where falls are a common and dangerous occurrence. 	No	Haines et al., 2004. ⁵⁴

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Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
Targeted, Multiple Intervention	University of Adelaide, South Australia	Randomized control trial in eight medical wards ranging from 17-45 beds in a Singapore hospital to determine the effectiveness of a targeted multiple intervention strategy to reduce the number of falls in an acute care inpatient hospital. Intervention group received the usual universal multiple interventions (colored wristband; alert card on patient's headboard; call bell within reach; low bed position; bed side rails raised; reassessment at every shift) as well as 30 minute education session on fall risk and specific interventions based on their individual risk	Patients admitted for medical conditions including cardiac, respiratory, renal, oncology, gastro-enterology, and endocrine issues. Also had a score of ≥ 5 on the Hendrich II Fall Risk Assessment	<ul style="list-style-type: none"> • The use of targeted multiple interventions reduced the risk of falling to about 29% of the risk in usual fall prevention interventions. • The proportion of high-risk patients who fell in the intervention group (0.4%) was significantly lower compared with the control group (1.5%). 	No	Ang, 2008. ⁴⁴

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Table 2. Evidence-based Falls Prevention Strategies*						
Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
		factors of: <ul style="list-style-type: none"> • <i>Confusion</i>: Use of sitters • <i>Symptomatic Depression</i>: Refer to doctor • <i>Incontinence</i>: Medication review; Toileting regimen; Patient/family education • <i>Dizziness/vertigo</i>: Review recent labs; check blood pressure for postural hypotension; refer to doctor; patient education • <i>Medications related to fall risk</i> (antiepileptics, 				

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Table 2. Evidence-based Falls Prevention Strategies*						
Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
		benzodiazapines, diuretics): Patient education on medication and fall risk; instruction to call for assistance on toileting, bathing, and mobility <i>Difficulty with mobility:</i> Review recent labs; Instruct patient to use assistive devices; refer to PT				
Fall Prevention Program	University Hospital of Basel, Switzerland	Intervention conducted in two hospital units consisting of 22 beds each: <ul style="list-style-type: none"> • Training staff in use of Morse Fall Scale • Implementation of 15 selected preventive interventions 	Internal Medicine patients with a mean age of 70.3 and a mean length of stay of 11.3 days.	Intervention program showed effect in preventing multiple falls but not first falls. <u>Proportion of patients with first falls:</u> <ul style="list-style-type: none"> • Intervention: 20% • Control: 56% 	No	Schwendimann et al., 2006. ⁸⁸

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Table 2. Evidence-based Falls Prevention Strategies*						
Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
		<ol style="list-style-type: none"> 1. Identification of Physical Deficit 2. Identification of Mental Deficit 3. Patient Education 4. Placement of call bell, lights, & personal articles within reach 5. Bed height 6. Stabilization of furniture 7. Obstacles cleared from pathways 8. Safe footwear 9. Nursing assistance with transfer and ambulation 10. Toileting assistance 11. Assistive devices used properly 12. Exercise 13. Monitoring confused patients 		<u>Number of Falls</u> <ul style="list-style-type: none"> • Intervention: 31 • Control: 51 <u>Falls per 1,000 patient days:</u> <ul style="list-style-type: none"> • Intervention: 11.5 • Control: 15.7 (not statistically significant)		

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Table 2. Evidence-based Falls Prevention Strategies*						
Strategies / Interventions	Sponsoring Organization	Program Description	Patient Population	Results	Inclusion of CAHs or small rural hospitals	Citations
		14. Medication review 15. Colored signage indicating high fall risk (on chart & above bed)				

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