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Fall Prevention in Hospitals: An Integrative Review

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Abstract

Purpose: This article summarize research and draws overall conclusions from the body of literature on fall prevention interventions to provide nurse administrators with a basis for developing evidence-based fall prevention programs in the hospital setting. **Method:** Data were obtained from published studies. Thirteen articles were retrieved that focused on fall interventions in the hospital setting. An analysis was performed based on levels of evidence using an integrative review process. **Results:** Multifactoral fall prevention intervention programs that included fall risk assessments, door/bed/patient fall risk alerts, environmental and equipment modifications, staff and patient safety education, medication management targeted to specific types, and additional assistance with transfer and toileting demonstrated reduction in both falls and fall injuries in hospitalized patients. **Conclusion:** Hospitals need to reduce falls by using multifactoral fall prevention programs using evidence-based interventions to reduce falls and injuries.

Introduction

Falls and fall injuries in the hospital setting are serious concerns for patients, families, and hospital administrators. Falls among hospitalized patients occur frequently, and some repeatedly. Of those who fall, 28% have bruises and minor injuries, 11.4% have severe soft tissue wounds, and 5% have fractures and around 2% have head trauma, which can in turn lead to subdural hematoma, long-term disability, or death (Coussement et al., 2008; Healey, Oliver, Milne, & Connelly, 2008). Even in a 'minor' injury, functional impairment, pain and distress can occur (Clough-Gorr et al., 2008). Patients who fall may have to stay in the hospital longer, go to a rehab unit or nursing home, and many incur additional bills (Chen et al., 2008; Tinetti, Allore, Araujo, & Seeman, 2005; van Helden et al., 2008). Wide variability in fall-rates are reported in the literature, ranging from 2.2 to 25.0 falls per 1,000 patient days (Center for Disease Control, 2007; Davison & Marrinan, 2007). A considerable amount of literature exists on fall risk factors, and there are a number of intervention studies for fall prevention in institutional settings. However, past analyses of hospital fall prevention programs have been inconclusive, leaving nurse administrators wondering how to develop an evidence-based fall prevention program (C. Cameron, Viola, Lynch, & Polomano, 2008; I. Cameron et al., 2010). The purpose of this paper is to report on findings from an integrative review of fall prevention programs in the hospital setting to provide a foundation for development of programs using the best available evidence.

Standards of Care

In 2008, the Center for Medicare and Medicaid Services identified falls as a Hospital Acquired Condition (a health state that occurs as a consequence of hospitalization [e.g., falls, pneumonia or urinary tract infections]); and no longer covers the cost of care as a consequence of

an inpatient fall (2009). Furthermore , the Joint Commission (2011) requires accredited hospitals to conduct fall risk assessments for hospitalized patient. The purpose of the standard is to identify patients who may be at risk for falls so that prevention measures can be implemented. Many hospitals also collect information on falls to participate in the National Database for Nursing Quality Indicators as part of their Magnet™ status quality improvement program (American Nurses Association, 2010). As a result, these initiatives have prompted interest in improving falls rates through the development of evidence-based fall prevention programs in hospitals nationwide.

Background

Research has shown that factors contributing to falls are multifactoral, complex, and interrelated. Falls are predominantly a problem of older people, and in the US, people over 65 accounts for 70% of bed days in hospitals (Davison & Marrinan, 2007). Individual intrinsic factors (e.g., comorbidities, behavioral disturbance, agitation or confusions, vision problems, delirium, muscle weakness, urinary incontinence and impaired balance) have increased risk for a fall while hospitalized (Oliver, 2007; Oliver et al., 2007). Transient factors that change over time (e.g., postural hypotension or syncope, poly-pharmacy or medication changes) are prevalent and coexist in many hospitalized patients and are associated an increased risk of falls (Fried, Ferrucci, Darer, Williamson, & Anderson, 2004; Tinetti, et al., 2005). In addition, differences in the physical environment increase falls. Although, 80—90% of falls are not witnessed in hospitals we know 50–70% occur around the bed, bedside chair, or while transferring and 10–20% occur in the bathroom (Australian Commission on Safety and Quality in Healthcare, 2009; J. M. Morse, 2000; National Patient Safety Agency, 2007).

Falls are often a combination of individual and transient risk factors, the physical environment (e.g., poor lighting, high bed position, improper equipment), and the riskiness of a person's behavior (Oliver, et al., 2007). Consequently, in hospitals, the two types of patients who most commonly fall: 1) those with transient confusion. hypotension or are medicated; and 2) those who are frail, wander, have risky behaviors, or a history of falls (Oliver, 2008). In sum, we know which factors may lead to a fall, however, what we have not been able to sort out is how to translate this information into programs that prevent fall injuries in the hospital setting.

The Ability to Predict Falls in the Hospital Setting

A fall risk assessment is required to meet the Joint Commission standards, thus, finding a tool that predicts who will be more likely to fall in the hospital setting is desired. Commonly used fall risk assessments in the hospital settings include the Morse Fall Scale (MFS), the St. Thomas Risk Assessment Tool in Falling (STRATIFY), and the Hendrich Falls Risk Model II (HFRM). The MFS is a 6-item index tool developed with weighted scores (0 to 125), with a score above 16 identified as high fall risk (sensitivity 79% and specificity 82%) (J. Morse, Morse, & Tylko, 1989). STRATIFY was developed on elderly care units in hospitals and includes five factors, each scored 1 point, with 2 points or higher as high risk for falls (sensitivity 93%, and specificity 68%) (Oliver, 2008). HFRM was developed with hospital patients and has 7 weighted items, with a maximum score of 25; and a score of three or greater is high risk for falls (sensitivity 77% and specificity 72%) (Hendrich, Nyhuis, Kippenbrock, & Soja, 1995). Although one study found the HRRM to have a 61% ability to predict falls in hospitals (Kim, Mordiffi, Bee, Devi, & Evans, 2007), recent meta-analysis and systematic reviews found both the MFS and HFRM to lack sensitivity and specificity in the hospital setting (Coussement, et al., 2008; Lovallo, Rolandi, Rossetti, & Lusignani, 2010; McClure et al., 2005). One study also found that

a general fall risk assessment was just as effective at predicting falls in hospitalized patients, as specific tools (Heinze, Halfens, Roll, & Dassen, 2006).

Consequently, which fall risk assessments should an administrator select if their ability to predict if a patient is going to fall is somewhat problematic? And should a hospital use a general fall risk assessment or a specific fall risk assessment? This creates a dilemma for nurse administrators, who desire to use evidence based fall risk assessments with the sensitivity and specificity to predict the occurrence of a fall. Nonetheless , international hospital fall expert, Oliver (2010), who recently conducted an in-depth tool validity analysis, suggests using a comprehensive fall risk assessment to identify modifiable and non-modifiable risk factors. Once the assessment is complete, evidence-based fall prevention interventions need to be implemented for those patients who are at high risk for falls.

Interventions to Reduce Fall-rates in the Hospital Setting

A Cochrane Review on hospital fall prevention interventions released in 2010 was inconclusive, providing no recommendations regarding fall prevention interventions in the hospital setting (I. Cameron, et al., 2010). Oliver and colleagues (2010) used systematic reviews, recent research, and clinical and ethical considerations to publish a summary of the most appropriate approach to fall prevention in the hospital environment. This includes multifactorial interventions (post fall review, patient education, staff education, footwear advice, and toileting) with multi-professional input. The single interventions found to be effective in the Oliver study (2010) included delirium avoidance programs, reducing sedative and hypnotic medication, in-depth patient education, and sustained exercise programs may reduce falls as single interventions. The Patient Safety Center of Inquiry, a project at the Veteran Affairs hospital in Tampa, has conducted a multiple studies on hospital fall and fall injury prevention (Mills, Neily,

& Quigley, 2005; Neily, Howard, Quigley, & Mills, 2005). Interventions they found to be effective include basic universal fall precautions for all patients, an assessment of all patients for risk of falling, a culture of safety, hospital protocol for those as risk of falling, enhanced communication of risk of injury from a fall, and customized interventions for those at risk of injury from a fall. An intervention with proven reduction in fall-rates in the hospitals is modification of the physical environment (e.g., larger doorways, hand rail grips in bathroom, and floor lighting) (von Renteln-Kruse & Krause, 2007). In addition, adjusting bed height to lowest level with use of floor mats and hip protectors have been found to be effective at reducing fall injuries in some studies (Applegarth et al., 2009; Bowers, Llyod, Lee, Powell, & A, 2008; Bulat et al., 2008). This creates a challenge for nurse administrators to sort through and identify evidence-based interventions for their hospital fall prevention programs. Clear guidance does not exist specifying the right combination of interventions to adequately protect hospitalized patients. Most fall prevention programs are multifactoral and complex, and information on dose, intensity, and duration of interventions are not clear (Quigley et al., 2010). Thus, this review provides the best evidence available in the scientific literature to guide nurse administrators when developing fall prevention programs.

Methods and Analysis

An integrative review method informed by Whittemore and Knafl (Whittenmore & Knafl, 2005) was adopted for our current study. Nurses are familiar with the process of reviewing literature when developing policies and procedures or clinical practice guidelines. However, the term integrative review is not often used. The intent of an integrative review is to summarize pertinent research findings and to use clinical judgment to draw conclusions from the body of literature on a particular topic to support and guide evidence based nursing practice.

The identification of relevant studies for this article was performed in two steps. First, a search was conducted of the databases CINAHL, COCHRANE, and PubMed for pertinent articles published between 2000 and 2011. Key words for the search were "falls," "acute-care hospitals," and "intervention". Second, the reference lists were searched for additional relevant studies. The inclusion criteria for this review included studies of adult patients in the hospital setting where falls was identified as the main outcome; and those where interventions were identified. Only English language papers were selected. Two reviewers examined relevant articles that met the inclusion criteria, and consensus was reached on which articles to retain through an iterative process. The initial search generated 613 titles and abstracts. Of 122 potentially relevant items that remained after title and abstract screening, 45 were identified. Of those, 11 articles met the inclusion criteria (see Table 1). The articles included adults 18 years of age or older, in various types of hospital units (e.g., rehabilitation, psychiatric, elder care, or long term stays [because there are differences between settings, this distinction is pointed out]), with the primary outcome examined patient falls. The findings of this integrative review are as follows.

Results

Fall-rates Reductions in the Hospital Fall Prevention Programs

Detailed results of individual studies are shown in Table 1. In meta-analyses of hospital fall prevention programs, one found a 25% fall-rate reduction, while the other was inconclusive (Oliver, et al., 2007; Oliver, Hopper, & Seed, 2000). Clinical trials with large numbers of patients found reduction in fall-rates of 19%, 22%, 30%, and 57%; while another reported a decrease in falls from 4.18 to 3.3 (Dykes et al., 2010; Fonda, Cook, & Sandler, 2006; Haines, Bennell, Osborne, & Hill, 2004; Healey, 2004; Mills, et al., 2005; Neily, et al., 2005; von

Renteln-Kruse & Krause, 2007). Case-control studies using multifactoral interventions found a decrease in falls from 4.90 to 2.96, 4.50 to 2.27, and 3.71 to 1.81 per 1000 patient bed days (Dacenko-Grawe & Holm, 2008; Kline, Thom, Quashie, Brosnan, & Dowling, 2009; Quigley et al., 2009).

Overall, wide variations in fall reduction rates were evident among this literature; ranging from 19—57% or 1.91—2.23 per 1000 bed days. In addition, inconsistent means of reporting fall rates (percent and falls per 1000 bed days) were found in the literature, making it difficult to compare results so that we could determine which multifactoral interventions are most effective. Consequently, we were unable to determine if those interventions that drew on multiple strategies produced greater results.

Finally, two studies reported reductions in fall injuries, a 77% and a 2.1 to 1.7 per 10,000 patient bed days decrease (Fonda, et al., 2006; Quigley, et al., 2009). Thus, little information was available on fall injury reductions.

Characteristics of Hospital Fall Prevention Programs that Reduced Fall Rates

The Cochrane review made no recommendations regarding fall prevention interventions in the hospital, as results were inconclusive (I. Cameron, et al., 2010). Most meta-analysis and systematic reviews did not report fall-rate reductions; while the one review that had a fall-rate reduction did describe the interventions. This included Oliver and colleagues (2010) who synthesized literature and clinical judgment to suggest the most effective approach for fall prevention. The remaining individual studies (Dykes, et al., 2010; Fonda, et al., 2006; Haines, et al., 2004; Healey, 2004; Mills, et al., 2005; Neily, et al., 2005) and case-studies (Dacenko-Grawe & Holm, 2008; Kline, et al., 2009; Oliver, 2007; Quigley, et al., 2009) not contained in the

Cochrane review demonstrated significant reductions in fall-rates, providing a credible model for hospitals wishing to develop evidence-based fall prevention programs.

To the best of our knowledge, Dykes and colleagues (2010) are the first to publish a technology integrated fall prevention toolkit, conduct a trial (intervention N=5160, control N=5104), finding reductions in hospital fall rates. In sum, the studies that were successful at reducing hospital fall rates included some or all of the following elements: 1) developing a culture of safety, 2) fall risk assessments, 3) multifactoral interventions, 4) post-fall follow-up and quality improvement, and 5) integration with electronic records (Table 2). Elements of the fall prevention interventions in these studies are presented to provide nurse administrators with the best available evidence to build a multifactoral fall prevention program in their hospital setting.

Developing a Culture of Safety. Focusing on developing a 'culture of safety' was often the foundational element for successful fall prevention programs (Dacenko-Grawe & Holm, 2008; Kline, et al., 2009; Mills, et al., 2005; Neily, et al., 2005; Oliver, et al., 2010; Quigley, et al., 2009). This occurred through organization wide training to educate staff about fall prevention to engage healthcare workers (e.g., housekeeping, dietary, transport, therapists, and physicians). The culture of safety included some or all of the following: administrative support, a well developed comprehensive plan, and staff participation and buy-in.

Risk Assessments. Most successful fall prevention programs incorporated a fall risk assessment to predict patients who have factors that were known to increase falls, with the intent of focusing fall prevention efforts on those that were at higher risk of falling (Dacenko-Grawe & Holm, 2008; Dykes, et al., 2010; Healey, 2004; Mills, et al., 2005; Oliver, et al., 2010; Quigley, et al., 2009; von Renteln-Kruse & Krause, 2007). The evidence did not demonstrate support for a

specific fall risk assessment, as no one tool was consistently used among successful fall reduction programs. However, most studies reported using tools that assessed cognitive dysfunction, gait and/or mobility, medications, and environmental factors; and conducting their fall risk assessments every 24-hours. Successful fall risk programs evaluated if their fall risk assessment was able to predict a fall by conducting a retrospective examination of those patients who had fallen and their fall risk assessment score, to determine if the fall risk assessment predicted the fall. Thus, better understanding how the assessment worked in their hospitals' case mix of patients.

Interventions. A consistent element within these successful fall risk programs included selecting interventions based on the findings of the fall risk assessment. Although the interventions identified in the articles are listed individually in Table 1, it is important to note, that none were provided as a singular approach to reduce falls. These interventions were grouped in the following categories: environment/equipment, arm bands and room/door signs, communication and education, safety rounds, staff assignment and sitters, patient aids, and medical referrals. The list is provided in this manner so that nurse administrators can examine proven interventions.

Environment/equipment. Environmental and equipment upgrades such as lighting, contrasting paint colors, hand rails, and beds with lower heights are associated with lower fall rates (Fonda, et al., 2006; Kline, et al., 2009). Taking action to correct environmental hazards such as clutter, water spills, or broken equipment on an-ongoing-basis reduced the occurrence of falls (Healey, 2004). Once the appropriate equipment is in place, how it is used is also an important factor. Bedrails and bed height kept at the lowest level have demonstrated effectiveness at reducing falls (Healey, 2004; Kline, et al., 2009).Conversely, bed-alarms and hip

protectors, frequently used in hospitals, have shown mixed results, and further study is needed (Dacenko-Grawe & Holm, 2008; Haines, et al., 2004; Oliver, 2007; Oliver, et al., 2010).

Arm bands and room/door signs. Following a fall risk assessment, high risk patients received color coded arm bands and bed, room, or door signs in most studies (Dacenko-Grawe & Holm, 2008; Kline, et al., 2009; Mills, et al., 2005; Neily, et al., 2005; Oliver, et al., 2010; von Renteln-Kruse & Krause, 2007). A few studies reported development of fall kits that included arm bands, signs, and educational materials, so that staff had all items available for immediate use.

Communication/Education. Some studies focused on system-wide marketing and communication plans, immersing hospital staff in patient safety and fall prevention information. Other studies listed specific communication techniques. One study had an acronym for staff to help them remember fall prevention duties at the bedside (Kline, et al., 2009) while another used a pre-printed care plan that included interventions matched to risks, so that all staff were cued to implement fall prevention measures (Healey, 2004). Staff, patient, and family education, with provision of written information reduced falls (Dacenko-Grawe & Holm, 2008; Dykes, et al., 2010; Fonda, et al., 2006; Haines, et al., 2004; Kline, et al., 2009; Mills, et al., 2005; Neily, et al., 2005; Oliver, et al., 2010; von Renteln-Kruse & Krause, 2007). Explaining the nurse 'call bell' use to the patient on admission and then placing it within reach each time in the room, informing of the importance of calling a nurse for help and advising all patients to change positions slowly reduced falls (Healey, 2004; Kline, et al., 2009; Tzeng & Yin, 2008). Examples of staff education included how to effectively communicate with co-workers and patients/families; and how to conduct safety rounds. Examples of patient and family education included safe mobility practices, such as how to move safely with an I.V. pole, indwelling catheter, or transferring from

the bed to the chair. Including non-licensed staff in fall prevention and improving patient hand-off reports also reduced falls (Rush et al., 2008; Tzeng, 2010).

Safety rounds. Routine toileting, turn, and safety rounds, and additional supervision and assistance with transfer and toileting reduced falls (Mills, et al., 2005; Neily, et al., 2005; Quigley, et al., 2009). Additionally, toileting prior to administration of pain medication demonstrated effectiveness at reducing falls (Dacenko-Grawe & Holm, 2008; von Renteln-Kruse & Krause, 2007).

Staff assignments and sitters. Moving patients who had the highest fall risk closer to nurses' station, staff assignments in close proximity, and increasing staff patient ratios demonstrated effectiveness at reducing falls (Healey, 2004; Rush, et al., 2008; Tzeng, 2010). Furthermore, in one study, availability of sitters reduced falls (Tzeng & Yin, 2008).

Patient aids. Unsafe footwear was replaced and in some instances non-skid footwear was provided (Dacenko-Grawe & Holm, 2008; Healey, 2004; Kline, et al., 2009; Oliver, et al., 2010; von Renteln-Kruse & Krause, 2007). Encouraging to use eye glasses, hearing aids, footwear, and mobility devices also reduced falls (Kline, et al., 2009; von Renteln-Kruse & Krause, 2007). Finally, ophthalmology referral for poor eyesight and obtaining glasses is they were lost was helpful (Healey, 2004).

Medical referrals. Medical referral for abnormal blood pressure and urine screened and if positive for nitrites a mid-stream urine sample needs to be collected (Healey, 2004). Medication review for sedatives, anti-depressants, diuretics, and poly-pharmacy and modifying the medication profile to reduce use of these medications also demonstrated some effectiveness at reducing falls (Healey, 2004; Kline, et al., 2009).

Post-fall Follow-up and Quality Improvement. Post-fall follow-up with a reassessment, modification of risk level and interventions, and determination of the underlying problem exists reduced falls (Mills, et al., 2005; Neily, et al., 2005; von Renteln-Kruse & Krause, 2007). Additionally, conducting a 'safety huddle' post fall to discuss what occurred, problem solve, and modify the plan of care was effective at reducing falls (Quigley, et al., 2009). Finally, one hospital with reduced falls reported gathering data that was unit specific (Kline, et al., 2009).

Integration with Electronic Medical Records. Dykes and colleagues (2010) integrated communication and workflow into an information technology systems in a trial examining fall prevention interventions. This included the use of a fall risk assessment to tailor fall prevention interventions that addressed specific patient detriments of fall risk. Their system also provided communication of patient specific alerts to key stakeholders. No other studies were found using technology.

Limitations

It is not clearly delineated within these various studies which single intervention reduced falls in theses hospital settings. Nonetheless, this review provides evidence of evidence-based multi-factorial approaches to fall prevention in a hospital setting. Finally, consistent reporting of falls per 1000 patient bed days and fall injuries per 10,000 bed days will provide consistent measurement to allow for clearer interpretation of occurrences of falls or fall injuries, while providing for comparisons to occur among hospital systems.

Discussion

Falls are a pressing issue for hospitals and a threat to patient safety (von Renteln-Kruse & Krause, 2007). This review is different than other reviews, in that it provides a listing of the best evidence available in the scientific literature to guide nurse administrators when developing fall

prevention programs. Although support for the dose, intensity, and duration of these multifactoral interventions are not yet clear. the studies identified seem to provide a reasonable base of evidence for designing evidence-based fall prevention programs in hospitals (Oliver, et al., 2010). Although among these studies, the populations, settings, assessments, interventions, follow-up, and quality improvement differ, there is a commonality of approach that may be replicable in multiple settings.

Implications for Nurse Administrators

Gaps exist in the literature regarding evidence-based fall prevention interventions in hospitals. Where high quality empirical evidence does not yet exist, clinicians can base practice on what levels of evidence there are—learning from where reduction in falls has been achieved. Furthermore, it would be a challenge to isolate and identify which of the multivariate fall interventions make a statistical difference in the hospital setting.

The following recommendations are made from the studies examined in this integrative review. Obtaining organizational support and staff buy-in that supports safety as a key component of patient care and is essential when developing a culture of safely to that will ultimately reduce falls. Approaches to cultural change regarding fall prevention programs are beginning to emerge in the literature (Boushon et al., 2008; Stalhandske, Mills, Quigley, Neily, & J., 2008). Establishing a process for evaluating each hospitalized patient for the risk of falling with an assessment that predicts the risk of falling, then performing the fall risk assessment in a timely manner is an effective means of improving patient falls in hospitals. Fall risk assessments need to discriminate and predict those who may fall, sensitive to the setting, to predict those who need interventions (Oliver, et al., 2007). Hospitals must examine if their fall assessment criterion correctly identifies fall risk in those who actually fall and if not, modify their assessment

accordingly or try a different assessment tool. One of the key elements among most of these successful fall reduction programs was the establishment of fall interventions for all hospitalized patients. Furthermore, strict fall prevention interventions were used for patients at high risk. Thus, the overall keys to success were assessing and managing patients at risk for falls, and implementing interventions to reduce falls based on the patients assessed risk. Finally, conducting post-fall follow-up to determine if underlying problems exist, then modifying the risk level and interventions is necessary. Examining falls will provide a list of factors and subsequent guidance to select interventions tailed to the case-mix of a specific hospital population (Oliver, et al., 2007). Since half of all falls in hospitals occur in people who have already fallen, an examination of the reason for the fall with subsequent modification of the interventions is necessary after every occurrence (Oliver, et al., 2007). In the future, linking elements of fall prevention risk assessments to care planning and quality improvement in the electronic medical record will ultimately help improve patient outcomes. Hospitals that have used this approach have experienced a reduction in both falls and some have reduced fall injuries. Table 2 provides a summary of the components of fall prevention interventions from all of these studies.

Several approaches to improving falls in hospitals are available. First, key elements of these successful programs seem to be identical to the Joint Commission patient safety goals for hospitals. The Quality and Safety Education in Nursing (QSEN) project may be a reasonable framework upon which to build a sustainable fall prevention program in a hospital setting. This includes assuring the nursing staff have the knowledge, skills, and attitude to continuously prevent falls through use of patient centered care, teamwork and collaboration, evidence based practice, quality improvement, and informatics; and the use of data to monitor fall rates after interventions are implemented to continuously improve quality and safety. Second, a study

conducted in 2010 (Lake, Shang, Klaus, & Dunton) using National Database of Nursing Quality Indicators data found a 5% lower rate of falls in Magnet™ hospitals concluding that patient safety may be improved in environments consistent with Magnet hospital standards (Lake, et al., 2010). So the Magnet™ Models five components may be a reasonable framework upon which to build sustainable fall prevention program in hospital settings. This includes transformation leadership to get organizational commitment to a culture of safety, structural empowerment to establish a falls-reduction committee, exemplary professional practice by putting the evidence to work, new knowledge, innovation, and initiatives to design a fall prevention program, and identification of empirical outcomes and continuous quality monitoring. The Magnet Model's approach would help ensure a culture of safety and reduce patient falls. Two other approaches to improving falls in hospitals include the Institute for Healthcare Improvement Transforming Care at the Bedside project (Boushon, et al., 2008) and the Agency for Healthcare Quality (Stalhandske, et al., 2008). As a final note, cost effectiveness of fall prevention programs must be examined, and models and evidence are beginning to emerge in the literature (Frick, Kung, Parrish, & Narrett, 2010; Quigley, et al., 2010).

Conclusion

If falls in hospitals were easy to eliminate, we would have eliminated them by now. The facts are undeniable: up to 50% of hospitalized patients at risk for falls, and almost half of those who fall suffer an injury. These falls and subsequent injuries have a tremendous impact on the patient, as well as directly affecting a hospitals length of stay and cost per case. As with many clinical challenges, there is no single easy answer to the challenges posed by patient falls in hospitals. Learning from colleagues' successes and analyzing the highest level of evidence

available will help nurse administrators to design and implement a fall prevention program that will ultimately reduce falls in their hospital setting.

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Table 1. Summary of Studies of Falls Prevention Interventions in Hospitalized Patients

Author	Outcome	*N*	Interventions listed in study	Findings related to falls and fall injuries
Type (level of evidence)[a]				
Cochrane Review				
Cameron et al., 2010 (1)	Falls and injuries		Exercises Environmental/assistive technology Medication management Education and knowledge	No conclusive recommendations
Meta-analysis and systematic review	Falls and injuries	17	Risk assessment, targeted interventions, delirium avoidance, reducing sedative and hypnotic medications In-depth patient education Sustained exercise programs ID arm bands, bed and door signs Supervision/assist transfer and use of the toilet Commitment of management and a range of clinical/ support staff	Multifactoral interventions with multiprofessional input improved fall rates
Coussement et al., 2008 (1)	Falls and injuries	8	Vitamin D supplements ID bracelets with bed alarms Modified environment, vinyl flooring Exercising for strength building Medication review and modification Assisting with toileting and transfers Fall-risk assessment RN instruction and biweekly audits Discussions of fall risk/plan modification	No reduction in all falls with interventions
Oliver et al., 2007 (1)	Falls and injuries	65	Risk assessment, care planning Change physical environment Assistive equipment/technology, hip protectors Education for staff/patient/family Medication review Removal of restraints, exercise	No conclusive evidence of improvement

(continued)

Table 1. (continued)

Author	Outcome	*N*	Interventions listed in study	Findings related to falls and fall injuries
Oliver et al., 2006 (1)	Falls and injuries	1,207	Bedrails, bed alarms Hip protectors Medication review Environmental changes	No reduction in falls with intervention Hip protectors, fall alarm devices Medication Changes in environment ineffective in hospital setting
Oliver, Hopper, and Seed, 2000 (5)	Falls and injuries	10	Same as 2006/2007	Pooled reduction, 25% reduction in falls after intervention Individual interventions showed no effect
Clinical trials				
Dykes, 2010 (3)	Falls	10,264	Fall-risk assessment linked to interventions (MFS) Safety precautions, document previous fall Review medication list, consult MD or PT Assist with ambulating or toileting Bed alarm, bed close to nurse station Frequent checks and reinformation Bed poster, plan of care, patient education Supervision/assist transfer and use of the toilet Use of eyeglasses, hearing aids, footwear, and mobility devices Provision of an information leaflet, staff education ongoing Individual patient and caregiver counseling	Intervention 3.15 falls per 1,000 bed days Control 4.18 falls per 1,000 bed days
Neily, Howard, Quigley, and Mills, 2005 (2) Mills, Neily, and Quigley, 2005 (2)	Falls	Multiple units	Basic preventive/universal fall precaution for all Risk assessment, cultural infrastructure, enhanced communication, customized interventions to risk Postfall follow-up in a safety huddle, use of teach back method of education, formative and summative evaluation	Falls were reduced to 3.3 to 1,000 OBDs

(continued)

Table 1. (continued)

Author	Outcome	*N*	Interventions listed in study	Findings related to falls and fall injuries
Case study				
Kline, Thom, Quashie, Brosnan, and Dowling, 2009, 2009 (4)	Falls 1/41 years	Reported	Developing a culture of safety Change theory, teamwork, communication, and delegation Acronym for staff to remember duties at bedside Data gathering, unit specific; root-cause analysis On-going work on practice changes Environmental and equipment changes Risk screening (categorized as none, high) Categories: patient factors, sensory and motor deficit, medications Standardized for all patients admitted to hospital Interventions for assessed as high risk for falling Staff education, initial 1-day training module, didactic and ongoing	Decreased from 4.90 to 2.96/1,000 patient days
Quigley et al., 2009 (4)	Fall fractures and hemorrhagic bleeds per 10,000 days and falls per 1,000 days	Two units	Teach back and toileting prior to pain medication Safety huddle postfall Toileting and turn rounds Comfort care and safety rounds Automatic high-risk falls identification	Fall 3.71 to 1.18/1,000 patient days Fall injuries 2.1 to 1.7/10,000 patient days
Dacenko-Grawe and Holm, 2008 (4)	Fall rates per 1,000 days		Established program: fall-risk assessment; identified high risk, arm bands and door tag; staff trained for high-risk transferring, assist to bathroom; patient instructed to call for help; bed alarms on confused patients; nonskid footwear; patient and family education.	Fall-rate decline 50% >3-year period, from 4.5 per 1,000 to 2.27 per 1,000

a. Levels of evidence in Guyatt and Rennie (2002) as discussed in Melnyk and Fineout-Overholt.

Table 2. Components of Evidence-Based Fall Prevention Programs in Hospital Settings

1. Developing a culture of safety
2. Risk assessments that is predictive of falls in hospital where used
3. Interventions
   - Environmental and equipment upgrades
   - Correct environmental hazards
   - High-risk patients received ID arm bands and bed and door signs
   - Bedrails and bed height kept at the lowest level
   - Nurse call bell is explained and within reach
   - Unsafe footwear replaced and/or nonskid footwear provided
   - Ongoing staff education
   - Individual patient and caregiver education and written instructions
   - Staff patient ratios increased for high fall-risk patients
   - Staff assignments in close proximity
   - Availability of sitters
   - Improving staff communication by including nonlicensed staff
   - Improving patient hand-offs
   - Advising patient on changing position slowly
   - Encourage to use of eye glasses, hearing aids, footwear, and mobility devices
   - Nurse toilet and turn or comfort and care safety rounds
   - Supervision and assistance with transfer and toilet use
   - Toileting prior to pain medication
   - Medical referral for abnormal blood pressure
   - Medical referral: mid-stream urine sample if positive for nitrites, blood or protein
   - Medication review for sedatives, antidepressants, diuretics, and polypharmacy
   - Ophthalmology referral for poor eyesight and optician visit if lost glasses
4. Postfall follow-up and quality improvement
5. Integration with technology/electronic medical records

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