# Fall Prevention Toolkit

## Module 1 ToolsPicture of puzzle with Tools piece highlighted

Tool 1E:Resource Needs Assessment

Miake-Lye IM, Hempel S, Ganz D, et al. Chapter 19. *Preventing in-facility falls*. In: Making Health Care Safer II: An Updated Critical Analysis of the Evidence for Patient Safety Practices. March 2013. Agency for Healthcare Research and Quality, Rockville, MD

### 1E: Resource Needs Assessment

**Background:** The purpose of this tool is to identify resources that are available for a fall prevention program.

**Reference:** Developed by Falls Toolkit Research Team.

**How to use this tool:** Complete this checklist to assess the resources that are available and the resources that are still needed. This assessment is best suited for hospital supervisors, managers, and administrators.

Use this tool to ensure that all resources needed for launching a fall prevention program are available.

| **Resource** | **Needed:**  **Yes/No** | **Notes on what is needed** |
| --- | --- | --- |
| Staff education programs |  |  |
| Quality improvement experts |  |  |
| Physical/occupational therapy consultation on work practices |  |  |
| Information technology support |  |  |
| Specific products/tools (e.g., low beds, floormats, assistive devices, safe patient handling equipment) |  |  |
| Facilities and supplies (e.g., meeting rooms) |  |  |
| Printing/copying |  |  |
| Graphics/design |  |  |
| Nonclinical time for team meetings and activities |  |  |
| Other |  |  |
| Funds |  |  |

## Chapter 19 Preventing In-Facility Falls

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How Important Is the Problem?

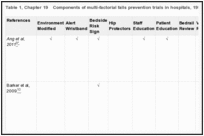
The rate of falls in [acute](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022583)-care hospitals is estimated to range from 1.3 to 8.9 per 1,000 bed-days,[1](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/" \l "ch19.r1) which translates into well over 1000 falls per year in a large facility. Higher rates are reported in particular sites or wards, such as those specializing in neurology, geriatrics, and rehabilitation. Because falls are believed to be underreported, most estimates are assumed to be overly conservative.[1](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r1) However defining what is a “fall” is itself a challenge, as there is variability in the research literature and among older adults about what constitutes a fall.[2](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r2),[3](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r3) Authoritative bodies have definitions (e.g., the NQF defines a fall as “an unplanned descent to the floor without injury”[4](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r4) and WHO defines a fall as “an event which results in a person coming to rest inadvertently on the ground or floor or some lower level”[5](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r5))but even after accepting a conceptual definition of a fall, there is a difference between any fall, a fall with injury, the proportion of a population who has a fall, and the number of falls. Nevertheless, there is widespread agreement that falls, however defined, occur frequently and can have serious physical and psychological consequences. Between 30 percent and 50 percent of in-facility falls are associated with reports of injuries. Hip fractures occur in 1 percent to 2 percent of falls. Inpatient falls are also associated with increased health care utilization, including increased length of stay and higher rates of discharge from hospitals into institutional or long-term care facilities. In one recent analysis in three hospitals in Missouri, operational costs for patients who have fallen with serious injuries were $13,000 higher than for control patients without falls, and patients who have fallen had an additional 6.3 days' length of stay.[6](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r6) Even falls that do not cause severe injuries can trigger a fear of falling, anxiety, distress, depression, and reduced physical activity. Family members, caregivers, and health care professionals are also susceptible to overly protective or emotional reactions to falls, which can also impact the patient's independence and rehabilitation.

What is the Patient Safety Practice?

Most in-facility fall prevention programs are multicomponent interventions. Unfortunately, the individual components vary across each published evaluation, with the same combination of components never being evaluated in more than one application. Therefore, in terms of identifying and reviewing the evidence for fall prevention interventions, the best that can be done is to describe the components most commonly included in interventions that have been evaluated. The Prevention of Falls Network Europe (ProFaNE ) proposed a detailed classification of fall risk assessment components (see [Appendix C](http://www.ncbi.nlm.nih.gov/pubmedhealth/n/erta211/appc/) for the complete list),[7](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r7) which map closely to the descriptions provided in this chapter. According to a review by Oliver and colleagues, the following were the most common components of successful interventions:

* Post fall review: to assess potential reasons for a specific instance of a fall and to remediate possible contributing factors
* Patient education
* Staff education
* Footwear advice
* Scheduled and supervised toileting
* Medication review: to assess for use of medication(s) that can affect mental alertness and balance (see ProFANE taxonomy for further details, [Appendix C](http://www.ncbi.nlm.nih.gov/pubmedhealth/n/erta211/appc/)).

The most recent Cochrane review notes a “striking variability in type, targeting, intensity, and duration” within the fall prevention programs and does not attempt to draw conclusions about which components might be most effective.[8](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r8) [Table 1](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t1/?report=objectonly) lists all the studies in the reviews by Cochrane and by Oliver, as well as new studies from our update search, and the components included in the intervention.

[](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t1/?report=objectonly)

[**Table 1, Chapter 19**](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t1/?report=objectonly)

Components of multi-factorial falls prevention trials in hospitals, 1999 to 2009.

All multicomponent interventions also included an assessment of falls risk. In about 60 percent of studies this was a formal falls risk assessment tool such as the Morse Fall Scale or STRATIFY, and the remainder used informal or idiosyncratic or unstated methods for assessing patients at increased risk of falls.

Other single intervention components include use or removal of bedrails, use of physical restraints, movement alarm devices, low-low beds (beds closer to the floor), [exercise](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022363) or additional physical [therapy](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022340), increased observation or assistance, [calcium](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022775) or [vitamin D](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0001921), hip protectors, and prevention of delirium (this last topic is covered in [Chapter 20](http://www.ncbi.nlm.nih.gov/pubmedhealth/n/erta211/ch20/)). Since most reviews conclude that multi-component interventions are more effective than single components, in this chapter we will consider only multi-component interventions. Multicomponent interventions are also referred to in the literature as multifaceted or multifactorial interventions. Although some authors draw distinctions between these labels, we will not do so here, and refer to all of them as multicomponent.

Why Should This Patient Safety Practice Work?

None of the controlled trials of fall prevention programs explicitly articulate the conceptual framework for their intervention. However, underlying each is the stated or implied understanding that falls have a multifactorial etiology and that attention to multiple risk factors will be more effective than an intervention that targets any single risk factor. A fall is usually the result of interactions between patient-specific risk factors and the physical environment. Patient-specific risk factors include patient age (particularly age over 85, sometimes called the “oldest old”), male sex, a history of a recent fall, muscle weakness, behavioral disturbance, urinary incontinence or frequency, certain medications, and postural [hypotension](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0023509) or syncope. Environmental causes include poor lighting; ‘trip” hazards (such as uneven flooring or small objects on floor); suboptimal chair heights; and staff availability, attitude, and skills. Given the multifactorial nature of falls, a patient safety practice designed to assess and remediate multiple factors is believed to be more likely to be effective. Indeed, the list of successful components in multi-component fall prevention interventions matches well with this list of patient and environmental contributors to falls. We identified one published logic model for why individual fall prevention components should work ([Figure 1](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/figure/ch19.f1/?report=objectonly)). For example, a bed alarm detects patient movements, which can allow a faster response to patients and reduce falls. Similarly, use of a visible sign or identification bracelet increases awareness of falls and at-risk patients and inform necessary responses, which in turn should reduce falls.

[](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/figure/ch19.f1/?report=objectonly)

[**Figure 1, Chapter 19**](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/figure/ch19.f1/?report=objectonly)

Multi-systemic fall prevention model. † Adverse outcomes (a) Firm mattresses; low beds; appropriate chair heights and depths for easy transfer; chairs with arm rests; and secured handrails throughout the movement of a patient. (b) Non-slip surfaces [(more...)](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/figure/ch19.f1/?report=objectonly)

The second underlying assumption of most fall prevention programs in the published literature is that fall risk assessment is primarily a nursing function, but that insufficient attention is currently paid to this task due to other demands for nursing time, and that some method of reminder, checklist, or similar tool can be effective to ensure the assessment of fall risk.

What Are the Beneficial Effects of the Patient Safety Practice?

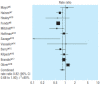
The primary sources of evidence about multi-component in-facility fall prevention programs are three systematic reviews: a 2008 review from the Cochrane Collaboration by Cameron and colleagues,[8](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r8) a review by Coussement and colleagues also published in 2008,[29](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r29) and a review by Oliver and colleagues originally published in 2006,[30](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r30) which was updated in 2010 as a narrative review.[1](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r1) All three reviews scored well on the AMSTAR criteria for systematic reviews (11/11, 10/11, and 10/11 respectively).[31](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r31) The Cochrane review searched a number of databases through November 2008 for randomized trials to assess the effectiveness of falls reduction interventions for older adults in nursing care facilities and hospitals.[8](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r8) Of the 41 trials they included, 11 were conducted in hospital settings, of which four addressed multifactorial interventions. The review by Coussement identified four studies, three of which were included in the Cochrane review.[29](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r29) The Oliver and colleagues review also searched multiple databases for relevant literature through January 2005.[30](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r30) This review's objective was to evaluate the evidence for fall prevention strategies in care homes and hospitals, with an additional focus on the effect of dementia and cognitive impairment on fall risk. Broader inclusion standards than the Cochrane review led to the inclusion of 43 trials, case-control studies, and observational cohort studies. Thirteen of these studies addressed multicomponent inpatient interventions. The updated narrative review focused directly on inpatient fall prevention and discussed 17 multifactorial studies spanning 1999-2009, which include the four trials found by the Cochrane group.[1](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r1)

The three reviews reached similar conclusions. The Oliver and Cochrane reviews found that multi-component in-facility fall prevention programs result in statistically and clinically significant reductions in rates of falls (see [Table 2](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t2/?report=objectonly)). The Cochrane pooled analysis of four fall prevention programs in 6,478 participants found a 31 percent decrease in the rate of falling (pooled rate ratio [RR]0.69 (95% CI, 0.49 to 0.96) and a 27 percent decrease in the incidence of falls among three trials involving 4,824 participants (RR 0.73; 95% CI, 0.56 to 0.96).[8](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r8) The Coussement review found a similar pooled rate ratio as the Oliver review; however, this effect was not quite statistically significant.[29](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r29) Principal results from the Oliver meta-analysis are reproduced below (see [Figure 2](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/figure/ch19.f2/?report=objectonly)).[30](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r30) The other systematic reviews and meta-analyses identified in the Oliver update review were “surprisingly consistent” (p. 679) and support the argument that multi-factorial interventions reduce fall rates more effectively does than any single intervention in [acute](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022583) care settings.[1](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r1)

[Table 2, Chapter 19. Meta-analytic estimate of the effect of multicomponent fall intervention programs on inpatient fall rates.](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t2/?report=objectonly)

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Meta-analytic estimate of the effect of multicomponent fall intervention programs on inpatient fall rates.

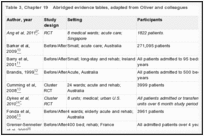
[](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/figure/ch19.f2/?report=objectonly)

[**Figure 2, Chapter 19**](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/figure/ch19.f2/?report=objectonly)

Meta-analysis from Oliver et al. 2006 for multifaceted interventions in hospital falls (random effects model). Reproduced from Strategies to prevent falls and fractures in hospitals and care homes and effect of cognitive impairment: systematic review [(more...)](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/figure/ch19.f2/?report=objectonly)

The Cochrane and Oliver reviews were supplemented with an update search (described below) and an additional search by Hempel and colleagues (discussed in more detail later), which addressed the prevention of inpatient falls. After using 15 existing reviews and reports to identify pertinent sources, which included the two reviews in this chapter, Hempel then searched multiple databases for relevant literature. The search covered January 2005 to August 2011 and included randomized controlled trials, non-randomized trials, and before-after studies in English-language publications that addressed falls in the hospital setting. Details of the search strategy are in [Appendix C](http://www.ncbi.nlm.nih.gov/pubmedhealth/n/erta211/appc/).

In the update search, we focused on studies with large sample sizes (at least N=1,000), that assessed multi-component interventions in [acute](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022583)-care hospitals, in the general population or older adult population. We were looking for “pivotal studies,” as defined by Shojania and colleagues (see [Methods, Chapter 2](http://www.ncbi.nlm.nih.gov/pubmedhealth/n/erta211/ch2/) p.ES-4) that could provide a signal when an existing systematic review is out of date.[32](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r32) We identified two new relevant studies, both of which showed statistically significant improvements in intervention groups when compared with controls, and which we discuss briefly here. A third study is reviewed because of its unique design. Data for all studies included in the Oliver review, the Cochrane review, and our update search are in an evidence table in [Appendix D](http://www.ncbi.nlm.nih.gov/pubmedhealth/n/erta211/appd/). [Table 3](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t3/?report=objectonly) provides an abbreviated description of each study.

[](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t3/?report=objectonly)

[**Table 3, Chapter 19**](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t3/?report=objectonly)

Abridged evidence tables, adapted from Oliver and colleagues.

Dykes and colleagues compared the fall rates of four intervention units to matched control units in four urban United States hospitals over a 6-month period.[14](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r14) Control units received usual care, which included fall risk assessments, signage for high-risk patients, patient education as needed, and manual documentation in patient records. The intervention group tested the Fall Prevention Tool Kit (FPTK), which was developed by the study team. The FPTK is a health information technology application that includes a risk assessment and tailored signage, patient education, and plan of care components. The FPTK is integrated with, and seeks to enhance, existing workflow and communication patterns. Adjusted fall rates in the intervention units (3.15 per 1,000 patient days [95% CI, 2.54 to 3.90]) were significantly lower than in control units (4.18 per 1,000 patient days [95% CI, 3.45 to 5.06]), with a particularly strong impact among patients aged 65 or older (rate difference of 2.08 per 1,000 patient days [95% CI: 0.61 to 3.56]). This study was judged to have a low risk of bias using the criteria of the Effective Practice and Organizational Organisation of Care (EPOC) Cochrane Group (score of 8 of 9 components). [34](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r34)

In the second study, Ang and colleagues [9](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r9) randomized patients in eight medical wards of an [acute](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022583)-care hospital in Singapore over a 9-month interval. They used an assessment tool to match high-risk patients with appropriate interventions, in addition to a tailored educational session, in the intervention group. Both the intervention and control groups in this study received usual care, which included environmental modifications, review of medications and fall history, and educational sessions. The proportion of patients with at least one fall in the intervention group was 0.4 percent (95% CI, 0.2 to 1.1) while in the control group this was 1.5 percent (95% CI, 0.9 to 2.6) for a relative risk reduction of 0.29 (95% CI, 0.1 to 0.87). Using the EPOC criteria, this study was judged to be at low risk of bias (score of 8 of 9 components).[34](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r34)

One additional study was identified and is noted here because of its unique design. The study by van Gaal and colleagues evaluated a program that targeted three patient safety practices (pressure [ulcers](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022806), [urinary tract infections](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0024568), and falls prevention) simultaneously and found an overall positive effect on the development of any adverse event, a composite measure of pressure ulcers, urinary tract infections, and falls.[35](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r35),[36](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/" \l "ch19.r36) The study was not powered to assess falls separately, yet it is worth noting that the point estimate for the relative risk reduction in falls was 0.69, which is within the range of results reported in other studies and meta-analyses. The value of this study is the demonstration of simultaneous improvements in several intervention targets.

Thus, new large controlled trials continue to support the conclusion of existing meta-analyses that multifactorial falls prevention programs are effective in reducing inpatient fall rates.

What Are the Harms of the Patient Safety Practice?

Most trials of fall prevention programs have not reported any harms. The Cochrane review reported none.[8](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r8) It is not clear whether the possibility of harms was explicitly assessed in these trials. However, concern exists that some falls prevention interventions may lead to harms. The review by Oliver and colleagues detailed a number of potential harms, including an increased use of restraints or sedating medications. However, Oliver and colleagues also note “so little empiric evidence on adverse effects of fall prevention activities on other clinical activities has been incorporated into [clinical trials](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022681) that one has very little with which to substantiate or refute these concerns.”[1](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r1)

How Has the Patient Safety Practice Been Implemented, and in What Contexts?

The ways in which falls prevention programs have been implemented and a description of contexts are lacking in most reports. The limited evidence available is summarized below.

**Structural Organizational Characteristics**

Fall prevention programs have been implemented in both [acute](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022583)-care hospitals and nursing homes. For this report, we focused on inpatient interventions, with a mix of acute-care, rehabilitation, long-term care, and geriatric wards and facilities represented. All but two of the studies came from outside the United States: five from Australia, three from the United Kingdom, two each from Sweden and Singapore, and one each from France, Switzerland, the Netherlands, and Germany. Six studies mentioned having an academic affiliation or being a teaching hospital. Of the 15 studies that reported the size of the setting, three were under 100 beds, five were between 100 and 500 beds, and two were over 500 beds. Three other studies described size using alternative measures: 24 wards in 12 hospitals, a staff of 641, and 2300 inpatients annually. Thus, falls prevention programs have been successfully implemented in hospitals of varying size, location, and academic/teaching status.

No studies reported on financial concerns (e.g., how patients' care or the interventions were financed), although one U.S. study mentioned the potential impact of reimbursement on the emphasis on falls prevention.[14](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r14) Since some countries where these studies have been conducted have national health insurance, this context may be less applicable, and therefore not reported.

**Existing Infrastructure**

Five studies reported on the existing quality and safety infrastructure. Here we describe this infrastructure in terms of factors that may affect implementation of a patient safety practice, which could include presence of electronic health records or prior experience with quality improvement or patient safety practices. The five studies included text that captured this concept; of these, four described their usual fall prevention care. The fifth study provided a more explicit statement, namely, “prior to this study none of the wards carried out specific fall assessments or interventions, and investigations such as lying and standing [blood pressure](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0023514) or ophthalmology referral occurred on an ‘ad hoc’ basis. There was no specialist falls clinic or other falls service available at this hospital.”[18](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r18) Another explanation was less explicit, and was embedded in the authors' explanation of the intervention, which noted that the two control wards “continued with the regular fall prevention policy used at the hospital (i.e., daily assessment of fall risk, review of fall prevention with the patient and/or their family, use of fall prevention signage, and implementation of other prevention strategies as needed).”[20](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r20) Two other reports of randomized controlled trials discussed usual care in a similar fashion when contrasting it with the intervention.[9](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r9),[14](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/" \l "ch19.r14) These descriptions illustrate the potential diversity that may exist in the “control” sites in terms of “usual care.”

In addition to a description of the current fall prevention care, a second type of infrastructure description addressed an inadequate information system, reporting that “the existing information system was not useful for producing data that we could use to analyze the causes of falls.”[16](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r16) A further example of this type of explanation is presented by Dykes and colleagues, who suggest that “including hospitals with diverse clinical information and documentation systems enhanced the [intervention] generalizability.”[14](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r14) The remaining studies do not mention existing quality and safety infrastructure.

Consequently, a dearth of data exists regarding the infrastructure needed to support fall prevention programs or how the effectiveness of implementation may vary as a result of infrastructure differences.

**External Factors**

Although a few studies briefly mentioned patient safety culture, teamwork, or leadership, only four studies presented expanded explanations that merited mention. Grenier-Sennelier[16](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r16) use a framework from Shortell and colleagues[37](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r37),[38](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/" \l "ch19.r38) to analyze safety on the unit level, teamwork at both the organizational and unit level, and leadership on the organizational and unit level. Stenvall discusses teamwork at the unit level in [Table 2](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t2/?report=objectonly) of their article (See [Appendix D](http://www.ncbi.nlm.nih.gov/pubmedhealth/n/erta211/appd/)).[23](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r23) Koh discusses leadership on the organizational and unit level: “Successful implementation is mediated by strong leadership and environmental support, which are integral to building positive attitudes among nurses, ensuring that the sociocultural environment is conducive to the process of change. In our study, the multifaceted strategy targeting barriers to change exemplified the commitment of the leadership and environmental support.”[19](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r19) (p. 429) Van der Helm made multiple observations addressing leadership on both the organizational and unit level:

* “Although the clinical ward management underlined the importance of implementing the guideline at the outset of the project, the actual support given was too weak to be effective. Some managers expressed doubt about the project's chances for success to the project leader, stating that implementation “had already failed before.” Ward staff often regarded improvement activities as unwanted additional work that hindered daily operations. The two senior nurses often displayed a delegating rather than a directive management style, for example, in terms of ensuring that the risk assessment tool was completed or all incidents reported.” (p.157)
* “nurses told us that the medical center did not take the falls problem seriously, which therefore undermined their own motivation to contribute to the project's success.” (p.158)
* A measure in the Questionnaire Regarding Knowledge of the Guideline and Attitude Toward Implementation, “There is enough support from the management for guideline implementation” scored 44% to 53%.[25](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r25)

**Implementation**

The most commonly reported implementation details were patient characteristics (17 studies) and an initial plan, or what was going to be done in the intervention (17 studies). Slightly less often (14 studies), studies reported the intended roles of project staff, or by whom the intended plan components were to be completed. The majority of studies reported the recipients of any training component (15 studies), with slightly fewer reporting the type of training or giving a description of the training (12 studies), and even fewer studies reporting the length of training (5 studies).

Another characteristic that distinguished studies was who conducted the risk assessments and performed the interventions. In the reviews by Oliver and colleagues and the Cochrane group, among the 17 studies of inpatient fall prevention programs, the risk assessments were performed by the existing ward staff in 15 and by research staff in two. In 15 studies, the intervention was performed by the ward staff: seven involved the nursing staff only, seven were multiprofessional, and two involved physical [therapy](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022340). In both of the new studies, clinicians or nurses from the wards performed the risk assessments. The study with nurse risk assessments had research team nurses provide the intervention, whereas the other study relied mainly on ward nurses, although reference was made to clinicians more generally.

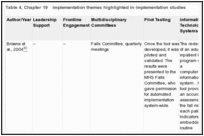
Thirteen studies provided the tools or materials used in the program implementation. Whereas eight reported on adherence or fidelity to the designed initiative, only five described how and why the plan evolved. Adherence or fidelity was most often characterized in a qualitative statement, as with Brandis: “The strategies implemented… had high acceptance by staff… it is suggested that the higher reductions occurred in areas where the multidisciplinary team enthusiastically embraced the project.”[12](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r12) An example from a less positive characterization comes from Cumming: “The lack of effect was evident in both… wards and occurred despite the planned nursing and physiotherapy interventions being successfully implemented.”[13](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r13) Dykes and colleagues provided a strong example of adherence reporting, where protocol adherence was measured by the completion of components in both control (81%) and intervention wards (94%). Measures of adoption and reach were usually provided in the form of a flow chart: Six studies presented these data for providers, and eight presented the data for patients.

For additional information on implementation, we used our update search and sought suggestions of additional studies from experts. All of these studies had pre-post designs or were a time series. Six were post-study evaluations of of falls implementations that reported a great deal of detail about the potential reasons for effectiveness or lack thereof. Nine of the eleven studies assessed implementation at only one or two facilities. Four of the studies did not report beneficial effects of the fall prevention program and the article highlighted potential implementation factors that might account for the lack of success. One study explicitly assessed the effect of some contextual factors on intervention success across 34 facilities.[39](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r39) One study explicitly assessed sustainability. Details of these studies are presented in [Appendix D](http://www.ncbi.nlm.nih.gov/pubmedhealth/n/erta211/appd/).

We used five of the implementation articles to develop themes regarding effective implementation and then reviewed all articles for these themes. The following are the most consistently supported themes:

* **Leadership support** is critical, both at the facility level and at the unit level (e.g. “clinical champions”).
* **Engagement of** [**front**](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022358) **line clinical staff** in the design of the intervention helps ensure that it will mesh with existing clinical procedures.
* **Multidisciplinary committees** guided or oversaw most interventions developed/guided/overseen by
* **Pilot testing** the intervention helps identify potential problems with implementation
* **Informational technology systems** capable of providing data about falls can facilitate evaluations of the causes, compliance with the intervention components, and (in one case) be a crucial facilitator of the intervention.
* **Changing the prevailing attitude** that “falls are inevitable” and “nothing can be done about them” is required to get buy-in to the goals of the intervention
* **Education and training** of clinical staff is necessary to help ensure compliance does not diminish.

[Table 4](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t4/?report=objectonly), below, presents textual support from the implementation articles for five of the seven themes (pilot testing and information technology systems are not presented due to space limitations).

[](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t4/?report=objectonly)

[**Table 4, Chapter 19**](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t4/?report=objectonly)

Implementation themes highlighted in implementation studies.

Are There Any Data About Costs?

The Cochrane review found no economic evaluations of the falls prevention programs that met inclusion criteria.[8](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r8) The review by Oliver and colleagues estimated the cost for specific combinations of components in terms of environment and equipment and in terms of staff. Fourteen of 17 trials were considered “low” cost in terms of equipment and environment (meaning some equipment costs like slippers, hip protectors, or alarms for a limited proportion of patients), and 14 of 17 were considered as “nil,” meaning none or inconsequential, for extra staff FTE.

Are There Any Data About the Effect of Context on Effectiveness?

The study by Neily and colleagues was the only one identified that explicitly assessed the effect of context on effectiveness. Across 34 Veterans Affairs health centers, a mix of [acute](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022583) care and long-term care facilities, leadership support was cited as one of the strongest factors for success. At 1-year followup, high-performing sites reported greater agreement with questions assessing leadership support, teamwork skills, and useful information systems than low-performing sites.[39](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/#ch19.r39)

### Conclusions and Comment

Inpatient multicomponent programs have been shown to be effective at reducing falls. The strength of evidence is high.

The effects of context have not been as well studied; however multicomponent interventions have been effective in hospitals that vary in size, location, and teaching status.

An assessment for themes in eleven implementation studies found the following to be most consistently supported:

* Leadership support is critical, both at the facility level and at the unit level (e.g. “clinical champions”).
* Engagement of [front](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022358) line clinical staff in the design of the intervention helps ensure that it will mesh with existing clinical procedures.
* Most interventions were developed/guided/overseen by multidisciplinary committees
* A pilot test of the intervention helps identify potential problems with implementation
* An informational technology system capable of providing data about falls can facilitate evaluations of the causes and compliance with the intervention components, and (in one case) can be a crucial facilitator of the intervention.
* Changing the prevailing attitude that “falls are inevitable” and “nothing can be done about them” is required to get buy-in to the goals of the intervention
* Adequate time for education and training of clinical staff is necessary to help ensure compliance does not diminish.

By January 2013, AHRQ intends to make available a list of tool kits for inpatient fall prevention programs. A summary table is located below ([Table 5](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t5/?report=objectonly)).

[Table 5, Chapter 19. Summary table.](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t5/?report=objectonly)

[**Table 5, Chapter 19**](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0055950/table/ch19.t5/?report=objectonly)

Summary table.

### References

1. Oliver D, Healey F, Haines TP. Preventing falls and fall-related injuries in hospitals. Clin Geriatr Med. 2010 Nov;26(4):645–92. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/20934615)]

2. Zecevic AA, Salmoni AW, Speechley M, et al. Defining a fall and reasons for falling: comparisons among the views of seniors, health care providers, and the research literature. Gerontologist. 2006 Jun;46(3):367–76. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/16731875)]

3. Schwenk M, Lauenroth A, Stock C, et al. Definitions and methods of measuring and reporting on injurious falls in randomised controlled fall prevention trials: a systematic review. BMC Med Res Methodol. 2012;12:50. [[PMC free article](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3388463/)] [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/22510239)]

4. National Database of Nursing Quality Indicators. Guidelines for Data Collection on the American Nurses Association's National Quality Forum Endorsed Measures: Nursing Care Hours per Patient Day, Skill Mix, Falls, Falls with Injury. 2012 March

5. World Health Organization. Violence and Injury Prevention: Falls. 2012. [July 25, 2012]. [www​.who.int/violence\_injury\_prevention​/other\_injury/falls/en](http://www.who.int/violence_injury_prevention/other_injury/falls/en).

6. Wong CA, Recktenwald AJ, Jones ML, et al. The cost of serious fall-related injuries at three Midwestern hospitals. Jt Comm J Qual Patient Saf. Feb;37(2):81–7. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/21939135)]

7. Lamb SE, Hauer K, Becker C. Manual for the fall prevention classification system. 2007. [www​.profane.eu.org/documents​/Falls\_Taxonomy.pdf](http://www.profane.eu.org/documents/Falls_Taxonomy.pdf).

8. Cameron ID, Murray GR, Gillespie LD, et al. Interventions for preventing falls in older people in nursing care facilities and hospitals. Cochrane Database of Systematic Reviews. 2010;1 (Art No.: CD005465) [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/20091578)]

9. Ang E, Mordiffi SZ, Wong HB. Evaluating the use of a targeted multiple intervention strategy in reducing patient falls in an acute care hospital: a randomized controlled trial. J Adv Nurs. 2011 Sep;67(9):1984–92. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/21507049)]

10. Barker A, Kamar J, Morton A, et al. Bridging the gap between research and practice: review of a targeted hospital inpatient fall prevention programme. Qual Saf Health Care. 2009 Dec;18(6):467–72. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/19955459)]

11. Barry E, Laffoy M, Matthews E, et al. Preventing accidental falls among older people in long stay units. Ir Med J. 2001 Jun;94(6):172, 4–6. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/11495234)]

12. Brandis S. A collaborative occupational therapy and nursing approach to falls prevention in hospital inpatients. J Qual Clin Pract. 1999 Dec;19(4):215–20. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/10619149)]

13. Cumming RG, Sherrington C, Lord SR, et al. Cluster randomised trial of a targeted multifactorial intervention to prevent falls among older people in hospital. BMJ. 2008 Apr 5;336(7647):758–60. [[PMC free article](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2287238/)] [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/18332052)]

14. Dykes PC, Carroll DL, Hurley A, et al. Fall prevention in acute care hospitals: a randomized trial. JAMA. Nov 3;304(17):1912–8. [[PMC free article](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3107709/)] [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/21045097)]

15. Fonda D, Cook J, Sandler V, et al. Sustained reduction in serious fall-related injuries in older people in hospital. Med J Aust. 2006 Apr 17;184(8):379–82. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/16618235)]

16. Grenier-Sennelier C, Lombard I, Jeny-Loeper C, et al. Designing adverse event prevention programs using quality management methods: the case of falls in hospital. Int J Qual Health Care. 2002 Oct;14(5):419–26. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/12389808)]

17. Haines TP, Bennell KL, Osborne RH, et al. Effectiveness of targeted falls prevention programme in subacute hospital setting: randomised controlled trial. BMJ. 2004 Mar 20;328(7441):676. [[PMC free article](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC381222/)] [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/15031238)]

18. Healey F, Monro A, Cockram A, et al. Using targeted risk factor reduction to prevent falls in older in-patients: a randomised controlled trial. Age Ageing. 2004 Jul;33(4):390–5. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/15151914)]

19. Koh SL, Hafizah N, Lee JY, et al. Impact of a fall prevention programme in acute hospital settings in Singapore. Singapore Med J. 2009 Apr;50(4):425–32. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/19421690)]

20. Krauss MJ, Tutlam N, Costantinou E, et al. Intervention to prevent falls on the medical service in a teaching hospital. Infect Control Hosp Epidemiol. 2008 Jun;29(6):539–45. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/18476777)]

21. Oliver D, Martin F, Seed P. Preventing patient falls. Age Ageing. 2002 Jan;31(1):75–6. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/11850313)]

22. Schwendimann R, Buhler H, De Geest S, et al. Falls and consequent injuries in hospitalized patients: effects of an interdisciplinary falls prevention program. BMC Health Serv Res. 2006;6:69. [[PMC free article](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1534028/)] [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/16759386)]

23. Stenvall M, Olofsson B, Lundstrom M, et al. A multidisciplinary, multifactorial intervention program reduces postoperative falls and injuries after femoral neck fracture. Osteoporos Int. 2007 Feb;18(2):167–75. [[PMC free article](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1766476/)] [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/17061151)]

24. Uden G, Ehnfors M, Sjostrom K. Use of initial risk assessment and recording as the main nursing intervention in identifying risk of falls. J Adv Nurs. 1999 Jan;29(1):145–52. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/10064293)]

25. van der Helm J, Goossens A, Bossuyt P. When implementation fails: the case of a nursing guideline for fall prevention. Jt Comm J Qual Patient Saf. 2006 Mar;32(3):152–60. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/16617946)]

26. Vassallo M, Vignaraja R, Sharma JC, et al. The effect of changing practice on fall prevention in a rehabilitative hospital: the Hospital Injury Prevention Study. J Am Geriatr Soc. 2004 Mar;52(3):335–9. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/14962145)]

27. von Renteln-Kruse W, Krause T. Incidence of in-hospital falls in geriatric patients before and after the introduction of an interdisciplinary team-based fall-prevention intervention. J Am Geriatr Soc. 2007 Dec;55(12):2068–74. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/17971140)]

28. Choi YS, Lawler E, Boenecke CA, et al. Developing a multi-systemic fall prevention model, incorporating the physical environment, the care process and technology: a systematic review. J Adv Nurs. 2011 May 6 [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/21545639)]

29. Coussement J, De Paepe L, Schwendimann R, et al. Interventions for preventing falls in acute- and chronic-care hospitals: a systematic review and meta-analysis. J Am Geriatr Soc. 2008 Jan;56(1):29–36. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/18031484)]

30. Oliver D, Connelly JB, Victor CR, et al. Strategies to prevent falls and fractures in hospitals and care homes and effect of cognitive impairment: systematic review and meta-analyses. BMJ. 2007 Jan 13;334(7584):82. [[PMC free article](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1767306/)] [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/17158580)]

31. Shea BJ, Grimshaw JM, Wells GA, et al. Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. BMC Med Res Methodol. 2007;7:10. [[PMC free article](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1810543/)] [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/17302989)]

32. Shojania KG, Sampson M, Ansari MT, et al. How quickly do systematic reviews go out of date? A survival analysis. Ann Intern Med. 2007 Aug 21;147(4):224–33. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/17638714)]

33. Downs SH, Black N. The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. J Epidemiol Community Health. 1998 Jun;52(6):377–84. [[PMC free article](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1756728/)] [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/9764259)]

34. Higgins JPT, Altman DG, editors. Cochrane Handbook of Systematic Reviews of Interventions Vol. 5.0.0. The Cochrane Collaboration; 2008. Chapter 8: Assessing risk of bias in included studies: Table 8.5.c.

35. van Gaal BG, Schoonhoven L, Mintjes JA, et al. Fewer adverse events as a result of the SAFE or SORRY? programme in hospitals and nursing homes. part i: primary outcome of a cluster randomised trial. Int J Nurs Stud. 2011 Sep;48(9):1040–8. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/21419411)]

36. van Gaal BG, Schoonhoven L, Hulscher ME, et al. The design of the SAFE or SORRY? study: a cluster randomised trial on the development and testing of an evidence based inpatient safety program for the prevention of adverse events. BMC Health Serv Res. 2009;9:58. [[PMC free article](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2675519/)] [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/19338655)]

37. Shortell SM, O'Brien JL, Carman JM, et al. Assessing the impact of continuous quality improvement/total quality management: concept versus implementation. Health Serv Res. 1995 Jun;30(2):377–401. [[PMC free article](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1070069/)] [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/7782222)]

38. Gillies GL, Reynolds JH, Shortell SM, et al. Implementing continuous quality improvement. In: Kimberly J, Minvielle E, editors. The Quality Imperative Measurement and Management of Quality in Healthcare. London: Imperial College Press; 2001.

39. Neily J, Howard K, Quigley P, et al. One-year follow-up after a collaborative breakthrough series on reducing falls and fall-related injuries. Jt Comm J Qual Patient Saf. 2005 May;31(5):275–85. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/15960018)]

40. Browne JA, Covington BG, Davila Y. Using information technology to assist in redesign of a fall prevention program. J Nurs Care Qual. 2004;19(3):218–25. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/15326991)]

41. Capan K, Lynch B. A hospital fall assessment and intervention project. JCOM. 2007;14(3):155–60.

42. Dempsey J. Falls prevention revisited: a call for a new approach. J Clin Nurs. 2004 May;13(4):479–85. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/15086634)]

43. Gutierrez F, Smith K. Reducing falls in a Definitive Observation Unit: an evidence-based practice institute consortium project. Crit Care Nurs Q. 2008 Apr-Jun;31(2):127–39. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/18360143)]

44. Kolin MM, Minnier T, Hale KM, et al. Fall initiatives: redesigning best practice. J Nurs Adm. Sep;40(9):384–91. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/20798621)]

45. McCollam ME. Evaluation and implementation of a research-based falls assessment innovation. Nurs Clin North Am. 1995 Sep;30(3):507–14. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/7567575)]

46. O'Connell B, Myers H. A failed fall prevention study in an acute care setting: lessons from the swamp. Int J Nurs Pract. 2001 Apr;7(2):126–30. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/11811315)]

47. Rauch K, Balascio J, Gilbert P. Excellence in action: developing and implementing a fall prevention program. J Healthc Qual. 2009 Jan-Feb;31(1):36–42. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/19343900)]

48. Semin-Goossens A, van der Helm JM, Bossuyt PM. A failed model-based attempt to implement an evidence-based nursing guideline for fall prevention. J Nurs Care Qual. 2003 Jul-Sep;18(3):217–25. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/12856906)]

49. Weinberg J, Proske D, Szerszen A, et al. An inpatient fall prevention initiative in a tertiary care hospital. Jt Comm J Qual Patient Saf. Jul;37(7):317–25. [[PubMed](http://www.ncbi.nlm.nih.gov/pubmed/21819030)]

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