

# **Breaking the Fall Cycle: A Survey of State of the Art Technology and Protective Devices**

## **Teaching Guide**

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## **Biography**

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# Introduction

Within long-term care facilities (e.g., nursing homes and assisted living centers) falls constitute the single largest category of adverse events. Up to 75% of residents experience one or more falls. Although most falls are injury-free, 10% to 25% result in hospital admission and/or fractures. Consequently, long-term care facilities need to address the issue of resident falls. To a large extent, effective fall prevention is dependent upon caregivers adhering to a structured process that consists of timely fall risk and post fall assessments and targeted multidisciplinary interventions based on identified risk factors and/or causes of falls. To support caregivers in their efforts to manage falls, a number of technologies related to reducing the hazards associated with falls have emerged as important strategies against the threats to resident safety. The most common fall management technologies include:

- Fall alarms (e.g., device designed to alert caregivers that the resident is getting up from bed, chair/wheelchair or toilet unassisted).
- Injury protection devices (e.g., hip protectors designed to reduce the impact of a fall and hip fracture, low beds designed to reduce risk of fall-related injury from bed, and cushioned floor mats designed to create a “landing area” and prevent an injury in the event of a fall out of bed).

Fall management technology can play a vital role in preventing falls and/or minimizing the adverse effects associated with falls. However, technology that is inappropriate for residents or poorly implemented into existing delivery systems, may actually predispose to falls and injuries.

The purpose of this manual is to:

- Provide an overview of falls in long term care facilities and the components of a ‘best practice’ fall prevention program
- Provide an overview of various technologies or products available to assist with fall prevention and injury efforts.
- Provide guidance on fall alarms and implementing a fall alarm program
- Provide guidance on preventing hip fractures with hip protectors and implementing a hip protector program
- Provide guidance on the successful selection and implementation of technology in residential care settings.

# Steps to Organizing a Fall Prevention Program

The success of fall prevention, to a large extent, is dependent upon facility staff:

## Knowing About Falls

- With an increased knowledge of why, when, where and how residents fall (Table 1) and what factors are associated with fall risk (Table 2), staff will be able to more easily identify residents at risk and explore appropriate solutions aimed at reducing fall risk .

## Table 1 About Falls

### Why Falls Occur

Falls are complex events caused by multiple internal factors (e.g., acute and chronic diseases and adverse medication effects) and/or external or hazardous environmental conditions (e.g., slippery floor surfaces, poor lighting, elevated bed heights, unstable or inappropriate furnishings, bed rails, unsupportive footwear, etc.).

Although falls occur all too frequently, not all falls are preventable. Up to 10% of falls occur because of acute medical events, such as fainting and dizziness. In most instances, these falls cannot be predicted and, thereby, are not preventable.

The overwhelming majority of falls, however, are due to a host of underlying risk factors (e.g., altered mental status, visual impairment, functional impairments, frequent toileting needs and polypharmacy), which are potentially preventable.

### Where Falls Occur

The majority of falls occur from, or near, the resident's bed, and account for up to half of all falls. Other common fall locations are the bathroom and toilet.

### When Falls Occur

Most falls occur during the early period of institutionalization or first 72 hours of stay, during nighttime hours, and post-meal times.

### How Falls Occur

The most frequently cited activity at the time of falling is transferring from a bed, chair or toilet. Other activities commonly associated with falls include toileting and getting up from bedside commodes and wheelchairs.

**Table 2 Fall Risk Factors**

<p><b>Internal or Health Factors</b></p>	<p>Recent falls (a history of falls is the best predictor of future falls).</p> <p>Poor vision (cataracts; macular degeneration; glaucoma)</p> <p>Lower extremity dysfunction (arthritis; muscle weakness; impaired sensory function)</p> <p>Unsteady gait/balance (stroke; Parkinson's disease, etc.)</p> <p>Uses cane/walker (ambulation aids are a marker for underlying gait/balance disorders)</p> <p>Elimination problems (excessive night time urination; incontinence)</p> <p>Altered cognition (dementia; depression; agitation) Fear of falling (leads to over-precaution, fear of walking, and consequently, weakness, poor balance, and increased fall risk)</p> <p>Polypharmacy ( 4 or more prescription drugs)</p> <p>Medication side effects (especially drugs that affect central nervous system, such as sedatives and tranquilizers)</p> <p>Mobility impairment (bed, toilet, and chair/wheelchair transfers)</p> <p>Foot deformities (corns, calluses, bunions can destabilize gait)</p>
<p><b>External or Environmental Factors</b></p>	<p>Toilets (lack of equipment for support, such as grab bars)</p> <p>Furnishings (inappropriate bed/chair heights )</p>

	<p>Floors (loose or thick-pile carpeting, sliding rugs, highly polished or wet ground surfaces)</p> <p>Poor lighting (lack of night lights)</p> <p>Footwear (ill-fitting shoes, slippery soles)</p> <p>Assistive devices (improper and/or broken cane, walker or wheelchair)</p> <p>Bed rails (rather than preventing falls, bed rails increase risk for injurious falls)</p> <p>Clutter in rooms or hallways.</p>
<p><b>Behavioral Factors</b></p>	<p>Certain resident activities may increase the risk of falls. Examples are:</p> <p>Walking in stocking feet.</p> <p>Rushing to the bathroom (especially at night when not fully awake or when lighting may be inadequate).</p> <p>Failing to use a cane or walker for balance support.</p> <p>Exhibiting unsafe behavior (overestimation of one’s abilities to self-transfer and ambulate, poor safety awareness, desire not to “bother” staff for assistance, and resistance to care).</p>
<p><b>Situational Factors</b></p>	<p>New admission/post-fall (many falls occur during the first week after admission and immediately following a fall).</p> <p>Post-meal times (need for toileting).</p> <p>Night-time hours (many falls occur at night; often while traveling to the bathroom and/or transferring from bed).</p> <p>Acute diseases and/or change in condition (e.g., urinary infection, pneumonia, acute dehydration, CVA, TIA, acute medication reaction, sudden hypoglycemia or hyperglycemia, etc.).</p>

## Adhering to a Clinical Process

- Having an organized approach or process of care to preventing falls will help identify factors contributing to falls and fall risk and finding solutions to reducing the risk of falling (Table 3).

**Table 3 Key Components of Fall Prevention**

<b>Steps</b>	<b>Actions</b>
<b>Assessing Fall Risk</b>	<ul style="list-style-type: none"><li>• The main purpose of risk assessment is to identify those residents most likely to fall. The rationale for a risk assessment is that if residents at high fall risk can be identified, then appropriate strategies can be instituted to reduce risk.</li><li>• Baseline fall risk assessments should be completed upon admission (within 2 hours of admission).</li><li>• Reassessment of fall risk needs to be ongoing; completed whenever residents experience a change of condition or medication, daily/every shift in certain high risk patients/residents (e.g., recent confusion, taking sedatives, recent fall, temporary acute illness, etc.), and immediately post-fall.</li></ul>
<b>Multidisciplinary Evaluation</b>	<ul style="list-style-type: none"><li>• Following risk assessment, an attempt should be made to identify the cause(s) of all risk factors identified. Since most residents will have multiple risk factors, multidisciplinary referral and evaluation is necessary.</li><li>• The risk assessment and subsequent multidisciplinary evaluations completed serve as the basis for selection of risk reduction strategies.</li></ul>



<p><b>Care Planning</b></p>	<ul style="list-style-type: none"> <li>• A fall prevention program is only useful if there is also an effective treatment or strategy available to reduce risk.</li> <li>• For those residents "at-risk", strategies (e.g., medical, nursing, rehabilitative and environmental interventions) needed to be targeted towards identified risk factors.</li> <li>• It's important to remember that as risk factors change, strategies may have to change as well.</li> </ul>
<p><b>Post-Fall Assessment</b></p>	<ul style="list-style-type: none"> <li>• All residents who fall should receive a post-fall assessment. The purpose of this assessment is to discover what caused the fall and to prevent another fall from occurring.</li> <li>• Key components of the post fall assessment include: identifying all internal and/or external factors contributing to the fall and identifying the presence of any new or additional risk factors. This information is very helpful in conducting an analysis of the fall (i.e., asking, "What happened?" and "Why did it happen?"), and designing appropriate strategies to prevent further falls.</li> </ul>

Aside for knowing about falls and having an organized clinical approach towards fall prevention, which are important starting points in organizing a fall prevention program, there are a number of other steps that long-term care facilities can take to achieve an effective fall prevention program.

**Establish a “Culture of Safety”**

A “culture of safety” refers to an environment of “no shame, no blame” in which staff are not blamed for falls, but rather falls are looked at as an opportunity of doing things better.

Facilities that promote a culture of safety encourage:

- An open atmosphere where staff members can report falls and safety concerns without fear of punishment.
- Identification of system or process errors, evaluating causes, and implementing appropriate actions to improve performance in the future.

### **Appoint a Falls Nurse Coordinator or Champion**

Identify a nurse fall coordinator or champion to support and follow through with your fall prevention program. The fall coordinator pulls together a facility's fall prevention program, takes responsibility to make things happen and sees what needs to be changed and improved. The fall coordinator's task may include:

- Raise awareness about the importance of preventing falls
- Provide ongoing education of staff and training of new staff.
- Oversee staff compliance with the fall prevention care process.
- Ensure that communication of residents at fall risk occurs between staff and shifts.
- Provide guidance in individualizing and targeting the resident care plan.
- Collect falls data and evaluate patient outcomes.
- Review fall cases and post-fall outcomes.
- Provide supportive feedback to staff regarding falls and prevention activities.
- Maintain equipment (i.e., fall alarms, hip protectors, ambulation aids, fall mats, etc.) and serve as the main "connection" with equipment vendors.
- Maintain and update fall prevention guidelines, policies and protocols.
- Problem solve; eliminate roadblocks and communication problems between staff team members.
- Provide administration with feedback on resource needs (e.g., staff, equipment, etc.).

### **Promote Education**

Ongoing staff education regarding fall prevention is essential. The purpose education is to increase staffs' confidence, knowledge, skills and abilities in the identification of residents at risk of falling and to appropriately select interventions for the prevention of falling.

- Staff should receive training on the fall prevention care process and available interventions used by the facility to prevent falls, especially the appropriate use of fall preventive equipment (e.g. bed alarms, low beds, hip protectors, etc.).
- When designing educational programs, it's important to include discussions on specific medications, diseases and disorders associated with falls within the facility.
- Education should occur during orientation and, subsequently, on a regular basis (i.e., audits of the care process can be used to detect any deficient practices and identify educational topics).

Ongoing communication and involvement of residents and their families is an important ingredient of fall prevention.

- Educate residents, as appropriate, and/or their family about falls and safety awareness, individual risk factors, and interventions aimed at preventing falls.
- Enlist the help of families as they too can assist in preventing falls (i.e., if families are aware of why the resident is at fall risk, they can communicate any potentially risky behavior and/or conditions to staff).

### **Develop a Fall Management Committee**

- A fall management or safety committee, composed of medical and nursing staff, physical and occupational therapists and administration, is useful in discussing residents at risk for falls, specific cases of falls and strategies to minimize fall risk. The committee may be especially useful in evaluating residents with recurrent falls

### **Conduct Quality Improvement Activities**

Beneficial quality improvement efforts include:

- Auditing the fall prevention process (i.e., evaluating whether staff are assessing risk, implementing interventions, etc.). This can help separate what you think is happening from what is really happening.
- Developing a falls surveillance system for monitoring the nature and severity of falls and contributing factors.
- Reviewing incident reports, tracking and trending falls, measuring fall rates and making recommendations for improvement.

### **Administrative Support**

Strong administrative or management leadership is essential for fall prevention. The primary role of leadership is to make safety a top priority within the facility and to support staff in their efforts to prevent falls. Important tasks to consider include:

- Making falls and injury prevention an explicit and important aspect of the facility's planning program and budget allocation.
- Keeping all policies, procedures and manuals updated.
- Ensuring the availability of required staff and/or equipment resources.
- Making available a primary medical provider experienced in geriatric care to help direct and/or coordinate fall prevention activities.
- Developing a process for recognizing and rewarding the efforts of staff for their falls prevention efforts

## **Fall Management Technology**

## **Warning Devices**

### **Fall Alarms**

Despite all fall prevention strategies, some residents remain at fall risk. Fall alarms are designed to warn nursing caregivers that residents, who shouldn't be leaving the bed, chair or wheelchair, or toilet unassisted, are doing so. Fall alarms can also warn a resident that they are “doing something that they shouldn't be.” In some cases the sound of the alarm may remind the resident to call for assistance and prompt them to sit back down.

Fall alarms are not designed to prevent the resident from getting up nor are they designed to prevent the patient from falling. Alarms only let caregivers know that a hazardous ‘situation’ is occurring, which can improve the timeliness of staff response to a fall risk situation. In other words, it's not the fall alarm but the response of staff to the alarm that can potentially prevent falls from occurring. There are several types of exit alarms available on the market

#### ***Pressure Pad Alarms***

- Consists of a thin pad (placed on top or underneath a bed mattress; on a chair or wheelchair seat) and a control unit (typically mounted on the bed or chair). The pad senses changes in weight and pressure; if the resident gets up from a bed or chair, the alarm sounds. Pad alarms are also available for use on toilet seats to detect unsafe egress.

#### ***Pull-String Alarms***

- Consists of an adjustable length cord and garment clip that is attached to the resident's clothing. The end of the cord is attached to the control unit via a small magnetic disc or ball. The alarm is activated when the resident exits the bed, chair/wheelchair or toilet and the cord detaches from the control unit. Pull-string alarms equipped with a prerecorded voice message (i.e., instructing the resident to not get up until help arrives) are available. These alarms activate automatically when the cord detaches from the control unit.

#### ***Floor Mat Alarms***

- Alarm consists of a pressure-pad mat placed on the floor alongside the bed, chair, wheelchair or toilet. The alarm unit is activated when the resident's foot pressure is applied to the mat.

#### ***Infrared Alarms***

- Alarm consists of directional infrared sensors that send a beam over the top or alongside the bed. The alarm is activated when the beam is broken (i.e., resident sits up in bed and puts their legs over the side of the bed).

There are benefits and disadvantages to most fall alarms. Consequently, choosing the “right” fall alarm for residents is crucial. To a large degree, the right alarm will depend on certain resident characteristics that may interfere or defeat the use of fall alarms, such as dementia, restless behavior, incontinence, being light weight, etc.

## **Injury Protection Devices**

### **Hip Protectors**

The majority of hip fractures occur as a result of a fall. Hip protectors are devices designed to ease the impact of a fall on the hip bone and help to prevent hip fractures.

#### ***Absorptive Pad Protectors***

- Consists of soft foam pads that are held in place at the hips with specially designed removable briefs or underwear (i.e., the pads are either sewn into or inserted inside pockets located over each hip). The light weight garments come in a range of sizes to ensure proper fit.

The risk of hip fracture when falling while wearing hip protectors compared with a fall with no hip protector in place is significantly reduced. The best use of hip protectors is in those residents at greatest hip fracture risk (e.g., highly medicated, seizure disorder, balance impairment, cognitive impairment, brittle or weak bones and multiple falls). In addition to preventing hip fractures, hip protectors offer psychological benefits (i.e. wearers feel more confident in completing tasks safely) and, as a result, became more physically active, and require less assistance with activities of daily living. As well, caregivers have a reduced ‘fear of injury’ when residents at fall risk are wearing hip protectors.

### **Low Beds**

Low beds, which sit less than eight inches from the floor, may be utilized to eliminate the risk of serious injury caused by falls from beds at higher heights. These beds are typically used for residents who are at risk for falling so that if they do fall out of bed they only fall a short distance, thus minimizing the injury associated with falling out of bed. There are two types of low beds:

#### ***Fixed or Stationary Low Beds***

- These beds rest about 3 inches from the floor. While these beds are effective in reducing the risk of injurious falls, they may increase the risk of caregiver injury (i.e., back and other ergonomic injuries) because the beds are not height adjustable.

#### ***Height-Adjustable Low Beds***

- These beds are a good choice for both high injury risk residents and caregivers. The advantage of height-adjustable over fixed-adjustable low beds is that caregiver staff can raise the bed to their waist height or a comfortable working height during resident care activities (e.g., turning and lifting residents, changing linens and clothing, transferring residents to chairs and other devices,

etc.). As well, height –adjustable beds are beneficial for short-height residents who have difficulty getting up from standard height beds safely because their feet don't reach the floor.

## **Fall Mats**

### **Cushioned Floor Mats**

- In those residents with repeated falls, cushioned floor mats may be used to prevent injurious falls (i.e., high density foam in the mat absorbs the impact if an individual fall). Fall mats can be used in areas where a resident could be injured from a fall on a hard floor such as the side of a bed, by a toilet or in front of a chair.
- Mats are available in various sizes 1" or 2" thick; some mats are designed with beveled edges (i.e., the tapered edge prevents tripping in resident and caregivers, and allows wheelchairs to easily roll on and off the mat). Floor mats have a durable vinyl cover, which wipes clean for easy care; a slip-resistant bottom keeps the mat securely in place and many mat designs folds in half for easy storage. Some floor mats are designed for use in conjunction with a bed exit or fall alarm mat (i.e., when the resident gets up from bed or chair and steps on the mat, their body-weight activates an alarm).
- The downside of floor mats, especially those that are thick, is that some residents with poor balance can experience even more unsteadiness when walking or standing on the mat, which can increase their risk of falling. Height adjustable low beds kept in the low height position can be used as an alternative to using floor mats.

# Implementing a Fall Alarm Program to Reduce Fall Risk

## Introduction

Fall alarms serve as an "early warning system"; they alert nursing staff when "at-risk" residents are engaging in activities that are likely to result in falls. Fall alarms can play a vital role in helping staff to prevent falls. However, the inappropriate selection and/or misuse of fall alarms may actually predispose residents to falls and injuries. The purpose of this article is to provide long term care facilities with guidance on the selection and appropriate utilization of fall alarms in reducing fall risk and guidance on incorporating fall alarms into a fall prevention program.

## Common Uses of Fall Alarms

Fall alarms can serve a variety of useful functions:

- Alarms warn staff that the resident has changed position and is about to leave their bed, chair, wheelchair or toilet. This may give staff enough time to assist the resident.
- Alarms warn staff that the resident has shortly left the bed, chair, wheelchair or toilet. This may give staff enough time to intercept the resident before a fall.
- Alarms promote speedy assistance to residents who have already fallen in order to promptly care for the resident. This can help reduce fall complications, such as the amount of time that a resident lies unaided.
- Alarms, in some cases, can warn residents themselves. When a resident attempts to leave their bed, the fall alarm can activate a verbal reminder through speakers/intercoms reminding the resident to wait for staff. In some cases the sound of the alarm may prompt the resident to sit back in bed, chair, wheelchair or toilet (i.e., the alarm warns the resident that they are "doing something that they shouldn't be doing") and/or remind the resident to call for assistance.
- Alarms may serve as an alternative to nurse call bells in residents who are noncompliant or unable to use their call bell because of cognitive and/or physical impairments. Fall alarms, which do not require active participation by residents to trigger, may be preferable to nurse call systems, which demand active participation by individuals to activate.
- Alarms may serve as an assessment or planning tool by monitoring the frequency of attempts to leave the bed, chair or wheelchair, which can help identify emerging trends and interventions. Coupled with initial and ongoing risk assessments, fall alarms can inform staff about a resident's habits. For example, a resident may consistently attempt to arise at a certain hour to go to the bathroom, while another resident may get up at nonspecific times, driven by an urge to wander. As a result of such a "history," nurses can adjust their attention and care to each resident's habits and needs.
- Alarms allow staff more freedom of time (avoiding constant supervision of residents at risk) and theoretically, completely eliminate the need to continually check on residents who have a tendency to falls. This provides nurses more opportunity to work with residents as opposed to spending time on surveillance or being frequently interrupted to observe patients.

## **Indications for Fall Alarms**

While it can be argued that all residents are at some degree of fall risk and may benefit from a fall alarm, certain residents benefit more than others from an alarm. Consequently, the use of fall alarms should be based on specific resident criteria and/or risk factors.

### **Criteria**

- Resident experiences fall(s) from bed, chair, wheelchair or toilet.
- Resident experiences fall(s) shortly after leaving bed, chair, wheelchair, toilet or is found on floor after an unwitnessed fall.
- Resident has impaired mobility/ demonstrates unsafe bed, chair, wheelchair or toilet transfers.
- Resident has a history of cognitive/communicative problems (e.g., forgets to use call bell or ask for assistance, can't remember or follow instructions).
- Resident has a history of nocturia (i.e., excessive urination at night).

### **Risk Factors**

#### ***History of Falls***

Resident has fallen at least one time in the past 30 days (or other facility specified time frame). A history of falling is one of the most reliable predictors of future falls. Residents with recurrent falls may repeat the circumstance or characteristics of their falls, such as leaving their bed and toileting at night. Knowing the circumstances of a resident's fall(s) can help design targeted interventions and the appropriate use of alarms.

#### ***Balance or Gait Problems***

Resident has problems walking or standing without assistance from a walker or requires staff assistance. Common disorders such as stroke, Parkinson's, dementia and arthritis can affect a patient's balance and ambulation skills.

#### ***4 or More Medications***

Multiple medications can inhibit a resident's motor skills and/or personal safety awareness and increase fall risk. Common drugs include those that act on the central nervous system, such as sedatives and tranquilizers.

#### ***Muscle Weakness***

Any weakness or impairment of the legs and/or arms (e.g., from arthritis, muscular weakness, stroke, etc) can inhibit a resident's safe transfers, ambulation and balance.



## ***New Admission***

Any resident who is newly admitted to a facility should be watched thoroughly until their condition is fully assessed. Many falls occur during the early period of institutionalization or the first 72 hours of stay.

## ***Continence Problems***

Residents who have bladder problems will be more inclined to get up without assistance to use the bathroom. Patients with nocturia, incontinence and those requiring toileting assistance are especially at high fall risk.

## ***Cognitive Problems***

Altered mental status (e.g., confusion, disorientation or impaired memory) is one of the most important risk factors for falling. Cognitive losses can cause errors in judgment (i.e., inability to recognize a difference between safe and hazardous transfers), forgetting to use the nurse call bell or not recognizing the purpose of the call bell (i.e., not making a connection between pushing a button and getting help), and not asking for assistance or not recognizing a need for assistance (i.e., overestimating the ability to transfer and walk safely or denying any mobility limitations).

## ***Mobility Problems***

Inability to ambulate and transfer safely and independently. Diseases directly affecting mobility (i.e., strength, flexibility and balance) include acute and chronic conditions that affect the muscular, skeletal or neurological systems and limit the resident's ability to move about safely.

## **Selection of Fall Alarms**

Selecting the correct or most appropriate fall alarm should be based on a process, which consists of:

- Identify a multidisciplinary team. The decision to introduce alarms affects many levels of the organization; as a result, a multidisciplinary team involving all stakeholders that may be affected by the introduction of alarms should be formed. Team members to consider include key personnel from nursing, medicine and rehabilitative therapy, as well as staff responsible for purchasing decisions, administrative leadership, front-line staff who will be using the technology, family representatives, insurance/legal representatives, quality improvement staff, risk managers, etc.
- Identify which residents could benefit from alarms and/or specific resident groups that fall alarms are intended to target. Performing a root cause analysis of falling events (i.e., asking why the fall occurred and how future falls may be prevented) can sometimes help identify the need for alarms.
- Consider how specific alarms will affect or complement a fall prevention program. Fall alarms work best when integrated into a fall prevention program (i.e., in other words, alarms should not be considered as the sole solution to fall or injury prevention). This is a fact that is not always clearly understood. To be effective, fall alarms need to be implemented with care and with a clear understanding of their benefits and limitations.
- Choose the “right” fall alarm(s) for residents. There are benefits and disadvantages to most alarms. To a large degree, the right alarm will depend on certain resident characteristics that may

interfere or defeat the use of exit alarms, such as dementia, restless behavior, incontinence, being light weight, etc.

- Choose the “right” alarm for staff. Many technologies, including fall alarms, directly affect nursing workload and procedure. Consideration of these issues is paramount when deciding upon which specific alarms to purchase. The best fall alarm is one that nurses find user friendly (i.e., one that is easy to use and does not malfunction and/or result in nuisance alarms). Nursing feedback and involvement in the evaluation, purchasing and implementation process is essential.
- Purchasing the “right” alarm(s). Once a decision has been reached to purchase exit alarms, there are certain features to look for that will help determine which type is the most appropriate.

## **Keys to Success**

Aside from selecting the right fall alarm, the effective use of fall alarms is dependent upon several factors:

- Maintaining strong organizational or management support for fall prevention programs, including use of exit alarms.
- Educating and training staff on the use of fall alarm (s) (i.e., know what fall alarms are, know how fall alarms work and know which residents benefit from an alarm). As well, ongoing staff education on fall prevention and the utilization of fall alarms as a potential preventive strategy is important.
- Checking alarms on a regular basis to ensure that they are functioning properly (i.e., to verify they send an alarm if a patient arises), sufficiently audible with respect to distance and that staff response to alarms.
- Auditing the use of alarms to ensure that staff are using them properly and that alarms are effective in helping to reduce falls.
- Choosing a “champion” or coordinator. Assigning a designated staff member to provide leadership, oversight and coordination for both fall alarms and fall prevention can help to ensure the successful integration of alarms.

## **Summary**

Fall alarms are designed to help nurses monitor residents at fall risk. While exit alarms are not a guarantee against falls, the appropriate use of alarms in combination with multidisciplinary strategies make up a large piece of the “fall prevention” puzzle.

# Preventing Fractures with Hip Protectors

## Introduction

Falls in long-term care facilities (e.g., nursing homes and assisted living facilities) are a major health concern. It's estimated that up to 50% of residents fall yearly (1) (2). Hip fracture is one of the most serious consequences from falling. While 1-2% of falls result in a hip fracture, more than 95% of hip fractures are caused by a fall (3). Hip fractures are a major threat to the health and well-being of residents. Approximately 20% of residents suffering hip fracture die within six months of injury and only about 40% of survivors return to pre-fracture functioning (3). Many residents experience pain, anxiety and fear of falling and/or injury, which can persist for years after a fracture. Consequently, long-term care facilities need to include focus on preventing hip fractures.

To date, multidisciplinary strategies designed to reduce hip fracture include efforts to reduce falls, improve gait and balance, increase bone strength, and modify hazardous environmental conditions. However, these strategies have met with only partial success in reducing hip fractures. One approach that could potentially prevent hip fractures is the use of hip protectors. The purpose of this article is to provide guidance on the use of hip protectors in long-term care settings.

## What is a Hip Protector?

Most hip fractures are due to ground-level falls while the resident is standing or walking; up to 75% of hip fractures occur under these circumstances (3). In most cases, the immediate cause of hip fracture is a sideways fall with direct impact on the hip (i.e., the greater trochanter of the proximal femur). Falls to the side, in contrast to falls forward or onto the buttocks, increase the risk of hip fracture (4). Several factors are associated with the risk of hip fracture following a fall. In addition to a loss of bone strength (i.e., osteoporosis), one of the principle determinants of injury is a reduction of soft tissue or fat covering the hip area. As a result, the hip's ability to withstand an impact with a hard floor surface and protect against a hip fracture is diminished (3).

Hip protectors are a device designed to absorb and disperse the impact of a fall on the hip bone, which helps to reduce the risk of hip fracture. In essence, hip protectors act as shock absorbers around the hip providing a cushion between the hip bone and impact surface. Current design of hip protectors consists of high impact absorbing foam pads that are held in place at the hips with specially designed removable briefs or underwear (i.e., the pads are either sewn into or inserted inside pockets located over each hip). Some models include a removable tailbone pad to protect against injury. These light weight, stretchy garments come in a range of sizes to ensure proper fit.

## Who Benefits from a Hip Protector?

### Residents

While all residents may potentially benefit from wearing a hip protector, the best use of a hip protector is in those residents who are at the greatest risk of hip fracture. These include residents with:

- History of injury following a fall
- History of osteoporosis and multiple falls
- Balance impairment
- Diseases (e.g., stroke, Parkinson’s disease, diabetes, Alzheimer’s disease, etc.) associated with balance loss and hip fracture risk.
- Medications associated with balance loss and falls (e.g., narcotics, sedatives or antidepressants, etc.).
- Seizure disorder
- Frequent nocturia (i.e., nighttime toileting)
- Dementia with agitated behaviors
- Fear of falling and/or injury (i.e., hip protectors offer psychological benefits; wearers feel more confident in completing tasks safely and, as a result, became more physically active, and require less assistance with activities of daily living.

### ***Caregivers***

- Nurses and nursing assistants experience reduced ‘fear of injury’ when residents at fall and hip fracture risk are wearing hip protectors.
- Hip protectors provide nurses with an additional injury prevention strategy that is more far-reaching in its applicability than current devices in use (e.g., low beds and floor mats), which are limited to guarding against injurious falls from bed. While many falls with injury occur in the resident’s bedroom, injurious falls and hip fractures occur throughout the facility.

### ***Long-term Care Facilities***

Fewer reports of hip fractures can result in:

- Improved facility quality ratings.
- Improved state and other survey results with regard to fall prevention.
- Improved healthcare cost savings (5) (6).

### **Are Hip Protectors Effective?**

Hip protectors are effective in reducing the incidence of hip fractures in long-term care settings, especially in high-risk residents (7) (8). The risk of suffering a hip fracture when falling and wearing a hip protector, compared to not wearing a hip protector, is greatly reduced. It’s estimated that hip fractures can be reduced by as much as 60% with the use of hip protectors (9).

While the effectiveness of hip protectors is evident, low compliance is a major obstacle in the effective use of hip protectors. The effect of hip protectors is obviously very much linked to where the protector is – whether it is protecting the hip or in a drawer. Clearly, hip protectors will only work if they are worn. Major compliance problems associated with the use of hip protectors and solutions to increase compliance

are included in Table 1(4). With improved compliance, which is both feasible and sustainable in at-risk long-term care residents, hip protectors are an effective prophylactic against hip fractures (10).

## **Key Components of Implementing Hip Protectors**

The ability to prevent hip fractures and appropriately use hip protectors is dependent upon nursing staff adhering to a clinical process or practice of care, which assists staff in identifying factors contributing to hip fracture risk and deciding on the use of hip protectors as a strategy (4). The key components of a “best practice” approach to implementing hip protectors consists of identifying residents at risk of falls and hip fracture, assessing the need for a hip protector, determining hip protector use, communicating the resident’s risk status and hip protector use to all staff, and monitoring the effect of the hip protector.

## **Assessing Fall and Injury Risk**

The purpose of risk assessment is to identify those residents most likely to fall and raise staff awareness of hip fracture risk. The rationale for this assessment is that if residents at high risk can be identified, then appropriate interventions, such as providing a hip protector, can be instituted to minimize their risk of injury. Therefore, conducting a fall and injury risk assessment (Table 2) represents an important starting point in attempting to reduce hip fractures.

Using a formal risk assessment is important as leaving the assessment of risk solely to “staff judgment” alone is risky; some staff have better judgment than others. A basic fall and injury risk assessment, which can be implemented in most long-term care settings, is included in Table 2. When implementing a fall and injury risk assessment, it’s important to select a process that is user friendly for staff (i.e., staff will not be adherent with an onerous process). Assessment of risk should take place at the time of admission, post-fall and whenever residents experience a “change of condition”.

## **Assessing Need for Hip Protectors**

If the resident has one or more of the risk factors included in Table 2 and altered mobility, they may be a candidate for a hip protector. The type of resident most suitable for a hip protector include those who are unsteady and have frequent falls, history of fractures from falls, osteoporosis and/or limitations of activity secondary to fear of falling.

## **Determining Use of Hip Protectors**

Once the decision has been made to use a hip protector, the next step is to determine when the hip protector is used (e.g., every day, every night, every day and night, during specific activities only, such as bathing/showering, exercising, etc.). It’s important that this information is communicated to all staff caring for the resident. Small cues can be left in different locations so that nursing staff are reminded of when hip protectors should be worn.

## **Communicating Risk**

Once a resident's risk of hip fracture risk has been identified and a decision on using a hip protector has been made, it's crucial that their risk status, specific risk factors and use of the hip protector are communicated to all nursing staff involved. Communication of risk can be achieved by means of:

- Posting a daily list of residents who are assigned to wear hip protectors.
- Using shift reports to communicate which residents are assigned hip protectors.
- Using of colored stickers (i.e., placing hip protector symbol on the resident's chart, on the bedroom wall above the bed, etc.) or wrist bands to identify residents who should and are wearing hip protectors. In this way, everyone in the facility knows that residents wearing a colored wristband for example are “at risk” and should be wearing a hip protector.

## **Monitoring**

Because hip fracture risk is a dynamic process, often subject to change, monitoring of residents “at-risk” should occur on a regular basis. The purpose of monitoring is to:

- Detect any change of condition (e.g., diseases, cognition, mobility and new medications) and reassess injury risk.
- Evaluate the compliance and effectiveness of the hip protector in reducing hip fracture risk.
- Decide on what to do next if the hip protector is not effective in reducing risk.

## **Achieving a Successful Hip Protector Program**

Aside from having in place an organized approach towards identifying risk of hip fracture and appropriate selection of hip protectors, there are a number of other steps that long-term care facilities can take to achieve an effective hip protector program.

### **Appoint a “Hip Protector” Nurse Coordinator or Champion**

Identify a nurse champion to support and follow through with the hip protector program. This individual pulls together a facility's hip protector program, takes responsibility to make things happen and sees what needs to be changed and improved. The hip protector champion's task may include:

- Familiarize staff hip protectors and its role in the prevention of hip fractures.
- Provide ongoing education of staff and training of new staff with respect to hip protectors.
- Oversee staff compliance with hip protectors.
- Ensure that communication of residents using hip protectors occurs between staff and shifts.
- Collect data and evaluate resident outcomes with respect to hip protectors.
- Provide supportive feedback to staff regarding hip protector use.
- Maintain hip protectors and serve as the main “connection” with hip protector vendors.
- Maintain and update hip protector guidelines, policies and protocols.
- Problem solve; address compliance and other issues with hip protector use.

- Provide administration with feedback on hip protectors (i.e., hip protector effectiveness, numbers of hip protectors needed, etc.).

## **Provide Education**

### ***Staff Education***

Ongoing staff in-service regarding hip protector use is essential and hip protectors should only be implemented in combination with an educational program. The purpose of education is to increase staffs' knowledge and skills in identifying residents at risk of hip fracture and the appropriate use of hip protectors. When designing in-service programs, it's important to include discussions on measuring residents for proper size, types of residents best suited for hip protectors, number of hip protectors each resident should receive, how hip protectors should be worn, and how to overcome common hip protector compliance problems. It's important to include Nursing Assistants as they are the staff that will utilize hip protectors the most. Education should occur during facility orientation and, subsequently, on a regular basis (i.e., audits of the care process can be used to detect any deficient practices and identify topics for in-service). Laundry and housekeeping should be in-serviced as well with respect to the handling and laundering of hip protectors.

### ***Resident and Family Education***

Promotion of ongoing communication and involvement with the residents and their families is an important ingredient to the success of a hip protector program. Educate residents, as appropriate, and/or their family about hip fracture risk, hip protectors and why hip protectors are being used. It's important to enlist the help of families as they too can assist in preventing hip fractures (i.e., if families are aware of why the resident is at risk, they can communicate any potentially risky behavior and/or conditions to staff).

## **Create a System of Administrative Support**

Strong administrative or management leadership is essential for the successful use of hip protectors. The primary role of leadership is to make hip fracture prevention a top priority within the facility and to support staff in their efforts to prevent fractures, including the use of hip protectors. Important tasks to consider include:

- Make hip protectors an explicit and important aspect of the facility's planning program and budget allocation.
- Conduct regular audits of fall and injury prevention activities (i.e., determine whether staff are assessing hip fracture risk and implementing hip protectors appropriately). This helps separate what you think is happening from what is really happening.
- Ensure that adequate numbers of hip protectors are available.
- Keep all policies, procedures and manuals related to hip protectors updated.

- Develop a process for recognizing and rewarding the efforts of staff for their efforts related to the successful use of hip protectors.

## Summary

Hip protectors are an effective strategy for reducing fall-related hip fractures in long-term care settings. The success of a hip protector program is enhanced by educational activities and administrative support, and a nurse champion to assume responsibility for the hip protector program.

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**Table 1 Compliance problems with hip protector use and solutions to increase compliance**

Adherence Factors	Problems	Solutions
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<b>Resident</b>	<p>Does not accept HP; low perception of hip fracture risk.</p> <p>Uncomfortable (too tight; poor fit; pads move).</p> <p>Incompatibility with urinary incontinence</p> <p>Difficult to put HP on independently</p>	<p>Resident education; compliance increases if information about risk of fracture/HP is provided. Fallers tend to have more of a positive view of HP than nonfallers.</p> <p>Committed staff who demonstrate understanding and support are vital in encouraging ongoing HP use.</p> <p>Make sure that HP fit correctly. HP needs to be fitted for the correct size, to fit snugly.</p> <p>Select HP specific for incontinence. HP can be worn with incontinence wear, if necessary.</p> <p>Amount of help needed putting HP on will vary depending on upper extremity strength and dexterity; using a HP that is one size larger may help (make sure pads remain aligned with/cover hips).</p> <p><b>Note:</b> Since dressing and undressing can increase the risk of balance loss/falls and hip fractures, only staff should put on/take off HP. If patient self-dress, observe balance while putting on HP.</p> <p>In general, when demented individuals acquire habit of</p>
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	Incompatibility with cognitive impairment and dementia (inability to comprehend reason for HP; may see HP as nuisance item).	wearing HP, they continue to wear it.
<b>Staff</b>	<p>Skepticism of HP (does not perceive “usefulness” or efficacy)</p> <p>Forgets to use HP</p> <p>HP not available</p>	<p>Structured education of staff can substantially improve adherence with HP.</p> <p>Allow involvement/input of staff in the implementation process helps with HP “buy-in”</p> <p>Attitude and motivation is crucial in achieving good staff compliance with HP. Also, motivated staffs are instrumental in convincing patients to wear HP.</p> <p>Compliance is likely to be improved when staff are educated about the likely benefits of HP and HP become part of usual everyday practice.</p> <p>Incorporating HP into fall prevention guidelines or protocol helps staff with compliance.</p> <p>Keep/store HP at bedside.</p>
<b>Facility</b>	HP not available	Have a sufficient number of HP available within facility; in different sizes. Number of HP needed is dependent upon number of individuals “at-risk”. In general, each resident will require 3 HP.

	<p>HP not available because of laundering practices (long turn around period; getting lost in wash)</p>	<p>It's a good idea to assign one staff member in facility that is responsible for HP program/purchase decisions.</p> <p>Each facility will need to formulate a policy for staff handling of soiled HP and laundering of HP.</p> <p>HP can be worn over light underwear to avoid the need for daily washing.</p>
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**Table 2 Fall and Injury Risk Assessment**

**Inquire about:**

- Previous falls/injurious falls
- Drugs (especially psychotropics/sedatives)
- Altered cognitive function
- Lower/upper extremity weakness
- Osteoporosis
- Elimination problems (urinary incontinence, frequency)
- Ambulatory aid use (cane/walker)
- Altered mobility (unsteady gait/balance; impaired transfers) (\*)

(\*) Observe the resident:

- Get up from a chair (without use of armrests, if possible)
- Stand still momentarily
- Walk forward 10ft
- Turn around and walk back to chair
- Turn and sit down in the chair

Factors to note:

- Transfers from sitting to standing
- Stability of walking
- Ability to turn without staggering/balance loss

## **Fall Management Technology: Care Process for Nurses (RNs) and Certified Nursing Assistants (CNAs)**

As members of the interdisciplinary team, RNs and CNAs play a crucial role in the effective use of fall prevention and/or injury reduction technology. During the care planning process, RNs and CNAs play a distinct and collaborative role in identifying fall/injury risk, developing strategies for fall prevention and utilizing fall management technology that is tailored to the unique needs of each individual resident.

<b>Fall Prevention Care Process</b>		
<b>Steps</b>	<b>RN Role</b>	<b>CNA Role</b>
<b>Fall Risk Assessment</b>	Identify residents at high risk for falling and specific fall risk factors.	Observe residents for any 'change in condition' and report to RN any changes noticed.
<b>Interim Plan of Care (POC)</b>	Based on identified fall/injury risk factors:  Consider resident/nursing needs and short-term use of fall prevention and/or injury reduction technology to support nursing measures in care of high risk residents  Initiate referral and further assessment to interdisciplinary team members.	Follow procedures/care plan for high-risk residents.  Observe residents and report to RN any deviation from plan of care  Report to RN operational and/or compliance issues with fall prevention and/or injury reduction technology.
<b>Plan of Care (POC)</b>	Based on feedback from interdisciplinary referrals, design interdisciplinary measures/interventions to reduce fall/injury risk,  Consider continuing/adding fall prevention and/or injury reduction technology to support POC.	Follow procedures/care plan for high-risk residents.  Observe residents and report to RN any deviation from plan of care  Report to RN problems and/or compliance issues with fall prevention and/or injury reduction technology.
<b>Education</b>	Provide education to residents/family members about POC and specific fall prevention and/or injury reduction technology in use.  Educate CNA on understanding	Reinforce education to residents/family members about POC and specific fall prevention and/or injury reduction technology in use.  Review procedures and protocols

	<p>need/use of fall prevention and/or injury reduction technology.</p> <p>Request feedback from CNA on knowledge/ understanding fall prevention and/or injury reduction technology in use.</p>	<p>related to fall prevention and/or injury reduction technology in use.</p>
<b>Monitor</b>	<p>Ensure POC and procedures for high-fall risk residents are in place, including fall prevention and/or injury reduction technology.</p> <p>Assess outcomes/staff compliance with fall prevention and/or injury reduction technology (*).</p>	<p>Observe residents for any ‘change in condition’ and report to RN any changes noticed.</p> <p>Report to RN any deviation from plan of care</p> <p>Report to RN problems and/or compliance issues with fall prevention and/or injury reduction technology.</p>
<b>Evaluate</b>	<p>Following fall risk assessments and post-fall evaluations, consider re-design of POC and use of fall prevention and/or injury reduction technology.</p>	<p>Provide feedback to RN on benefits and/or problems associated with fall prevention and/or injury reduction technology.</p>

(\*). In the event of poor outcomes with fall prevention and/or injury reduction technology, consider:

### **Resident Factors**

- Technology is not appropriate for identified risk factors
- Resident defeats or does not use technology

### **Staff/User Factors**

- Failure to list technology in POC
- Unfamiliar with technology
- Misuse of technology
- Technology not available or not found
- Lack of protocols/procedures to assist with technology operation

## **Fall Management Technology: Its Selection and Implementation**

### **Introduction**

Fall prevention technology can play a vital role in preventing falls and/or minimizing the adverse effects associated with falls. However, technology that is inappropriate for residents or poorly implemented into existing delivery systems, may actually predispose to falls and injuries. The purpose of this article is to provide a framework for selecting and implementing fall prevention technology.

## **Selecting the Best Technological Solution**

Selecting fall prevention technological solutions for a particular organization or resident population should be based on a structured, systemic step-by-step approach that consists of:

### **Identify a Multidisciplinary Team**

- The decision to introduce fall preventive technology or devices affects many levels of the organization; as a result, a multidisciplinary team involving all stakeholders that may be affected by the introduction of technology or devices should be formed. Team members to consider include key personnel from nursing, medicine and rehabilitative therapy, as well as staff responsible for purchasing decisions, administrative leadership, front-line staff who will be using the technology, resident representatives, family representatives, insurance/legal representatives, quality improvement staff, risk managers, etc.

### **Identify the Need for Technology**

- Identify how many residents could benefit from fall technologies and/or specific resident groups which the technologies or intervention is intended to target. Performing a root cause analysis of falling events (i.e., asking why the fall occurred and how future falls may be prevented) can help identify technologies that may be beneficial. The readiness for technology is often driven by organizational needs for technological interventions. It's also important to consider how specific technology or devices will affect or complement the fall prevention program. Fall prevention technology works best when integrated into a fall prevention program (i.e., in other words, technology by itself should not be considered as the sole solution to fall or injury prevention).

### **Identify Appropriate Technology**

Once the need for technology and potential technologies are identified, the next step is to list all specific devices or products that might be appropriate in reducing falls and/or injury and, for each product of interest, request information from the manufacturers or vendors. Questions and features to ask manufacturers or vendors about their products include:

- Is product appropriate for the task to be accomplished?
- Is product safe for resident?
- Does the product interfere with daily resident care in any way?
- Does the design or use of the product have an effect on the functional independence of the resident, while keeping them as safe as possible?

- Is product easy to use? Some staff have low “gadget tolerance”; it’s frustrating/costly to purchase technology that will not be used.
- Is product easy to maintain by staff? Never believe or assume that technology will not require maintenance.
- Is product durable? Is a warranty and service contract included? If product breaks down, how easy is it to fix? Can product be updated easily, if needed?
- Does product have history of dependability? Has product performed reliably? Ask about prior user satisfaction (i.e., many questions can be answered by talking to other facilities that have used the product (s) of interest).
- What is the cost of the product? Are there any ongoing costs?
- What information or services does the manufacturer or vendor provide on proper use of the product? Do they provide staff training on how to properly use the product? Do they provide technical support if needed?

Once specific products have been identified, and before actual purchase, it’s a good idea to:

- Compare similar devices or products from different manufacturers. What are the features and options of each and what are the pros and cons for each product. What does product really do? Many times a company will get carried away with excitement about their product and present it as more than it is.
- Invite technology vendors to present their products on-site to the nursing staff and other appropriate staff. Products may be set up and demonstrated at this time, facilitating side-by-side comparisons. Nurses should be encouraged to examine and use each product and to provide feedback.
- To help reach a purchase decision, ask about a 30 day free-trial period; many companies offer hands-on trials.
- Consult with an expert in the field about fall prevention technology; specifically the product (s) that is/are under consideration.

## **Implementing Technology**

Deciding which technologies to utilize in your fall prevention program is only the first step in their successful incorporation into practice. The implementation process is equally important and has multiple potential barriers that need to be overcome, including staff and resident acceptance of the technology, and ongoing maintenance and availability issues.

## **Staff Acceptance of Technology**

Many technologies directly affect staff workload and procedure, which may require a change in how care is provided. If the benefits of technology are not apparent or how to use the products are not understood, staff will quickly abandon the technology. Consequently, staff acceptance and understanding of technology is a major barrier to overcome in implementing technology. Approaches to gaining staff “buy-in” to technology include:



- Provide adequate staff education and training. The amount and quality of staff education regarding a product and how it will fit into the fall prevention program can have an effect on the success of implementation.
- Provide readily available protocols on the product as well as the availability of technical support services. Having ongoing support will encourage staff to problem solve thru difficulties and facilitate staff acceptance of technologies.
- Provide a staff or “point” person. Select a leader in the organization to champion the change, an individual with administrative skills to coordinate the process of education and implementation.

### **Resident Acceptance of Technology**

- Involve the resident with any decisions made concerning their fall safety. This information can have an effect on acceptance and motivation to use certain products that are dependent upon resident adherence or compliance, such as walkers, hip protectors, bed transfer aids, etc.

### **Maintenance and Availability Issues**

- Facility administration should establish channels and means for residents and staff to report problems with a specific device. As well, resources and procedures for repairing or replacing of non-functioning or broken products should be in place.

### **Conclusion**

Fall prevention technology is an important component of any effective fall prevention program. An organized approach to the selection and implementation of fall prevention technologies helps to ensure that the product (s) will be of benefit in reducing the risk of falls and/or injurious falls.