Falls and the Aging Population – Practical Solutions for the Property Owner and Risk Manager

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Introduction

Throughout the course of a day, most people experience a misstep or encounter a situation that might cause a stumble. For a younger person, they will often catch themselves or if they do fall, it’s more likely that they can pick themselves up and go about their business. But for an older person, a stumble or a missed curb more frequently leads to a fall, often with more serious consequences than a minor bruise. Slips, trips, and falls constitute a high percentage of workplace accident. Slips, trips, and falls cause 15% of all accidental deaths and are second only to auto accidents. Of general industry accidents, they cause 15% of all accidental deaths, and are second only to motor vehicles as a cause of fatalities.

A look at the changing demographics can help business owners better understand the risk of slips and falls in the workplace to their employees, customers and visitors. The world’s population is projected to triple by midcentury, from 516 million in 2009 to 1.53 billion by 2050. As of 2009 less than 8% of the world’s population is 65 years old and older. By 2030 this demographic is expected to reach 12% and by 2050 to grow to 16%. In the US the population 65 years and older will more than double by 2050, rising from 39 million in 2009 to 89 million. The most populated states that have the largest number of people over 65 years are California, Florida, Illinois, Michigan, New Jersey, New York, Ohio, Pennsylvania and Texas. You may be thinking that given the demographics presented above that there is nothing you can do to address the issue. But, there are practical and effective countermeasures to minimize specific fall risk factors.
Managing the Hazard

Slip and fall accidents can be very costly to companies and building owners. Property owners face potential liability for injuries to their employees as well as to the general public that might be on their property at any given time. Back injuries, strains, sprains, contusions, and fractures are common injuries related to slip and fall accidents. Management of slip and fall issues is often thought of as a reactive process – if the floor is wet, clean it up or if there is debris on the floor, sweep it up. While these activities are often proper courses of action, a better course of action is to prevent the deficiency from occurring in the first place.

Most businesses follow a plan, organize, direct and control approach to their business. This approach can be applied to address your slip and fall exposures. Having a formal program to address slip and fall exposures is an important start, especially when you consider the higher frequency of these incidents as compared to a chemical spill. A formal program to address slip and fall exposures can help prevent an accident from occurring in the first place.

A formal program builds the framework for developing a formal strategy for addressing slip and fall hazards at your facilities—one that takes into consideration our aging population and their unique challenges maneuvering through the world. Integrating slip and fall management as part of your total risk management program will help to reduce the exposures and ultimate costs of these avoidable accidents. Consider the following as you manage your slip and fall risk.

What Happens As We Age

There are a number of physiological changes that occur over time that can affect our ability to safely ambulate. A few of these are briefly discussed below.

**Vision**
Our vision gradually deteriorates as we age, with the nature and extent varying from person to person. These changes may include declining visual acuity, decreased color discrimination, reduced dark adaptation (affecting vision at night), and increased sensitivity to glare. Other age-induced changes may include the development of cataracts, glaucoma, macular degeneration, and other diseases affecting vision. Presbyopia, or the progressive loss of accommodation for near vision, is another common age-related change. Some of these changes may require the use of corrective lenses, such as bifocal and trifocals, which can also in turn affect ambulation by affecting our ability to discern changes in the walkway surface.

**Hearing**
As people age there is usually a gradual loss of hearing for the higher frequencies, a decreased ability to distinguish between sounds from similar frequencies and a decreased ability to localize things in space through hearing. An echoing environment (sound reflections on the walls) makes it much more difficult for a person with diminished hearing to hear and potentially react to an emergency situation.
Changes in the Nervous System / Processing of Visual Information
Balance is a function of several sensory structures working together: vision, proprioception, touch and vestibular. As individuals age, reaction time is frequently reduced due to slower neurological detection, slower processing and slower movement in response to instructions from the brain. Balance may also be reduced in older individuals from either vestibular or inner ear deterioration, blood flow to the brain, cardiac output, medications, or other neurological conditions.

Benign paroxysmal positional vertigo (BPPV) is an example of a vestibular disorder that can affect balance. BPPV is a transient and relatively common form of vertigo that causes a sudden sensation that you are spinning. BPPV is caused by the repositioning of calcium carbonate crystals in certain areas of the inner ear during head movement, causes the spinning sensation and triggering involuntary eye movements.

Musculoskeletal Changes
Muscle strength generally slowly declines as we age, with an increase in the rate of loss after approximately age fifty. By age seventy, lower extremity strength may be one-third of our peak strength that generally occurs in our mid-twenties. Muscle loss affecting those muscles critical to balance and ambulation can affect one's susceptibility to falling.

Bone and joint diseases, such as arthritis, can also affect the ability of joints to handle the loads applied during ambulation. Another potential adverse effect of arthritic conditions is decreased ability to recovery from a partial fall or stumble.

Use of Medications
Certain medications include potential side effects that can potentially increase the risk of falls for any portion of the population by affecting vision, balance, and the opportunity to recover. Elderly patients may be prescribed multiple medications that can potentially interact and thereby increase the risk of a medication-related fall.

A Business Approach to Slip Trip Fall Prevention
There are multiple possible approaches that can be taken with respect to slip trip and fall prevention. One possible avenue is to apply the fundamental business principles of planning, organizing, directing, and controlling that are common to business management. A clear advantage in using this approach is that key management partners will already have invested in using this technique to manage an issue to a desired outcome.

Planning in this context entails establishing goals related to slip trip and fall outcomes, such as a reduction in the number, location, severity, etc. Furthermore, planning includes the establishment of specific steps or actions that will be taken to achieve the desired outcome. Planning also includes detailed analysis of any past history of slip trip and fall incidents so as to have a thorough understanding of potential contributing factors.

Organizing is the next step, and includes the identification of those actions or activities that will achieve the desired outcome or goal for slip trip fall prevention. This organizing step also includes determining the staffing requirements to achieve these actions or
activities. Actions or activities for slip trip and fall prevention may include, but are not limited to:

- Establishing protocols for the selection of new flooring materials as part of new construction, repair, or renovation projects;
- Establishing floor cleaning and maintenance procedures that match the floor materials present;
- Establishing protocols for the upkeep of parking lots and sidewalks, including snow removal, landscaping, and other issues that can affect pedestrian activity;
- Developing procedures regarding the use of mats at entrances, especially during inclement weather conditions;
- Evaluating lighting / illumination levels of interior areas, stairways, entrance ways, parking lots, etc., including potential for glare, shadows, or other conditions that may affect safe pedestrian ambulation;
- Establishing a spill response and cleanup program, especially important for properties with significant public pedestrian volume;
- Establishing who has the authority and responsibility for implementing the various actions or activities.

Directing in this context is the managerial leadership and communication of the goals, actions, and activities towards slip trip and fall prevention. This is where managers and supervisors guide and lead the implementation of the slip trip and fall plan to achieve the desired outcome.

Controlling is where the actual outcomes are measured to determine if the desired outcome is being achieved. In this context, controlling may include, but are not limited to:

- Periodic inspections to determine if housekeeping, floor maintenance, and other procedures are effective.
- Testing of slip resistance when floor surfaces are initially installed and over time to determine if undesirable and unexpected changes are occurring.
- Conducting incident investigations that determine what factors led to the slip trip or fall and what corrective actions may be warranted.
- Analyzing slip trip and fall data to map locations, trend contributing factors over time, and establish changes that may be needed in the planning and organizing steps.

**How People Fall**

There are three basic types of falls, with several sub-categories of interest to researchers:

- **Slip of trailing foot during push-off** – most often results in a fall forward due to location of person’s Center of Gravity (CG). Person might be able to use their forward foot and arms to help arrest the fall.
- **Trip** over a protruding object, often by the toe of the leading foot (the swing leg),
causing a fall forward. Or, trip caused by entry into a depressed defect in the walking surface, also causing a fall forward. In both cases, there is an opportunity for the person to help arrest their fall.

- **Heel strike slip of leading leg** – most often results in a fall backwards, again due to rotation around the CG. With this type of fall, there is little opportunity to recovery before contacting the ground. This type of fall tends to be the more serious since a head injury may occur, as well as the lack of opportunity to recover means there is little diminishment of forces prior to body contact with the ground.

  Elderly pedestrians who experience a heel strike slip of the leading leg may also rotate to one side as they descend, causing the hip to contact the ground. This can result in a high force loading on the hip area, potentially causing a hip fracture. Head injuries are also common for slips involving the elderly.

  Contributing factors for falls include, but are not limited to:

  - Lack of sufficient slip resistance (traction). In this context, the traction provided by the floor surface is not at least equal to the traction demand for safe ambulation.
  - Unexpected changes in traction. A person walking across a building lobby who has successfully made 15 strides has an expectation that the same traction level will occur at the next step. If there is an unexpected change in traction, such as that caused by a small amount of water on the floor surface, the person will not mentally be prepared for that change. Contaminants, such as water tracked in during inclement weather, spilled foods or beverages, accumulated dust, or other materials cause a separation of the footwear from the floor surface, and can result in reduced traction.
  - Changes in elevation, particularly those that tend to blend in with the surrounding surfaces, such as sidewalk curbing. Minor changes in elevation, even those of one-half inch, if undetected by the pedestrian, can result in trips. Gait studies show that toe clearance as a person swings their leg forward may be as little as one-quarter of an inch.
  - Lighting conditions that lower the pedestrian’s ability to discern changes in the floor surface, potential contaminants, or other conditions that can affect safe ambulation.
  - Factors associated with stairs, such as insufficient lighting, particularly the top and bottom steps. Other factors associated with stairs include handrails, as well as stair tread colors and patterns that make it difficult to discern where the lead edge of the step is located.

**Countermeasures**

If we apply the business approach of plan, organize, direct and control to the slip and fall issue we find countermeasures that can affect the potential for workers compensation and general liability claims. Consider the following countermeasures:

**Interior Flooring**

The type of flooring selected and how it will perform under dry and wet condition directly affects the potential for someone to slip and fall. Performance of the floor should be identified prior to
selection. Flooring in wet areas such as bathrooms and kitchens should have a higher coefficient of friction associated with it. The color of carpet should contrast with the color of flooring and not be visually confusing. Patterns can be difficult for older individuals to discern. All walking surfaces should be maintained according to a regular schedule. But it is also important to realize that maintenance procedures themselves can cause slip and fall accidents. For example, a poorly trained custodian may not know that certain types of flooring require specific care. Many of the best cleaning and finishing materials can be hazardous when improperly applied, so it is crucial to follow the flooring manufacturer’s maintenance directions.

**Exterior Walking Surfaces**

Walking surface height differences and surface conditions are a common area for individuals to trip and fall. Grind sidewalk joints so that there are smooth transitions from one section to another. Choose and position trees with roots in mind. Patch depression and potholes immediately. Paint curbs, ramps and other elevation changes to visually cue individuals. Parking stops/blocks can be a maintenance nuisance; you may want to consider removing them thus removing a trip and fall hazard. Position and identify speed bumps.

**Lighting**

Interior and exterior lighting should be inspected on a routine basis. Interior lighting levels in stairwells should be high so that individuals can navigate the stairs. Exterior lighting should be inspected at various times of the year. If your property is accessed at night then lighting is important to review on a regular basis. Older people require more lighting and less glare to be able to see well. Lighting may need to be adjusted during those months where there is less daylight.

**Weather**

Develop precautions and assign them to specific employees to enact under certain poor weather conditions. One important precaution is the placement of walk-off mats at all entrance doors. Mats should allow for a minimum of 10 paces in the normal direction of travel in order to absorb water or snow that may accumulate at entrances during inclement weather. Mats should be constructed of rubber or cocoa fiber, which helps remove water and dirt from shoes. The color of the mats should contrast with the color of the flooring, and mat edges should taper down to the floor for a smooth transition to the floor’s surface. This is especially critical for individuals with reduced or impaired vision, who may not realize when they are stepping off of the mat and onto the floor itself. This lack of realization can catch them off-guard, potentially resulting in a slip and fall.

Under severe conditions, consider posting a janitorial staff member at each entrance to warn employees and customers entering the area about the slipping hazard and to manually mop up any excess water that may accumulate. Have extra mats available to replace excessively dirty or saturated mats as needed.

**Footwear**

Footwear is only controllable from a workers compensation standpoint. Ensure that employees are wearing slip resistant shoes that are in good condition. The type of footwear should match the job tasks. The soles should be inspected regularly to ensure they are in good condition. Businesses can offer on-site purchase plans with vendor or make suggestions as part of the uniform.
Conclusion

A large proportion of falls and fall injuries in older people are attributed to multiple risk factors, many of which can be modified or eliminated with targeted fall prevention solutions. These solutions must be feasible, sustainable, and cost effective to be practical for widespread use. The most promising prevention strategies involve multidimensional fall risk assessment solutions. Incorporating these solution strategies, whenever feasible, into a fall prevention program can be the most effective means for fall prevention in older adults.

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