Slips, Trips, and Falls: A Heavy Toll on Your Workers and Your Bottom Line
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Chapter 1: HOW TO REDUCE YOUR RISK

Slips, Trips, and Falls: A Major Workplace Safety Concern

Slips, trips, and falls rank among the leading causes of injury, accounting for more than 8.7 million injuries per year according to the National Center for Injury Prevention and Control. According to BLS figures, slips, trips, and falls are a major concern in the workplace, accounting for nearly a quarter of all on-the-job injuries. These incidents, along with strains, sprains, and overexertion injuries, account for 67 percent of the top 10 disabling workplace injuries, according to the 2014 Liberty Mutual Workplace Safety Index. These figures clearly establish slips, trips, and falls as an important focus area in employers’ efforts towards preventing workplace injuries.

Source: www.libertymutualgroup.com/researchinstitute; 2014, Liberty Mutual Workplace Safety Index
Slips, Trips and Falls: Counting the Costs

According to Liberty Mutual’s Workplace Safety Index, the direct costs of workplace injuries related to slips, trips, and falls were more than $16 billion in 2014, and such injuries are the leading cause of workers’ comp claims. In a report titled Pace Yourself: What You Should Know About Slips, Trips, & Falls, Liberty Mutual Research Institute for Safety places the annual direct cost of disabling occupational injuries due to slip, trips, and falls at more than $11 billion. According to 2011 BLS data, these types of injuries account for more than 15% of all occupational fatalities and 25% of all non-fatal injuries. Last, but certainly not least, is the impact that these injuries have on your company’s bottom line workers’ compensation expenses if you are self-insured. Even if you’re insured through a workers’ compensation carrier, slips, trips and falls that create injuries have a significant impact on the experience modifier, better known as your “mod rate,” which directly affects the amount you pay in workers’ compensation premiums.

<table>
<thead>
<tr>
<th>Occupational Deaths</th>
<th>Non-Fatal Occupational Injuries</th>
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<td>25%</td>
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<td>STF deaths</td>
<td>STF non-fatal injuries</td>
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<tr>
<td>All other deaths</td>
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(BLS 2011)
Chapter 2:
ABOUT SLIPS, TRIPS, AND FALLS

Addressing the issue of slips, trips and falls in the workplace begins with a clear understanding of the risk factors behind these incidents. What are the most frequent causes? According to Liberty Mutual’s report, the vast majority of these incidents are same-level falls, which typically result from slipping on wet or otherwise hazardous surfaces, tripping over objects, or taking missteps due to uneven surfaces. The most common types of injuries from same-level falls are lower back strains and sprains of the hand, wrist, or ankle. Falls to a lower level – from ladders, vehicles, equipment, loading docks, or stairways, for example – occur less frequently than same-level falls, but often result in much more severe injuries, including fractures and death.
Chapter 2: ABOUT SLIPS, TRIPS, AND FALLS

Understanding Balance

There is a lot that goes into maintaining your balance. The process of balance involves your vision, hearing, your inner ear, the positioning of your joints, your muscles, and last but not least, your cognitive awareness. (Prado 2007) Basically, what it comes down to is that all the movements your body makes are sensed by your brain. Your brain then sends signals to your muscles so that they will respond with reflexes that preserve your balance and keep you upright. See Figure 1.

![Figure 1: Balance feedback loop.](image-url)

Even when you’re just standing quietly with both feet on the ground, your body is still working to keep your balance and keep you upright by way of tiny reflexive muscle movements. Figure 2. In order to maintain balance, it is important that your body and your brain are able to adjust all these tiny reflexive muscle movements quickly anytime there is a change in...
your posture. These small continuous muscle movements begin in your ankle muscles, then progress up into your thigh muscles, and then into the muscles in your trunk and spine. (Sohn 2013)

When your body starts to move, your center of gravity shifts. If you are walking, for example, (Figure 3) your center of gravity shifts from right to left, and constantly moves forward over each leg as it steps forward onto the floor. While all this happens, your muscles and joints are constantly working to keep you balanced.
When you bend forward, your center of gravity dramatically shifts forward (Figure 4). Also, when you carry a heavy load on either side of your body, or on the back or front of it, your center of gravity shifts with it. Any activity that shifts your center of gravity requires rapid changes in the muscle activity of your lower back, your thighs, and your lower legs. Uneven or slippery surfaces make this balancing act even more challenging because you can’t always predict how your footing will be affected.

**Figure 4: Displacement of center of gravity with movements.**
Addressing Environmental Risks

Preventing workplace injuries from slips, trips, and falls starts with an examination of the workplace environment in order to identify and address the hazards that can increase the risk of these incidents.

- **Slip Hazards** – The chief culprits are spills, with wet, oily, or powdery spills presenting the highest risk followed by low-friction flooring materials or freshly waxed or polished floors. Tips for addressing these hazards include a policy requiring employees to clean up spills or report them to designated maintenance staff immediately, warning signs in potentially slippery areas, and treatment or replacement of slippery flooring. Additionally, requiring that workers wear appropriate, high-traction footwear in the workplace can help.

- **Trip Hazards** – The most common cause of trips are obstructions in walkways. Risk reduction tactics include ensuring that electrical cables are not routed through walkways. When cables cannot be routed away from walks, using cable guards can minimize the trip hazard. Rugs, mats, and similar objects should be eliminated when possible and be firmly fixed to the floor when they can’t be. Uneven surfaces should be repaired where possible and clearly marked and well-lighted when eliminating them isn’t feasible. Conducting periodic inspections to ensure follow-through of these guidelines is critical.
Chapter 3: PREVENTING SLIPS TRIPS AND FALLS

Addressing the Human Element: An Essential, but Often Overlooked, Factor in Preventing Slips, Trips and Falls

It is important to acknowledge that, while environmental hazards can be reduced, they cannot be entirely eliminated in any workplace. Additionally, in some workplaces, certain hazards are simply part of the job, and eliminating them is impossible. In industries like housekeeping, healthcare or food processing, for example, workers cannot perform the essential functions of their jobs without some exposure to wet, slippery floors and other potential hazards. In the construction industry, employees must contend with the elements and/or working at heights. This is where managing the human element comes in, and doing so is just as important as minimizing environmental risks.
Chapter 3: PREVENTING SLIPS TRIPS AND FALLS

**Step One: Hire Right**

If you can’t remove the hazard, what can you do to reduce the risk? You can start by taking measures to help ensure the people you hire are up to the challenge of the job they’re being asked to do, such as instituting a pre-employment Physical Ability Testing (PAT) program in your workplace. Adequate levels of physical fitness among workers can go a long way toward reducing injuries.

A pre-hire physical abilities testing program can help you hire employees who are less likely to be injured on the job. If new-hires pass a well-designed PAT, they will have proven themselves physically capable of safely and effectively performing the essential functions of the specific jobs in your workplace. In the case of slip, trip and fall injuries—commonly suffered by workers in housekeeping, health care, construction and food processing—PAT screening can evaluate balance and agility, ensuring that your employees are capable of navigating the unavoidable workplace hazards they may face.

For instance, studies have shown that workers who are obese are at higher risk of injury due to these types of incidents, since obesity may cause changes in the person’s center of gravity that can lead to poor stability and balance.
In the average weight individual, the line of gravity falls in front of the shoulder, behind or through the hip joint and in front of the knee and ankles. But in high body mass individuals, there’s usually a significant increase in abdominal girth. This brings the line of gravity in front of the hip instead of behind or through it, and also puts it farther in front of the knee and ankle joints. See Figures 5 and 6.

**Figure 5:** Normal line of gravity through jaw.

**Figure 6:** Center of Gravity in Obesity: Shifted forward in front of shoulder joints, through or behind hip joints and in front of knee and ankle joints.
As a result, obese employees are already “off balance” before they even begin to perform dynamic, functional work activities which might require them to adjust their balance quickly, such as walking on uneven surfaces, climbing ladders or stairs, or encountering wet or slippery surfaces. In addition, hip and ankle muscles, which would normally help correct any balance challenges, are already constantly firing to keep obese individuals upright. Because of this, these muscles aren’t as helpful in dynamic situations where they are already fatigued. Also, ankle torque requirements increase, which puts even more of a strain on these muscles. Increased body mass also increases the amount of inertia at the ankle. This is likely to create a disadvantage in the reactive-recovery phase of a typical slip-induced fall. (Corbeil 2001)

A job applicant can’t and shouldn’t be rejected due to body weight. However, applicants (large and small) whose balance is inadequate for the job, should not be hired.
Other physical factors that can affect balance and increase risk include poor posture and/or gait, certain medications, and previous injuries, especially traumatic brain injuries.

Lower back pain increases postural instability (Sohn 2013) and increases an individual’s risk of falling. (6) Back pain causes balance problems for a variety of reasons:

- The poor spinal motion that is associated with lower back pain doesn’t provide the brain with adequate information for it to adjust posture. (Mok et al.)
- Injury or damage to the back’s joint, muscle and tendon nerve receptors result in info not being sent to the brain. (Mientjes et al)
The bottom line is – the brain just doesn’t get the information it needs from spine motion, joints, muscles and tendons to properly adjust posture and maintain balance, especially in dynamic and rapidly occurring movements. In other words, the normal brain-body feedback loop is disrupted on both the front end and the back end. The brain doesn’t get enough information (or the correct information) to tell the muscles what to do, and balance is negatively affected.

Knee injury, arthritis and pain have also been found to negatively affect balance. Hurley and associates found that, in people with knee arthritis, joint damage decreases muscle activity and also diminishes joint sensors. Because of this, these people had decreased postural stability which led to reduced functional performance. (Hurley 1997) Hinman and associates also found that posture is negatively affected in people...
with osteoarthritis of the knee (Hinman et al). In a study published in the Journal of Rehabilitation in 2001, more than half (51%) of patients with knee arthritis had decreased postural control. They also found that muscle weakness and joint sensor inaccuracy were associated with the decreased postural control. (Sanchez-Ramirez et al).

The process by which this decreased control and balance happens is the same as discussed above for back pain, illustrated in Figure 8. Incorrect information from weak muscles and painful joints is sent to our brains. Our brains then interpret the flawed information and provide flawed direction to weak muscles and painful joints that aren’t able to react appropriately.
An overview of studies examining the effects of ankle sprain and instability conducted by Wikstrom et al clearly indicates that poor balance and posture are present in those with a history of ankle trauma. The twenty-five studies included in this analysis provided a representative sample of ankle injury severity and gender (Wikstrom et al). The findings also indicate that the decreased postural control does not occur only on the side of injury, but on the uninjured side as well, which in turn suggests that the ankle injury changes the brain’s responses to sensory information even on the uninvolved leg. (Figure 9)
Chapter 3: PREVENTING SLIPS TRIPS AND FALLS

At first glance, this might seem unlikely. However, knowing how complicated the feedback loop between the brain and the peripheral joints is, and how much of an effect this feedback loop has on balance, this is more plausible than we might initially think. A simple ankle sprain can have significant long-term consequences for balance and falling. However, this analysis also found that balance training can improve balance in the presence of a previous strain or ankle instability—which makes a case for aggressive rehabilitation of even minor ankle sprains.

Those examples, of course, don’t mean that all job applicants who are obese, have health issues or prior injuries, will have balance deficits that will interfere with work. However, job-specific physical ability testing of all workers/candidates can help ensure that those who do have balance problems and whose abilities do not match the balance requirements of the job are not placed in positions that are beyond their physical capabilities, protecting the applicant as well as the safety of others.
Does that mean that using PAT in preventing slip, trip and fall injuries requires investing resources in testing all job applicants? It does not. Physical abilities testing is done in the post-offer phase of the hiring cycle, only after a conditional offer of employment has been extended. As with background checks or drug testing, employers can rescind conditional employment offers if the candidate cannot pass the PAT. The chief reason for this timing is EEOC compliance, since a safe, effective PAT will include components that are considered a medical exam under EEOC guidelines, and medical exams are prohibited until after an offer has been made. Post-offer testing also conserves resources, ensuring that only serious candidates-those who have been deemed otherwise suitable for employment-are tested.

In addition, just because you test one position, you don’t have to test all of your positions. Before initiating a PAT, examine your injury data. Which jobs are creating most of the injuries? You may want to select the top 10-20 percent of the jobs that are creating the majority of the injuries or the highest injury expense, for implementation of the screening program.
Chapter 3: PREVENTING SLIPS TRIPS AND FALLS

How much difference can a good physical abilities testing make in workplace injury rates? According to a meta-analysis published in the journal “Work,” quite a bit. After examining data from PAT validation studies, researchers found that new hires who passed PAT tests had a 47 percent lower rate of workers’ compensation injuries, and analysis of data from 175 pre/post-implementation studies indicated a 41 percent reduction in workers’ compensation injuries.

Other Important Steps in Addressing the Human Element

Ensuring that employees receive training on job-specific risks and how to handle them is essential. Drafting and enforcing clear safety policies and protocols is important in preventing workplace injuries, combined with job-appropriate safety equipment and effective workplace supervision. Basic fall protection training is necessary, and behavior policies that stress the importance of safety issues can help–wearing appropriate footwear, using handrails on stairs, walking at a careful, deliberate pace, and reporting and/or correcting hazards immediately, for instance.

A comprehensive workplace safety program that addresses both critical elements–environmental and human–of slip, trip and fall injuries can do good things for worker safety. Improving workplace safety will, in turn, do good things for your bottom line, reducing both direct and indirect injury costs and workers’ comp claims and improving productivity.


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