PREVENTING SOFT-TISSUE INJURIES

CHARLES J. BRIENZA

Statistically speaking, soft-tissue injuries are the most common type of injury sustained to workers in almost any industry, especially in the construction industry. Construction activities, regardless of the size, scope, or specialty of the contractor, have a higher prevalence of risk factors which cause these types of injuries. Therefore, it would benefit any contractor interested in protecting their employees from injury to focus on preventing them. Protecting workers from soft-tissue injuries is often a misunderstood science rife with catchphrases such as "lift with your legs" or "always lift with a buddy," both of which can be sound advice when used properly but are far from the keystone in an ergonomically sound safety program.

We must first understand what constitutes a soft-tissue injury and the factors that cause them. Soft-tissue injuries are typically strains and sprains of muscles, tendons, and ligaments. They can be the acute variety (such as slipping/falling while carrying a bucket of coating, which causes an immediate discomfort in one's back) or the chronic variety (such as repeatedly lifting and twisting as one loads bags of concrete onto a truck, causing an increasing discomfort). Back and shoulder injuries are the most common soft-tissue injuries in construction but no muscle or joint is spared from the possibility of being injured; knees, elbows, and necks also have a high occurrence rate.

Understanding the risk factors will help devise strategies for preventing soft-tissue injuries. The risk factors that cause soft-tissue injuries are posture, force, frequency, and duration.

Posture, or more specifically an awkward posture, is any position the body is in that deviates from neutral posture. Neutral posture is a position on which your feet are planted firmly on level ground about shoulder width apart, your entire body is centered over your feet, your upper arms are parallel with your torso, your lower arms hang naturally from your elbows, and your head and eyes are looking and pointed forward.

Force is not just the weight of an object but the weight of the object factored by the position in which the object is held. For example, the human body loses up to 80% of its available strength when working with an object at shoulder level and above. Not only do you lose strength but you also lose control.

Frequency is the number of times the body performs a task. Certainly, lifting a 5 lb (2.3 kg) widget from the floor to a work table once is typically not an issue. Perform the task 60 times an hour and the probability of injury rises.

Duration is the length of time one must apply a force in a given posture. For instance, a gallon of paint, which is something most people have no issue picking up and carrying for extended periods when held in a neutral posture, becomes very difficult to hold and control with your arm parallel to the floor extended fully from the shoulder for any length of time beyond 30 seconds. Beyond posture, force, frequency, and duration, there are a number of other secondary factors that can lead to soft-tissue injuries. They are vibration, temperature, glove fit, flooring type, general health (or more specifically lack thereof), smoking, contact, or impact stress.

Now that the risk factors are understood, they can be put into an equation, which looks something like this:

Posture × Force × Frequency × Duration = Risk

Statistically speaking, if any one of the risk factors is considered high, a worker is three times more likely to sustain a soft-tissue injury. If any two of the risk factors are high, a worker is 17 times more likely to sustain a soft-tissue injury.

Now that we've discussed the metrics by which risk factors are judged, we'll focus on injury prevention by risk mitigation. We do so in the normal hierarchy of risk mitigation, which is elimination or control of risk through (in order of preference) engineering controls, administrative controls, and safe work practices.

The optimum engineering control is to eliminate or reduce manual labor as much as possible. Whenever an employee can use a piece of machinery in place of manual labor, the chances of sustaining a soft-tissue injury are reduced. The use of machinery, such as skid steer-mounted hydraulic breakers, is a great alternative to traditional handheld demolition methods; even better would be to use a robotic breaker or hydrodemolition, which doesn't expose the operator to vibration that a skid steer-breaker does. The use of carts as opposed to carrying tools or materials is a simple yet effective control that doesn't require an extensive investment in machinery and training. Beyond using equipment, choosing the most ergonomically friendly equipment is another part of the process. The simple choice between a two-wheeled wheelbarrow and a single-wheeled wheelbarrow should not just be about the additional cost of the two-wheeled model. Remember, an ergonomic worksite is always a more productive worksite.

Engineering the hazard out of the equation is hands-down the best method to reduce the risk of soft-tissue injuries; however, in the world of concrete repair, a certain amount of manual labor is to be expected. That is when administrative controls come into play. The primary administrative controls are worksite design and planning. When designing a worksite, care should be taken to select a lay-down area that is as close to the work as possible. In some cases, we don't get to select where our lay-down area is located. At the very least, if the lay-down area is located an excessive distance from the work area, every effort must be made to ensure that mechanical equipment can access the lay-down area and the worksite, and travel the path between the two to reduce the need to manually move tools and materials. If tools and materials must be transported to elevated locations, material hoists or freight elevators should be employed as much as possible. Planning doesn't just pertain to worksite design; one can also plan the frequency and duration of the lifts. Heavy or high-volume lifting should be broken down

into multiple sessions if at all possible. Rather than moving an entire pallet of bagged concrete all at once, if the schedule allows for it, move a smaller number of bags at different times throughout the day. If the schedule doesn't allow for it, this may be rectifiable through planning as well. Another effective administrative control is tool selection. Operating a stand-up breaker in lieu of a handheld chipper that requires a user to bend over for extended periods is a simple change. Remember, the objective is to keep a worker as close to neutral posture as possible for as long as possible.

Safe work practices are the final step in the process of preventing soft-tissue injuries. They are also the least effective. It cannot be overstated that engineering and administrative controls must be exhausted before safe work practices are put into service as a protection against soft-tissue injuries. The phrase "lift with your legs" has seemingly been around since the dawn of time, yet back injuries continue to be the number-one injury type (by body part) in the construction industry and has been since the term "back injury" was coined. Does that mean lifting with your legs doesn't work? Does that mean safe work practices should be ignored? The answer to both of those questions is of course not. It illustrates the need for engineering and administrative controls. Safe work practices are only effective to a certain point and workers need to understand that.

What are safe work practices? We've already mentioned lifting with your legs, but the science goes far beyond that point. A worker must be trained to keep his/her body as close to the neutral posture as possible. For instance, we've mentioned that the body loses up to 80% of its strength and control when handling an item that is shoulder level or above. This not only applies to vertical work but it also applies to horizontal work. Shoulder level is relative to the position of the torso. For example, if a worker who bends over to chip concrete also reaches out beyond his/her shoulders to reach the extreme edge of a repair area, he/she is technically performing overhead work in relation to the torso. To keep the body closer to neutral posture, the upper arms must remain as close to parallel with the torso as possible. This is a position of greater strength and control and thus less likely to sustain injury. Beyond posture, other important safe work practices include planning your lift, and when carrying is required, ensure that a clear path of travel is available free of slip, trip, and fall hazards. Bulky or odd-shaped items should be handled by multiple parties in tandem. Communication amongst the parties is critical; a lift is only as strong as its weakest member.

One final thought regarding the prevention of soft-tissue injuries and a somewhat controversial practice is the institution of a wellness program or a flex-and-stretch program. Wellness and flex-and-stretch programs have never gained a great deal of traction in the construction industry, yet studies have proven that a generally healthy worker is less likely to be injured at any time, including on the job. Flex-and-stretch programs, which are typically more likely to be instituted in an industrial work environment, can be extremely effective in reducing both the frequency and the severity of soft-tissue injuries. A study performed by a major worker's compensation insurance carrier discovered a 61% reduction in strain/sprain frequency and a 30% reduction in severity at construction companies surveyed. A University of Oregon study, which examined municipal firefighters, saw a reduction in claim cost of 63% between groups of "stretchers" versus "non-stretchers." It is hard to argue with those types of tangible results. A flex-and-stretch program is not necessarily the first step in preventing soft-tissue injuries, but if a program was looking to squeeze the last few injuries out of a prevention program, it may be the solution.

In conclusion, soft-tissue injuries are the number-one injury in the construction industry. Any company looking to enhance their safety program or reduce worker's compensation claim costs would be wise to focus on these injuries or more specifically their prevention. Prevention is best accomplished through engineering controls, then administrative controls, followed by training workers in the science of safe work practices. Finally, if you are still on the fence about construction ergonomics, it is best to think of ergonomics as a tool to increase production. Ergonomically friendly worksites are safer, workers have more energy due to more efficient worksite design, and there is less down time caused by injury.

***Charles J. Brienza**, CHST, is a Safety Director with Concrete Protection and Restoration, Inc.*