

# MSDs of the Upper Body:

## from recognition to resolution

**Pain** — for most afflicted with these conditions, it is intermittent. For others, it is constant. For all, the loss of mobility and flexibility in their hands, arms, shoulders and back hampers daily activities both inside and outside the workplace. Pervasive but preventable, work related Musculoskeletal Disorders (MSDs) affecting the upper body and limbs are now recognized as one of the leading causes of worker pain and disability.

### How common are MSDs?

In the industrialized world, the incidence of MSDs has reached epidemic proportions. In the United States, these disorders affect one out of every four people (American Academy of Orthopedic Surgeons, 2000). According to the National Institute for Occupational Safety and Health (NIOSH), MSDs account for one-third of all job-related injuries. In Canada, a national survey conducted by Statistics Canada found approximately 2.3 million Canadian adults have experienced a MSD injury serious enough to limit their normal activities. These findings represent a significant increase in MSDs incidence over the five-year period between 1996 and 2001. The survey established the majority of these injuries are caused by work-related activity. It also found a direct link between MSDs and stress.

According to the Workplace Safety & Insurance Board, in Ontario, MSDs account for 42 percent of all lost-time claims, 42 per cent of all lost-time costs and 50 percent of lost-time days.

### What exactly are MSDs?

A work-related musculoskeletal disorder is an injury to the muscles, tendons and/or nerves of the upper body either caused or aggravated by work. Other names used to describe work-related musculoskeletal disorders include repetitive motion injuries, repetitive strain injuries, cumulative trauma disorders, soft tissue disorders and overuse syndromes. MSDs of the upper body affect nerves (carpal tunnel syndrome), tendons (teno-synovitis, peritendinitis, epicondylitis) and muscles (thoracic outlet syndrome).

### What causes these injuries?

Work-related MSDs of the upper body are rarely the result of a single stress or strain. Rather, they develop gradually, over time, with repeated trauma to the

muscles, tendons and/or nerves of the body. The causes of MSDs affecting the upper body are complex, encompassing both physical and psychological factors. In fact, psychological factors, including the assignment and planning of work, relationships with supervisors and coworkers and organizational support to complete tasks are now understood to be as important, if not more significant, in the development of MSDs. However, in light of space constraints this document is limited to a discussion of the physical factors only.

Work-related MSDs arise from ordinary movements of the hand, arm, shoulder, neck and torso involved in the actions of bending, straightening, gripping, holding, twisting, clenching and reaching. While not harmful to the body on a daily basis, repetition of these acts, often in a forceful and awkward manner in a work situation, makes them hazardous. Work-related musculoskeletal disorders are associated with work patterns that include:

- fixed or constrained body positions for extended periods of time;
- repetition of movements;
- rapid pace of motion that doesn't allow for sufficient recovery between movements; and, force concentrated in the hand, wrist or arm.

Low temperatures and vibration can also contribute to the development of MSDs.

#### Position

In jobs that involve repetitive tasks, body position contributes significantly to the risk of musculoskeletal injury. Poor workstation layout and improper design of equipment and tools often forces the worker to assume an awkward posture and/or extend the upper limbs to extreme ranges, thereby increasing the opportunity for pain and injury. In these situations, primarily the wrist, elbow, neck and shoulder are affected.

#### Repetition

Workers performing repetitive tasks are at the greatest risk for work-related musculoskeletal injury. The same or similar movements, repeated over and over again, within a short period, do not allow the muscles to recover sufficiently. Over time, the effort required to maintain these repetitive motions, even when the force is minimal, steadily increases, with pain and injury the lasting result.

#### Force

The force required to execute a task also plays an important role in the onset of musculoskeletal injury to the upper body. More force demands more muscular effort and more time to recover between tasks.

Fatigue occurs more quickly when the movement is forceful. Exerting force in certain hand positions, such as pinching, pressing and grasping is particularly hazardous.

#### Pace

The pace of work refers to the amount of time available for rest between cycles of a task. The faster the pace, the less time is allocated to recovery and the higher the risk for musculoskeletal injury. With no control over the timing or speed of work, for example, on an assembly line or under a quota system, the stress levels experienced by a worker builds steadily. And with increased stress comes muscle tension and fatigue and a greater potential for pain and injury.

#### Low temperature

Work in a cold environment necessitates the exertion of slightly more force than is generally required to keep objects from slipping out of the hand. Increased force also makes a job more stressful.

#### Vibration

Vibration is yet another risk factor associated with the development of MSDs of the upper body. It is considered the primary cause of work-related peripheral nerve disorders.

### What are the symptoms?

All work-related MSDs of the upper body are characterized by some degree of pain. In fact, pain in the affected area is typically the first and the most common of all symptoms. These injuries generally progress in stages from mild to severe.

#### Early stage

In the early stage of the injury, ache and fatigue is experienced in the affected limb during the work shift but disappears after work hours. Work performance is not usually affected.

#### Intermediate stage

In the intermediate stage of this injury, pain and tiredness occurs early in the work shift and persists even after work hours. One's capacity for repetitive work declines.

#### Late stage

In the last stage of injury development, muscle ache, fatigue and weakness is constant, hindering one's ability to sleep and perform daily functions.

### Who is at risk?

MSDs of the upper body have the potential to affect all workers in all industries. The highest rates of injury, however, tend to occur where work is



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forceful, repetitive and awkward. Cashiers and stackers in grocery stores, sewers and cutters in the garment trade, butchers in the food processing industry and electronics assemblers, office data entry clerks and carpenters, plumbers and electricians in the construction sector are at particular risk for MSDs.

**What legislation is available?**

California, Sweden, Australia, Japan and the European Union are just some of the jurisdictions worldwide that have recognized the need for regulatory action to protect workers from musculoskeletal injuries. In varying degrees these legislative initiatives address hazards associated with repetitive, awkward and forceful work.

**Federal legislation**

Here in Canada regulatory action has progressed. Amendments in 2007 to Part XIX of the *Canada Occupational Health and Safety Regulations* (COHS) call on employers to incorporate ergonomic-related hazards responsible for the development of MSDs into their legally mandated Workplace Hazard Prevention Program (Section 125(1)z.03, Part II, *Canada Labour Code*). These amendments outline the details employers must incorporate in the prevention program including a hazard identification and assessment process, development of preventive measures along with ergonomics training. Employers are also required to develop, implement and monitor such a program in consultation with and with the participation of the policy committee, or, if there is no policy committee, the workplace committee or health and safety representative. As well employers are required to submit, at least every three years, an evaluation report of effectiveness to the Ministry of Labour.

**Provincial legislation**

Among provincial jurisdictions British Columbia has the most comprehensive ergonomic regulation. It requires employers to consult joint health and safety committee members and affected workers in identifying, assessing and controlling the risks associated with the development of musculoskeletal injuries. Saskatchewan and Manitoba have also enacted ergonomic regulation.

In Ontario, ergonomic interventions are legislated only for those in the health care sector and are especially limited in scope. Still concrete steps have been taken to address ergonomic related injuries in Ontario workplaces. In 2007 the Ministry of Labour (MOL) released two musculoskeletal disorders (MSDs) prevention resource documents developed by the Occupational Health and Safety Council of Ontario (OHSCO). The *MSD Prevention Guideline* and *Resource Manual* provide workplaces with a framework for addressing MSDs in the workplace. This was followed by the 2008 release of an accompanying *MSD Prevention Toolbox* which as the name suggests contains different tools designed to aid workplaces in assessing, implementing and monitoring their MSD prevention programs.

The guideline, resource and toolbox also speak specifically to the importance of providing MSD prevention training to all workers ensuring their participation in the MSD prevention process.

Without specific ergonomics legislation Ontario workers and their representatives must rely on the employer’s general duty clause in the *Occupational Health and Safety Act*. This clause requires employers to take every precaution reasonable for the protection of workers. The MOL indicates its inspectors will consider the OHSCO MSD Guideline and accompanying materials as a determinant of what is reasonable to protect workers from MSDs.

**What controls are available?**

The most effective means to address a hazard is at the source. For MSDs, eliminating or reducing the repetitiveness, awkwardness and force associated with a task is best achieved through ergonomic interventions. This includes both workplace and job design. The guiding principle in workplace design is to fit the workplace to the worker. Ideally, the workstation should be fully adjustable, providing a worker with the option to work in a standing, sitting or sitting-standing position. Additionally the work area should be appropriate to the worker’s body size and shape. Both measures decrease the muscular effort required to maintain a comfortable working position thereby reducing stress and strain.

Proper design of tools and equipment is also critical in minimizing the force needed to complete the task. Good quality tools, carefully maintained and where necessary, changed frequently, can virtually eliminate the muscular effort and force associated with a task.

A well-designed job is as important as ergonomically designed workstations and work tools. Where possible, aspects of the job should be automated to reduce repetitiveness. Enlarging and enriching the tasks of a job increases the variety of tasks, breaking the monotony of a job and avoiding overloading of one part of the body. Job enrichment also allows the worker increased autonomy and control over the work. Implemented together, these measures can significantly reduce the body stress and strain associated with many jobs.

**Does ergonomics work?**

Examples of the benefits of specific ergonomic interventions in reducing injury incidence and costs abound.


A slow but steady increase in the incidence of injuries related to MSDs at an Ontario appliance manufacturer prompted the joint health and safety committee to investigate their source. In one work area, where many workers suffered from tendonitis, air guns were used to screw gaskets onto refrigerator doors. Depending on the refrigerator model, up to 5,000 screws could be installed per worker per shift. After an ergonomic assessment, extended rest periods were implemented, lighter non-vibrating air guns and better quality screws, with more threads, to allow for easier installation, were introduced. With these changes, RSIs declined steadily.

Ergonomic design has also been successful in reducing injuries at another Ontario manufacturer where workers produce rubber extrusion, moulding and weather stripping for cars. An investigation completed in the mid 1990s resulted in the integration of ergonomics solutions in the new workers orientation package, elimination of piecework and the redesign of new and existing equipment. Their once high rate of MSDs has dropped sharply.

After participating in Workers Health & Safety Centre (WHSC) training, office workers at an Ontario rail company realized their aching necks were directly related to repeated typing and prolonged sitting. Since then, workstations have been redesigned and adjustable chairs introduced. Work is now more varied and rest breaks away from the computer are encouraged. Fewer complaints of neck, shoulder and wrist pain have been received from all administrative workers as a result.

There is more than enough evidence to demonstrate the benefits of workplace ergonomic changes. Now the challenge is to institute ergonomic principles in the initial design of work spaces and tasks to prevent worker pain and injury. These changes, however, do not occur in isolation. To be effective, ergonomic interventions must be accompanied by worker training.

**NOTE:** The WHSC offers a suite of specialized programs in this area. These include: *Applying Ergonomics to Prevent Musculoskeletal Injuries*; *Ergonomics: Injuries, Risk Factors and Design Principles*; and *Ergonomic Toolbox*. For more information about WHSC training programs, please contact the WHSC office near you or visit [www.whsc.on.ca](http://www.whsc.on.ca).



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