

# Sitting on the Job:

## static load, chronic pain

### From offices to industry, mechanization and automation has changed the way most of us do our jobs. For many, this involves prolonged sitting.

The act of sitting is rarely viewed as a health and safety concern. However, we have all felt stiffness in our back, pains in our neck or shoulders and tingling in our toes after sitting for long periods. In fact, people who sit at work for extended periods of time run a high risk of low back pain and injury, second only to people who perform heavy lifting tasks.

For some, the effects of prolonged sitting can cause chronic life-altering injuries. Fortunately, musculoskeletal disorders (MSDs) such as low back pain and other health effects associated with sitting can be eliminated or reduced through well-designed chairs and other aspects of workstation and work design.

### What are the associated risk factors?

Workers who sit for most of their workday are exposed to a number of risk factors associated with poorly designed chairs, seating systems and workstations. These risk factors rarely work in isolation. For instance, the combined effects of awkward and sustained posture can increase health risks for workers. Below are some risk factors associated with prolonged sitting.

#### Sustained posture

The human body was designed for movement, not for static postures. Prolonged sitting adds to the static load on our musculoskeletal system and can also have an impact on the circulatory system.

#### Awkward posture

Excessive twisting, bending and reaching can result from poorly designed workstations. These actions force the spine into a non-neutral position that can damage the spinal discs and increase the demands on the muscles and ligaments. Seated workers may also be forced to assume non-neutral arm, shoulder, and neck and wrist posture.

#### Localized contact stress

Seat height that forces compression of the upper thighs on the underside of work surfaces is a common example of localized contact stress. The underside of the legs may also be subjected to contact stress when a seat is not contoured downward.

#### Repetitive work

Seated workers in a range of sectors including textile, light assembly and office environments may also be exposed to health effects associated with repetitive work. The combined risks presented by sitting and repetitive work place additional pressure on the muscles, ligaments and other parts of the musculoskeletal system.

#### Environmental factors

Temperature extremes and vibration can have an impact on the health of exposed workers including those who operate construction and agricultural equipment or public transit vehicles. These factors, combined with prolonged sitting and/or poorly designed seating systems can increase susceptibility to back injuries and other MSDs.

#### Psychosocial factors

Numerous researchers point to stress as a factor in a range of occupational injuries and disease including MSDs. Contributing factors can include a lack of participation in task or workstation design, monotonous work and an excessive work pace.

### How does the human body respond to sitting?

Sustaining any static posture, such as sitting, increases the demand on the muscles, ligaments and other soft tissues of the musculoskeletal system. It is not surprising then, that overall discomfort and pain in the back, neck and shoulders are common symptoms reported by workers who sit for most of their workday.

Sitting alters the normal curvature of the spine and puts pressure on the discs. With prolonged sitting this pressure can cause herniated discs, premature deterioration of discs and overall spinal degeneration. The resulting chronic back pain and possible nerve damage can have an impact on a workers ability to perform normal everyday functions and may lead to permanent disability.

Sitting also restricts the circulation of blood to the lower extremities causing swelling, pain, numbness and tingling in the legs and feet. Other potential health concerns include edema, varicose veins and blood pooling.

Deep-vein thrombosis (DVT) is another health concern linked with the pooling of blood. DVT is the formation of large blood clots usually in the veins of the legs. Clots that become mobile and result in blockages in the lungs, brain or heart may have fatal consequences. Most recorded victims of DVT were

passengers on overseas flights. However a recent allowed compensation claim in the United States highlights excessively sedentary workers are also at risk for DVT and associated death. Other studies have also found an association between prolonged sitting and heart disease and cancer.

### How can sitting be made less hazardous?

Selection or design of chairs, work surfaces and other aspects of workstations and job design must take into account the physical capabilities of workers. A study involving state employees in New Jersey reported a 40 per cent reduction in computer related health concerns in less than one year following ergonomic improvements. Three hundred and fifty state employees were provided with ergonomic chairs designed to support the back and easily adjust. Negative slope adjustable keyboard trays were also provided. Equally important, they received training on proper adjustment procedures.

#### Chair or seating system

A worker who is short and small framed and the one who is tall with a larger frame are not likely to find comfort in the same chair — regardless of adjustability. Seeking worker input will help to ensure seating is appropriate for individual worker needs.

Overall adjustability and ease of adjustability are important factors to consider. Other factors that need to be reviewed when selecting a chair or seating system includes:

#### Back rest

1. height and angle adjustment;
2. contoured support (adequate lumbar/pelvic support);
3. tilt resistance.

#### Seat:

1. height;
2. tilt;
3. sliding seat pan (adjusts distance from the back rest);
4. breathable, non-slippery fabric;
5. adequate width and depth;
6. front edge contoured downward.

#### Armrests:

1. adjustable for height and width;
2. removable;
3. slightly cushioned;
4. tilt.

#### Chair base:

1. five point base is recommended;
2. wheels or casters suitable for flooring;
3. swivel mechanism.



Information Bulletins for health, safety and environmental representatives

# RESOURCE LINES

## Workstation design

Workstation design must interact with the chair or seating system and the specific job characteristics to ensure workers can assume comfortable and safe seating postures. Appropriate workstation design must include:

- work surface height that takes specific tasks into consideration
- freedom of leg movement;
- allowance for viewing of displays and controls without twisting or bending head, neck or spine;
- appropriate position of handling/assembly tasks allowing for continual maintenance of vertical alignment of the head, neck and spine;
- avoidance of lifting or heavy horizontal movement while seated;
- footrest that allows for an element of posture change;
- foot tasks designed to avoid trunk or hip twisting and that allow for use of both feet.

## Task design

No task design factor can be assessed in isolation. For example, an effective job rotation program must allow workers to perform tasks that offer a variety of posture positions using different muscle groups. Other important task design considerations include:

- provision of frequent rest breaks;
- allowances for varied posture always keeping within comfortable range;
- job enrichment to give workers varied tasks that encourages movement away from sitting;
- allowances for alternating between sitting and standing;
- time provided to adjust to demands of job for new hires or those new to the job;
- appropriate work pace requirements.

## Worker training

Providing ergonomically correct chairs and well designed workstations is an important step in helping to ensure the well-being of those who perform sitting tasks. Equally important though, is training focused on the use and operation of specialized equipment.

An American study has found more than half of chair users are unaware of how to tighten or loosen the tilt tension, 45 per cent do not know how to adjust the back height and 21 per cent are unfamiliar with the seat height adjustment feature.

Adequate training will also help joint health and safety committees play a proactive role in identifying risk factors and recommending solutions. Widex located in Burlington, Ontario is an example of a workplace that used their training to make ergonomic improvements to the work environment. After participating in Workers Health & Safety Centre (WHSC) training workers at this hearing aid manufacturer initiated ergonomic solutions in their workplace including adjustable chairs and desks. As well when a worker reported a painful elbow caused by repeated use of the computer mouse; they could not find an appropriate elbow rest so they modified a wrist rest instead. All this was accomplished with the information they gained through training.

## 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 employers 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.

Worker members of joint committees are also using their legal authority to inspect the workplace to review the design of chairs, seating systems and other elements of the workstation that may impact the health of workers who perform sitting tasks. These inspections also offer the opportunity to ask workers about their safety and ergonomic concerns and solicit prevention recommendations.

When designing or redesigning work or the work environment, workers and other workplace parties can also refer to other available resources for information. For example the Canadian Standards Association (CSA) *Guidelines on Office Ergonomics* (CSA-Z412) includes specific information about measurements which allows for the adjustment of individual chairs and workstations. CSA Standards can be viewed at online <http://ohsviewaccess.csa.ca>.

Information is also available from the Occupational Health Clinics for Ontario Workers (OHCOW). Their *Office Ergonomics Handbook* covers topics such as purchasing the right chair, adjusting them and adjustable versus nonadjustable workstations. The *Handbook* is available at [www.ohcow.on.ca](http://www.ohcow.on.ca).

**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).



## RESOURCE LINES

Published by the  
**Workers Health & Safety Centre**  
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