

# Guide to Musculoskeletal Injury (MSI) Risk Assessment

This guide describes how to do a musculoskeletal injury (MSI) risk assessment. You can use it with WorkSafeBC's [Musculoskeletal Injury \(MSI\) Risk Assessment Worksheet](#) or another acceptable assessment tool.

## What are MSIs and why do I need to conduct a MSI risk assessment?

A musculoskeletal injury (MSI) is an injury or disorder of the muscles, tendons, ligaments, joints, nerves, blood vessels, or related soft tissue. These injuries may be caused or aggravated by work. MSI risks can exist in any type of workplace.

As required by the Occupational Health and Safety Regulation, you must identify the factors in your workplace that may expose workers to a risk of MSI, and ensure the risk to workers is assessed.

## What is the purpose of a risk assessment?

Doing a risk assessment will help you determine the risk level of various physical demands risk factors that could lead to an MSI. When determining whether a risk level is low, moderate, or high, consider the following elements:

- The extent of exposure, including the magnitude (how much), duration (how long), and frequency (how often and how fast)
- The effects of the contributing factors (see “What are the risk factors?” on page 2)
- The combined effect of all the identified risk factors

## How are risk factors assessed?

When you're assessing risk factors there are various ways to gather data, including the following:

- Observe workers performing their tasks (e.g., by video recording them).
- Look at photographs of elements in the work environment, such as work postures and workstation layout.
- Measure workstations, for example, using a measuring tape or weigh scales.
- Measure variables such as handle sizes and tool weights.
- Determine the characteristics of work surfaces, such as slip resistance.
- Measure exposures to heat, cold, vibration, noise, and lighting.
- Survey workers — for example, use physical effort scales and ask for suggested control measures.

Once you have assessed the risk factors, it is important to document the circumstances of where risk factors have been observed, such as the actions being performed, the loads being handled, the tools being used, and the location of the activity.

## Who performs the risk assessment?

Risk assessments should be performed by people who understand the work process, the risk factors, and the principles of risk assessment and control.

Risk assessments must also include the following stakeholders:

- A representative sample of workers who carry out the work
- Workers who have signs or symptoms of MSI
- Your joint health and safety committee or worker health and safety representative, as applicable

## What are the risk factors?

A *risk factor* is something that may cause or contribute to the development of an MSI. **Section 4.49** of the Regulation lists factors that you must consider during the risk assessment process.

MSI risk factors are divided into five categories. The first category is physical demands. It includes force required, repetition, duration, work postures, and contact stress. These are the most common risk factors you'll find.

The next four categories are:

- Aspects of workplace layout
- Characteristics of objects handled
- Environmental conditions
- Organization of work

These four categories of risk factors are often referred to as contributing risk factors because they often act in combination with the physical demands risk factors. Contributing risk factors may increase the level of risk.

In some cases, other factors, such as illumination or vibration, may be involved.

## Physical demands risk factors

### Force required

*Force* is the effort a worker must exert. The greater the magnitude or intensity of the force, the greater the risk of an MSI. Several types of activities require force:

- Lifting, lowering, or carrying
- Pushing or pulling
- Gripping or pinching



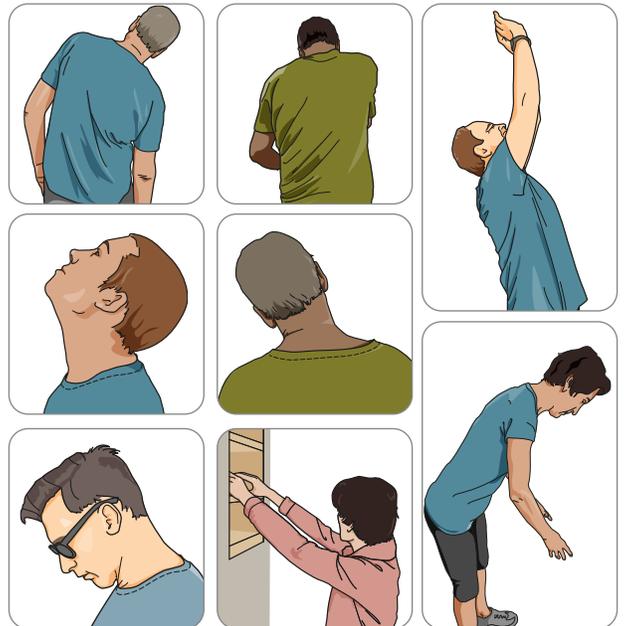
## Repetition

*Repetition* involves doing a task that uses the same muscles over and over, with little chance for rest or recovery. This applies to large muscles and small muscles. Repetition creates a higher risk of injury when other risk factors are also present, such as an awkward posture or heavy force.



## Work postures

*Awkward postures* occur when a joint bends or twists excessively, outside a comfortable range of motion. Awkward postures place significant stress on tendons, muscles, and other soft tissues and decrease their strength and efficiency.



*Static postures* occur when a position is held long enough to feel aches and pains.



## Local contact stress

*Local contact stress* occurs when a hard or sharp object comes in contact with the skin. Local contact stress usually involves the knees, shoulders, elbows, wrists, fingers, or hands. It can occur when using tool handles with ridges or hard edges that dig into the hand, when kneeling on hard surfaces, or when using a work surface with edges that dig into the forearm or wrist. Local contact stress can also occur suddenly when using a body part, such as a palm or knee, as a hammer.



## Contributing risk factors

### Aspects of workplace layout

*Working reaches* refers to work that requires reaching behind, forward, or across the body. This factor may cause MSI, either through a single incident or through a repetitive or cumulative process.

*Working heights* relates to working surfaces that lead to handling loads or working with the hands above chest or below knee height.

*Seating* refers to the physical properties of a chair or seat. Also consider workstation design, prolonged sitting, and the presence of vibration.

*Floor surfaces* includes physical characteristics such as slope, surface texture and material, hardness, unevenness, and slip resistance. Physical characteristics may also include standing or sitting on a vibrating surface.

### Characteristics of objects handled

The *size and shape* of objects, such as large and awkwardly shaped objects, may restrict vision

or require the use of an awkward posture to see around them.

*Load condition and weight distribution* determines how workers handle a load. For inanimate objects, the term *condition* typically refers to factors such as whether the load is slippery, sharp, fragile, hot, cold, rigid, or liquid. For example, to handle fragile loads, workers may have to use awkward or static postures.

*Container, tool, and equipment handles* may make the object more difficult to grasp. Design considerations for handles include size, shape, texture, and location. The shape of a tool or handle may require the use of a pinch grip.

### Environmental conditions

*Cold temperatures* may have a negative effect on body tissues because of reduced blood flow. Cold temperatures can lead to increased forceful exertions and increased gripping forces.

Poor *lighting* and glare can adversely affect postures and cause eye strain.

*Hand-arm vibration* results from gripping vibrating tools, such as power tools, especially when cold. Whole-body vibration results from standing or sitting on vibrating surfaces.

## Organization of work

*Work-recovery cycles* refers to the availability and distribution of breaks in a particular activity to allow the tissue to return to a resting state for recovery.

*Task variability* refers to changing the work tasks or body parts used during a shift. Varying work tasks can reduce repetition and allow tissues to rest and recover.

*Work rate* refers to the speed at which tasks are being done. Individual workers may vary in how quickly they can safely perform the same task. Fast, non-stop movements and a lack of worker-controlled work rates may increase risk of MSI.

## Does WorkSafeBC have any MSI risk assessment tools?

The [Musculoskeletal Injury \(MSI\) Risk Assessment Worksheet](#) can help you assess the level of risk associated with the following risk factors:

1. Force required
2. Repetition
3. Awkward posture
4. Contact stress
5. Hand-arm vibration

You can use the worksheet to assess these risk factors for each of your selected jobs or tasks. The worksheet also considers other contributing factors listed in the Regulation.

You can also use a different method for assessing risks, as long as you consider all of the risk factors from [section 4.49](#) of the Regulation.

## What do I do with the results of an MSI risk assessment?

Determining the level of risk associated with a risk factor will help you prioritize your risk control efforts. The goal of risk controls is to eliminate or, if that is not practicable, minimize the risk of MSI to workers.

If you need risk controls, the next step is to look at options. Focus on reducing the magnitude, duration, and frequency of exposure. When prioritizing the need for risk controls, consider the following:

- The level of risk
- The presence of multiple risk factors
- The presence of contributing risk factors
- Observations of job and tasks
- Worker injuries, first aid records, or signs and symptoms of MSI

As with the risk assessment, you must consult with your joint health and safety committee (or worker health and safety representative, as applicable) on how to implement controls. You must also train affected workers on the risk control measures.

## What are the regulatory requirements for MSI risk assessment?

The following sections of the OHS Regulation relate to MSI risk assessment:

- **Sections 4.46 – 4.53** — Ergonomic (MSI) Requirements
- **Sections 4.64 – 4.69** — Illumination
- **Sections 7.10 – 7.16** — Vibration Exposure

The corresponding OHS guidelines provide additional support:

- **G4.46 – G4.53** — Ergonomic (MSI) Requirements
- **G4.65 – G4.69** — Illumination
- **G7.11-1 – G7.16** — Vibration Exposure

## Where can I find additional information?

*Preventing Musculoskeletal Injury (MSI): A Guide for Employers and Joint Committees* provides information about MSI risk identification, assessment, and control, including some common risk control options.

Visit the following pages on [worksafebc.com](http://worksafebc.com) for additional information and resources:

- **Ergonomics**
- **Office ergonomics**
- **Lifting & handling**
- **Sprains & strains**
- **Vibration**