Ergonomics in the workplace: Identifying and controlling MSI hazards

OHS information for employers and supervisors

This bulletin provides an overview of musculoskeletal injury (MSI) hazards, with information on contributing factors, required MSI controls and best practices. It is part of the *Ergonomics in the workplace* series that focus on applying ergonomics principles to reduce illness and injury, while meeting Alberta's occupational health and safety (OHS) requirements.

ERGONOMICS

Ergonomics is the study of interactions between people and their work. Ergonomics aims to reduce hazards by adjusting the design of work to fit the abilities of the workers.

Ergonomics principles (such as using equipment for handling heavy loads, using neutral body postures as much as possible, etc.) are used to eliminate and control MSI hazards. Employers need to consider these principles and apply them as appropriate to their work site.

Why prevent MSIs?

OHS legislation requires employers to assess a work site to identify existing and potential hazards including those that cause MSIs. Workers must be involved in the hazard assessment process. As with all other hazards on a work site, the hazards that contribute to MSIs must be eliminated or controlled.

The Alberta OHS Code defines an MSI as an injury to "the muscles, tendons, ligaments, joints, nerves, blood vessels or related soft tissues that are caused or aggravated by work, including overexertion injuries and overuse injuries."

MSIs – also called strains and sprains, musculoskeletal disorders (MSDs) and repetitive strain injuries – can affect many body areas, such as the low back, shoulders, neck, elbows, hands or wrists, legs and feet. They can range in severity from minimal discomfort and a short recovery to a life-long injury that restricts a worker's ability to do the work and home activities they once could. Factors such as repetitive use, overexertion and improper lifting of heavy objects significantly contribute to MSIs.

MSI symptoms vary but can include pain (with or without movement), swelling and tenderness, reduced range of motion or joint stiffness, tingling or numbness.

MSIs are one of the most common causes for both lost-time and disabling injury claims in Alberta.

MUSCULOSKELETAL INJURIES

If a worker reports to the employer what the worker believes to be work related symptoms of a musculoskeletal injury, the employer must promptly

(a) review the activities of that worker, and of other workers doing similar tasks, to identify work-related causes of the symptoms, if any, and
(b) take corrective measures to avoid further injuries if the causes of the symptoms are work related.

-OHS Code, Part 14, s. 211

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Identifying MSI hazards in the workplace

OHS legislated requirements for dealing with hazards apply to MSIs as well. Part 14 of the OHS Code, Lifting and Handling Loads, reinforces those requirements – including the requirement for hazard assessments and training.

When you are identifying hazards consider:

- Records of reported incidents and injuries in your workplace.
- Job tasks where workers report having difficulties, injuries or discomfort.

Ask workers to provide feedback about concerns they have with a job or work task and for suggestions about changes and improvements (examples include: worker surveys, and reporting to the health and safety committee or health and safety representative).

> An employer must assess a work site and identify existing and potential hazards before work begins at the work site or prior to the construction of a new work site.
>
> -OHS Code, Part 2, s. 7(1)

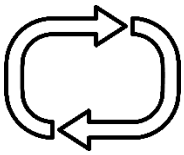
> Use checklists such as the MSI hazard identification checklist – instructions and template, found on page 12 of this bulletin, as part of your work site hazard assessment process.

Read Hazard Assessment and Control: a handbook for Alberta employers and workers to learn more about why, when and how to perform a hazard assessment.

Hazards that contribute to MSIs

There are three main physical hazards in the workplace that contribute to MSIs:

awkward or sustained postures



repetition

forceful exertions

Other physical hazards such as contact stress, impact stress and vibration can also contribute to MSIs.

Awkward or sustained postures

Posture refers to the position of a body part.

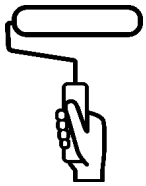
> See Table 1. Awkward posture examples by body area on page 9 of this bulletin.

- A **neutral posture** of a joint is when the joint is being used in the middle of its range of motion. In this range, there is the least amount of stress on the muscles, and the muscles can generate the greatest amount of strength.
- An **awkward posture** is any position where the joint moves away from neutral. In an awkward posture, there is more stress on the muscles and other tissues, and an increased risk for injury. Table 1, on page 9, shows some examples of awkward postures by body area.
- A **sustained posture** is a posture held in the same position for a long period of time. When the muscles hold a single position they quickly become tired, which can lead to pain and discomfort.

Repetition

Repetition is doing the same action over and over with very little variation to the movement, for example:

using a keyboard or mouse



painting a large surface

working on a conveyer line

Repetition can be hazardous because:

- Without enough time to rest, the muscles become fatigued, which can lead to pain and injury. This is often called an overuse injury.
- When workers perform repetitive actions that lead to muscular fatigue, they can also lose precision and alertness, increasing the risk for incidents.

How fast muscular fatigue can happen depends on how quickly the action is performed, the total length of time the action is performed, and the amount of force being applied.

Forceful exertions

A forceful exertion is the amount of effort that a worker must apply to perform a task. The level of the effort can vary depending on the task. A forceful exertion can cause injury if:

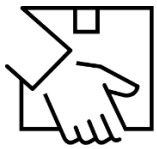
- An effort that is too big overloads the muscles and other tissues. This is often called an overexertion injury.
- An action that requires a small amount of effort is held for a long period of time or repeated often.

Manual handling is when a person moves a load using their own strength and effort, without help from a machine. Manual handling includes activities such as lifting/lowering, pushing/pulling, carrying, handling or transporting.

Gripping objects and **manual handling** are common work activities that include forceful exertions.

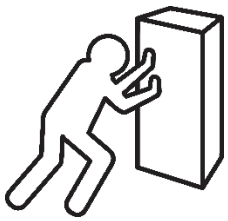
Typical manual handling activities such as lifting or carrying of large or heavy loads are easy to identify. However, in other situations, forceful exertion may not be as obvious. For example:

- Using tools. If a tool is heavy or not being used as intended, a worker may experience forceful exertions in the hand and arms as a result of operating the tool.
- Opening and closing large bay doors. If tracks are not maintained, it may require up to two workers to open and shut the doors.



lifting/carrying heavy loads

using heavy or difficult to grasp tools



heavy pushing of carts or doors

Contact/impact stress

Contact stress is when a worker's body comes into contact with a hard or sharp surface and the pressure is concentrated on a small area of body tissue. This pressure can compress nerves and soft tissues and reduce blood flow to the area and can lead to injury.

Examples of contact stress in the work place include kneeling on a hard surface, wrists resting on the edge of a table, using a tool that creates pressure points on the hand or fingers.

Impact stress is caused when a high external force is applied to the tissues in the body, which can damage the tissues and lead to injury.

An example of this would be when a worker uses the knee or the hand as a hammer.

Vibration

Hand-arm and whole-body are two types of vibration that can impact workers. Hazards associated with both types of vibration become worse with increased exposure and awkward postures.

Hand-arm vibration occurs when a person holds a vibrating tool or machine in their hand(s) and the vibration travels from that tool to the person's hands and arms, which can damage blood vessels and nerves. Symptoms associated with hand-arm vibration include limited mobility and pain in the hands and elbows, whitening of the fingers, and numbness, which can be temporary or permanent.

Examples of power tools that can cause hand-arm vibration include hand-held and bench grinders, drills, chainsaws, jackhammers, jigsaws, power hammers, hedge and grass trimmers, powered lawn mowers, compactors, floor sanders and polishers, and power washers.

Whole body vibration occurs when a person sits or stands on a vibrating vehicle, machine or surface. Whole body vibration can contribute to injuries of the spine and back muscles, and create general discomfort.

Vibration typically comes from engines, movement of gears, rotation of tires and the movement of a vehicle over uneven surfaces.

Factors that affect MSI risk

There are other factors that can contribute to an MSI hazard. It can help to be aware of these additional factors when identifying hazards onsite.

Organizational factors

The way work is organized can impact a worker's risk for injury. For example:

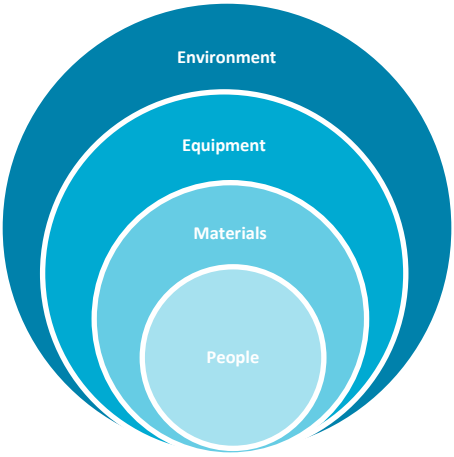
- When the speed of work is set by a conveyor belt or other automated system, a worker can't take small breaks or alternate job tasks.
- A worker may be switching between two different job tasks but, if those two job tasks require the same muscles to perform the action, there is limited time for the muscles to recover, which can contribute to muscle fatigue and discomfort.
- Fast-paced work such as piece work or jobs that pay workers according to the amount of product or work produced can increase risk for MSIs if hazards are not addressed. Piece work may discourage workers from taking the rest breaks their bodies require to recover.

When you identify MSI hazards, think about organizational factors such as:

- the order tasks are performed
- how long tasks are performed
- whether the worker uses the same muscle groups when performing different tasks
- if breaks are sufficient for muscle recovery

Workplace factors

People are the centre of our workplaces. Safe job design that suits workers' abilities can be achieved by considering the materials, equipment and environment that makes up the workplace and can impact a worker's risk for injury.



Workplace factors

Environment

Tasks may change based on the time of the day or the time of the year. Weather, temperature, lighting and space can all effect how work is done. For example:

- Cold weather can reduce flexibility and strength of muscles and other body tissues. Thick winter gloves can change the way an object feels when gripped, resulting in a tighter grip when lifting the object. Bulky jackets increase the distance from the body to an object being held, putting increased stress on the back.
- A hot environment can increase the risk for heat exhaustion, which leads to headaches and muscle cramps.
- Poor lighting can reduce visibility and require awkward postures to get closer to labels or other information for reading clarity, and increase the risk for tripping over unseen obstacles.

A lack of good housekeeping can also result in MSIs**.** For example:

- Congested and cluttered work floors increase the chance of tripping and restrict the movement of equipment such as carts and dollies which may result in choosing not to use the equipment or using extra force and awkward maneuvering to move the equipment
- Cluttered work stations limit available space and movement and can increase the likelihood of awkward postures.

Equipment
The wrong equipment or poorly maintained equipment may contribute to MSIs. For example:

- Tools that aren't right for the task or person can cause awkward posture, force or vibration.
- Dull cutting tools require more force to cut through materials.
- Old tools with worn handles can cause contact stress on hands.
- If mechanical aids stop working, workers may start manually handling the loads.
- If wheels on carts and dollies aren't in good working order, they require much more effort to push and pull.

Materials
The shape, size, weight, frequency and location of the materials to be lifted or handled can all affect a worker's risk. For example:

- Large and/or oddly shaped loads can be difficult to grasp and handle and cause awkward postures.
- Heavier loads require greater forceful exertions to lift and handle.
- Greater frequency increases the repetition and demands placed on the same parts of the body to lift and handle loads.
- Loads stored in very low or high positions, or otherwise difficult to reach locations, can cause awkward postures and forceful exertions.

People
Individual characteristics such as gender, size, age, experience and training may affect the way different people perform the same task. It's a good practice to watch a variety of people performing the same task when identifying MSI hazards, to help make sure hazards aren't being missed.

> When performing a hazard assessment, knowing how awkward or sustained postures, repetition, force exertion, contact stress, or vibration can contribute to MSIs can help you to identify and assess where these hazards may be happening at your work sites. Remember to consider organizational, environmental, equipment, material and personal factors as part of your hazard assessment process.

Controlling MSI hazards

The employer must take measures to eliminate MSI hazards, or if elimination is not reasonably possible, control the hazards.

Your hazard assessment may reveal a lot of MSI hazards. All hazards must be addressed but it may not be realistic to address them all immediately. Prioritize the hazards you've identified and address those that pose the greatest risk right away. Introduce interim controls for those hazards that may have to wait for more permanent solutions.

The hierarchy of controls

Alberta's OHS Code states you must follow the hierarchy of controls to eliminate or control hazards. Controls must be implemented in the following order:

- Elimination – Remove the hazards if possible/reasonable.
- Engineering – Isolate people from the hazard by controlling it at its source.
- Administrative – Change the way people work.
- Personal protective equipment (PPE) – Protect workers with PPE. PPE is only introduced after engineering and administrative controls are found to be insufficient for specific hazards. Workers must be trained in the proper use of the PPE and the equipment must be maintained in working order.

If a hazard can't be eliminated or controlled by using a single control method, the employer may use a combination of controls to give a greater level of worker health and safety.

 **OHS legislation also requires employers to control MSI hazards in the following ways**	
Lifting and handling loads	Employers must follow specific requirements regarding the hazard identification and control for manual handling activities. For more details on these requirements, refer to the bulletin Ergonomics in the workplace: Identifying and controlling manual handling hazards.
Training	Employers have an obligation to ensure that workers are adequately trained in all matters necessary to protect their health and safety. • Workers who are exposed to the possibility of an MSI must be trained in specific measures to reduce that risk. • If equipment is used to help control MSI hazards, workers must be trained and competent in the safe operation of the equipment. Read the Ergonomics in the workplace: MSI prevention training bulletin for more information.
Maintenance	Regular preventative maintenance schedules should be set and tracked for all equipment and tools per manufacturer specifications. This ensures equipment is kept in good condition and functioning appropriately. • For occasions when equipment does break down or stops functioning properly, ensure you have communication procedures in place to report broken equipment so repairs can happen quickly.
Housekeeping	Employers must ensure a clean and uncluttered work site in order to prevent slips and trips. This can also help reduce MSIs.
Health care requirements	Specific requirements apply ergonomic principles to safe patient/client/resident handling considerations in the design and construction of health care facilities, and the development and implementation of safe patient/client/resident handling programs.

Ergonomic controls to address MSI hazards

The following section highlights some ergonomic controls to consider for controlling MSI hazards. It is the responsibility of the employer to select and implement controls to address the MSI hazards.

Work height

Not all of your workers are the same height. Where possible and if reasonable, provide adjustable workstations so workers of different height can work in a comfortable and neutral posture.

When planning and designing work sites or processes or selecting new equipment, identify MSI hazards that cannot be eliminated and use ergonomics principles to control them.

When working from a standing position, consider these guidelines when determining the work surface height:

- Detailed or precise work: set slightly above the worker's elbow height.
- Light work: set at elbow height.
- Heavy work/work with large objects: set to just below the worker's elbow height.

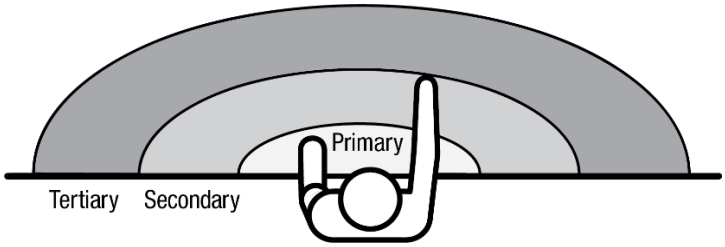
Precision work Light work Heavy work

Whenever possible, avoid work below the mid-thigh and above chest height as this results in awkward postures. If the workstation or work product can't be changed, then look at ways to reposition the worker, such as:

- using a platform to raise the worker up for work that is above the shoulder, or
- providing stools to sit on to lower the worker down for work that is below the waist.

Workstation layout

Arrange workstations to keep the most frequently used objects within the closest reach of the worker (primary zone). Objects that are used less frequently can be positioned slightly farther (secondary zone). Objects only used very occasionally and of a reasonable weight can be placed a little further away, requiring the upper body to also move forward to reach (tertiary zone) This reduces the need for workers to reach excessively and repeatedly.



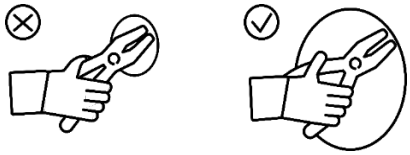
Clearance

Clearance for the worker at the workstation or where the job task is being performed can impact a worker's posture.

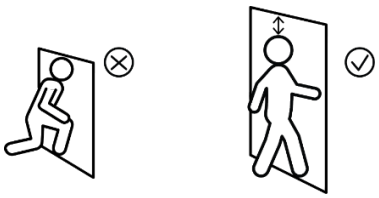
- Position equipment and design the work flow to allow workers enough space to face their work and not have to reach over other objects.
- Ensure there is adequate space for the worker (with any PPE they may be wearing) and tools to fit and maneuver. A lack of space can contribute to awkward postures such as twisting and excessive reaching.
- Ensure hallways and walkways are wide enough to accommodate any equipment used to help transport loads. Consider the space required for moving around corners and if the design is for one-way or two-way traffic.
- Ensure there is sufficient clearance for the worker to perform job tasks in neutral postures and easy access as much as possible.

Leg clearance so the worker can sit close to the work station.

Hand and tool clearance to allow access to the work area or task, with a power grip and neutral positioning of hand and wrist



Whole body clearance for access into a space without the need for awkward postures



Frequency and duration

Frequency and duration controls can be an important part of controlling MSI hazards. Implement administrative controls through scheduling, policies or procedures that:

- increase the number of workers on site during high workload periods
- ensure adequate rest breaks and/or recovery time between demanding tasks
- incorporate task rotation into your work processes

If you use task rotation as a control, here are a few things to remember:

- The task that the worker is switching to should use different movements. For example, if a worker had just been using his arms repeatedly then the next task should be less demanding on the arms and neck.
- Task rotation is most effective when it is done frequently.
    - Provide movement variation for the body frequently throughout the day.
    - More repetitive tasks or those that require awkward postures or high effort will require more frequent task rotations.

Task rotation does not eliminate hazards and can increase overall risk if used as the only control for MSI hazards. Adequate rest breaks must be provided.

See Table 2. Common MSI hazards and sample ergonomic control combinations on page 10 of this bulletin for more examples.

An example MSI identification scenario is provided on page 16 of this bulletin.

Table 1. Awkward posture examples by body area.

Return to Awkward or sustained postures.

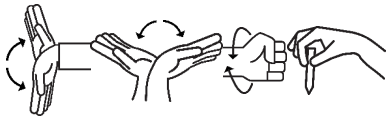
Body area	Neutral posture	Awkward postures	Concern
Neck	Head is upright and over the shoulders, looking forward.	Neck is bent more than 30 degrees in any direction or rotated to the side. 	When the neck is rotated or bent, workers can experience muscle fatigue, muscle and tendon strain, pain or stiffness.
Shoulders	Shoulders are relaxed, arms are by the side.	Arms are outstretched away from the side of the body, including reaching overhead, forward, across body or out to the side. 	When the arms are raised away from the body, workers may experience muscle fatigue, pain and discomfort in the shoulders, neck and back, and may have less precision in their actions.
Hands/ wrists/ forearms	Elbows are bent to 90 degrees, wrists are straight and in a handshake position.	Elbows are straight or bent more than 90 degrees. Wrists are bent up/down or sideways, wrists rotated, or hands in a pinched grip. 	When the elbows are bent excessively or straight while performing tasks, the muscles have a reduced capacity to exert force, which may lead to muscle fatigue. Wrist bending, deviation or rotation can lead to pain and tingling in the hands and compression of the nerves.
Back	Back is upright, not twisted and the natural curves in the spine are maintained.	Back is bent more than 30 degrees in any direction or twisted. 	Twisting or bending the back in any direction, can increase the pressure on spinal discs and cause muscle fatigue and pain in the back and neck.
Legs	Legs are straight, knees are loose and not locked.	Squatting or kneeling on the ground, or knees are locked for long periods. 	Contact stress from kneeling on a surface, or awkward leg positioning can contribute to muscular fatigue and pain in the back and legs.

Table 2. Common MSI hazards and sample ergonomic control combinations.

Note: this is not a comprehensive list of control measures. Return to Ergonomic controls to address MSI hazards.

Common MSI hazards	Design changes and control measures
Awkward / sustained postures	
Overhead work (neck, shoulder, back extension)	• lower the work task or work product • raise the worker using a platform or a piece of equipment • limit overhead storage to light and infrequently used items use task rotation to avoid overhead work for too long • provide tools with longer handles
Reaching forward or to the side	• position frequently used items within a comfortable arm's reach of worker • ensure there is adequate leg clearance
Neck bending and twisting	• position items, objects and/or people being viewed directly in front of worker • raise work surfaces where detailed work is being performed
Back forward bending or twisting	• raise the work product or work surface to provide better access • provide a stool to sit for work at low heights • keep objects within an arm's reach • ensure there is adequate leg clearance under work surfaces
Wrist bending or deviating	• adjust the work surface height and/or angle to keep a straight wrist • select the proper tool for the job that avoids bending the wrist during use
Squatting or kneeling for long periods of time	• raise the work to provide better access • use stools to sit for work that cannot be raised • wear knee pads if kneeling cannot be avoided • take frequent rest breaks to stand up and move • use task rotation to avoid squatting or kneeling for too long
Standing for long periods without movement	• use task rotation to avoid standing still for too long • design workstations and tasks so workers can shift their weight between feet • provide an anti-fatigue mat • provide cushioned insoles in worker shoes/boots • provide a foot rail for worker to alternate lifting and resting one foot up at a time
Forceful exertions (includes manual handling*	
Heavy lifting	• provide lifting equipment • reduce the weight of the load • reduce the size of the container (to lighten the load) • change workstation design to reduce forward reaching • reduce the size of the load to reduce reaching • organize workstations so lifting occurs between knee and chest height
Awkward postures while lifting	• provide lifting equipment • change workstation or workstation layout so neutral postures can be used while lifting

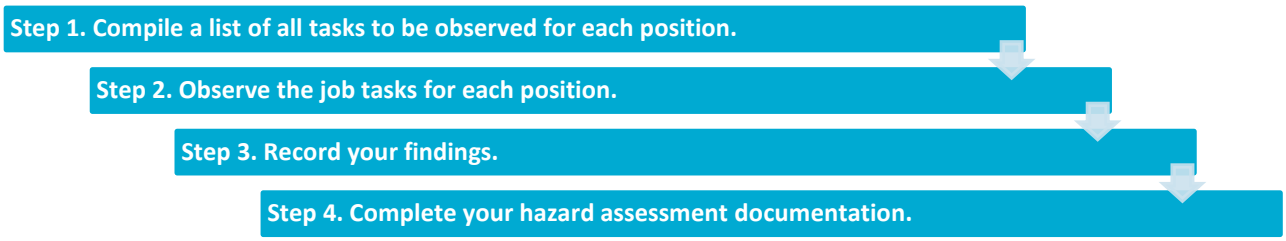
Frequent lifting	• use mechanical lift devices whenever possible • reorganize work to decrease the need to handle loads • rotate workers periodically to jobs with light or no manual handling • use mobile storage racks to avoid unnecessary loading/unloading
Pushing/pulling tasks	• eliminate the need to push/pull by installing conveyors • reduce push/pull forces required by selecting or adding in an automated power assist for moving equipment that reduces the effort required by the worker reduce the distance of the push/pull through work organization • maintain a clear and unobstructed pathway for pushing/pulling • do not obstruct workers view of the path of travel by overloading equipment use handles on cart that are between waist and chest height • reduce required push/pull forces by making sure the wheels are maintained and are well lubricated
High hand force	• use clamps, vices, jigs, etc., to eliminate forceful pressing or pinching • reduce the weight of the tool or the object • use balancers or articulating arms to support tools to minimize weight held in the hand • sharpen cutting tools to reduce force requirements
Repetitive	
Intensive computer work (keying and using the mouse) for long periods	• provide equipment to reduce awkward postures (e.g., adjustable keyboard trays, palm supports, ergonomics keyboard or mouse) • schedule frequent breaks • rotate to tasks that do not require computer work or detailed hand work
Repeating the same action with little or no variation every few seconds	• use mechanical assists to reduce repetitive actions • increase the number of different tasks performed by the worker to vary movement • rotate jobs to vary the worker's movement • schedule breaks
Vibration	
Hand-arm vibration	• select the tool that is best suited for the job task • maintain tools as recommended by the manufacturer • improve hand and arm postures during use by adjusting the height of the work • use task rotation or breaks to limit exposure time to vibration
Whole body vibration	• maintain or improve vehicle suspension • maintain or improve suspension of driver's seat • for standing exposure, provide vibration-mitigating material to for workers to stand on • maintain the surfaces vehicles drive on • use task rotation or breaks to limit exposure time to vibration

*For more information about manual handling, read Ergonomics in the workplace: Identifying and controlling manual hazards.

Return to Ergonomic controls to address MSI hazards.

MSI hazard identification checklist – instructions and template

Use this checklist as a starting point for identifying and controlling for MSI hazards in your formal hazard assessment. This checklist does not replace the hazard assessment documentation required by the OHS Code Section 7.



Step 1. Compile a list of all tasks to be observed for each position.

You may have to adapt or expand this checklist to meet the unique context of your work site(s). For jobs with a lot of variability, complete this checklist for each of the different tasks within the job.

For highly repetitive jobs, completing this checklist once for that job may be sufficient. Start with a blank checklist for each different task to be observed.

Step 2. Observe the job tasks for each position.

Record the task name, location, date and time observations were completed, and who completed the observations. Observe different workers performing the same task if possible. This will give you a better sense of the overall postural demands and different strategies different workers may use.

Have conversations with the workers to get a better sense of the amount of time the tasks take.

- Asking the workers about their job task will help to make sure you don't miss any critical components.
- Workers may be able to highlight specific challenges they encounter when doing certain job tasks, and may also point out or suggest effective controls.

Step 3. Record your findings.

Record your observations. Use the notes section to record identified MSI hazards and note if particular tasks have more than one hazard present. The presence of multiple hazards increases the risk for an MSI to occur.

This checklist can also help you decide if the lifting assessment tool, found in Ergonomics in the workplace: Identifying and controlling manual handling hazards, needs to be used to determine safe lifting limits for the observed tasks.

Step 4. Complete your hazard assessment documentation.

Incorporate the identified MSI hazards into your formal hazard assessment report and include the methods used to eliminate or control the hazards identified. Read the following bulletins for guidance on selecting controls:

- Hazard Assessment and Control: a handbook for Alberta employers and workers
- Ergonomics in the workplace: Identifying and controlling manual handling hazards

Return to Identifying MSI hazards in the workplace

MSI hazard identification checklist

Task name:			
Company name:		Job title:	
Location:		Department:	
Evaluated by:		Date and time:	

Awkward postures

Neck

Select the appropriate box(es) below if workers are in one or a combination of these postures for **two or more hours** a day.

Notes:

neck is bent more than 30 degrees sideways	neck is bent more than 30 degrees forward or backward	neck is twisted to either side
		
☐	☐	☐

Shoulders

Select the appropriate box(es) below if workers are in one or a combination of these postures for **two or more hours** a day.

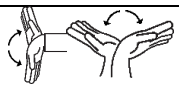
Notes:

reaching with the hand(s) above head	reaching forward or to the side with the elbow(s) above shoulder
	
☐	☐

Hands/ wrists/ forearms

Select the appropriate box(es) below if workers are in one or a combination of these postures for **two or more hours** a day.

Notes:

wrists bent more than 15 degrees in any direction	hold an object weighing 1 kg (2 lbs) or more with a pinch grip	hold an object weighing 4.5 kg (10 lbs) or more with a power grip
		
☐	☐	☐

Back

Select the appropriate box(es) below if workers are in one or a combination of these postures for **two or more hours** a day.

Notes:

forward bending (>30°)	backward bending(>30°)	side bending (>30°)	twisting
			
☐	☐	☐	☐

Static postures

Select the appropriate box(es) if a worker is:

Notes:

sitting for extended periods without standing or walking	standing for extended periods without sitting or walking
☐	☐

Other postures

Select the appropriate box(es) below if workers are in one or a combination of these postures for **two or more hours total** per day.

Notes:

squatting	kneeling
	
☐	☐

Repetition

Select any body areas that are performing the same steady motion or an exertion is repeated with little variation for **two or more hours** a day (four or more hours a day for typing)

Notes:

head/ neck	shoulders	elbows	hands/ wrists	back	legs/ feet
☐	☐	☐	☐	☐	☐

Forceful exertions		
For any lifting required in this task, consider the following points. If you select yes for any of the listed items, please continue on to the Lifting assessment tool found in Ergonomics in the workplace: Identifying and controlling manual handling hazards.	**Yes**	**No**
Worker(s) must lift a load that is heavy and/or bulky.	☐	☐
Worker(s) are required to lift objects without evenly distributed handholds or handles.	☐	☐
The size of the load, or the design of the lift, requires the worker(s) to outstretch their arms to grasp the load.	☐	☐
The lifting of the load requires handling of the load **below knee height** and/or **above shoulder height** at any point during the lift.	☐	☐
The lifting of the load requires twisting of the back and/or trunk.	☐	☐

Contact stress and impact stress			
Select the appropriate boxes if a worker is exposed to the following hazards during the task.			Notes:
equipment edges or ground place pressure on a small area of the body (hands, forearms, trunk, legs)	tool handles dig into the body (hand, or other body part)	using the hand or knee as a hammer	
			
☐	☐	☐	

Vibration			
Select the appropriate boxes if workers are exposed to vibration.			Notes:
using vibrating tools	worker sitting on a vibrating surface	worker standing on a vibrating surface	
			
☐	☐	☐	

Other	
Use this section to note any other MSI risk factors that have not been addressed.	Notes:

This checklist is adapted from the Centre of Research Expertise for the Prevention of Musculoskeletal Disorders[1] and the Washington State Department Labor & Industries[2].

Return to Identifying MSI hazards in the workplace

MSI hazard identification example scenario

Job task: Accessing product from shelves above a counter

A worker is frequently accessing product from shelves located above a counter, placing them on the counter, and then assembling the products into packages. For example, this activity can be observed in commercial kitchens where food is being plated on dishes pulled from above-counter shelves, as well as in storage or warehouse areas where product is picked and placed into shipping boxes.

- The position of the product on the above-counter shelves causes the worker to look up and reach above shoulder and head height.
- The counter extends further than the shelves and causes contact stress on the waist of the worker when leaning and reaching forward to access the product.
- Grasping the product with one hand to achieve a further reach results in pinch gripping.

Here is a portion of the completed MSI Hazard Identification Checklist for this task:

Awkward postures Neck	Awkward postures Shoulders	Awkward postures Hands/wrists/forearms	Contact stress and impact stress
neck is bent more than 30 degrees forward or backward	reaching forward or to the side with the elbow(s) above shoulder	hold an object weighing 1 kg (2 lbs) or more with a pinch grip	equipment edges or ground place pressure on a small area of the body (hands, forearms, trunk, legs)
			
☐	☐	☐	☐

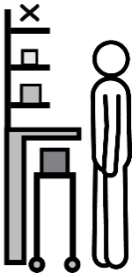
Outcome: Under these conditions, awkward postures of the neck bending backward, reaching forward with elbows above shoulder height, pinch gripping objects weighing 1 kg (2 lbs) or more, and contact stress on the waist will occur. There is opportunity to re-design this task to reduce these MSI risk factors.

Administrative control only:

The first re-design changes the organization of the shelving storage. To avoid high reaching, only the shelves near and below shoulder height are used.

- Product is reorganized so lighter and less frequently used items are on the higher shelf and heavier and more frequently used items are on the shelf below shoulder height.

This reduces the occurrence of the MSI risk factors noted, however also reduces the storage capacity available. Further re-design of this task needs to be explored.



Engineering control and administrative control:

Engineering control options need to be considered. The administrative controls for the organization and use of shelving noted above are still used.

- A cart is provided to increase storage capacity and allow the heaviest products to be stored at waist height.

The cart allows the worker to maintain more neutral postures and reduce MSI risk when manual handling.

Return to Ergonomic controls to address MSI hazards.

Contact us

OHS Contact Centre
(Concerns, questions, report serious incidents)

Anywhere in Alberta
- 1-866-415-8690

Edmonton and surrounding area
- 780-415-8690

Deaf or hearing impaired
- 1-866-232-7215 (Alberta)
- 780-427-9999 (Edmonton)

> Call the OHS Contact Centre if you have concerns that involve immediate danger to a person on a work site.

Notify OHS of health and safety concerns online

alberta.ca/file-complaint-online.aspx

Report a potentially serious incident online

alberta.ca/report-potentially-serious-incidents.aspx

Report a mine or mine site incident online

alberta.ca/report-mine-or-mine-site-incidents.aspx

Website
alberta.ca/ohs

Get copies of the *OHS Act*, Regulation and Code

Alberta Queen's Printer
qp.gov.ab.ca

OHS
alberta.ca/ohs-act-regulation-code.aspx

For more information

Hazard Assessment and Control: a handbook for Alberta employers and workers (BP018)
ohs-pubstore.labour.alberta.ca/bp018

Working in Extreme Temperatures: cold environments (INFO003)
ohs-pubstore.labour.alberta.ca/info003

Working in Extreme Temperatures: hot environments (INFO004)
ohs-pubstore.labour.alberta.ca/info004

Ergonomics in the workplace: Identifying and controlling manual handling hazards (ERG043)
ohs-pubstore.labour.alberta.ca/erg043

Ergonomics in the workplace: MSI prevention training (ERG044)
ohs-pubstore.labour.alberta.ca/erg044

Prevention Initiative Resources – Musculoskeletal disorders (MSDs) / Musculoskeletal injuries (MSIs)
ohs-pubstore.labour.alberta.ca/musculoskeletal-disorders

References

1. Occupation Health and Safety Council of Ontario (OHSCO) and Centre of Research Expertise for the Prevention of Musculoskeletal Disorders. (2018). *General MSD Hazard Identification Tool*. Retrieved April 14, 2021, from https://www.msdprevention.com/resource-library/view/general-msd-hazard-identification-tool.htm.

2. Washington State Department of Labor & Industries. (n.d.). *Hazard Zone Checklist*. Retrieved April 14, 2021 from https://lni.wa.gov/safety-health/_docs/HazardZoneChecklist.pdf