

# Train the Trainer

## MSI Risk Management

### MSI Risk Assessor Training

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## Training Package – Materials

- Presentation PDF (printed if notes are desired)
- BC OHS Regulations – 4.46-4.53 (Ergonomics MSI Requirements)
- Paper copies of worksheets to use in scenarios:
  - MSI Hazard Identification Checklist
  - WorkSafeBC MSI Risk Assessment Checklist
  - RULA worksheet
- Optional – web access to WorkSafeBC manual handling calculators

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## Objectives

- Understanding of:
  - Regulatory requirements for MSI Prevention
  - Company Policy and Procedures for MSI Prevention & Regulatory Compliance
  - Strategies to prioritize MSI risk management efforts
  - MSI – what they are, signs and symptoms, and why they happen (risk factors)
  - Strategies to control risk of MSI
- Skills in:
  - MSI Hazard Identification
  - MSI Risk Assessment
  - MSI Risk Control Strategies
  - Documenting a complete MSI Prevention Process

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## Resources for the MSI Prevention Process

- MSI Prevention Policy and Procedures
- MSI tracking (claims, first aid, medical reports, complaints, concerns)
- MSI Hazard Identification Checklist
- MSI Risk Assessment Tools
- MSI Risk Control Plan
- MSI Awareness Education for Employees
- Training for MSI Assessors (this session)

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## Ergonomics (MSI) Requirements

- WorkSafeBC OHS Regulations  
Sections 4.46 - 4.53
- Purpose:  
to eliminate or, if that is not practicable, minimize the risk of musculoskeletal injury to workers.

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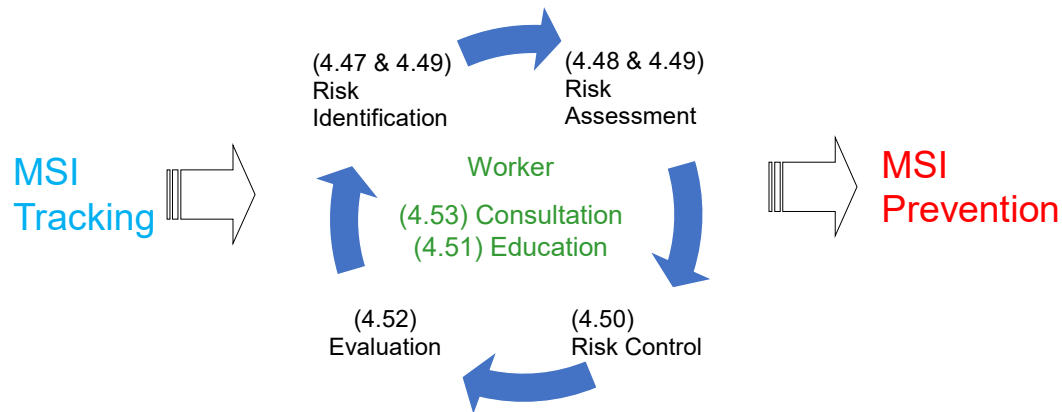
### 4.46 Definition: “Musculoskeletal Injury” or “MSI”

“an injury or disorder of  
the muscles, tendons, ligaments, joints,  
nerves, blood vessels or related soft tissues  
including a sprain, strain and inflammation,  
that may be caused or aggravated by work”.

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## Regulatory Requirements for MSI Prevention

- Ongoing, iterative MSI risk management
- All parts listed in Regulation are required for compliance



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## 4.47 Risk Identification

The employer must identify factors in the workplace that may expose workers to a risk of musculoskeletal injury (MSI).

NOTE: “MSI risk factors” = “MSI hazards”

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## 4.49 Risk factors

The following factors must be considered, where applicable, in the identification and assessment of the risk of MSI:

- a) Physical demands of work activities  
(force, repetition, posture, duration, contact stress)
- b) Layout and condition of the workplace/workstation  
(working reaches, working heights, seating, flooring)
- c) Characteristics of objects handled  
(load size, shape, condition and weight distribution; handles)
- d) Environmental conditions  
(cold/hot, lighting)
- e) Organization of work  
(work-recovery pattern, task variability, work rate)

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## Risk Identification and Assessment - By who?

- By people who:
  - Are familiar with work processes
  - Are familiar with risk factors for MSI
  - Have been trained in principles of risk assessment

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## Risk Identification - When?

When there is a *reasonable* expectation of MSI risk in a job.

Prioritize based on evidence, concern and opportunity.

- Evidence = MSI in claims, first aid or medical reports.
- Concern = worker concerns, regular safety inspections, discomfort surveys, or need to evaluate prior efforts to control MSI risk.
- Opportunity = planned changes such as construction, renovation, seasonal reorganization, restocking, purchasing new equipment, hiring new or seasonal employees. New MSI Hazards or controls?

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## Risk Identification – How?

- Create a master list of jobs and tasks
- Prioritize jobs for assessment based on MSI evidence, concern, or opportunity
- Review work with workers and supervisors to identify and understand concerns
- Observe work to identify MSI risk factors
  - MSI Hazard Identification Checklist
- Document identified MSI risk factors and opportunities to control risk

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## 4.48 Risk Assessment

When factors that may expose workers to a risk of MSI have been identified, the employer must ensure that the risk to workers is assessed.

NOTE: compliance requires that risk assessment:

1. Use an accepted method to rate MSI risk as high, moderate or low.
2. Is performed by a person with appropriate training.

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## Risk Assessment – How?

Accepted tool(s) to assess MSI risk:

- General Physical Demands MSI Risk Factors:
  - WorkSafeBC MSI Risk Assessment Checklist (July 2022)
- Upper extremity (shoulder, arm, wrist, hand) MSI risk
  - RULA – Rapid Upper Limb Assessment (posture-based assessment)
- Manual handling MSI risk
  - Lifting/Lowering Risk Calculator
  - Push/Pull/Carry Risk Calculator

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## 4.50 Risk control

1. The employer must eliminate or, if that is not practicable, minimize the risk of MSI to workers.
2. PPE may only be used as a substitute for engineering or administrative controls if those controls are not practicable.
3. The employer must, without delay, implement interim controls when the introduction of permanent controls will be delayed.

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## 4.51 Education and training

The employer must ensure that:

1. A worker who may be exposed to MSI risk is educated in
  - Risk identification related to the work
  - Recognition of early signs and symptoms of MSI
  - Potential health effects
2. A worker to be assigned to work requiring specific control measures is trained in the use of those measures, including:
  - Work procedures
  - Mechanical aids
  - PPE

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## 4.52 Evaluation

1. The employer must monitor the effectiveness of the measures taken to comply with the Ergonomics (MSI) Requirements and ensure that they are reviewed at least annually.
2. When monitoring required by (1) identifies deficiencies, they must be corrected without undue delay.

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## Evaluation – How?

- Confirm implementation of controls
- Interview workers – perception of benefit; discomfort survey
- Repeat hazard identification and risk assessment after controls
- MSI tracking – claims, first aids, medical reports
- Check the priority job & task list (have priority jobs been assessed?)

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## 4.53 Consultation

1. The employer must consult with the joint committee or the worker health and safety representative, as applicable, with respect to the following when they are required by the Ergonomics (MSI) Requirements:
  - a) Risk identification, assessment and control
  - b) The content and provision of worker education and training
  - c) The evaluation of compliance measures taken

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## 4.53 Consultation

2. The employer must, when performing a risk assessment, consult with:
  - a) Workers with signs or symptoms of MSI, and
  - b) A representative sample of the workers who are required to carry out the work being assessed

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## MSI Prevention Across Multiple Locations

- Tasks may be performed in a similar manner with similar equipment in many stores (e.g., all cashier stations designed the same)
- Hazard ID, Risk Assessment, and Risk Control may be performed at a small sample of representative stores
- The Hazard ID and Risk Assessment are then verified at each location by ensuring:
  - Documented MSI hazards and risk assessment accurately represent work at the individual location
  - There are no unique or different aspects of the task at the individual location that might alter the assessment
- If verified, then the Risk Control Plan shall be implemented at the store
- If modifications are needed, the Risk Assessment is adjusted and a modified Risk Control Plan shall be defined for the individual location
- Documentation of the Hazard ID, Risk Assessment and Control Plan will be maintained and accessible at all locations

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## Risk Management Documentation

- Policy documents
- Accident and injury records – track MSI and review monthly
- Activity level documents
  - Job & task master list – priorities for risk management & tracking activity
  - Hazard Identification, Risk Assessment and Risk Control records
  - Store-level verification of the above (or modified version of the above)

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## Hazard ID, Risk Assessment and Control Record

- MSI Hazard Checklist
  - Date, location, name of assessor(s)
  - Job and Name of employees observed
  - MSI Hazards identified and described
- Risk Assessment Tools
  - Rating of high, moderate or low MSI risk
- Controls implemented during inspection or assessment
  - What was changed during the inspection to eliminate or minimize risk factors?
- Control Plan (further controls that require resources)
  - Controls, person responsible, implementation and completion dates
- Evaluation of Controls
  - Are they in place and were they effective at reducing MSI risk?

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What are MSI?  
Early Signs and Symptoms.  
Why do MSI happen?

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## What are MSI?

- MSI are soft tissue injuries that are caused or made worse by work
  - Injuries away from work are also an issue if work makes them worse or prevents healing
- MSI may be caused by a single event or incident  
For example, straining a muscle during heavy lifting.  
These are called “traumatic MSI” or “overexertion injuries”
- MSI may be caused slowly over time, due to multiple repeated events  
For example, tendonitis from repetitive awkward wrist movements.  
These are called “cumulative trauma injuries” or “repetitive strain injuries”.

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## Early Signs and Symptoms of MSI

- Signs can be seen, including: swelling, redness, bruising, or limited ability to move.
- Symptoms cannot be seen but are felt, including: pain, aching, tingling, numbness, fatigue or loss of strength.
- Signs and symptoms may begin gradually or may occur suddenly.
- Signs and symptoms may be noticed during work or at home.
- Early signs and symptoms indicate possible MSI that may worsen if there is no change in how work is performed.
- Response to EARLY signs and symptoms is critical in preventing worsening to full MSI and permanent or chronic damage
  - Discomfort, fatigue, weakness, temporary numbness or tingling, aching, or low level pain that is not perceived as limiting are EARLY symptoms

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## What to do if an employee has MSI signs, symptoms or concerns

- Don't ignore it. The earlier they respond to signs and symptoms, the better. Encourage discussion and action to reduce risk of worsening.
- Record reported signs, symptoms or concerns – what body part, what sign/symptom, and what activities does the employee believe makes it worse. (A body map or discomfort survey can assist)
- Encourage the employee to report this to their supervisor.
- Look for MSI hazards that are likely to make it worse.
- Look for MSI controls to minimize exposure to things that make it worse (MSI controls).
- Encourage the employee to seek medical assistance if signs and symptoms are severe, getting worse, or not improving.

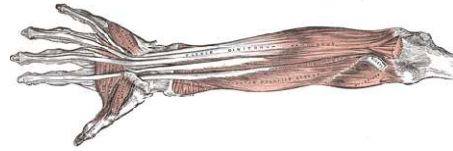
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## Common MSI

- Strains and sprains – usually a single incident “overexertion”
- Tendonitis – may be a single overexertion or may be repetitive strain
- Low back pain/back pain/neck pain – usually repetitive strain but may become aware of the injury in a specific moment
- Nerve disorders (carpal tunnel syndrome) – repetitive strain

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## Tendonitis



- Tendons attach muscle to bone
- Overuse/Repetitive Strain over time or high force overexertion incident
- Signs and symptoms include pain, swelling, loss of strength or range of movement
- Damage to tendons in the thumb, hand, wrist, elbow, shoulder result from:
  - Forceful gripping (whole hand or fingertip pinch grip)
  - Awkward postures of the fingers, wrist, elbow or shoulder
  - Repetitive gripping or movements
  - Sustained force or awkward postures

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## Nerve Entrapment



- Nerves transmit information between our brain and tissue.
- Nerves may become trapped or irritated at joints or at narrow passages that they pass through.
- Carpal tunnel syndrome (wrist), thoracic outlet syndrome (shoulder) are two common types.
- Referred symptoms that occur “downstream” from the injury are common: pain, numbness, tingling, burning or weakness in the hand or fingers may occur from nerve irritation at the wrist, elbow, shoulder or neck.
- Risk factors are the same as those for tendonitis plus contact pressure.

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## Low Back or Neck Injury



- Low back or neck injury may involve similar symptoms as those experienced during tendonitis or nerve entrapment: pain or weakness in the back or neck, but may also referred symptoms.
- Low back referred symptoms are often in the legs or feet.
- Neck referred symptoms are often in the shoulders and arms.
- Risk factors
  - Forceful exertion (lifting, pushing, pulling or carrying)
  - Awkward postures of the back or neck (bending, twisting), or arms (reaching)
  - Repeating or sustaining forceful exertion and/or awkward postures.
  - Prolonged sitting or standing without movement

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## MSI hazards – What to watch for

MSI are more likely to occur when work involves:

- Forceful exertion
  - Awkward postures
  - Repetitive movements
  - Contact pressure
  - “Other” risk factors
- Risk is higher when more than one hazard exists at the same time
  - Risk is higher when unaccustomed to performing the work (new worker or new work)

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## Hazard: Forceful Exertion

- Lifting, Pushing, Pulling, Carrying
- Gripping
- Higher risk if:
  - Heavy, unstable or awkward loads
  - Reaching – forward, up, down, or to one side
  - Unable to use two hands
  - Unable to use a whole hand grip
  - Repetitive or sustained effort



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## Hazard: Awkward Postures

Consider all joints: neck, back, shoulders, elbows, wrists, fingers/thumb, hips, knees, ankles and toes.

Awkward postures occur when:

- Reaching, bending, twisting
- Working above chest or below hip level
- Using straight-handled tools (e.g., scissors, pliers)
- Sitting
- Looking to one side, above or below head level
- Working spaces are constrained or tight

Awkward postures present higher MSI risk when:

- Held for long durations with little recovery or rest
- Applying force
- Moving repetitively in or through awkward posture



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## Hazard: Repetitive Motions

- Using the same body part repeatedly or sustaining effort without rest
- May be the same task or different tasks that use the same movements
- E.g., stocking shelves, folding clothing, checkout



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## Hazard: Contact Pressure

- Leaning against edges
- Kneeling on hard surfaces
- Small handles (e.g., buckets with wire handles)
- Hard or square edges on handles
- Using your hand or body parts to hammer objects



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## Other risk factors

- Cold (e.g., refrigerated zones, winter)
- Hot (e.g., bakery, summer)
- Uneven or slippery flooring
- Poor lighting – shadow or glare
- Unaccustomed or new work
- Extended shifts or overtime
- Poor work-rest balance

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## MSI Hazard Identification

### 1. Preparation

- Select a job or task(s) from the job list based on priority
- Define what is to be observed – entire job or specific tasks?
- Review MSI claims, concerns, prior risk assessment for the job or task
- Set up observation kit
  - Print a copy of the MSI Hazard Identification Checklist
  - Print a copy of the discomfort survey (if using)
  - Tape measure to document heights, distances, etc.
  - Camera to document work, postures, movements
- Define a time to perform observations that will allow observation of:
  - Representative work: – typical of what is intended (usual or busy?)
  - Representative workers: – employees with MSI or history of MSI  
– range in size/experience/gender
- Select who will perform MSI Hazard ID – know the job, trained in MSI

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## MSI Hazard Identification

### 2. Observation

- Speak to representative workers
  - Use discomfort survey to learn about signs, symptoms, discomfort
  - Ask about any concerns, perceived MSI hazards and ideas for controls
- Observe work performed by representative workers
- Document observed MSI Hazards using the MSI Hazard ID Checklist
  - Measure or estimate observed hazards (weights lifted, heights reached, etc.)
  - Describe when and why they exist (e.g., upper 2 shelves are above shoulders)
  - Must consider all MSI Risk Factors listed in BC OHS Regulation 4.49

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## MSI Hazard Identification Checklist

- The MSI Hazard Identification Checklist can be used as tool to guide and document observation of MSI hazards.
- The Checklist systematically goes through each of the MSI risk factors that are listed in BC OHS Regulation, including the “other contributing factors”.
- If a hazard is present, check that it is present. Then follow across the row to provide additional details on what is known about a specific hazard – Repetitive? Sustained? When/why? How much?
- Are there any controls in place already to minimize the severity or exposure duration to identified hazards?

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MSI-Hazard-Identification-Checklist--MSI-Prevention-Inspection-or-Investigation¶

Date:¶	Location:¶
Assessors-(list):¶	Employees-observed-(list):¶
Job-or-Task-(describe):¶	





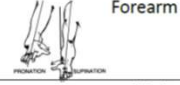

  

MSI-Hazards Observed¶	Present?¶	Repetitive?¶	Sustained?¶	When-and-why-risk-factor-occurs-(task, workstation, load, etc.)¶	Describe-risk-factor-(magnitude, direction, duration)¶	Controls-to-eliminate-or-minimize-risk-factor¶
<b>Force¶</b>	¶	¶	¶	<b>*task; object; forward-reach; below-knee; above-chest; distance-moved; twisting¶</b>	<b>*typical-&amp;-highest-load; how-many; hours¶</b>	<b>*mechanical-assists; working-height; training; etc.¶</b>
Lift, Lower¶	¶	¶	¶	¶	¶	¶
Push, Pull¶	¶	¶	¶	¶	¶	¶
Carry¶	¶	¶	¶	¶	¶	¶

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MSI Hazards Observed	Present?	Repetitive?	Sustained?	When and why risk factor occurs (task, workstation, load, etc.)	Describe risk factor (magnitude, direction, duration)	Controls to eliminate or minimize risk factor
<b>Force</b>				<b>*task; object; forward reach; below knee; above chest; distance moved; twisting</b>	<b>*typical &amp; highest load; how many; hours</b>	<b>*mechanical assists; working height; training; etc.</b>
Lift, Lower						
Push, Pull						
Carry						
 Power Grip						
 Pinch Grip						

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MSI Hazards Observed	Present?	Repetitive?	Sustained?	When and why risk factor occurs (task, workstation, load, etc.)	Describe risk factor (magnitude, direction, duration)	Controls to eliminate or minimize risk factor
<b>Awkward Postures (bending or twisting)</b>				<b>*task; reason for posture; forceful; rapid?</b>	<b>*bend, twist, forward, sideways; angle; hours</b>	<b>*adjustable height; reaching tool; etc.</b>
Neck 						
Back 						
Shoulder 	L	R				
Elbow 	L	R				
Forearm 	L	R				
Wrist 	L	R				

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MSI Hazards Observed	Present?	Repetitive?	Sustained?	When and why risk factor occurs (task, workstation, load, etc.)	Describe risk factor (magnitude, direction, duration)	Controls to eliminate or minimize risk factor
<b>Contact Stress</b>				<b>*task; body part; reason for contact stress</b>	<b>*duration, load</b>	<b>*gloves; padding; etc.</b>
Leaning on edges, pressure on handles, hammer with body						
<b>Other Contributing MSI Risk Factors</b>				<b>*task; description and reason for risk factor</b>	<b>*magnitude; duration</b>	<b>*clothing; PPE; task rotation; rest breaks; etc.</b>
Vibration (hands, whole-body)						
Workplace layout (flooring, reaches, heights, seating)						
Characteristics of objects handled (size, shape, condition, weight distribution, handles)						
Environment (hot/cold; lighting)						
Organization of work (work-recovery cycles, task variability, work rate)						
Other						

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## MSI Hazard Control Plan

- In response to identified MSI hazards, lay out a control plan.
- Controls that are immediately implemented or controls for later consideration and further research.

### MSI Hazard Control Plan and Evaluation

List all controls implemented or planned to address identified MSI Hazards, along with person(s) responsible for implementation, date initiated, date completed (control implemented), and the impact of controls on eliminating or minimizing MSI hazards. Indicate interim and permanent controls.

Control (describe all interim or permanent controls that arise from the current inspection)	Person(s) Responsible	Date Initiated	Date Completed	MSI Hazard Re-evaluation (Impact of Controls)

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## MSI Hazard Identification - Practice

- Use your paper copy of the MSI Hazard Identification Checklist to document MSI hazards that you see in a video (2 minutes).
- Task = stocking processed meat shelves.
  - Duration ~30 min/day
  - One of several similar shelf stocking tasks for this job.
  - Combined duration of shelf stocking is ~2.5 h/day
  - Objectives include stock rotation so newer stock is at the back.
- We will watch the video a few times. Just watch the first time. Then use the tool while the video runs again to document MSI hazards.

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## MSI Risk Assessment

- Rate MSI risk as high, moderate or low using a risk assessment tool
- Informed by MSI Hazard Identification but may require additional information (depends on risk assessment tools)
- Used to:
  - Prioritize MSI risk control planning
  - Identify MSI hazards that have the greatest effect on MSI risk
  - Evaluate the effectiveness of MSI controls on MSI risk ratings  
Pre-control vs. Post-control risk rating

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## MSI Risk Assessment Tools

- WorkSafeBC MSI Risk Assessment Worksheet
- RULA Rapid Upper Limb Assessment
- WorkSafeBC Lift/Lower Calculator (online)
- WorkSafeBC Push/Pull/Carry Calculator (online)

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## WorkSafeBC MSI Risk Assessment Worksheet

- Best performed by looking at individual tasks within a job rather than attempting to assess an entire job. (Multiple worksheets needed for most jobs)
- Perform for:
  - Most frequent tasks
  - Tasks associated with evidence or concern for MSI
  - Tasks where planned changes will alter work or risk factors (opportunity)
- General risk factor assessment
- Contains a lifting/lowering assessment
- Consider whether additional risk factors exist that are not included (if so, record these as well)

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## MSI Risk Assessment Worksheet – Description

### Description

Date:

Completed by:

Job or task being assessed:





Representative sample of workers, including workers with MSI signs and symptoms:

Joint health and safety committee (or worker health and safety representative) reviewed?

 Yes No





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## MSI Risk Assessment Worksheet – Force

Pinch gripping		
Low risk	Moderate risk	High risk
<input type="checkbox"/> Pinch gripping unsupported objects less than 2 hours total per day.	<input type="checkbox"/> Pinch gripping unsupported objects that weigh 1 kg (2 lb.) or more per hand for more than 2 hours total per day.  <input type="checkbox"/> Pinch gripping with a force of 2 kg (4 lb.) or more per hand for more than 2 hours total per day. This is equivalent to pinch gripping half a stack of photocopy paper (250 sheets).	Pinch gripping unsupported objects that weigh 1 kg (2 lb.) or pinch gripping with a force of 2 kg (4 lb.) in any of the following situations: <input type="checkbox"/> Pinch gripping for more than 3 hours total per day with repetitive motions every few seconds. <input type="checkbox"/> Pinch gripping for more than 3 hours total per day with wrists bent in any of the following positions: <input type="checkbox"/> $\geq 30^\circ$ flexion  <input type="checkbox"/> $\geq 45^\circ$ extension  <input type="checkbox"/> $\geq 30^\circ$ ulnar deviation 

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## MSI Risk Assessment Worksheet – Force

Power gripping		
Low risk	Moderate risk	High risk
<input type="checkbox"/> Power gripping unsupported objects less than 2 hours total per day.	<input type="checkbox"/> Power gripping unsupported objects that weigh 4.5 kg (10 lb.) or more per hand for more than 2 hours total per day.  <input type="checkbox"/> Power gripping with a force of 4.5 kg (10 lb.) or more per hand for more than 2 hours total per day. This is equivalent to clamping light-duty automotive jumper cables onto a battery.	Pinch gripping unsupported objects that weigh 1 kg (2 lb.) or pinch gripping with a force of 2 kg (4 lb.) in any of the following situations: <input type="checkbox"/> Power gripping for more than 4 hours total per day. <input type="checkbox"/> Power gripping with a repetitive motion every few seconds for more than 3 hours total per day. <input type="checkbox"/> Power gripping for more than 3 hours total per day with wrists bent in any of the following positions: <input type="checkbox"/> $\geq 30^\circ$ flexion  <input type="checkbox"/> $\geq 45^\circ$ extension  <input type="checkbox"/> $\geq 30^\circ$ ulnar deviation 

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## MSI Risk Assessment Worksheet – Push/Pull/Carry

### Pushing, pulling, or carrying

Force is needed to push or pull an object, either on wheels or by sliding. Force is also needed to carry an object.

Note any pushing, pulling, or carrying tasks, especially tasks that are repeated and/or long duration, or involve long distances, awkward postures, or work above the shoulder level or below knee height. See [MSI prevention guidance: Pushing and pulling](#) for more information on assessing these risks.



Look for the following factors that increase risk level, and eliminate or minimize these for MSI risk control:

- Push/pull above shoulder
- Push/pull below knees
- Reach away from body
- Wrists bent or twisted
- Seated or kneeling position
- One-handed push/pull/carry
- High resistance or high force
- Long distances push/pull/carry
- Rough ground or floor
- Frequent or for long duration

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## MSI Risk Assessment Worksheet - Lift/Lower

### Lifting or lowering

#### Low risk

- Any lifting or lowering that is less than moderate risk.



#### Moderate risk

Lifting or lowering objects:

- Above shoulder height, below the knees, or at arm's length.
- Twice or more per minute for more than 1 hour per shift.
- That weigh 2.3 kg (5 lb.) or more, twice or more per minute.
- That weigh more than 8.2 kg (18 lb.), once per shift.

**Note:** If any box above is selected, proceed to high-risk column.

#### High risk

If you find any lifting or lowering that presents a moderate risk, do a lift/lower risk assessment for high risk (see page 5).

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## Lift/Lower and Push/Pull/Carry Calculators

- Select the WorkSafeBC calculator for your scenario
  - [WorkSafeBC Lift/Lower Calculator \(worksafebcmedia.com\)](https://worksafebcmedia.com)
  - [WorkSafeBC Push/Pull/Carry Calculator \(worksafebcmedia.com\)](https://worksafebcmedia.com)
- Enter the requested information
- Lift/Lower Calculator same as the MSI Risk Assessment Worksheet
- Need to know actual weights lifted for lift/lower or carry assessment
- Need to know push/pull force for push/pull assessment
- Calculators are only for 2-handed manual handling
- Risk is higher for one-handed manual handling or unstable, awkward objects

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## Push/Pull/Carry Calculator

- Select push, pull or carry calculator for the work scenario
- Select gender for the assessment – if mixed gender, use “female”.
- Enter closest value for each of the following from dropdown menu:
  - Height of hands (can measure handle height)
  - Distance pushed/pulled/carried
  - Frequency (how often)
- Calculator output – forces that 75% of worker population should be able to exert
  - Initial force (required to start moving for push/pull)
  - Sustained force (required to continue moving for push/pull)
  - Maximum carry weight
- Compare calculator output to actual push/pull force or carry weight

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## Measuring push/pull forces

- Use a spring scale (fish scale or luggage scale) or force meter
- Only if safe while maintaining control of the load
- Slowly push/pull from a stopped position until the object first begins to move and read the force measured: this is “initial force”
- Continue to push/pull at a typical speed and read the force measured: this is “sustained force”



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## Push/Pull Scenario



- Handle height 100cm
- Initial force 19kg
- Sustained force 10kg
- Frequency 4 per shift
- Distance 9 m
- Gender?

WorkSafeBC Push/Pull Calculator:

Push

- 75% M: 32kg initial; 21kg sustained
- 75% F: 23kg initial; 13kg sustained

Pull

- 75% M: 30kg initial; 21kg sustained
- 75% F: 23kg initial; 14kg sustained

Conclusion?

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## Lift/Lower Assessment

- If there is variability in what is lifted/lowered, then assess:
  - Worst-case scenarios: heaviest load and most awkward posture
  - Most common scenario: typical load and typical posture
- Assess different lifting conditions to identify when lifting is higher risk
  - Lifting different objects
  - Lifting to/from different locations.
- Focus MSI Risk Control on higher risk aspects of a task.

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## Lift/Lower Assessment – Step 1

### **Step 1: Determine the actual weight of the lifted object**

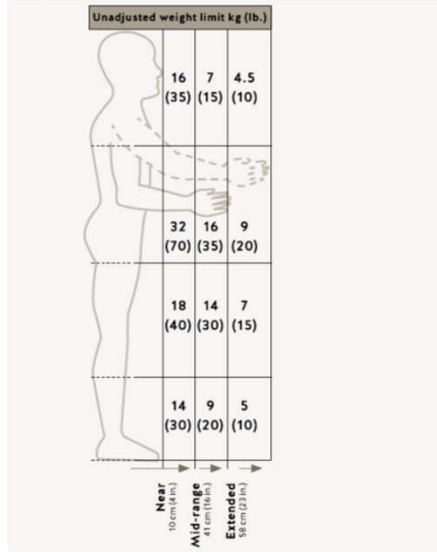
What is the lifted object?

- 1. Heaviest/most awkward
- 2. Most common

**Actual weight =** \_\_\_\_\_

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## Lift/Lower Assessment – Step 2



- Determine unadjusted weight limit based on most extreme hand position
- Usually when picking up or putting down the load
- Could do this for different scenarios to identify safe zones vs high risk zones

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## Lift/Lower Assessment – Step 3

How many lifts per minute?	How many hours per day?		
	Less than 1 h	1 h to 2 h	more than 2 h
1 lift every 2–5 min	1.00	1.00	0.85
1 lift every min	0.95	0.95	0.70
2–3 lifts every min	0.90	0.85	0.60
4–5 lifts every min	0.85	0.70	0.50
6–7 lifts every min	0.60	0.50	0.35
8–9 lifts every min	0.40	0.30	0.15
10+ lifts every min	0.20	0.10	0.05

**Note:** For lifting done less than once every five minutes, use 1.0.

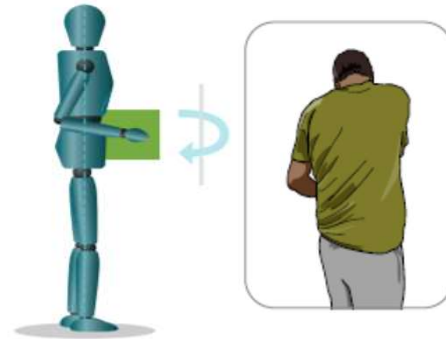
**Frequency + duration adjustment =** \_\_\_\_\_

- Determine the frequency of lifts (lifts per minute)
- Determine the total duration of lifting tasks per day (hours)
- Select the multiplier from the table based on frequency and duration
- For infrequent lifts (more than 5 minutes between lifts) use 1.0 as the multiplier.

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## Lift/Lower Assessment – Step 4

- Determine whether twisting more than 45 degrees occurs during the lift
- If yes, then twist multiplier = 0.85
- If no, then twist multiplier = 1.0



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## Lift/Lower Assessment – Steps 5 and 6

### Step 5: Calculate the weight limit

To get the weight limit, multiply the unadjusted weight limit (Step 2) by the frequency + duration adjustment (Step 3) and the twisting adjustment (Step 4).

	$\times$		$\times$		$=$	
<b>Step 2</b>		<b>Step 3</b>		<b>Step 4</b>		<b>Weight limit</b>
Actual weight = _____						Weight limit = _____

### Step 6: Analyze the results

If the actual weight (Step 1) is greater than the weight limit (Step 5), you must implement risk controls.

- Multipliers reduce unadjusted weight limit
- Compare the actual weight to the weight limit.
- If actual weight is more than the weight limit, the lifting task is high risk and requires controls.

65



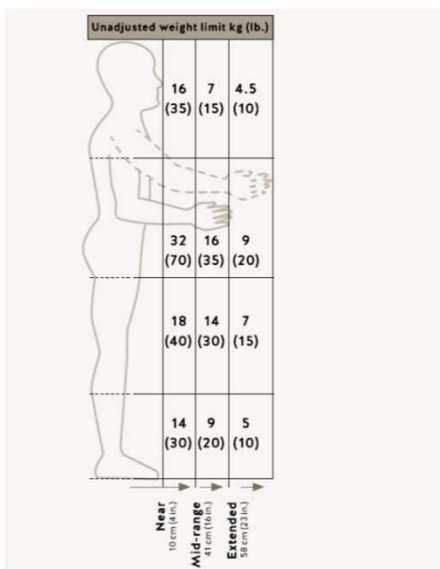
## Lift/Lower Assessment

- Actual weight: 8 kg
  - Start of lift is most awkward  
mid-shin, mid-reach = 9kg max
  - Frequency 2-3/minute  
Duration of lifting tasks 1-2 hours  
Multiplier = 0.95
  - Twisting – close to 45 degrees?  
Multiplier = 0.85 or 1.0
- 
- Weight limit =  $9 \text{ kg} \times 0.95 \times 0.85 = 7.3 \text{ kg}$ ; or  $9 \text{ kg} \times 0.95 = 8.6 \text{ kg}$  (no twist)
  - Online: 6.5kg (twist); 7.7kg (no twist)
  - Actual weight > weight limit = high risk; or actual weight < weight limit
  - Conclusion?



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## Ideas to reduce risk?



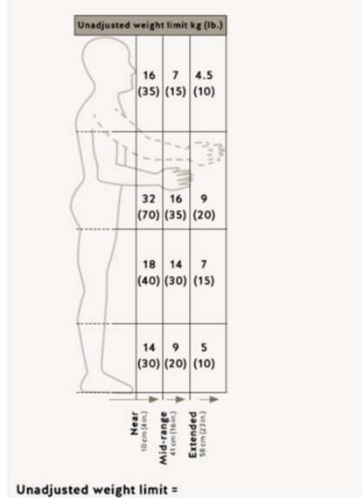
How many lifts per minute?	How many hours per day?		
	Less than 1 h	1 h to 2 h	more than 2 h
1 lift every 2-5 min	1.00	1.00	0.85
1 lift every min	0.95	0.95	0.70
2-3 lifts every min	0.90	0.85	0.60
4-5 lifts every min	0.85	0.70	0.50
6-7 lifts every min	0.60	0.50	0.35
8-9 lifts every min	0.40	0.30	0.15
10+ lifts every min	0.20	0.10	0.05

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## Reducing MSI Risk for Lift/Lower Tasks

### Step 2: Determine the unadjusted weight limit

Look for the most extreme hand position during the lift/lower task. Mark it on the following diagram.



- Reduce the weight actually lifted
- Improve hand position to increase weight limit (control pick up & put down position)
  - Closer to the body
  - Mid-thigh to Mid-chest
  - Avoid below knees or above chest
- Reduce frequency of lifting (Step 3)
- Reduce duration of lifting (Step 3)
- Eliminate twist beyond 45 degrees

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## MSI Risk Assessment Worksheet - Contributing Risk Factors for Force

- Aspects of workplace layout (working reaches, working heights, seating, floor surfaces)

Describe: \_\_\_\_\_

- Characteristics of objects handled (size and shape, load condition and weight distribution, handles)

Describe: \_\_\_\_\_

- Environmental conditions (cold temperatures)

Describe: \_\_\_\_\_

- Organization of work (work-recovery cycles, task variability, work rate)

Describe: \_\_\_\_\_

**Notes and observations:**

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## MSI Risk Assessment Worksheet - Repetition

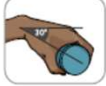


### Physical demands risk factors

Determine if any of the following MSI risk factors are present. Check the boxes for the highest level of risk for each body part.

Neck, shoulders, elbows, wrists, and hands		
Low risk	Moderate risk	High risk
Some repetition, but less than 2 hours total per day: <ul style="list-style-type: none"> <li><input type="checkbox"/> Neck</li> <li><input type="checkbox"/> Shoulders</li> <li><input type="checkbox"/> Elbows</li> <li><input type="checkbox"/> Wrists</li> <li><input type="checkbox"/> Hands</li> </ul>	Repeating the same motion every few seconds with little or no variation for 2-6 hours total per day: <ul style="list-style-type: none"> <li><input type="checkbox"/> Neck</li> <li><input type="checkbox"/> Shoulders</li> <li><input type="checkbox"/> Elbows</li> <li><input type="checkbox"/> Wrists</li> <li><input type="checkbox"/> Hands</li> </ul>	Repeating the same motion every few seconds with little or no variation for more than 6 hours total per day: <ul style="list-style-type: none"> <li><input type="checkbox"/> Neck</li> <li><input type="checkbox"/> Shoulders</li> <li><input type="checkbox"/> Elbows</li> <li><input type="checkbox"/> Wrists</li> <li><input type="checkbox"/> Hands</li> </ul>

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## MSI Risk Assessment Worksheet - Repetition

Wrists and hands (excludes typing)		
Low risk	Moderate risk	High risk
<input type="checkbox"/> Some repetition but less than 2 hours total per day.	<input type="checkbox"/> Repeating the same motion every few seconds with little or no variation for more than 2 hours total per day.	<input type="checkbox"/> Repeating a high, forceful hand motion every few seconds with little or no variation for more than 2 hours total per day, with wrists bent in any of the following positions: <ul style="list-style-type: none"> <li><input type="checkbox"/> <math>\geq 30^\circ</math> flexion </li> <li><input type="checkbox"/> <math>\geq 45^\circ</math> extension </li> <li><input type="checkbox"/> <math>\geq 30^\circ</math> ulnar deviation </li> </ul>

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## MSI Risk Assessment Worksheet - Repetition

Wrists, hands, and fingers (typing)		
Low risk	Moderate risk	High risk
<input type="checkbox"/> Intensive typing for less than 4 hours total per day.	<input type="checkbox"/> Intensive typing for 4-7 hours total per day.	<input type="checkbox"/> Intensive typing for more than 7 hours total per day. <input type="checkbox"/> Intensive typing for more than 4 hours total per day with wrist bent in any of the following positions: <ul style="list-style-type: none"> <li><input type="checkbox"/> <math>\geq 30^\circ</math> flexion</li> <li><input type="checkbox"/> <math>\geq 45^\circ</math> extension</li> <li><input type="checkbox"/> <math>\geq 30^\circ</math> ulnar deviation</li> </ul> <p>Refer to the high-risk illustrations on the previous page under "Wrists and hands."</p>

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## MSI Risk Assessment Worksheet - Contributing Risk Factors for Repetition

- Aspects of workplace layout (working reaches, working heights, seating, floor surfaces)

Describe: \_\_\_\_\_

- Characteristics of objects handled (size and shape, load condition and weight distribution, handles)

Describe: \_\_\_\_\_

- Environmental conditions (cold temperatures)

Describe: \_\_\_\_\_



- Organization of work (work-recovery cycles, task variability, work rate)

Describe: \_\_\_\_\_

**Notes and observations:**

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## MSI Risk Assessment Worksheet – Awkward Postures

Knees		
Low risk	Moderate risk	High risk
<input type="checkbox"/> Squatting or kneeling for less than 2 hours total per day.	<input type="checkbox"/> Squatting for 2-4 hours total per day.  <input type="checkbox"/> Kneeling for 2-4 hours total per day.	<input type="checkbox"/> Squatting or kneeling for more than 4 hours total per day.
	 	


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## MSI Risk Assessment Worksheet – Awkward Postures

Shoulders		
Low risk	Moderate risk	High risk
<input type="checkbox"/> Working with elevated arms less than 2 hours total per day.	<input type="checkbox"/> Working with hands above the head for 2-4 hours total per day.  <input type="checkbox"/> Working with elbows above shoulder level for 2-4 hours total per day.	<input type="checkbox"/> Working with hands above the head for more than 4 hours total per day.  <input type="checkbox"/> Working with elbows above shoulder level for more than 4 hours total per day.
		




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## MSI Risk Assessment Worksheet – Awkward Postures

Neck		
Low risk	Moderate risk	High risk
<input type="checkbox"/> Working with the neck bent in any direction less than 2 hours total per day.	<input type="checkbox"/> Working with the neck bent more than 30° in any direction for 2-4 hours total per day.  <input type="checkbox"/> Side <input type="checkbox"/> Backward <input type="checkbox"/> Forward  	<input type="checkbox"/> Working with the neck bent more than 45° for more than 4 hours total per day, without support or the ability to vary posture.

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## MSI Risk Assessment Worksheet – Awkward Postures

Back		
Low risk	Moderate risk	High risk
<input type="checkbox"/> Working with the back bent in any direction less than 2 hours total per day.	<input type="checkbox"/> Working with the back bent more than 30° in any direction for 2-4 hours total per day.  	Working with the back bent forward without support or the ability to vary posture for: <ul style="list-style-type: none"> <li><input type="checkbox"/> More than 30° for more than 4 hours total per day. </li> <li><input type="checkbox"/> More than 45° for more than 2 hours total per day. </li> </ul>

77

## MSI Risk Assessment Worksheet - Contributing Risk Factors for Posture

- Aspects of workplace layout (working reaches, working heights, seating, floor surfaces)

Describe: \_\_\_\_\_

- Characteristics of objects handled (size and shape, load condition and weight distribution, handles)

Describe: \_\_\_\_\_

- Environmental conditions (cold temperatures)

Describe: \_\_\_\_\_




- Organization of work (work-recovery cycles, task variability, work rate)

Describe: \_\_\_\_\_

**Notes and observations:**

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## MSI Risk Assessment Worksheet – Contact Pressure

Hands		
Low risk	Moderate risk	High risk
<input type="checkbox"/> Using a hand as a hammer less than 10 times per hour for less than 2 hours total per day.	<input type="checkbox"/> Using a hand as a hammer more than 10 times per hour for more than 2 hours total per day.	<input type="checkbox"/> Using a hand as a hammer more than once per minute for more than 2 hours total per day.
		
Knees		
Low risk	Moderate risk	High risk
<input type="checkbox"/> Using a knee as a hammer less than 10 times per hour for less than 2 hours total per day.	<input type="checkbox"/> Using a knee as a hammer more than 10 times per hour for more than 2 hours total per day.	<input type="checkbox"/> Using a knee as a hammer more than once per minute for more than 2 hours total per day.
		
Local pressure		
Local contact stress occurs when a hard or sharp object comes in contact with the skin (e.g., holding hand tools, handling objects with grooved or uneven edges, using power tool triggers with sharp edges). See <a href="#">MSI prevention guidance: Contact stress</a> for more information on assessing this risk.		

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## MSI Risk Assessment Worksheet - Contributing Risk Factors for Contact Pressure

- Aspects of workplace layout (working reaches, working heights, seating, floor surfaces)

Describe: \_\_\_\_\_

- Characteristics of objects handled (size and shape, load condition and weight distribution, handles)

Describe: \_\_\_\_\_

- Environmental conditions (cold temperatures)

Describe: \_\_\_\_\_

- Organization of work (work-recovery cycles, task variability, work rate)

Describe: \_\_\_\_\_

**Notes and observations:**

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## MSI Risk Assessment Worksheet - Hand-Arm Vibration (HAV)

### Moderate risk

Check the appropriate box if any of the following MSI risk factors are present.

- Using high-vibration tools for more than 30 minutes total per day (e.g., impact wrenches, chainsaws, jackhammers, or riveting hammers).
- Using moderate-vibration hand tools for more than 2 hours total per day (e.g., grinders, sanders, or jigsaws).

### High risk

Does hand-arm vibration exceed regulatory limits? Exposure beyond these limits poses a high risk of hand-arm vibration disorders.

#### Step 1

There are three ways to find the vibration value for a tool:

- A. Ask the manufacturer for the vibration value.
- B. Look it up in a vibration database.
- C. Measure the vibration yourself. Follow ISO Standard 5349-1:2001 and ISO Standard 5349-2:2001.

#### Step 2

Determine how many hours per day the worker uses the tool (i.e., the amount of time that the tool is actually vibrating in the worker's hands). This is the total exposure time.

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## MSI Risk Assessment Worksheet - Contributing Risk Factors for HAV

- Aspects of workplace layout (working reaches, working heights, seating, floor surfaces)

Describe: \_\_\_\_\_

- Characteristics of objects handled (size and shape, load condition and weight distribution, handles)

Describe: \_\_\_\_\_

- Environmental conditions (cold temperatures)

Describe: \_\_\_\_\_

- Organization of work (work-recovery cycles, task variability, work rate)

Describe: \_\_\_\_\_

**Notes and observations:**

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## MSI Risk Assessment Worksheet - Summary

### Summary of risk

	Low risk	Moderate risk	High risk	Contributing risk factors
Gripping force	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Lift/lower force	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Repetition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Awkward posture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Contact stress	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Hand-arm vibration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Notes and observations on controls:

83

## MSI Risk Assessment Worksheet

- Use the worksheet results to:
  - Prioritize focus on tasks that have high risk factors and/or multiple risk factors
  - Focus control efforts on risk factors that are identified as high risk
- Finalize and review the MSI Risk Assessment with the Joint Health and Safety Committee to ensure that they are aware:
  - That the risk assessment has been completed
  - That risk factors of concern have or have not been identified for this task
  - That risk control efforts are under way to address identified risk factors
- Keep a copy of the completed Risk Assessment Worksheet to:
  - Demonstrate compliance with OHS Regulations
  - Demonstrate evaluation of controls by repeating risk assessment with controls in place – pre/post risk comparison

84

## MSI Risk Assessment Worksheet - Practice

- Same scenario
- Will run video again
- Reference your MSI Hazard ID checklist
  - For identified hazard, determine high, medium, low risk level
  - If hazard wasn't identified, skip it

85

## RULA - Rapid Upper Limb Assessment

- More sensitive to posture than MSI Risk Assessment Worksheet
- Validated risk rating for upper limb MSI
- Posture, Force, “Muscle Use” (static or repetitive)
- One limb at a time - right or left
- Select which part of task to assess
- Assess from a snapshot or series of snapshots

### Sources:

1. L. McAtamney and N. Corlett (1993) Applied Ergonomics, 24(2), 91-99.
2. Alan Hedge; <http://ergo.human.cornell.edu/>

87

## Which snapshot(s)?

- Observe several work cycles to understand what is done
- Select snapshot (can use photo or stopped video) of:
  - Postures held for the majority of the work cycle
  - Most forceful aspect of the task
  - Arm that appears at greatest risk (or do RULA for right and RULA for left)
- If unsure, analyze several snapshots and focus on the highest rating
- Assess for more than one person
  - Size and technique may change RULA scores
  - Use this to inform who is at risk and why
  - Use this to inform possible controls to reduce risk

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## RULA Process

- “A”: ARM & WRIST                      “B”: NECK, TRUNK, LEG
1. Score segment postures
  2. Table A Posture Score
  3. Score segment postures
  4. Table B Posture Score
  5. Add Muscle Use Scores to A and B
  6. Add Force/Load Scores to A and B
  7. RULA Final Score from Table C.

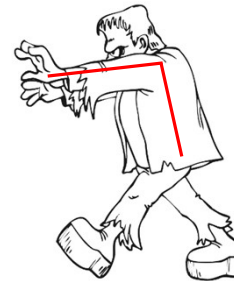
89

## RULA Results

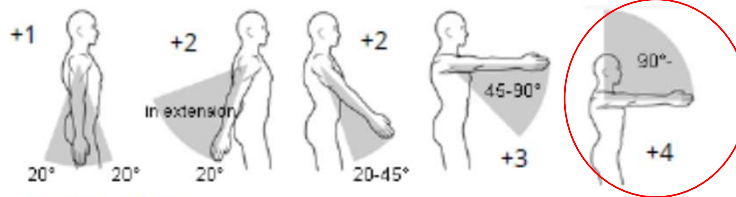
<b>RULA Final Score</b>	<b>RULA Action Required</b>	<b>Interpretation for MSI Risk Rating</b>
1 or 2	None (Acceptable)	Low
3 or 4	Investigate further	Low - Moderate
5 or 6	Investigate further and change soon	Moderate
7	Investigate and change immediately	High

90

# Upper Arm Posture



## Step 1: Locate Upper Arm Position:



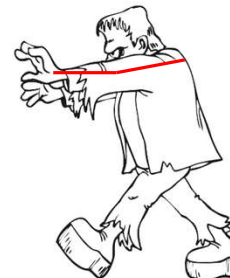
### Step 1a: Adjust...

- If shoulder is raised: +1
- If upper arm is abducted: +1
- If arm is supported or person is leaning: -1

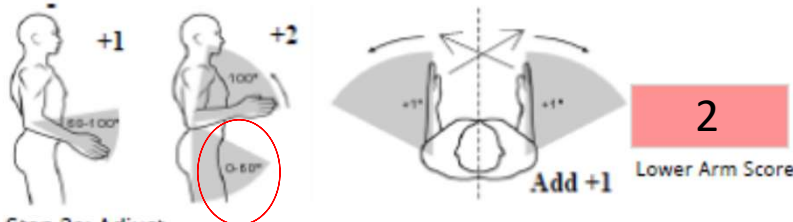
**5**  
Upper Arm Score

91

# Lower Arm Posture



## Step 2: Locate Lower Arm Position:



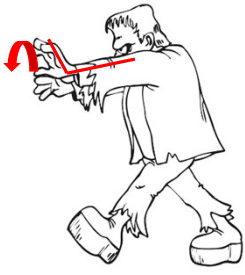
### Step 2a: Adjust...

- If either arm is working across midline or out to side of body: Add +1

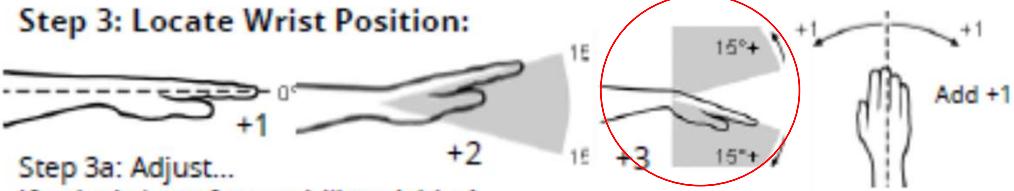
**2**  
Lower Arm Score

92

## Wrist Posture



**Step 3: Locate Wrist Position:**



Step 3a: Adjust...  
If wrist is bent from midline: Add +1

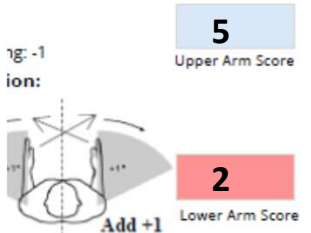
**Step 4: Wrist Twist:**  
If wrist is twisted in mid-range: +1  
If wrist is at or near end of range: +2

2  
Wrist Twist Score

3  
Wrist Score

93

## Posture Score A



**5**  
Upper Arm Score

**2**  
Lower Arm Score  
Add +1

Wrist Twist Score: **2**  
Wrist Score: **3**

Posture Score A:

**Table A**

		Wrist Score							
		1		2		3		4	
Upper Arm	Lower Arm	Wrist Twist	Wrist Twist	Wrist Twist	Wrist Twist	Wrist Twist	Wrist Twist	Wrist Twist	Wrist Twist
1	1	1	2	2	2	2	3	3	3
	2	2	2	2	2	3	3	3	3
	3	2	3	3	3	3	3	4	4
2	1	2	3	3	3	3	4	4	4
	2	3	3	3	3	3	4	4	4
	3	3	4	4	4	4	4	5	5
3	1	3	3	4	4	4	4	5	5
	2	3	4	4	4	4	4	5	5
	3	3	4	4	4	4	5	5	5
4	1	4	4	4	4	4	5	5	5
	2	4	4	4	4	4	5	5	5
	3	4	4	4	5	5	5	6	6
5	1	5	5	5	5	5	6	6	7
	2	5	6	6	6	6	6	7	7
	3	6	6	6	7	7	7	7	8
6	1	7	7	7	7	7	8	8	9
	2	8	8	8	8	8	9	9	9
	3	9	9	9	9	9	9	9	9

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### B. Neck, Trunk and Leg Analysis

**Step 9: Locate Neck Position:**

+1 +2 +3 +4

Step 9a: Adjust...  
 If neck is twisted: +1  
 If neck is side bending: +1

**Step 10: Locate Trunk Position:**

+1 +2 +3 +4

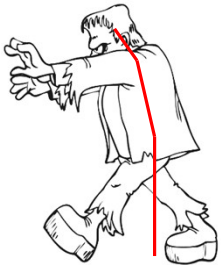
Step 10a: Adjust...  
 If trunk is twisted: +1  
 If trunk is side bending: +1

**Step 11: Legs:**  
 If legs and feet are supported: +1  
 If not: +2

**2**  
Neck Score

**2**  
Trunk Score

**2**  
Leg Score



95

### Posture Score B

**2**  
Neck Score

**2**  
Trunk Score

**2**  
Leg Score

Neck Posture Score	Table B: Trunk Posture Score											
	1		2		3		4		5		6	
	Legs	Legs	Legs	Legs	Legs	Legs	Legs	Legs	Legs	Legs	Legs	
1	1	3	2	3	3	4	5	5	6	6	7	7
2	2	3	3	3	4	5	5	5	6	7	7	7
3	3	3	3	4	4	5	5	6	6	7	7	7
4	5	5	5	6	6	7	7	7	7	7	8	8
5	7	7	7	7	7	8	8	8	8	8	8	8
6	8	8	8	8	8	8	8	9	9	9	9	9

**4**  
Trunk Score

**2**  
Trunk Score

**2**  
Leg Score

**Posture B Score**

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## Add Muscle Use & Force/Load Scores to A

### Step 5: Look-up Posture Score in Table A:

Using values from steps 1-4 above, locate score in Table A

7

Posture Score A

### Step 6: Add Muscle Use Score

If posture mainly static (i.e. held >10 minutes),  
Or if action repeated occurs 4X per minute: +1

1

Muscle Use Score

### Step 7: Add Force/Load Score

If load < .4.4 lbs. (intermittent): +0  
If load 4.4 to 22 lbs. (intermittent): +1  
If load 4.4 to 22 lbs. (static or repeated): +2  
If more than 22 lbs. or repeated or shocks: +3

0

Force / Load Score

### Step 8: Find Row in Table C

Add values from steps 5-7 to obtain  
Wrist and Arm Score. Find row in Table C.

8

Wrist &amp; Arm Score

97

## Add Muscle Use & Force/Load Scores to B

### Step 12: Look-up Posture Score in Table B:

Using values from steps 9-11 above,  
locate score in Table B

3

Posture B Score

### Step 13: Add Muscle Use Score

If posture mainly static (i.e. held >10 minutes),  
Or if action repeated occurs 4X per minute: +1

1

Muscle Use Score

### Step 14: Add Force/Load Score

If load < .4.4 lbs. (intermittent): +0  
If load 4.4 to 22 lbs. (intermittent): +1  
If load 4.4 to 22 lbs. (static or repeated): +2  
If more than 22 lbs. or repeated or shocks: +3

0

Force / Load Score

### Step 15: Find Column in Table C

Add values from steps 12-14 to obtain  
Neck, Trunk and Leg Score. Find Column in Table C.

4

Neck, Trunk, Leg Score

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## RULA Score

Table C		Neck, Trunk, Leg Score						
		1	2	3	4	5	6	7+
Wrist / Arm Score	1	1	2	3	3	4	5	5
	2	2	2	3	4	4	5	5
	3	3	3	3	4	4	5	6
	4	3	3	3	4	5	6	6
	5	4	4	4	5	6	7	7
	6	4	4	5	6	6	7	7
	7	5	5	6	6	7	7	7
	8+	5	5	6	7	7	7	7

Scoring: (final score from Table C)  
 1-2 = acceptable posture  
 3-4 = further investigation, change may be needed  
 5-6 = further investigation, change soon  
 7 = investigate and implement change

7

RULA Score



Risk Assessment:

- High MSI risk to upper extremities
- Controls needed to reduce MSI risk

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## RULA Practice



- Use your RULA Worksheet
- Left arm assessment – holding box to load back of shelf
- 2.7 kg box
- ~1-2 minute sustained posture

100

## RULA Practice



1. Upper Arm: +2 (~30 degrees)
  2. Lower Arm: +1 (~90 degrees)
  3. Wrist: +4 (~30 degrees + lateral)
  4. Wrist twist: +2 (palm up)
  5. Posture Score A: 4
  - 6/7. Muscle use: 0; Force: +1
  8. **Wrist/Arm Score = 5**
  9. Neck: +5 (extension + twist)
  10. Trunk: +3 (>20 degrees flex)
  11. Legs: +1
  12. Posture Score B: 7.
  - 13/14. Add Force +1
  15. **Neck/Trunk Leg Score = 8**
- \*\*\* RULA = 7 “investigate and change”**

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## MSI Risk Control

- Risk control aims to eliminate or minimize MSI risk factors
- A Risk Control Plan will be generated if MSI Risk Assessment identifies moderate or high risk – priority on high risk
- Risk control strategies are based on a “hierarchy of controls”
  - Engineering controls
  - Administrative controls
  - Personal protective equipment (PPE)
- Interim controls are required when permanent controls are delayed
- Based on what is reasonable and practical to achieve
- Involve employees who perform the work when planning controls

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## Hierarchy of Controls: Engineering Controls

Physical changes to tools, equipment, workstations, or work areas.

Examples of engineering controls:

- Equipment to help with heavy lifting like a pallet jack or fork lift
- Wheeled carts, dollies, or hand-trucks rather than manual carry.
- Height adjustable workstations at checkout or offices
- Moving a meat cutter to a lower location that improves shoulder posture
- Height adjustable stocking carts
- Portable steps to access higher shelves or racks
- Reaching hooks

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## Hierarchy of Controls: Administrative Controls

Behavioural or organizational changes to work technique, work patterning, or personnel assignment to work.

Examples of administrative controls include:

- Training in manual lifting techniques.
- Task rotation to reduce exposure duration to repetitive or forceful tasks.
- Designating heavier lifting and large awkward items as a two-person lift.
- Scheduling extra rest breaks for physically demanding work.
- Temporary modification of duties in response to reporting early signs and symptoms of MSI.

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## Hierarchy of Controls: PPE

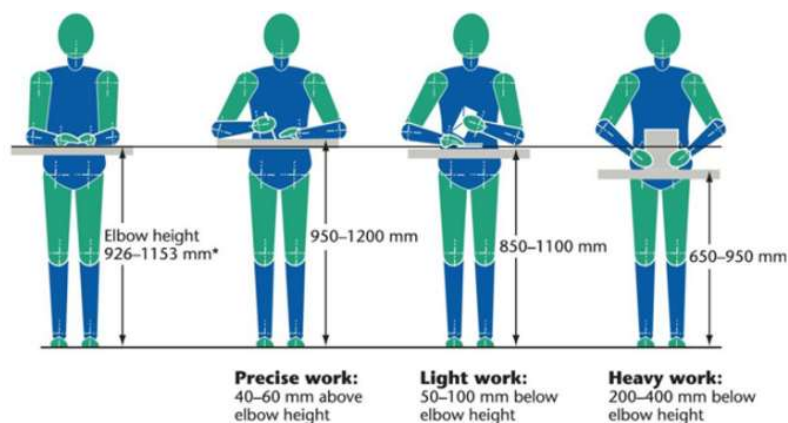
Personal Protective Equipment acts as a barrier between the hazard and the body, but does not eliminate the hazard.

Examples of PPE for MSI risk control:

- Foam padding on a sharp edge to reduce contact pressure
- Knee pads or a portable matt for kneeling work
- Gloves to provide hands with padding against sharp edges of boxes, or hard tool handles with ridges
- Apron to protect from leaning across workstation edges

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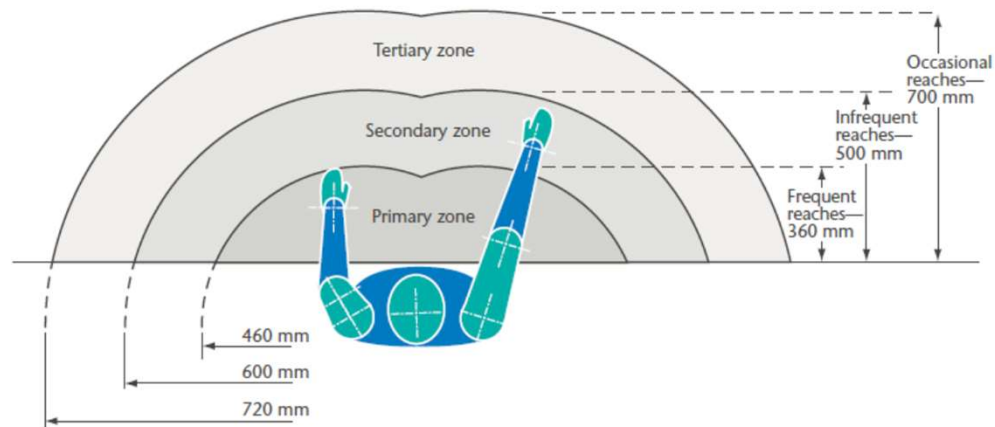
## Guidance: Working Heights



- Counters, check stands, desks, sorting tables, stocking carts
- Elbow height as primary reference with higher/lower for task

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## Guidance: Working Reaches



- Reference is forearm reach for frequent, arm's length for infrequent

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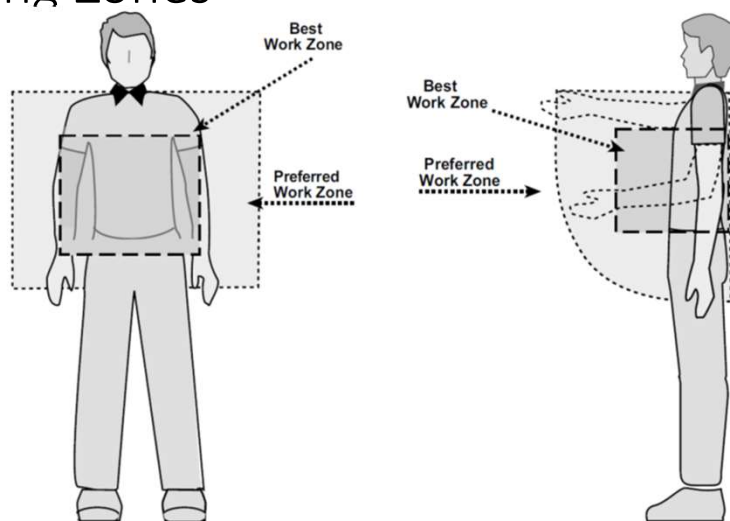
## Guidance: Working Zones

Best work zone:

- Hip to mid-chest high
- Shoulder width
- Forearm reach

Preferred work zone:

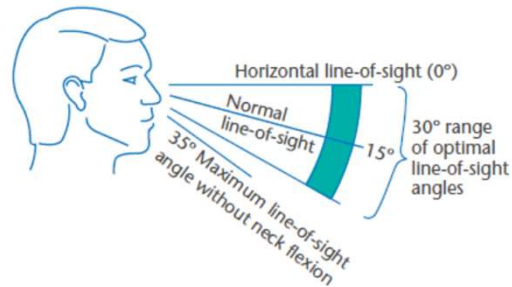
- Mid-thigh to shoulders
- 1' wider than shoulders
- Arm's reach



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## Guidance: Line of Sight (sustained viewing)

- Reference is eye height with top of monitor at eye height
- Touchscreen monitors lower - between elbow and shoulder height
- Maximum height to see over (security, monitoring shoppers) is based on standing eye height
- Standing eye height range 1442-1813mm (56.8-71.4") for small female – tall male



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## Guidance: Standing Stations

- Square to the customer & work
- Counter below elbow height
- Toe kick to allow standing close
- Raised foot rest to relieve standing strain
- Work within forearm reach on the counter



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## Guidance: Computer Workstations

### Posture:

– 90°-100° angle at knees, hips, and elbows. Everything else straight



- **Monitor:**
  - top at eye height; arm's length away;
  - centred to nose; 90° to window
- **Lighting:**
  - within 2x monitor brightness
- **Keyboard/mouse or worksurface:**
  - elbow height & relaxed shoulders; close to front edge
- **Feet:**
  - on the floor or supported in front of the chair
- **Standing? 90° elbow. Same targets.**

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## Guidance: Manual Handling Controls

- **Minimize Force**
  - Divide load into smaller portions; make more trips
  - Use equipment – carts, pallet jacks, hand trucks, etc.
- **Minimize Awkward Postures**
  - Use the right equipment for the task
  - Adjust working height
  - Load near waist height and close to the body
  - Grip on object (handles and shape) for power grip
- Reduce the distance moved or duration
- Remove obstacles along the path
- Use good body mechanics and lifting technique



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## Guidance: Manual Lifting Technique

- Beware of the force
  - Test the load or read the box – know how heavy it is before committing
  - Ask for help or use a lift assist for heavy or awkward items
  - Use the shape of the load to reduce force – tilt and pull
- Control posture
  - Plan the movement and choose a technique that fits the scenario
  - Set up work to avoid lifts below knees or above shoulders
  - Bring the load close and square up to the load before lifting
  - If lifting from below knees, tighten stomach muscles and stick butt out to protect low back (lift with legs and maintain lower back curvature)
  - Move feet rather than twist the body

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## Lifting Technique Below Knees

**Natural Tendency – increased risk**  
bend at waist and lift



**Preferred technique - lower risk**  
squat, bum out, head up, tummy tight



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## MSI Risk Controls – Prioritizing Options

	Benefit	Low	High
Cost			
High		Why?	Need to justify
Low		Maybe... Interim Fix	Why not? Just do it... "Quick Fix"

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## MSI Risk Control Plan

### MSI Hazard Control Plan and Evaluation

List all controls implemented or planned to address identified MSI Hazards, along with person(s) responsible for implementation, date initiated, date completed (control implemented), and the impact of controls on eliminating or minimizing MSI hazards. Indicate interim and permanent controls.

Control (describe all interim or permanent controls that arise from the current inspection)	Person(s) Responsible	Date Initiated	Date Completed	MSI Hazard Re-evaluation (Impact of Controls)

- Record controls that have been implemented during inspection
- Record controls that will be implemented to address risk factors
- Assign a person to be responsible and track timing
- Record the outcome of controls on MSI Hazards and Risk Assessment

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## Evaluation – Effectiveness of Controls

- Is the control in place and being used as intended?
- Are the MSI hazards reduced in severity or duration of exposure?
- Is the Risk Assessment at a lower level than it was prior to control?
- Do employees report less discomfort and positive perception of control?
  
- If the answer is no to any of these, then revisit the Risk Assessment and revise the Control Plan

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## Summary Hazard ID, Risk Assessment and Control Record

- MSI Hazard Identification Checklist
  - MSI Hazards identified and described for specific task; representative employees
- Risk Assessment Tools
  - Rating of high, moderate or low MSI risk using risk assessment tools
- Controls implemented during inspection or assessment
  - What was changed during the inspection to eliminate or minimize risk factors?
- Control Plan (further controls that require resources)
  - Controls, person responsible, implementation and completion dates
- Evaluation of Controls
  - Are they in place and were they effective at reducing MSI risk?
  - Repeated “post-control” risk assessment.

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## Evaluation – MSI Prevention Program

At least annually:

- Review personnel assigned to MSI Prevention
- Review the Job and Task List:
  - Has MSI Identification, Assessment and Control been performed for priority tasks?
  - Are controls in place and evaluated as effective for assessed tasks?
  - MSI Risk Assessments are verified and/or modified for all locations?
- Review MSI statistics:
  - Have MSI rates or severity been reduced?
  - Which jobs and tasks have the highest rates or severity of MSI now?
- Review Education and Training:
  - MSI Awareness Education for all employees? Who still needs it?
  - MSI Risk Assessor Training for all performing this role?
- Set objectives for the next period
  - Evidence, Concern, Opportunity? Which jobs/tasks will be priority?
  - Where is education and training needed?