

Performing a Risk Analysis for Musculoskeletal Injuries

Module #3



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PERFORMING A MSI RISK ANALYSIS

Introduction

The Musculoskeletal Injury Risk Analysis is the process of identifying and analyzing specific risks for MSI that workers may be exposed to during work. Hazard identification is achieved through direct observation, conversations with parties directly connected to the work, such as supervisors and workers, and the use of checklists. The goal of the risk analysis is to determine the risks for MSI that are present in the work, whether the hazards contribute to an increased risk of injury, and how the hazards can be controlled to reduce the chance of a worker suffering from a Musculoskeletal injury (MSI). The risk analysis process may include a number of tools/checklists such as: the Ergonomic Analysis Worksheet, (<http://www.gov.mb.ca/labour/safety/pdf/b.pdf>) the Ergonomic Risk Factor Checklist (<http://www.gov.mb.ca/labour/safety/pdf/d.pdf>) or videotape analysis. Keep in mind that there are other assessment tools available on the internet, or through various associations, and the most appropriate one for the work under analysis should be chosen.

Analysis of the ergonomic risks within a job is the most important step in developing effective control measures [*Module #4*(<http://www.gov.mb.ca/labour/safety/pdf/ergomodule4.pdf>)].

The tools described in this module are designed to make the MSI risk analysis process as accessible, and straightforward as possible. The key to a successful MSI risk analysis is to be systematic and consistent. A properly completed MSI risk analysis combines direct observation, worker input, and injury data to determine what the specific risks for MSI are within a job. Once the risks have been properly identified, the

appropriate control measures can be determined and implemented. See module #4 (<http://www.gov.mb.ca/labour/safety/pdf/ergomodule4.pdf>) for more information on controlling risks for MSI.

Rationale

The goal of the risk analysis is to provide a listing of the risks for MSI present in a job. Compare the risk analysis with the injury data to ensure you have a properly completed risk analysis. For example, jobs with repetitive motions typically show repetitive strain-type injuries in the upper limbs, and jobs with high forces, such as heavy lifting, typically show strain/sprain-type injuries in the back. The goal of the MSI risk analysis is to determine what the hazards are, and which ones are significant enough to warrant control measures.

ERGONOMIC ANALYSIS WORKSHEET (<http://www.gov.mb.ca/labour/safety/pdf/b.pdf>)

Resources Required

- Approximately twenty (20) minutes
- Clipboard
- Stop Watch
- Measuring Tape
- Weight Scale

Step-By-Step Procedure

1. Introduce yourself to the worker(s) and explain what you are doing. Ask them to continue working as normal, and inform them that you may be interrupting them briefly to ask some questions.

2. Complete the top section of the EAW.

ERGONOMIC ANALYSIS WORKSHEET

Date:	September 12	Analyst:	Jeff Doe
Job:	Mechanic	Department:	Shop
Shift:	Morning		

This information is important as jobs

may vary across departments and shifts. Examples in this module will follow

Jane, a mechanic, through a

day's work.

3. Begin with the section labeled "Job Description". A job is made up of a series of tasks, all of which take a certain amount of time. In sequential order, list the

JOB DESCRIPTION	
(Provide a sequential list of tasks performed to conduct this job and the approximate time for completion of each task)	
TASK	TIME
1. Unwrap new transmission	3 Min
2. Lift transmission to table	20 Sec
3. Clean & prepare	15 Min

tasks that the worker performs to complete the job.

Use the stop watch to determine the amount of time each task requires and mark it down beside the task.

4. Complete the "Scheduling" section. This might require interrupting the worker to ask a number of questions.

Use the scale to determine the weight of tools and materials handled. Where possible, use production specifications to obtain the average weight of materials and finished products.

SCHEDULING	
Is there a repeating cycle in this job? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
If 'yes', how long is this cycle? _____	
Number of cycles per shift? _____	
Does the worker alter shifts? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
If 'yes', what is the shift schedule? _____	
Breaks: Number?	2
Duration of each?	10 Mins
Schedule? (i.e. 2hrs into shift, 4 hr & 6.5 hr)	
Breaks @ 10:00, 2:30 + 45 mins for lunch	
Does worker rotate to other jobs? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
If 'yes', provide job rotation schedule: _____ _____	
TOOLS/MATERIALS	
Types of materials/tools handled? _____	
Transmission	
Power Washer, Pneumatic ratchet	
Average weight of tools?	2.5 Kg
Maximum weight of object handled?	35 Kg

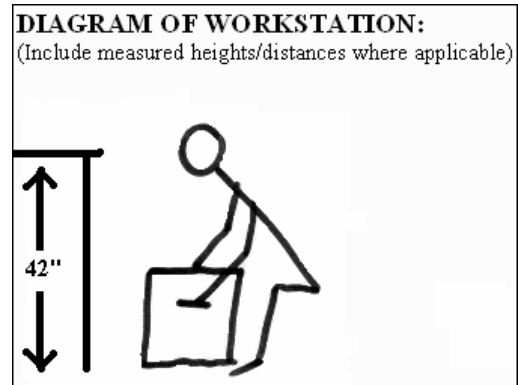
5. Complete the "Worker Interview" section. Ask the worker questions about any discomfort/pain they have experienced, and any ideas or suggestions they might

WORKER INTERVIEW:
- Lifting the transmission from the floor is very difficult
- Never anyone available to help lift
- Workstation is too high, hard to reach some parts when cleaning

have to improve the job. Also ask if any changes in the job have occurred

recently, and how those changes affected their health.

6. On the second page of the worksheet draw a diagram of the workstation. Stick figures are easier to use since the angles of the arms, legs and trunk can be clearly illustrated. Where necessary, include measured heights or distances. Complete a diagram from the side of the workstation, and from the front or rear where possible.



COMMENTS:

- **Table height was set for previous employee (6 ft. Male)**
- **Jane is 5' 2"**
- **Additional help lifting would be appreciated**

7. In the "Comments" section record any thoughts you have on the risks for MSI in the work being done.

For more detailed instructions consult the Guideline "Ergonomics: A Guide to Program Development and Implementation" (<http://www.gov.mb.ca/labour/safety/ergoguide.html>)

Self-Checks

The purpose of self-checks is to ensure that the process has been completed accurately and completely. The self-checks for the EAW are as follows:

- Ensure that all tasks have been included in the Job Description, including tasks which occur regularly but not every job cycle, i.e. Load materials cart three times per day.
- The worker interview included questions on discomfort / pain experienced during and after the shift. The worker was encouraged to provide ideas or suggestions on how to improve the ergonomics of the job.
- The diagram of the workstation includes measurements and angles, where the information would be useful.

The Next Step(s)

The ergonomics analysis worksheet is designed to provide a complete listing of what the worker must do to complete their job. Attention should be given to the information contained within the worksheet when considering ergonomic controls. If workers are concerned about the weight of a tool, the height of a workstation, or a job rotation schedule, the worksheet provides an opportunity to record this information and collect employee concerns. This ergonomic analysis worksheet makes examining the current job rotation schedule or developing a new one less complicated. Job rotation should be designed so as to allow workers to perform different actions throughout the day to allow some muscles and joints to rest while others are performing work. The EAW should be used to identify and modify job rotation schedules that have workers performing tasks or movements which are too similar in nature to benefit from the rotation. Ergonomic analysis should include reviewing the tools and materials that the worker is handling for

both weight and location relative to the workstation. Where measured heights and distances indicate hazardous material handling situations, i.e. the elbow is away from the side of the body for prolonged periods, reduce how far the worker must reach, lift, or carry objects. The worker interview is important since it is one of the best sources of

WORKER INTERVIEW:

- Lifting the transmission from the floor is very difficult
- Never anyone available to help lift
- Workstation is too high, hard to reach some parts when cleaning

ideas for ergonomic interventions. Deliberately including the worker's own idea(s) in the analysis will result in a greater worker "buy-in" when the ergonomic intervention is introduced. There are many more uses for the ergonomic analysis

worksheet than those listed here. Remember that this worksheet is a tool for collecting ergonomic information, and the more information collected, the more useful this tool will be. The next step is developing control measures to reduce or eliminate the risks for MSI. Use this worksheet to identify areas for improvement. In the example above, the greatest risks for injury appears to occur during the lift and cleaning. Therefore reducing the distance the object must be lifted, or reducing the amount of effort the mechanic must use to perform the lift will reduce the risk of injury.

Compare the worker actions recorded on the worksheet to those which cause hazards. Those actions which overlap are potentially hazardous and should be reduced or eliminated through control measures.

ERGONOMIC RISK FACTOR CHECKLIST (<http://www.gov.mb.ca/labour/safety/pdf/d.pdf>)

Resources Required

- Approximately Fifteen (15) minutes
- Clipboard
- Stop Watch

Step By Step Procedure

1. Introduce yourself to the worker(s) and explain what you are doing. Ask them to continue working as normal, and inform them that you may be interrupting them briefly to ask some questions.
2. Complete the top section of the ERF. This information is important since jobs may vary across departments and shifts.

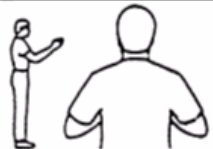
RISK FACTORS	EXPOSURE Is the risk factor present within the job or task?	TIME				SCORE
		0% to 25% of total job time	25% to 50% of time	50% to 100% of time	If total time for job is >8hrs, add 0.5 per hour	

3. Read the checklist from left to right. Begin with the “Risk Factors” column. If the risk factor in question is present, mark a yes in the “Exposure” column; if not, mark no. Where a risk factor is present, use your stop-watch to determine the amount of time that the worker is exposed to the hazard. The time is expressed as a percentage of the whole job cycle. To calculate the percentage, record the time it takes for the worker to complete a full cycle of their job tasks. It is best to begin when the worker performs the first or last

action in a cycle. Record the time until the worker performs the same action at the beginning or end of the next cycle. Determine the total

<p><u>Example</u> - Jane the Mechanic</p> <p>Risk factor: #8 Shoulder Unsupported Source: Cleaning top of transmission Exposure Time: 5 Minutes Task Time: 15 Minutes</p> <p><i>Exposure percentage</i> 5 Minutes / 15 Minutes x 100% = 33%</p>

time the worker is exposed to each hazard. To express the exposure time as a percentage, divide the exposure time by the total cycle time and multiply that number by 100. If the exposure time is on the border between categories, it is always best to estimate on the side of safety and choose the larger exposure time. If the exposure is underestimated it will produce a greater margin of error, and make the hazard analysis less accurate. Once the time component has been established, record the corresponding number score in the “Score” column.

RISK FACTOR CATEGORY	RISK FACTORS	EXPOSURE Is the risk factor present within the job or task? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	TIME				SCORE
			0% to 25% of job time	25% to 50% of time	50% to 100% of time	If job time is >8hrs, add 0.5 per hour	
	8. Shoulder: Unsupported arm or elbow above mid-torso height	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	1	2	3		2

4. At the completion of each section calculate the total score.
5. Total the scores from the upper extremity and lower extremity risk factor checklists. Where applicable, include the score from the manual handling checklist.

6. Any risk factors that score a 3 indicates that the specific risk factor under consideration is hazardous and must be controlled, regardless of the total job score.
7. A total score equal to or greater than 7 on the ergonomic risk factor checklist indicates the job contains hazardous levels of ergonomic risk.

For more detailed instructions consult the Guideline "Ergonomics: A Guide to Program Development and Implementation" (<http://www.gov.mb.ca/labour/safety/ergoguide.html>)

Self-Checks

The purpose of self-checks is to ensure that the process has been completed accurately and completely. The self-checks for performing a MSI risk analysis are as follows:

- Ensure that all risk factors have been accounted for.
- Each risk factor has the appropriate score recorded in the "Score" column.
- Borderline time measurements have been estimated on the side of safety.

The Next Step(s)

The ergonomic risk factor checklist is designed to identify jobs that are hazardous, and indicate what parts of that job contain risks for MSI. The total score that a job receives can be used to rank that job against others, with the highest scoring jobs receiving prioritized attention. Any individual risk factor with a score of three indicates a risk for MSI and should be controlled as soon as possible.

The ERF can also be used to evaluate proposed ergonomic interventions. Once an intervention has been decided upon, use the ERF to determine if the ergonomic risks

have been controlled to an acceptable degree. The new ERF score should have a lower score, if not, re-evaluate the proposed intervention to ensure that the overall level of ergonomic risk is decreased. Finally, risks for MSI that have been identified from the ERF can be used to educate the workforce on the hazards associated with their job. In the above example with Jane, after it is determined that Jane is exposed to risks for MSI at her shoulder, she should be informed of them, and what to do should she start to experience any discomfort or pain. When workers have been educated on potential risks to their health, they are better prepared to address an injury while it is developing before it becomes a lost-time injury.

VIDEOTAPE

Resources Required

- Approximately ten (10) minutes to videotape one (1) job
- Video Camera
- Videotape
- T.V. / V.C.R. to view video

Step-by-Step Procedure

1. Introduce yourself to the worker(s) and explain what you are doing. Ask them to continue working as normal, and inform them that you may be interrupting them briefly to ask some questions.
2. Give the worker as much space as possible; use the zoom function to keep the worker in the full frame while maintaining your distance.
3. Film the worker from at least two different angles for approximately 5 minutes per shot. If more time is needed to complete a job cycle, or if the worker has changed their behavior in response to being filmed, more than 5 minutes of video is appropriate.
4. Where possible, include a wide angle shot (the worker appears small in the field of view) and a tight angle shot (the worker, or part of the worker fills the frame). The purpose of the wide angle shot is to capture the overall movements the worker performs, in addition to any aspects of their workstation that may impact on the ergonomics of their work, i.e. where raw materials are placed. The purpose of the tight angle shot is to film specific

movements that are of interest during the analysis. For example, if one of the risks for MSI in a job is suspected to be at the location of the shoulder, it is advisable to capture movements of the shoulder for later review.

5. Once sufficient video has been captured, review it for risks for MSI. Use the slow motion, or pause features when the movements are rapid or otherwise difficult to pick out.

For more detailed information consult the Guideline "Ergonomics: A Guide to Program Development and Implementation" (<http://www.gov.mb.ca/labour/safety/ergoguide.html>)

Self-Checks

- Reduce camera shake as much as possible by supporting the camera against the body, or on a tripod.
- Use slow steady movements when panning left to right, use the zoom function slowly.
- Ensure that all the movements that the worker performs have been captured on video.
- At least two different camera angles, side and front/rear have been used.

The Next Step(s)

Video capture allows a much larger group to perform an ergonomic analysis than would otherwise be possible. It might not be physically possible to have ten people get close enough to see what is occurring in a job, but ten people can comfortably review the information in a meeting room. When reviewing the video, cross-check to determine if the information from the video corresponds with other information

already gathered, such as from the ergonomic analysis worksheet or the ergonomic risk factor checklist. Repetitive, forceful or awkward motions should be noted and hazard control measures developed wherever practicable. Additionally, having video of best practices is beneficial when training a new-hire for work.