OHCOW
Occupational Health Clinics for Ontario Workers Inc.
Centres de santé des travailleurs (ses) de l'Ontario Inc.

Ergonomics & Manual Materials Handling

Spring into ACTion Health & Safety Forum

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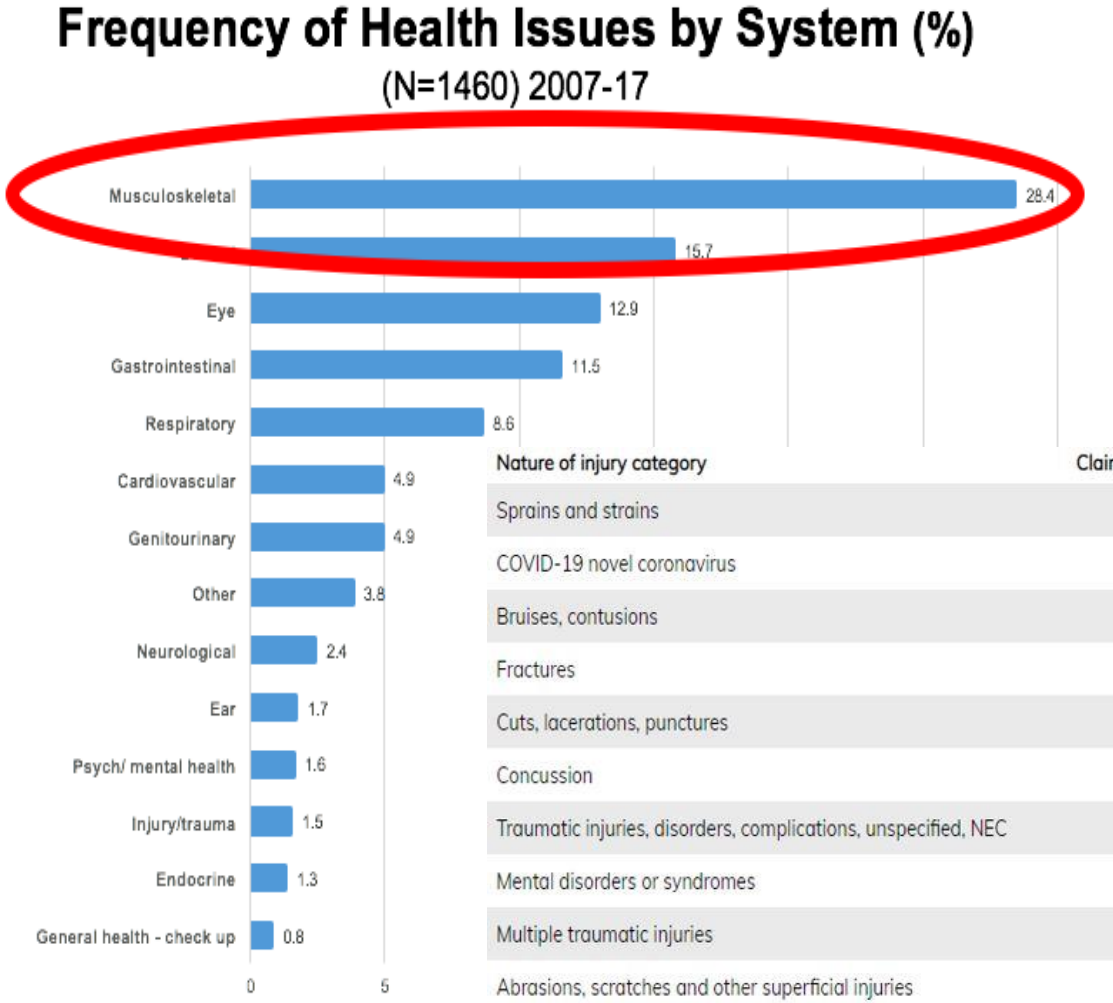
Presentation Overview

- Intro to Musculoskeletal Disorders (MSDs)
- Recognizing and Controlling MSD hazards
- Manual Materials Handling
- Assessing risk

Musculoskeletal Disorders (MSDs)

- Painful disorders of the muscles, tendons, and nerves that develop over time from tasks that repeatedly cause stress and injury to tissues (CCOHS, 2016)
- Umbrella Term for:
  - RSI, CTD, MSK, sprain, strain, MSI



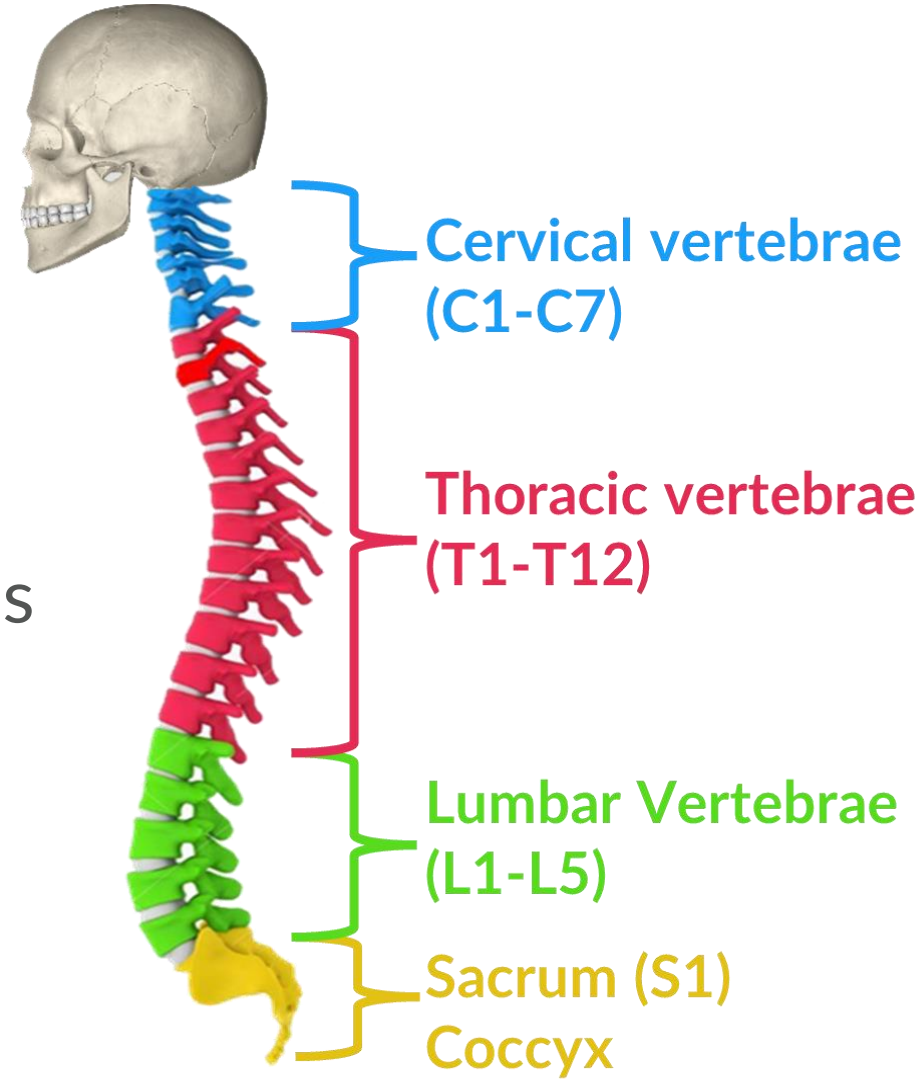
Nature of injury category	Claim count
Sprains and strains	51,565
COVID-19 novel coronavirus	40,432
Bruises, contusions	10,765
Fractures	9,635
Cuts, lacerations, punctures	8,516
Concussion	8,266
Traumatic injuries, disorders, complications, unspecified, NEC	6,835
Mental disorders or syndromes	4,650
Multiple traumatic injuries	2,742
Abrasions, scratches and other superficial injuries	2,535

Commonly Injured Areas in MMH

- Lower Back
  - Low back injuries are very common. Vertebral disc disorders are affected greatly by heavy forces and awkward postures.
- Tendons
  - Flexible bands of fibrous tissue that connects muscles to bones. They are meant to glide smoothly as muscles contract.
- Wrist
  - The wrist is put under a lot of pressure when performing MMH activities.

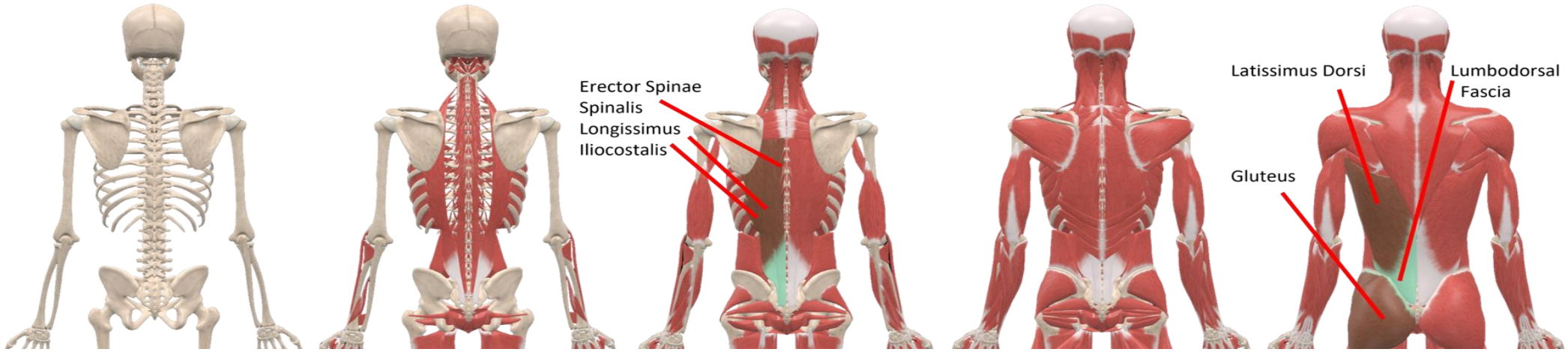
Back Anatomy

- The spine is divided into 4 parts
- They all support the body and protect the spinal cord
- Lumbar (lower back) vertebrae are larger as they are designed to bare weight

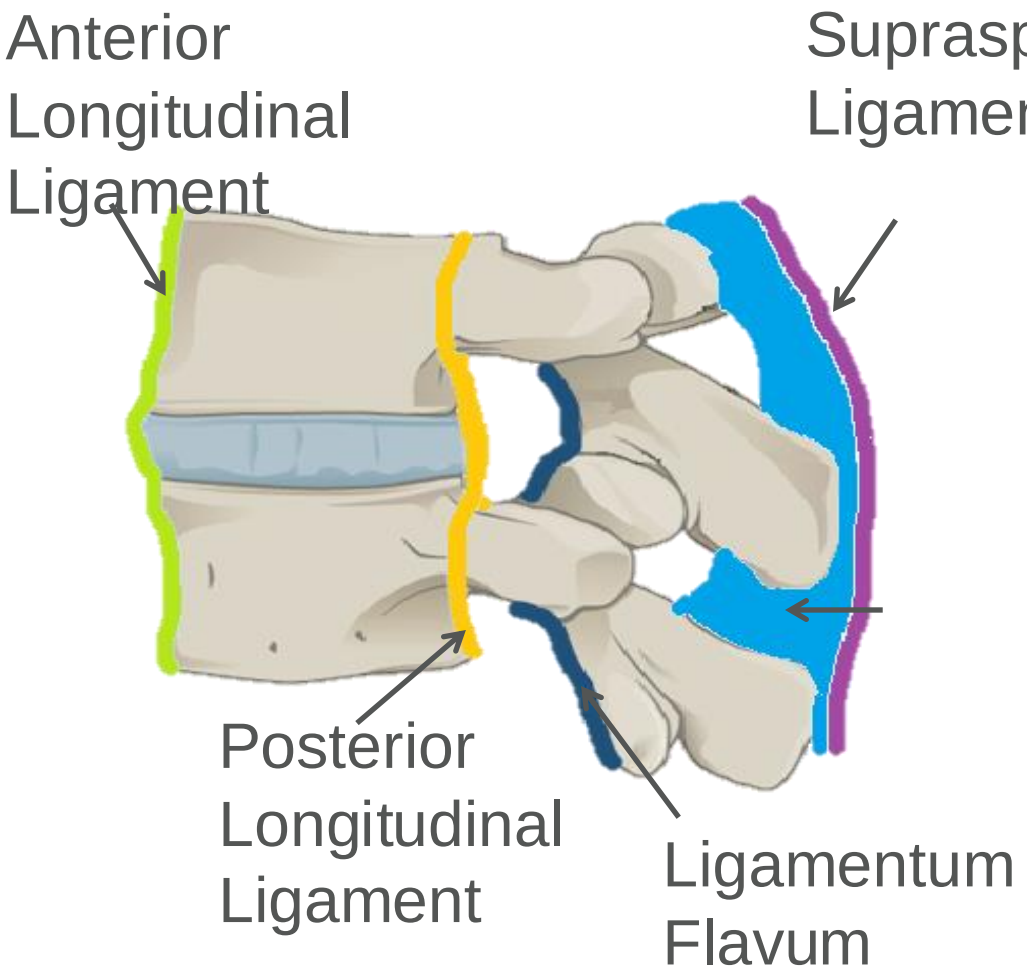


Back Muscles

- Provide movement
- Provide stabilization
- Keep vertebrae aligned
- Short and less powerful than leg muscles
- Two layers: superficial and deep



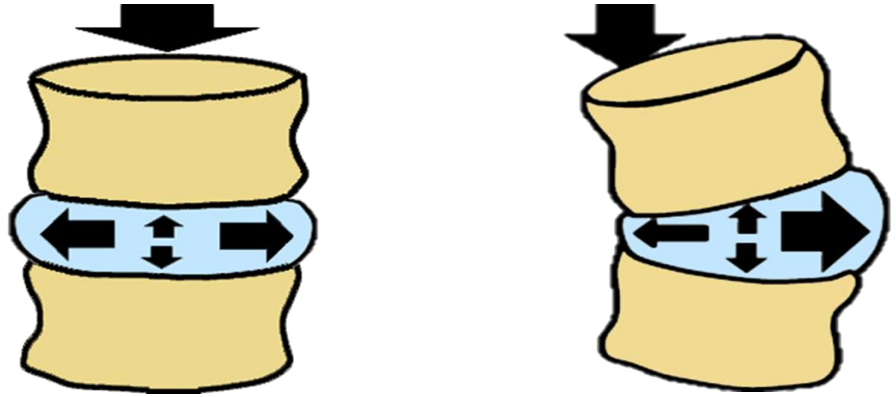
Ligaments



- Tough elastic fibers
- Connects bone to bone
- Connect and stabilize vertebrae as one structure
- Prevents excessive movement

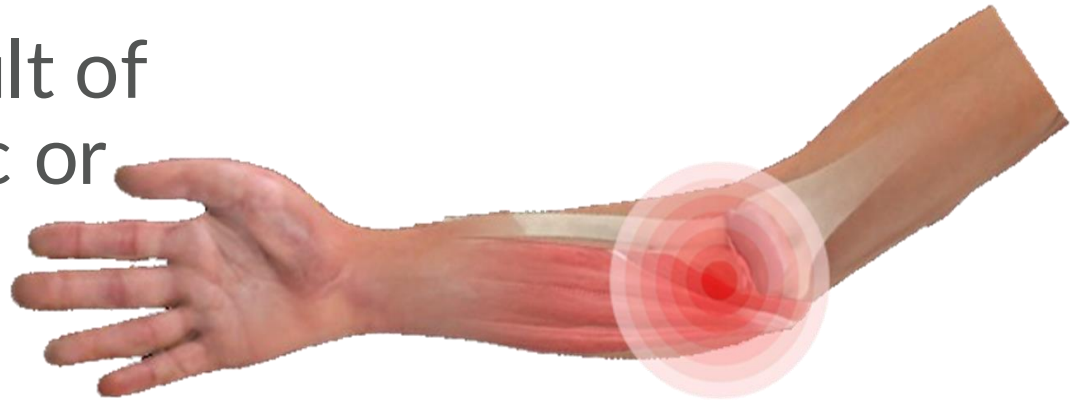
Movement and the Spine

- In between are intervertebral disc or “shock absorbers”
- When factors such as large forces or awkward postures act on the Intervertebral discs, injuries can occur
- This can have an instant or gradual onset



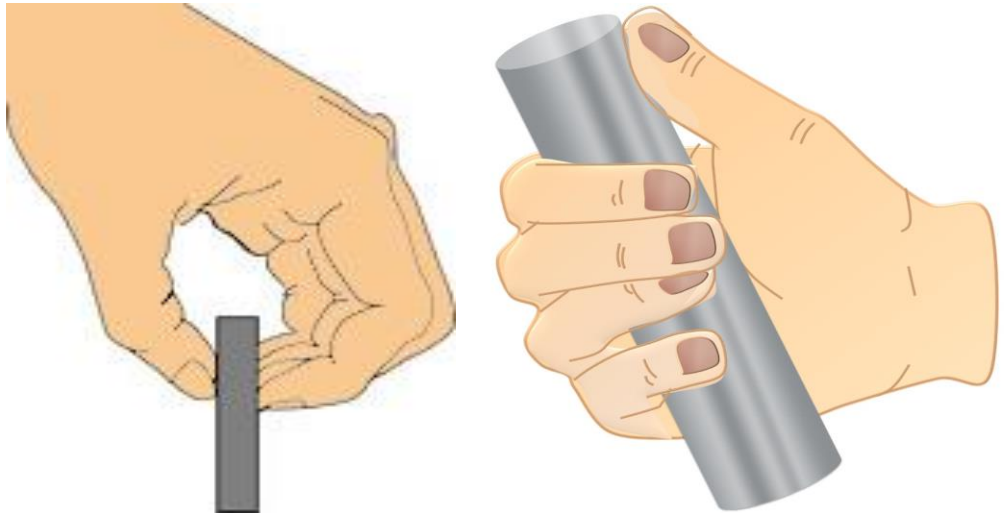
Tendonitis

- Smooth gliding of tendon is impaired leading to inflammation of the tendon
- Using the muscle becomes irritating and painful
- Commonly found in tendons with poor blood supply
- Cause: Too much strain as a result of heavy loads, repetition and static or awkward postures



The Wrist

- The wrist can move in many directions; however, a neutral wrist posture is the strongest and safest
- Many different types of tasks can flex, extend, or deviate the wrist increasing its probability of injury



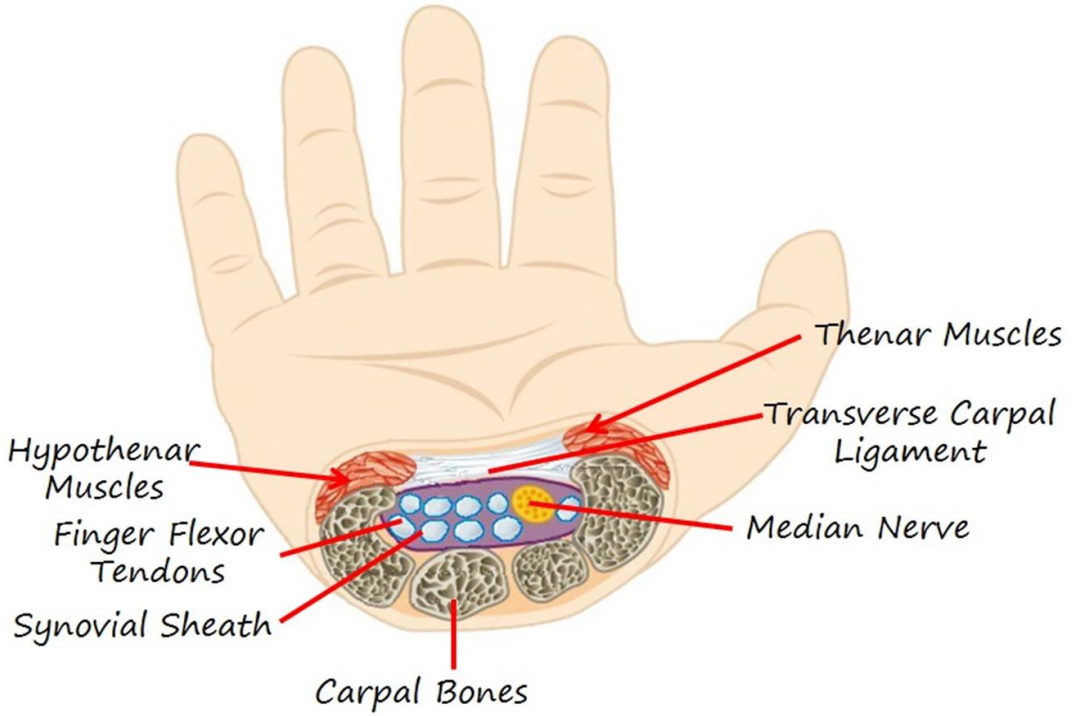
The Wrist

Carpel Tunnel Syndrome:

- Compression of the median nerve underneath the ligaments
- Symptoms include numbness, tingling and reduced grip strength

Risk Factors:

- Excessive force, awkward postures, repetition, and prolonged gripping



Vibration Hazards

Whole Body Vibration

- Tractors, heavy equip., vehicles, etc.
- Different frequencies affect different areas
- Increased risk of vertebral disc herniation and degeneration

Segmental Vibration (Hand & Arm)

- Hand tools, controls, machinery
- Lead to vascular disorders (i.e. HAVS, white finger, and carpal tunnel)

Source: Kodak's Ergonomic Design for People at Work, 2004

Stages of MSDs

Mild

Beginning of physical discomfort such as light pain.

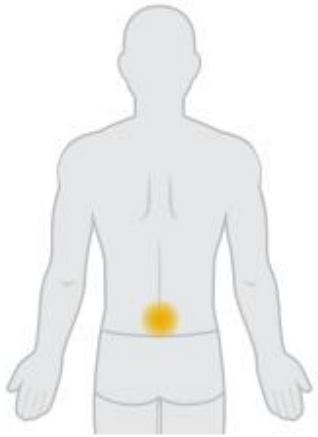
Symptoms: Pain, aching, fatigue

Onset: Weeks or Months

Job Performance: Not affected

Visible Signs: None

Treatment: May be reversible if treated early



Moderate

Increased physical discomfort such as more frequent and intense pain.

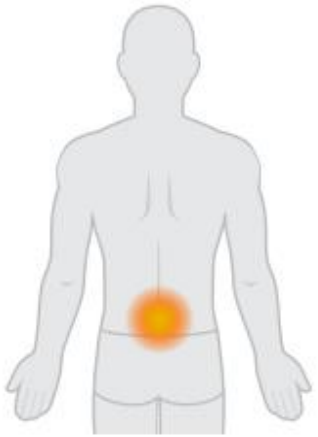
Symptoms: Pain, aching, fatigue, sleep difficulty

Onset: Months

Job Performance: Decreased

Visible Signs: May be present

Treatment: Difficult and slower recovery



Severe

Persistent physical discomfort such as intense and prolonged pain.

Symptoms: Constant to intense pain, fatigue, sleep difficulty

Onset: Months to years

Job Performance: Unable to perform job duties

Visible Signs: Often present

Treatment: Greater risk of permanent damage

REACTIVE

Solutions AFTER problems arise

PROACTIVE

Solutions BEFORE problems arise

Indicators that should trigger further action

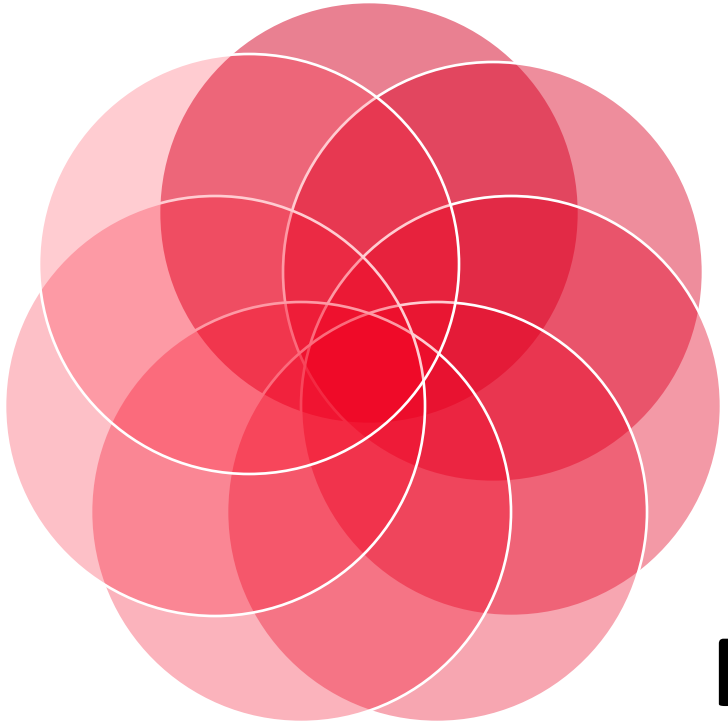
- Reporting pain / discomfort
- Taking frequent breaks due to fatigue
- Shaking or rubbing of body parts due to fatigue
- Wearing additional protective products (wrist supports or braces)

Risk Factors for MSDs

Force

REPETITION

VIBRATION



Static Postures

CONTACT STRESS

AWKWARD POSTURES

Psychosocial

Extreme Temperatures

Force

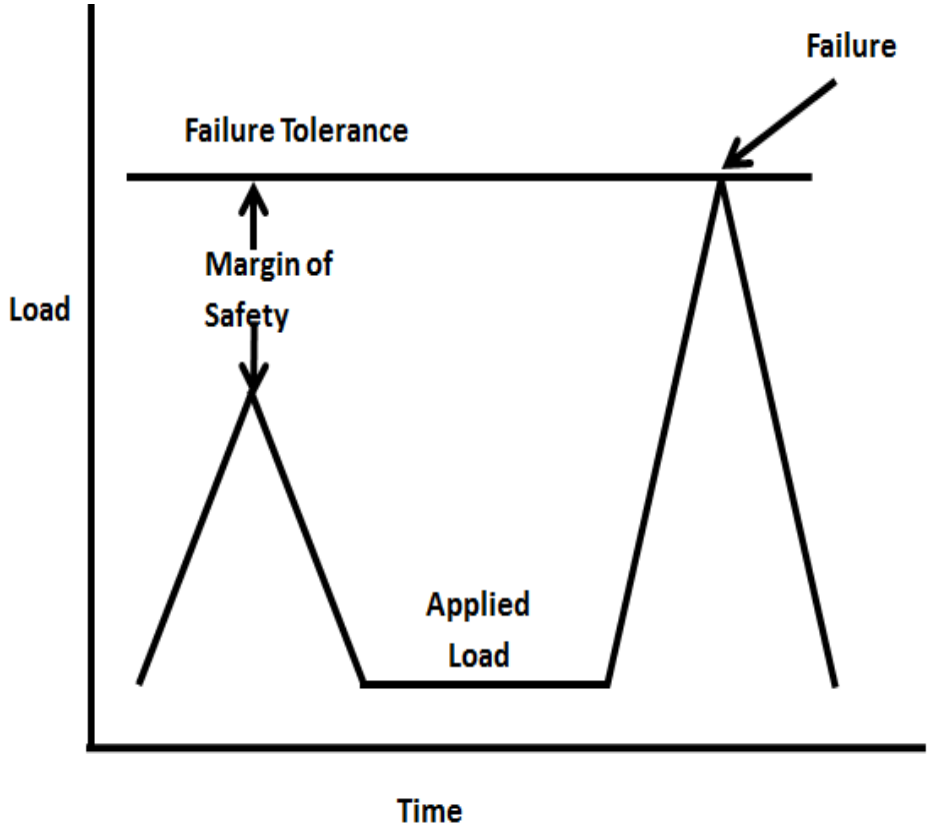
External forces

- Applied to the body by outside objects
- *E.g. weight of an object being held*

Internal forces

- Generated by muscles in response to task demands
- *E.g. force required of the shoulder/neck to support the arms*

Single High Load = Injury



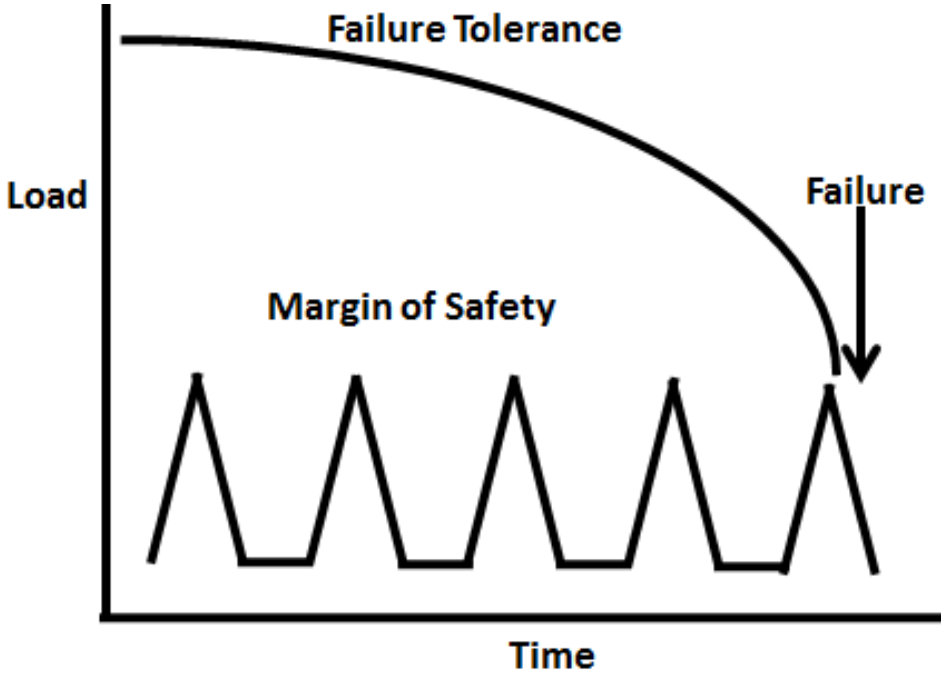
Repetition

- Performing **same or similar movements** or tasks over a given period of time by the **same muscle group**

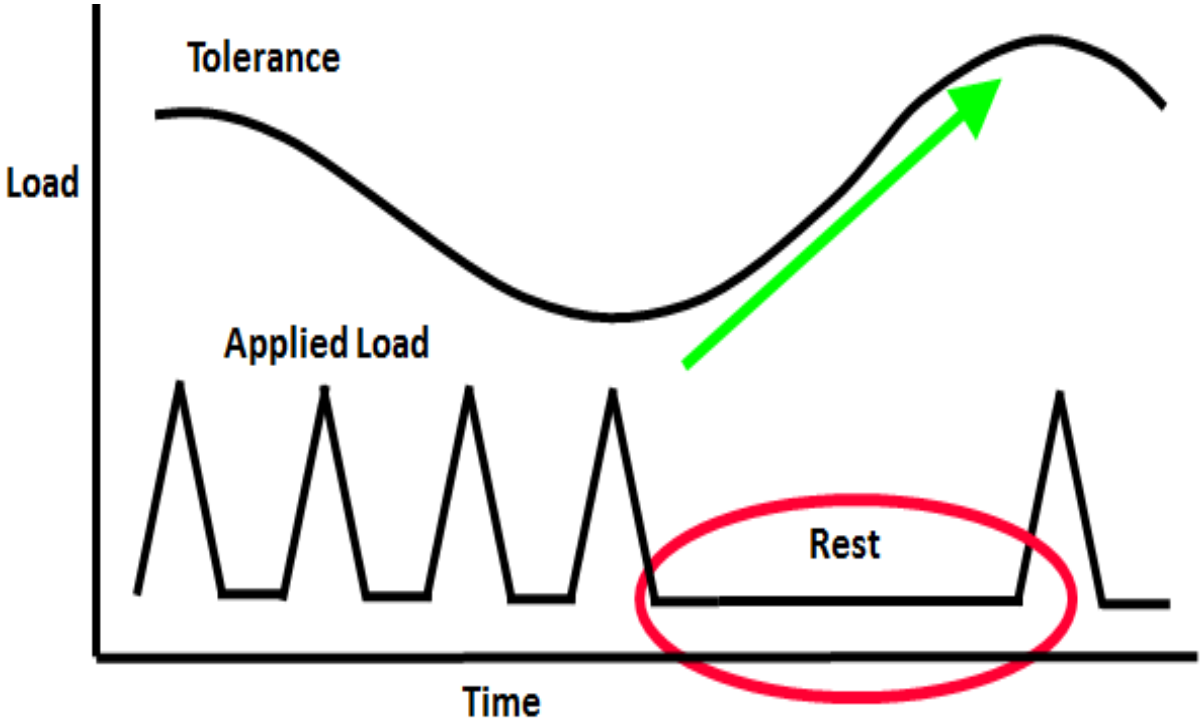
Repetitions = Exertion or Effort

- Requires greater recovery time

Repetition Injury



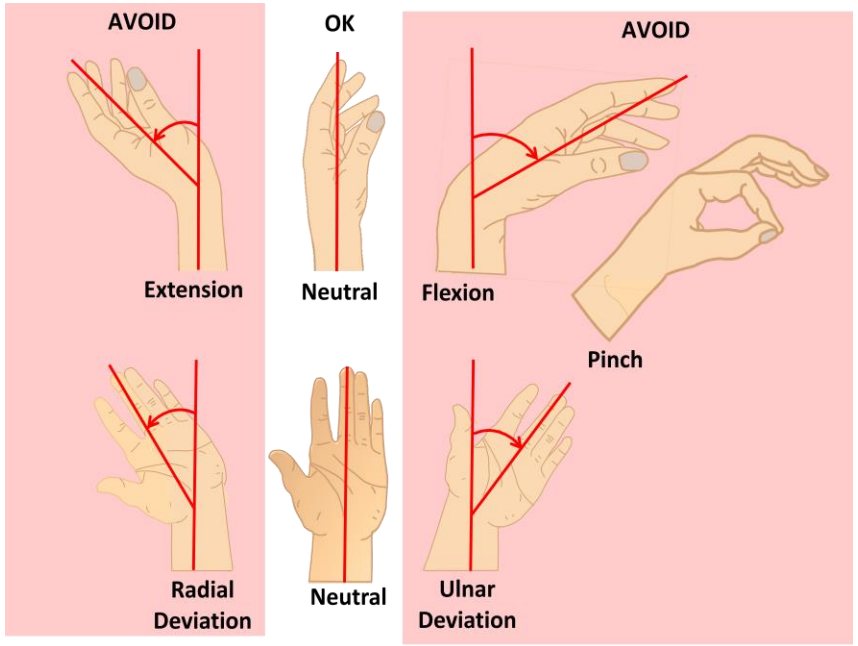
Importance of Rest



- Loading causes tiny micro-tears, or injuries in tissues
- Rest allows the tissues to recover, and tolerance increases
- If there is no rest these micro-tears grow into more severe injury

Posture – Maintaining Neutral Postures

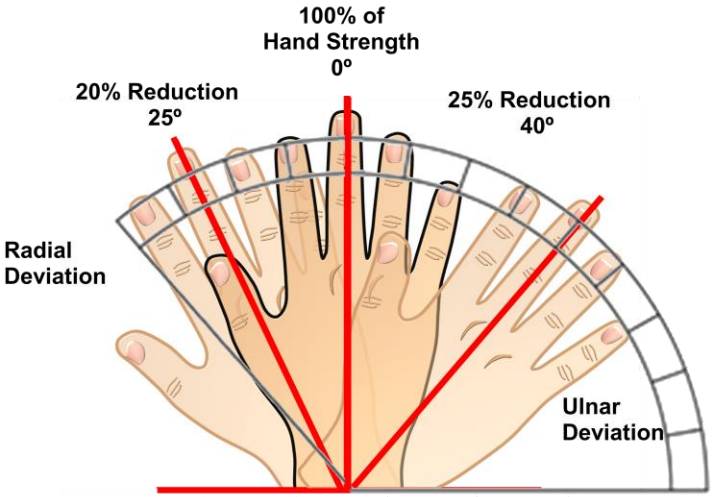
- *Neutral posture*
  - Position which minimizes stresses on the body
  - Safest & most efficient position to work

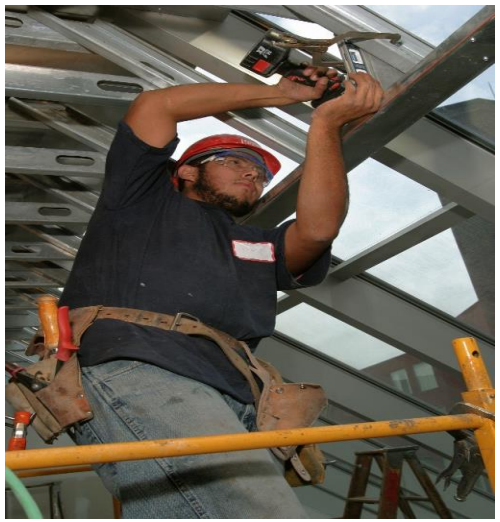


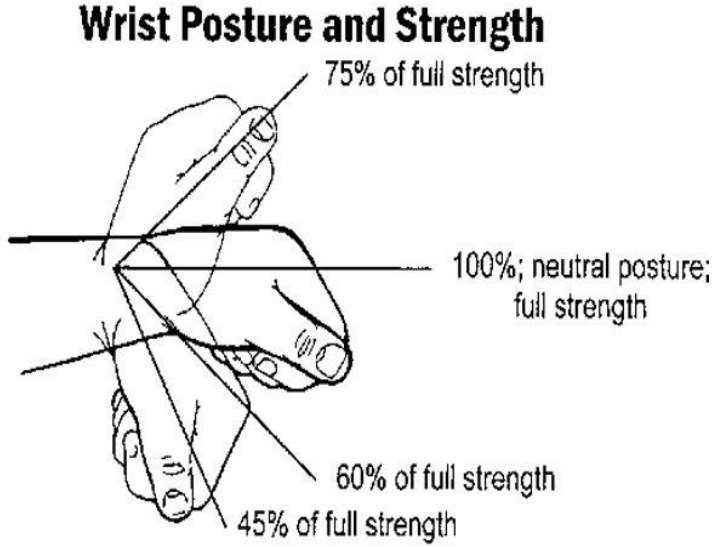
Awkward Posture

Awkward postures can increase risk of injury

- Muscles operate less efficiently, and more force must be expended due to the task
- Bending down, twisting, overhead reaching







Awkward Postures

Bending Backward

Bending to One Side

Twisting

Hands above Shoulder

Elbows/arms away from Body

Arms behind the Body

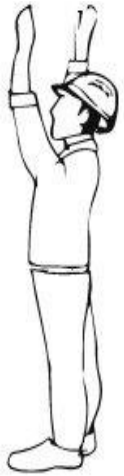
Bending the wrist up

Bending the wrist down

Neck bent forwa Neck bent backward

Neck turned to one side

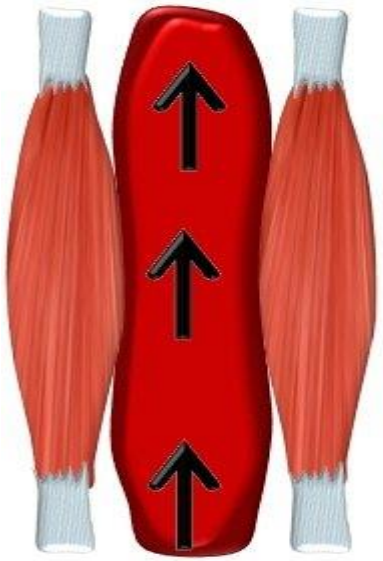
Neck bent to one side

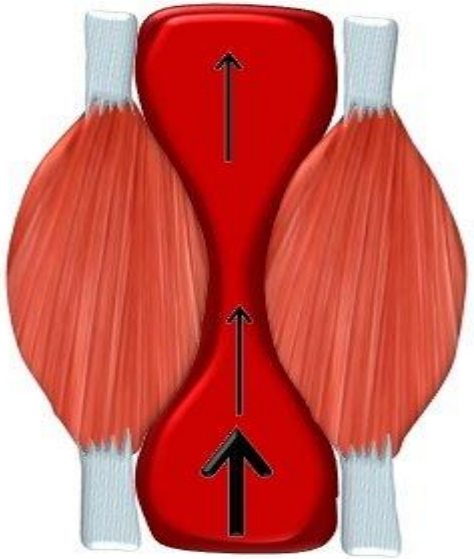


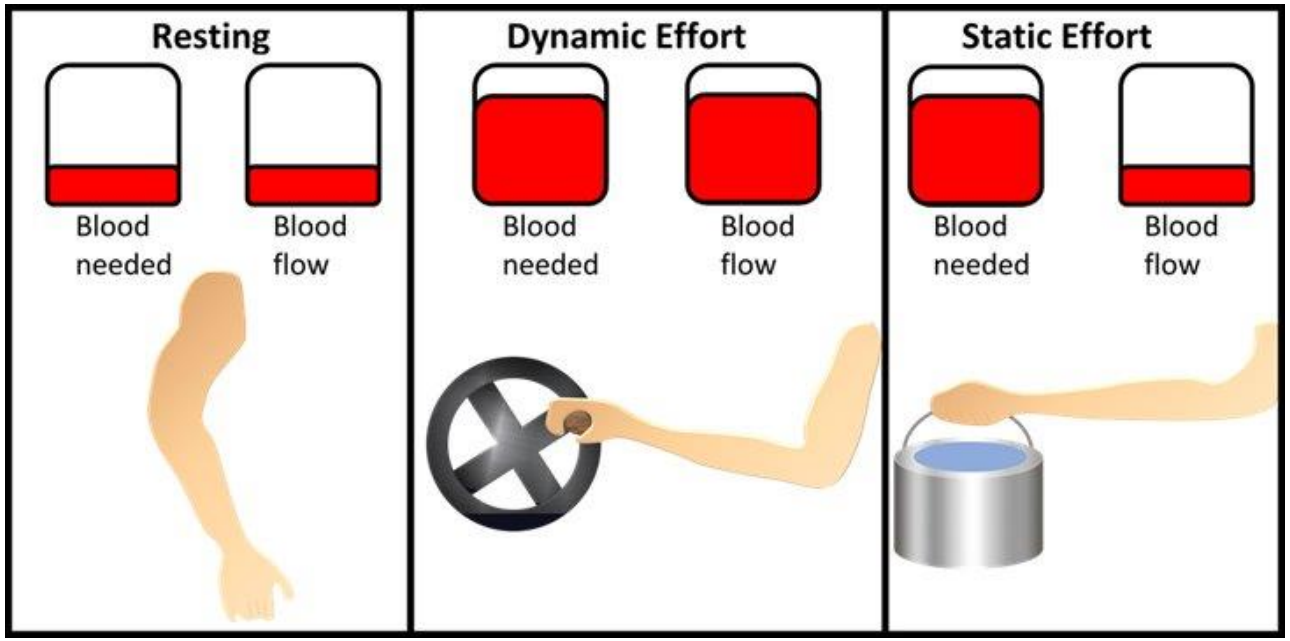
(a) Working Overhead (b) Kneeling (c) Back Bending Forward (d) Squatting (e) Neck Bending (f) Reaching

Static Postures

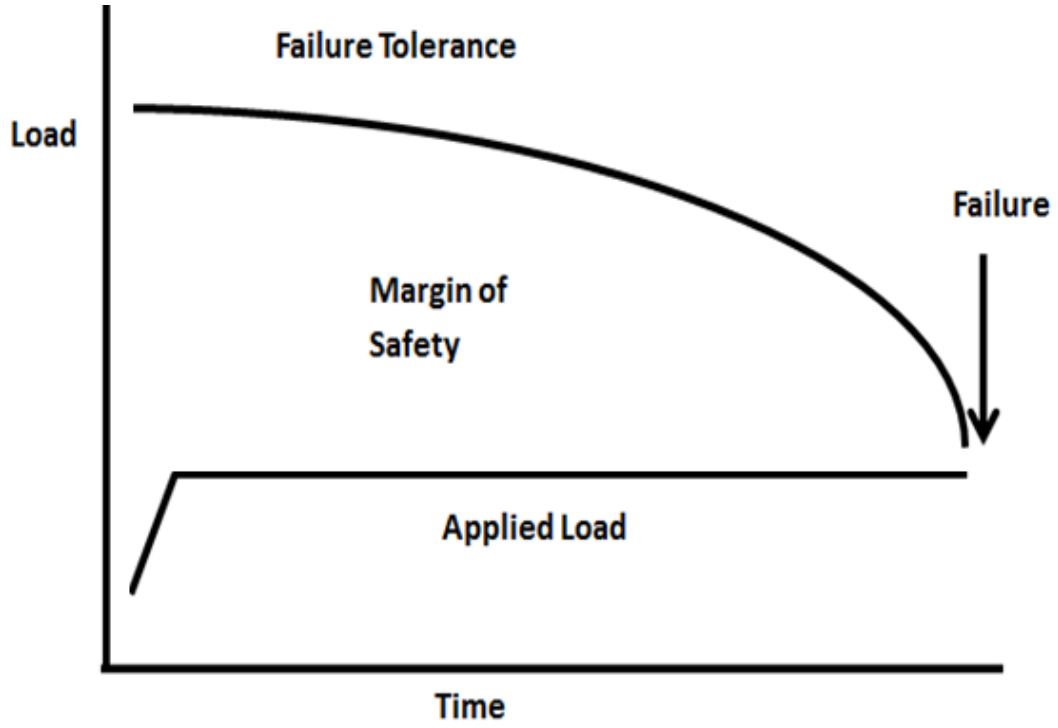
- Occur when a posture is held for a long period
- Reduced blood flow to muscles
- Can lead to early onset of fatigue





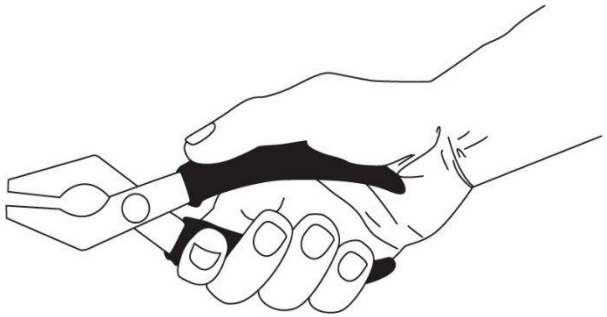


Static Posture Injury



Contact Stress

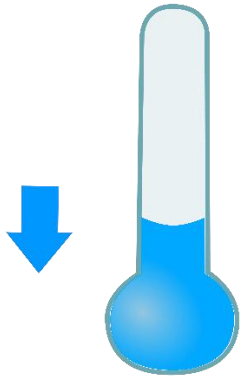
- Stress on tissues of the body that come into contact with hard or sharp objects
- Direct pressure on underlying tendons and nerves resulting in decreased blood flow
- Examples:

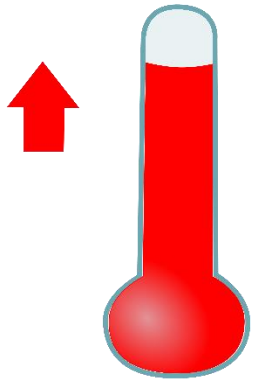


Extreme Temperatures

Extreme Temperatures

- Cold
  - Muscles and Tendons become less flexible
  - Blood circulation is reduced in arms and hands
- Hot/ Humid
  - Imposes strain on the body and increases dehydration





Psychosocial hazards

Some psychosocial hazards to look for, according to the Copenhagen Psychosocial Questionnaire, are:

Work Demands

Work Organization

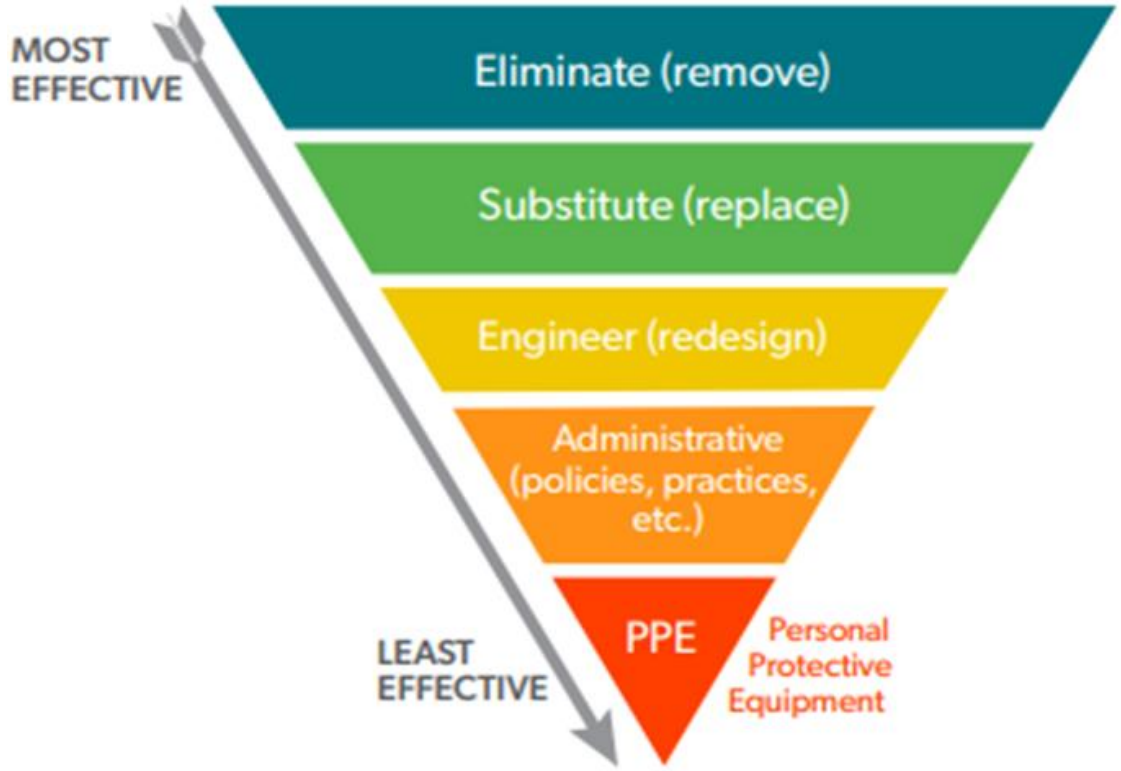
Work Values (Social Capital)

Work Relationships

Work-Life Balance

Offensive Behaviours

How to Control for Hazards



Eliminate the hazard from the job

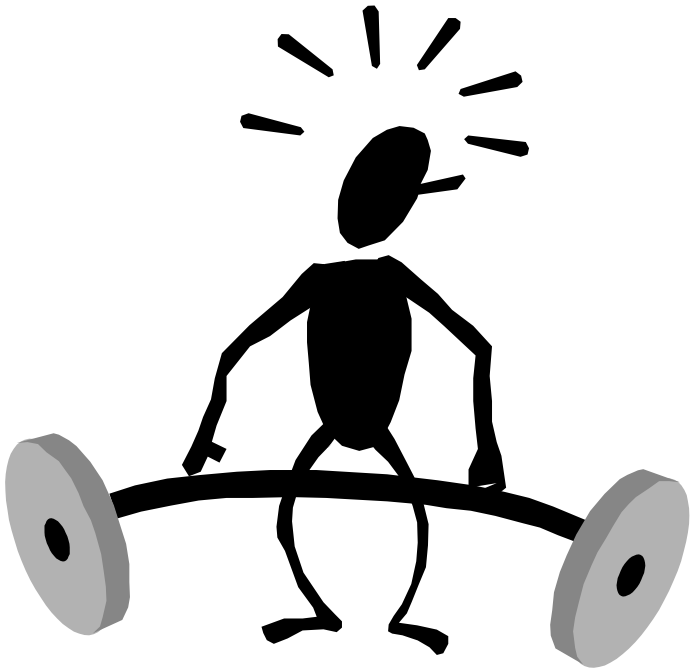
Replace the hazard

Isolate from the hazard

Training, job rotation, policies, etc.

Equipment worn to reduce exposure (i.e. knee pads, gloves)

Can Lifting Technique Make a Difference?



YES!

Ergonomics and Lifting

- Lifting and carrying items can pose a risk to your back's health
- Safe lifting principles can help keep you healthy, and your back comfortable

Principles of Lifting:

B ack Straight

A void Twisting

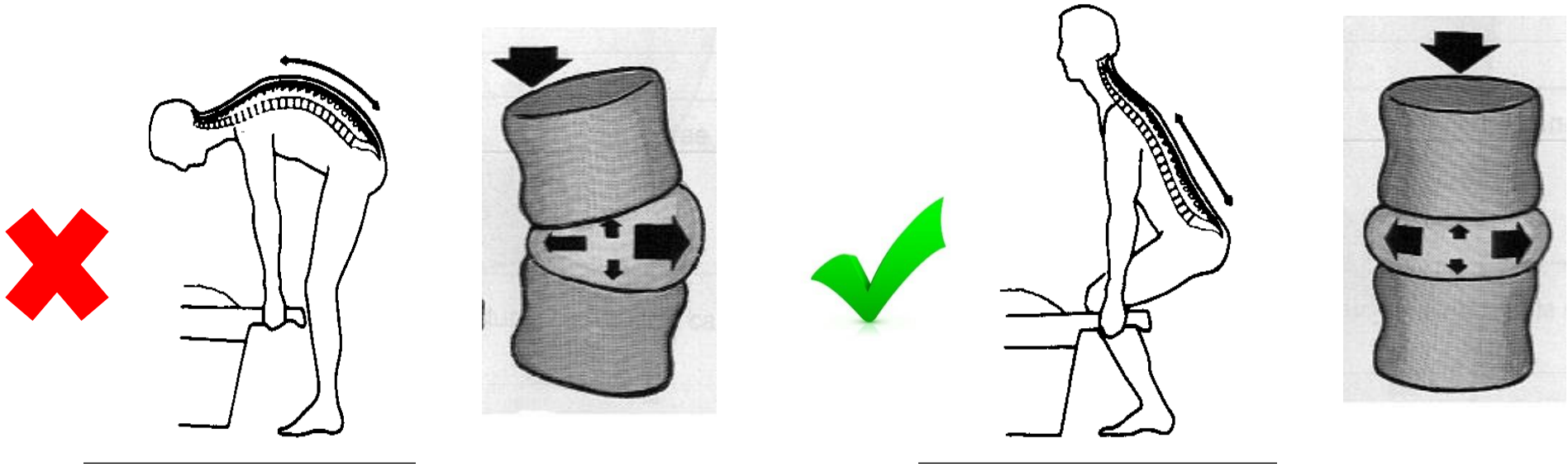
C lose to Body

K eep Smooth

Lifting Technique

Back Straight

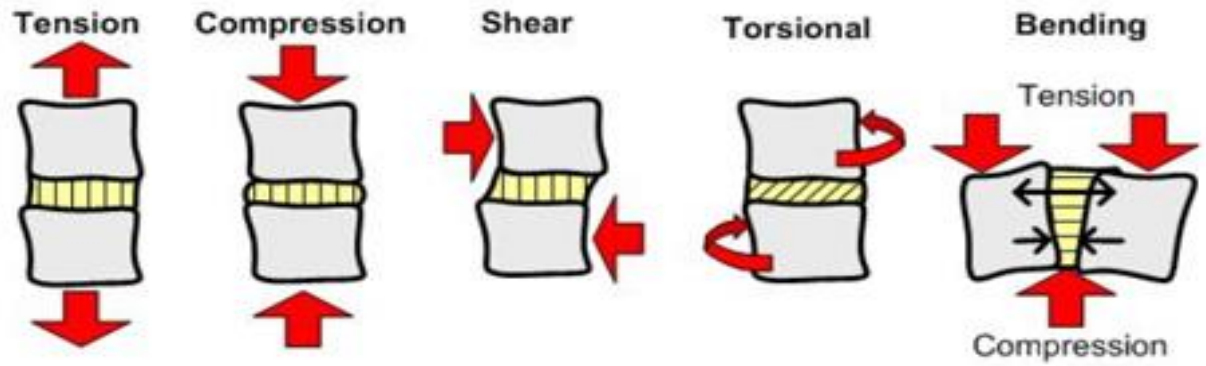
- Discs can handle larger loads when the back is straight
- Neutral spine position - bend at knees and hips

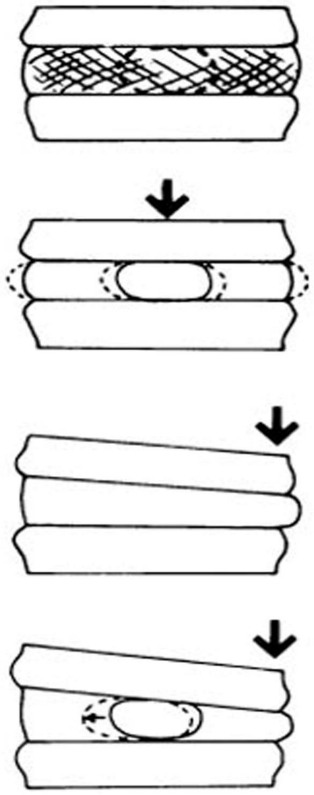


Lifting Technique

Back Straight - Neutral Spine

- Aligns torso
- Maintains spine's natural curves
- Keeps torso moving smoothly

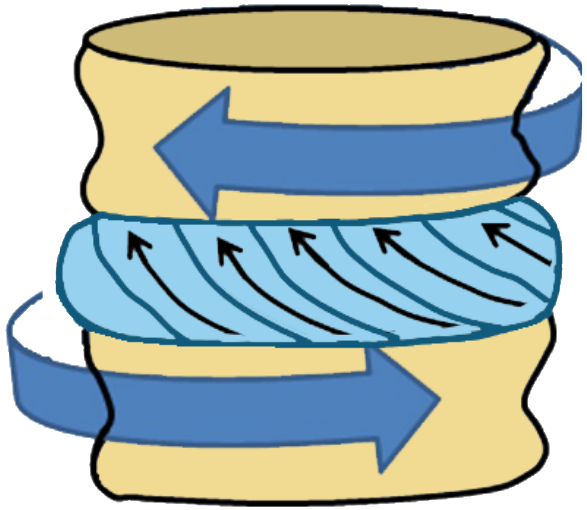




Lifting Technique

Avoid Twisting

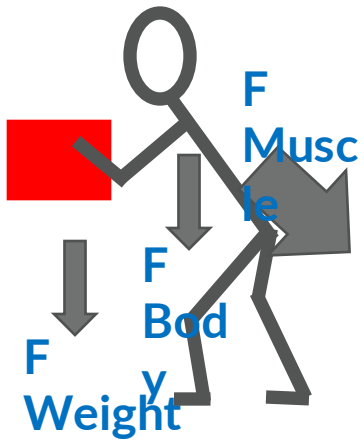
- Discs are weaker when lifting and twisting
- Avoid twisting by pivoting



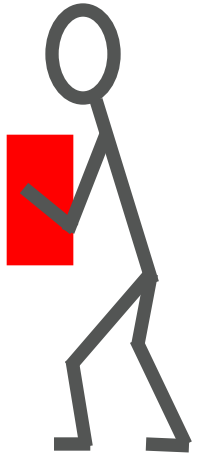
Lifting Techniques

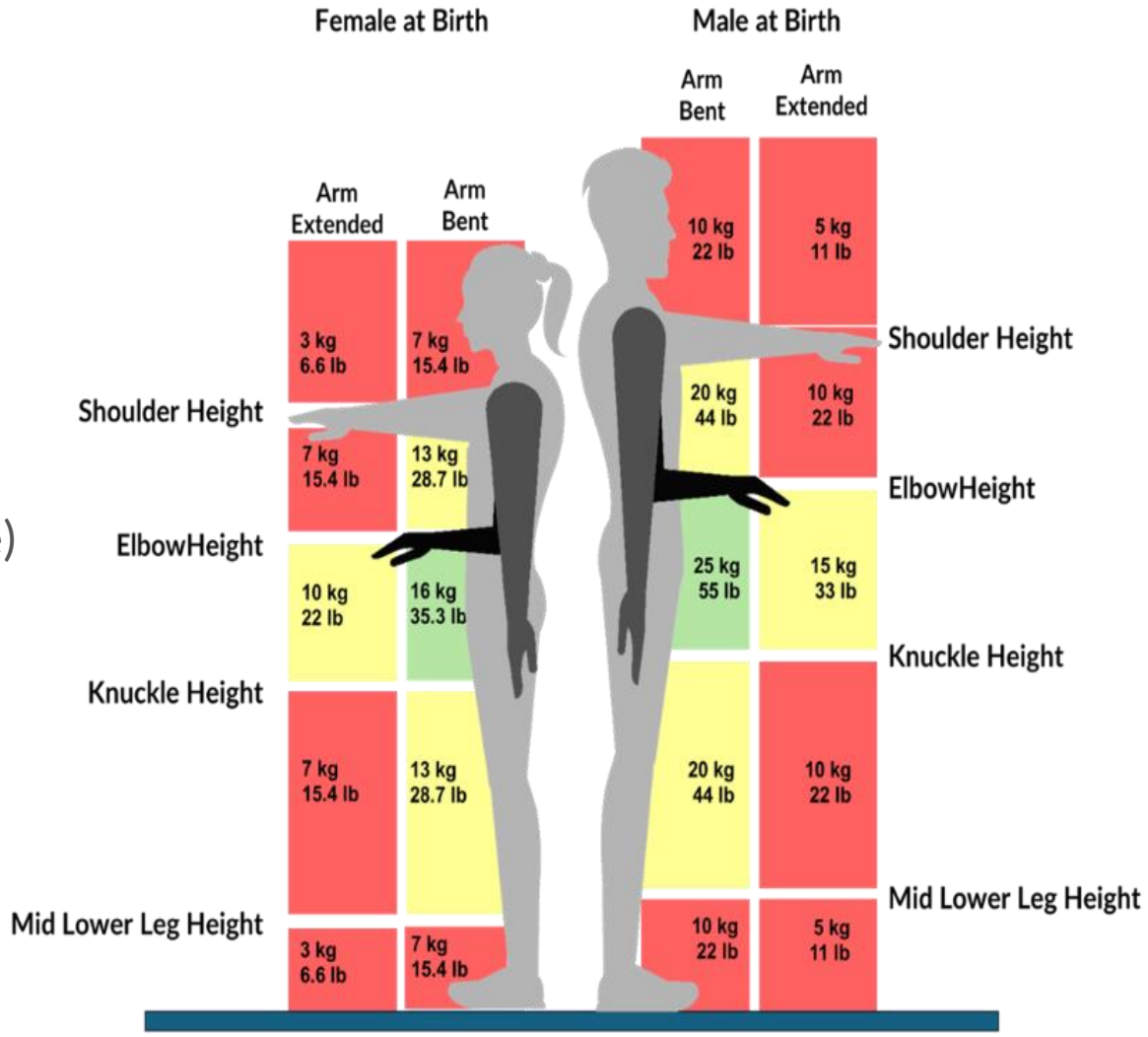
Close to Body

- Back joints act as a fulcrum
- Muscles counterbalance the weight
- ⇑ distance from body = ⇑ stress on the back
- Raise the center of gravity of the object you want to lift. Lifting from a higher starting point reduces the torque (force) needed.



Close = less load on the back

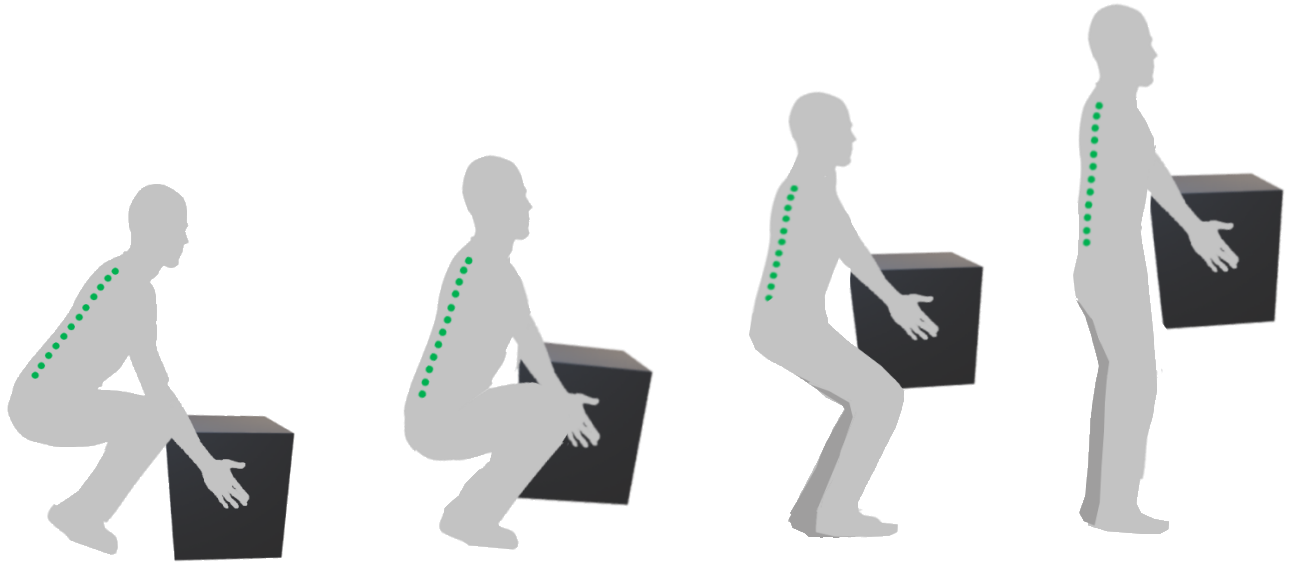




Lifting Techniques

Keep Smooth

- Avoid sudden, forceful movements, as they increase strain on the discs
- Do not release force abruptly
- Clear communication is essential when lifting with a partner



Lifting is Affected By..

Object Weight

Object Size

Grip

Asymmetry

Vertical and
horizontal location

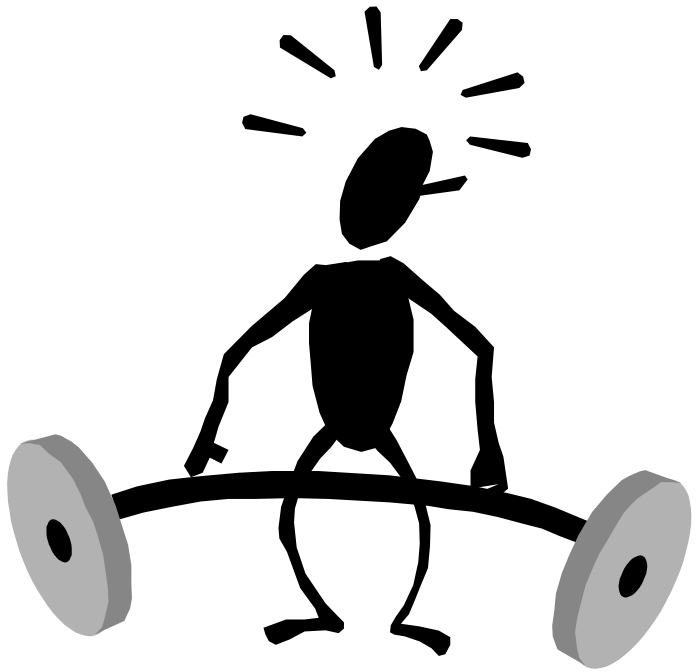
Object Weight

Heavier weight Increases:

- Difficulty
- probability of poor technique
- Risk of injury

Prevention Measures:

- Utilize lifting aids
- Get help - partner
- Test weight before lifting
- Use proper technique



Vertical Location

Vertical Travel Distance:

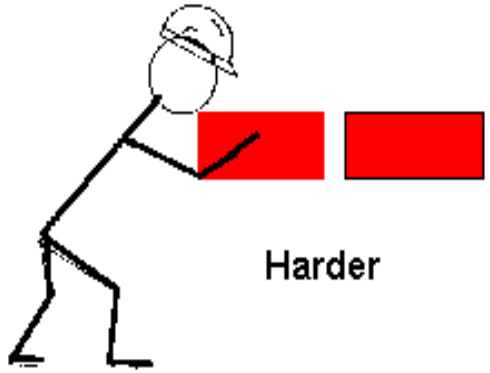
- Increased difficulty
- Increased reaching
- Risk of injury
- Decreased safety

Prevention Measures:

- Avoid above shoulder work
- Store objects between knuckle and chest level
- Minimize vertical distance

Horizontal Locations

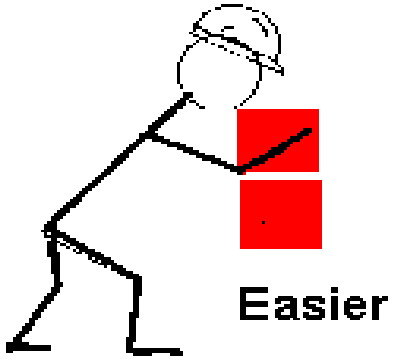
Increased horizontal distance from fulcrum (torso) to the load (object lifted) = increased effort force required



Dimensions of object may:

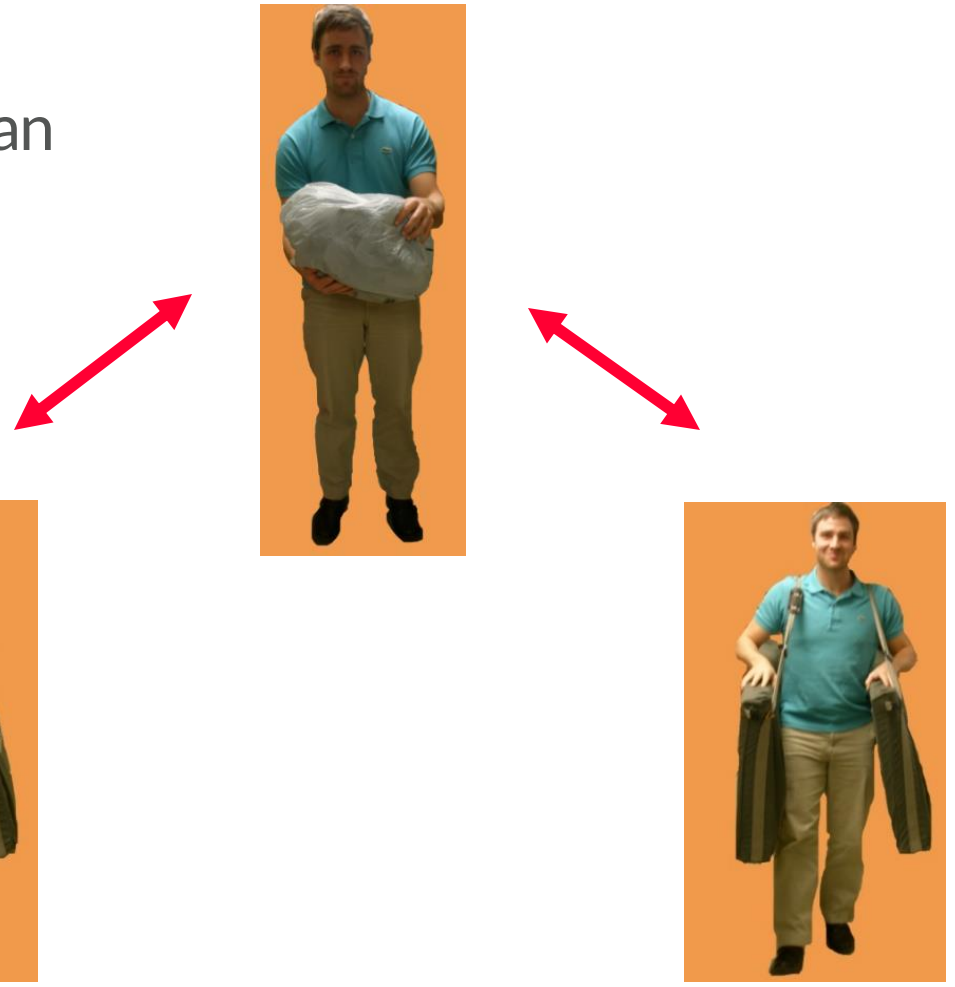
- Increase difficulty
- Increase force required
- Decrease grip

Decrease horizontal distance



Unbalanced Loading

- Create awkward posture – twist, lean
- Unbalanced force production
- Increased stress on muscles, discs
- Increased probability of injury



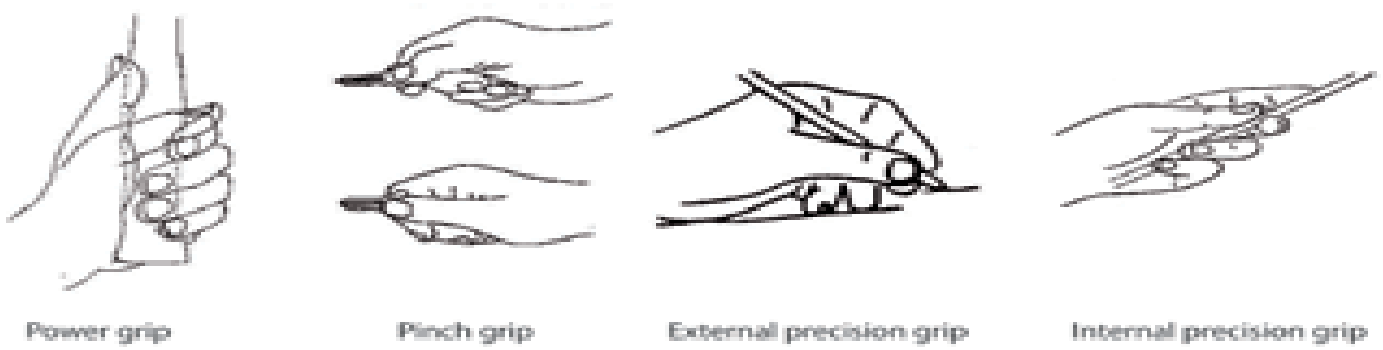
Prevention measures

- Avoid single handed carry
- Balance load
- Utilize lifting aid
- Get help - partner

Grip

Poor coupling (grip) increases the risk of injury

- Slippery objects
- Pinch grips
- Awkward shapes
- Glove use



Grip

- Examples:
  - Can Claw
  - Gorilla Gripper

Controlling for Vibration

- Report any poorly maintained equipment to your supervisor
- A good suspension system and correct tire pressure will help reduce vibration
- If your seat has hydraulic dampers and shock absorbers, adjust the seat to your weight and height
- Slow down when driving over potholes and rough terrain
- Get out of your vehicle for a few minutes every hour to stand, stretch and give your body a break from the vibration

Alternative Lifting Techniques

There are often situations or objects being lifted where the standard lifting technique cannot be used.

Alternative techniques can be used depending on the situation and what you are lifting.

Next are 3 videos of different lifting techniques.

Partial Squat Lift – One Hand

Tripod Lift

Golfer's Lift

Carrying Loads

- Move feet -do not twist
- Keep object close to body
- Maintain neutral postures
- Use an aid if load is heavier than you can lift
    - Wheelbarrow
    - Dolly
    - Cart

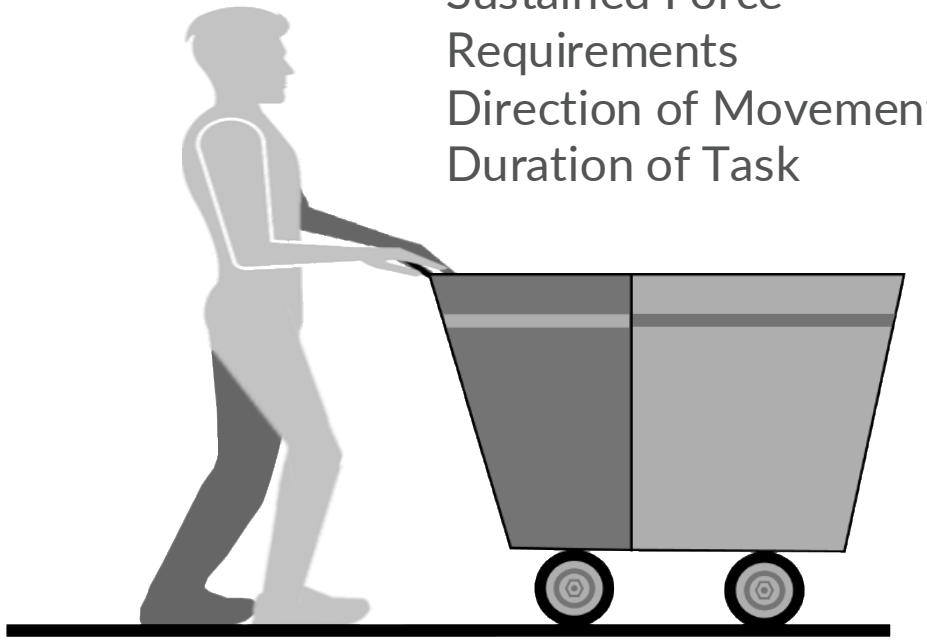
Pushing and Pulling

If a load is heavier than what you feel you can lift, use a device like a handcart or dolly, which will involve pushing and pulling.

Variables to consider:

Task
Distance Travelled
Initial Force Requirements
Sustained Force Requirements
Direction of Movement
Duration of Task

Human Factors
Height
Weight
Age
Sex at Birth
Strength
Posture
Physiological Capacity



Equipment
Handle Height
Handle Orientation
Wheel/Caster Design
Stability
Size
Weight

Floor/Ground
Surface Characteristics
Slope
Contaminants

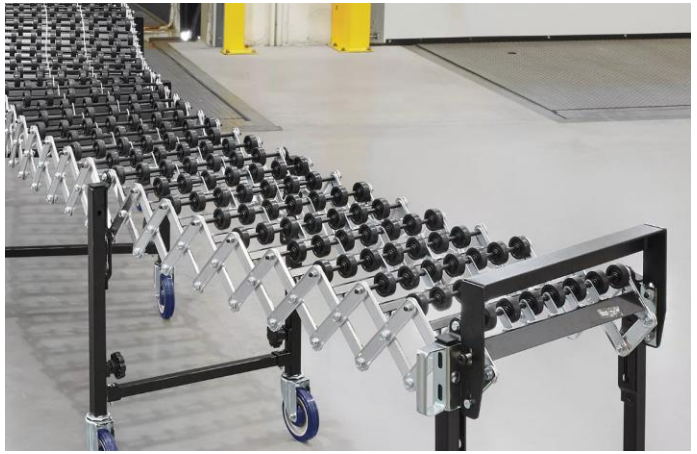
Pushing and Pulling

Reduce the distance to push or pull:

- Relocation of material that is moved
- Avoid pushing carts through crowds of people (have a planned route)

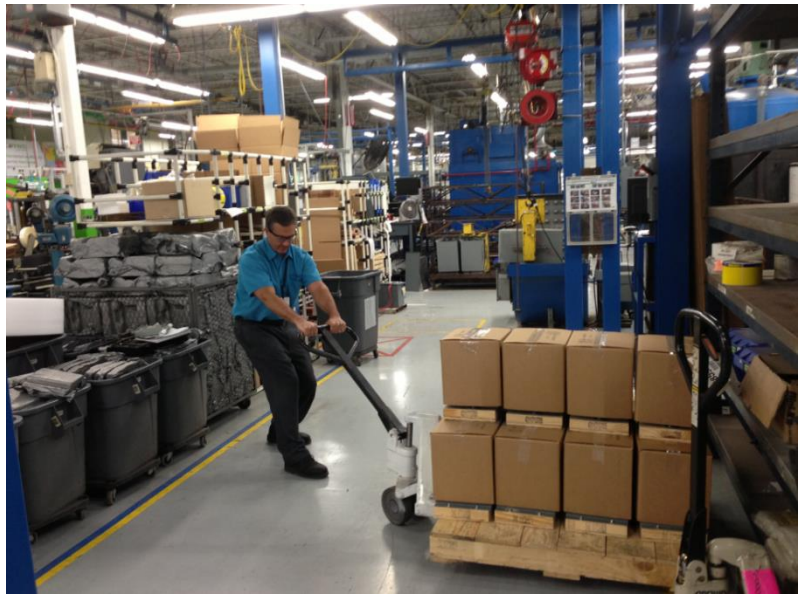
Eliminate Pushing/Pulling:

- Conveyors (powered or non-powered)
- Powered trucks
- Lift tables
- Slides or chutes



Pushing and Pulling

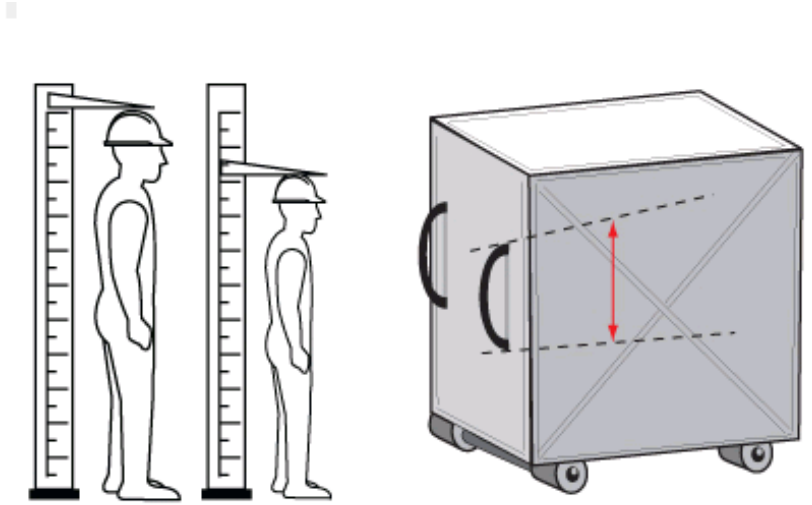
- Reduce force when pushing or pulling:
  - Improve handhold or grip
  - Reduce the size or weight of the load
    - Take two trips
  - Use 4-wheel trucks or dollies
  - Preventative Maintenance on all carts/dollies (lubrication, larger casters)
  - Floor maintenance (eliminate bumps, cracks, carpets)
  - Proper gripping shoes



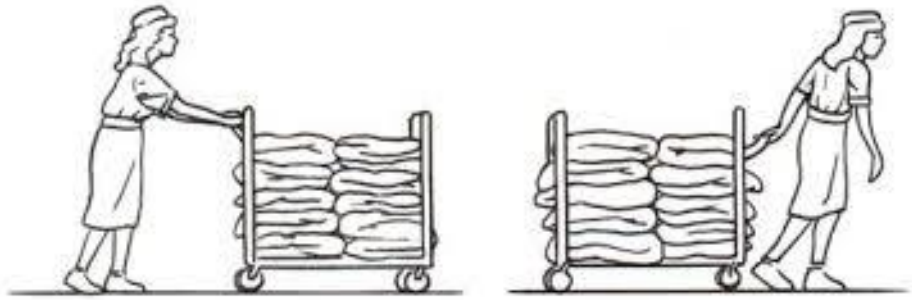
Pushing and Pulling

Optimizing Pushing/Pulling Tasks:

- Eliminate 1 handed pushing/pulling tasks
- Provide variable handle heights to accommodate employees with different heights
  - Vertical handles for more neutral wrist posture
- Use ramps with a slope of less than 10%
- Keep the load within shoulder to mid-thigh vertical range

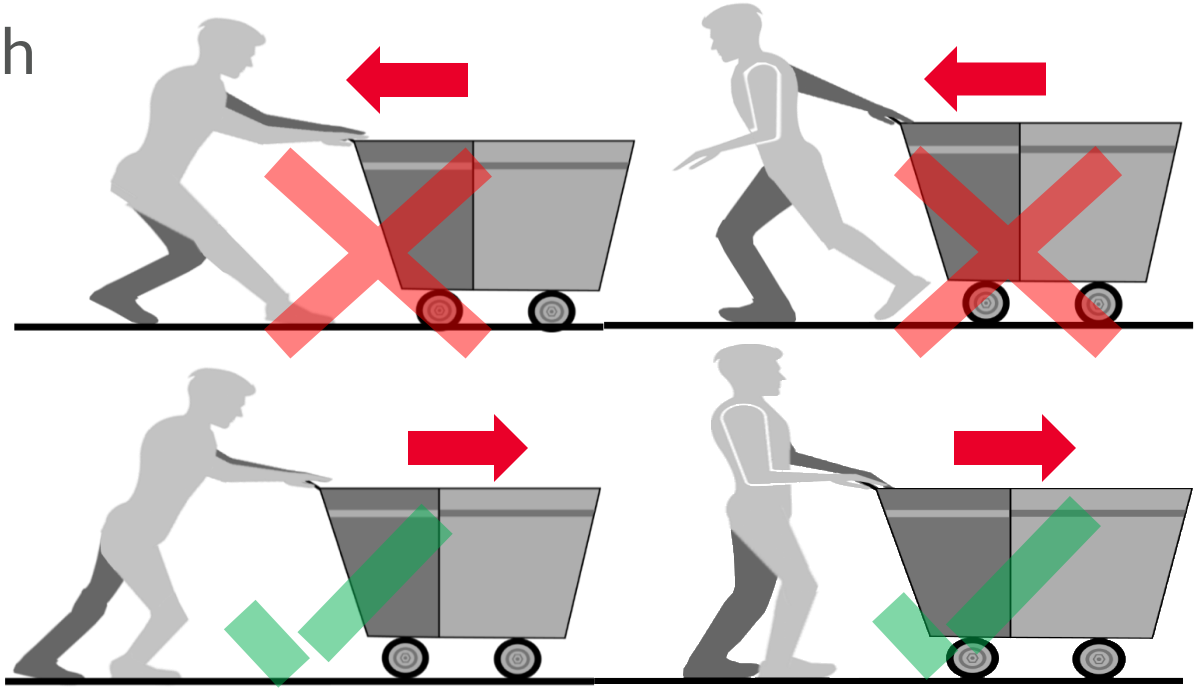


Vertical handles are good for workers of various heights.

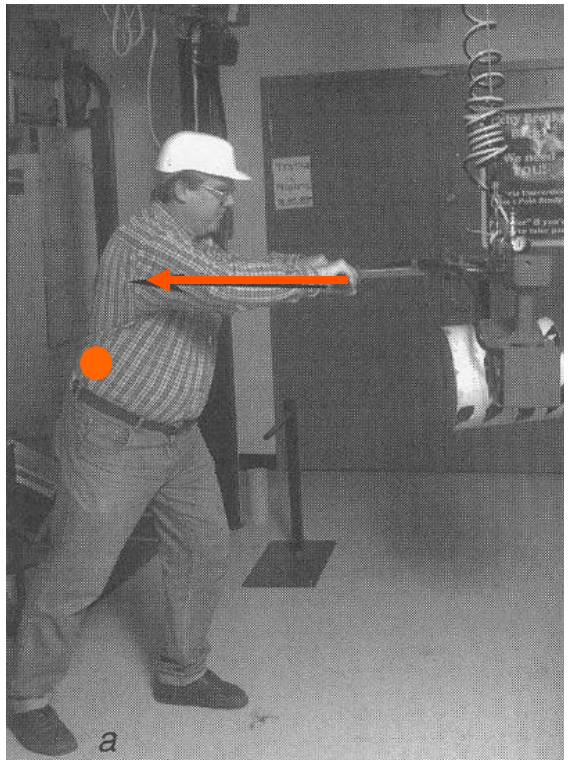


Pushing and Pulling - Suggestions

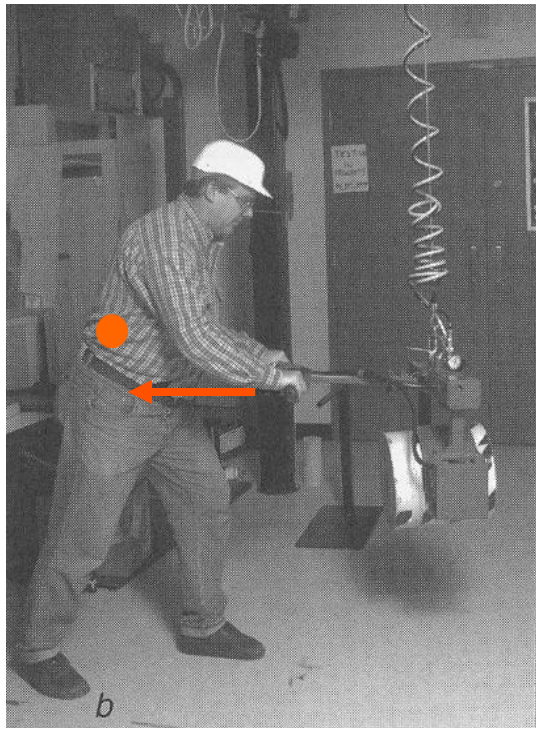
- **PUSH** don't **PULL**
  - Pushing gives you mechanical advantage
  - Can see the travel path
  - Can use both hands to push
  - Spine is not twisted



Directing a Push Force Through the Lower Back



Push force passes OVER the low back

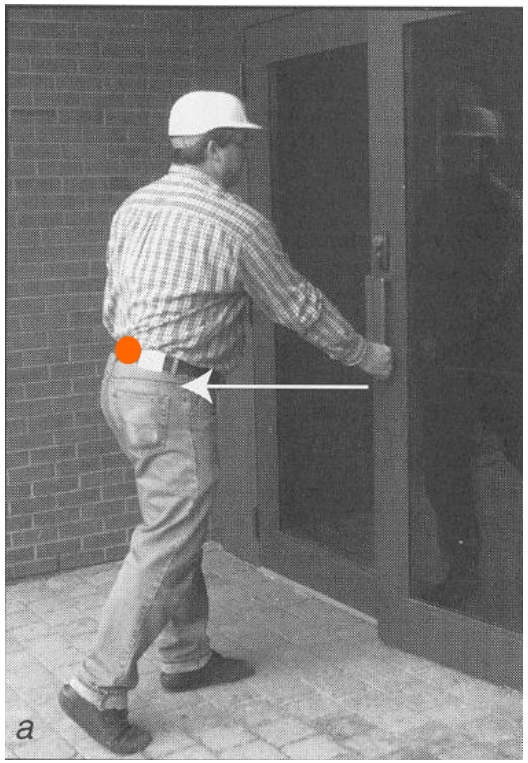


Push force directed THROUGH the low back

*Low back spared

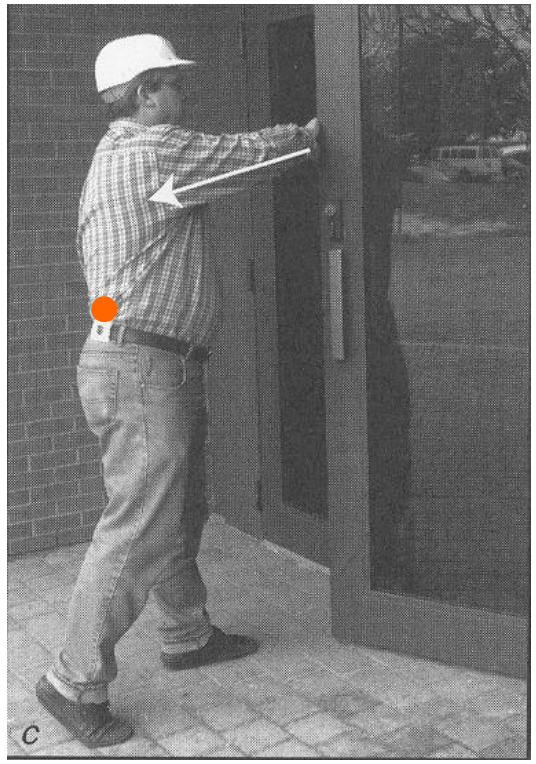
Images source: "Low Back Disorders: Evidence based prevention & rehabilitation" by Stuart McGill

Directing a Pull Through the Lower Back



Pull force directed THROUGH the low back

*Low back spared



Pull force passes OVER the low back

Images source: "Low Back Disorders: Evidence based prevention & rehabilitation" by Stuart McGill

Assessing Risk

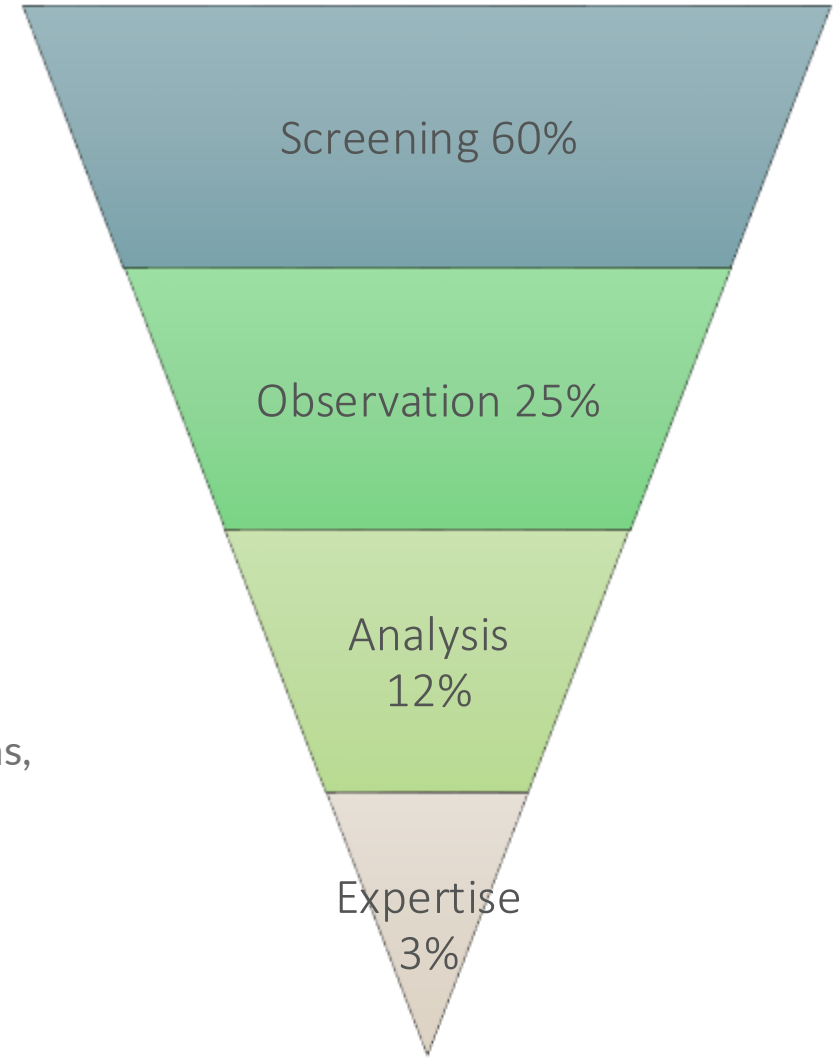
SOBANE: Levels of hazard identification

Screening: is when **workers** identify hazards based on their first-hand experience

OBservation: is qualitatively organized investigations using checklists, can be done by **JHSC**

ANalysis: is the quantitative evaluation traditionally associated with H&S professionals, internal OH practitioners (safety officers, occupational physicians, industrial hygienists, ergonomists)

Expertise: is the outside help that is needed to solve a particularly difficult problem, outside OH practitioners/experts



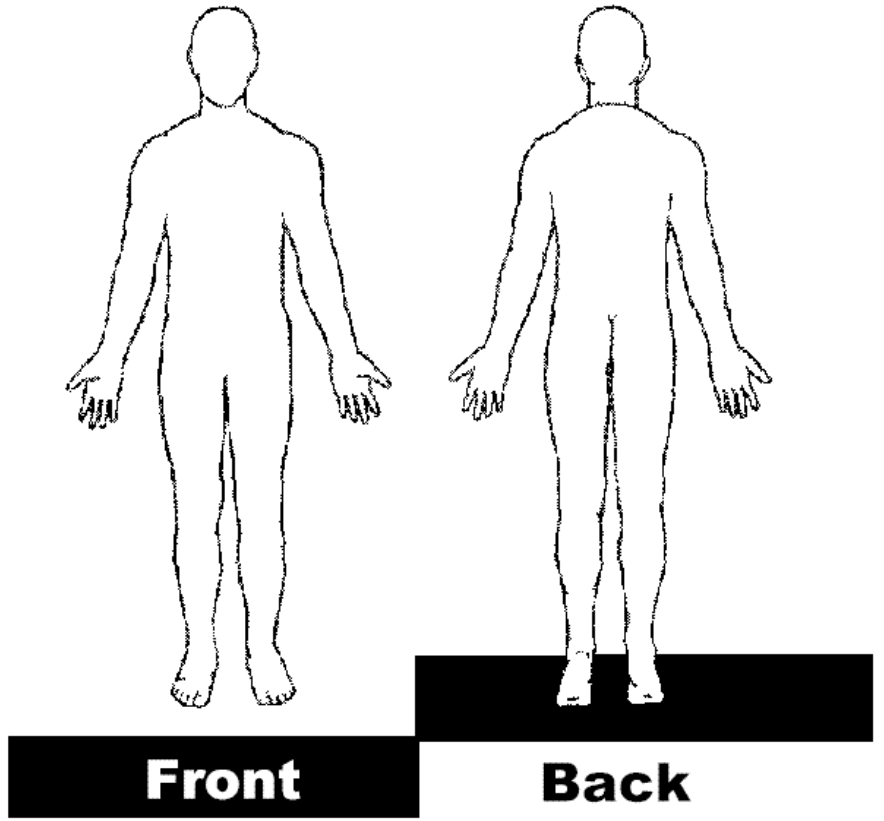
- Body mapping
- Surveys
- OHCOW APPS – Pain Point, Hazard Assess
- Checklists
- Job Assess

- RULA
- REBA
- Liberty Mutual Tables
- Human modeling software

Malchaire J. B. (2006). Participative management strategy for occupational health, safety and well-being risks. *G Ital Med Lav Ergo, 28*(4), 478–486.

Body Mapping as a Hazard Identification Tool

- Provides information that can be presented to:
  - employer/supervisors
  - government inspectors
  - JHSC
  - WSIB representatives
- Can lead to recognition of problems
- Can identify further needs for investigation



Benefits of Body Mapping

- Encourages discussion and analysis
- Simple to use
- Can be drawn retrospectively
- Visualization; more easily and widely understood
- Helps to overcome literacy problems and language difficulties
- Provides an easy and effective way to encourage workers to discuss and report symptoms
- Identifies common trends of health problems among workers in particular jobs, areas or workplaces
- Highlights areas for further investigation and action

Surveys as a Hazard Identification Tool

- When preparing a survey, it is good to ask:
  - What is the purpose of the survey?
  - Who will be asked to respond?
  - What information do you want when it is done?
  - How will you use the information?
  - What is your time frame to get them completed and analyzed?
  - Which resources do you need?

Checklists

- Only a snapshot of the actual job
  - Talk to workers
  - Observe what is going on and how people are working
  - Make notes and drawings
  - Take photographs
- Used as a means of prioritizing where to begin

Checklists

Strengths

- Simple to use and administer
- Serves as a reminder to the observer as to what critical factors to look for
- Define relationships between factors
- Good for breaking down operational procedures
- Methods can provide high correlations between observers of the same set of activities which indicates the validity of the method

Checklists

Limitations

- Little insight into specific problems – only highlights risk factors
- Concept thinking is not promoted
- Yes/no answers – lack of values make arguing for changes difficult
- Questions may be unanswerable
- No help in generating new ideas – although they can help in identifying problem areas
- Only represent the first step

Checklists

OHSCO's Musculoskeletal Disorders Prevention Series
Part 3A: MSD Prevention Toolbox – Getting Started (Final)

MSD Hazard Identification Tool – Option 1

Job Title or Task: _____ **Date:** _____

Completed By: _____

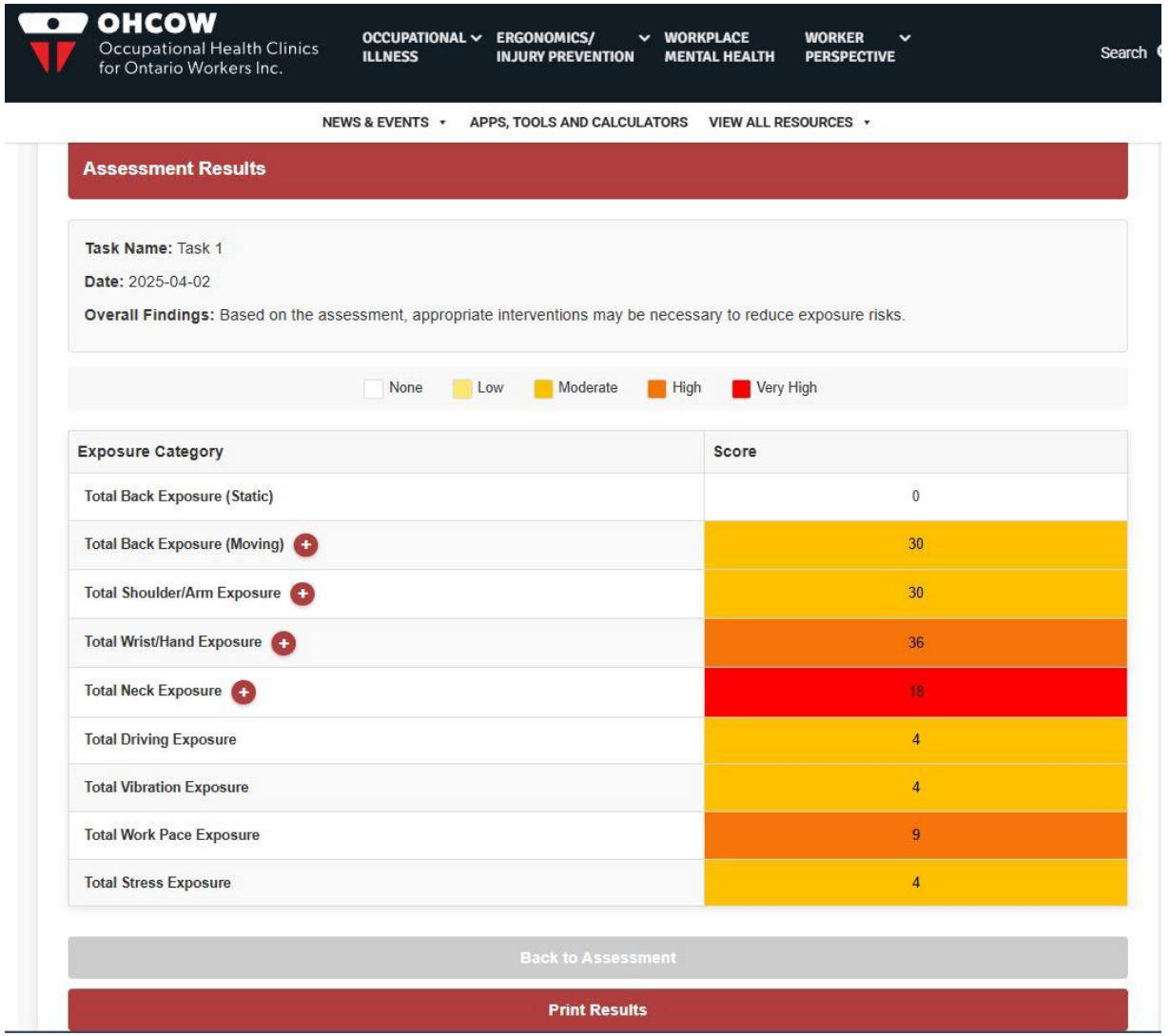
General Observations/Notes:

MSD HAZARDS - GRIPPING		CHECK (✓) IF PRESENT
Pinch Gripping 	• unsupported heavy object(s)	☐
	• difficult/tiring holding or manipulating	☐
	• difficult/tiring squeezing to open/close	☐
Power Gripping 	• unsupported heavy object(s)	☐
	• difficult/tiring holding or manipulating	☐
	• difficult/tiring squeezing to open/close	☐
Notes:		

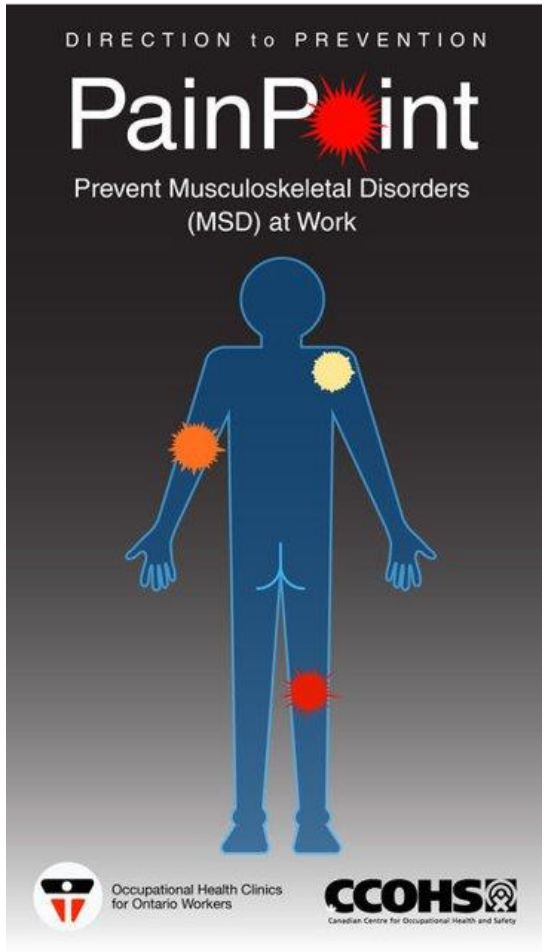
MSD HAZARDS - FORCE		CHECK (✓) IF PRESENT
Lifting / Lowering (consider both one- and two-handed lifting/ lowering)	• object is heavy/difficult to lift/lower	☐
	• object is lifted/lowered repeatedly	☐
	• hands are above the shoulders when lifting/lowering object	☐
	• hands are below the knees when lifting/lowering object	☐
	• object is far away from the belly button	☐
	• loads are unstable, unbalanced, uncooperative, or unpredictable	☐
	• awkward lifting/lowering postures (bend, twist, kneel, reach, sit)	☐

Quick Exposure Check

For assessing exposure to risk factors for work-related musculoskeletal disorders



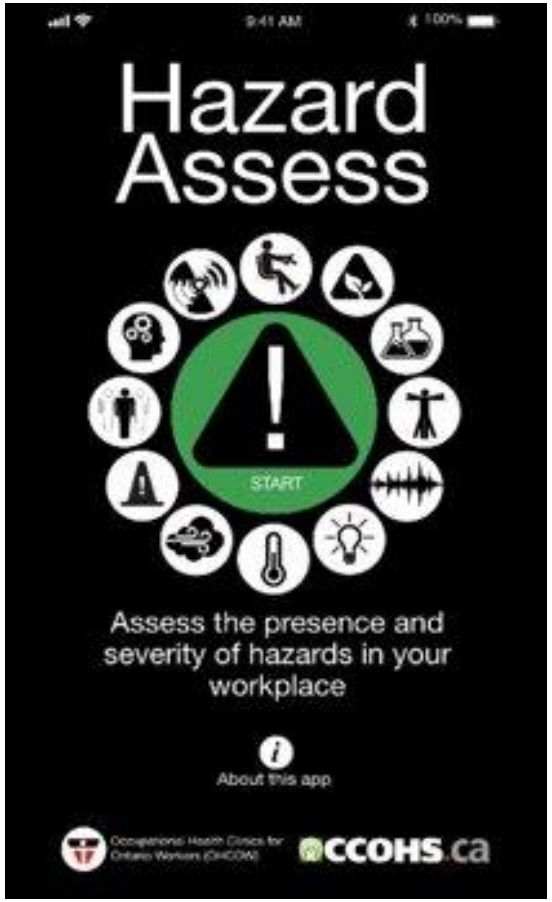
PainPoint App



- Delivers very basic ergonomic assessment
- Results depicted on a body map
- Gives recommendations to address work-related MSD hazards
- Summary of results can be shared, history of results can be stored

A good first step for recognition, action and prevention

Hazard Assess



App for the reporting of workplace hazards

- **HazardAssess** is an app designed to help workers identify and report hazards
- Runs through a checklist of **12 categories** of hazards
- Rated on the same scale as described above (“concerned”, “annoyed”, “interferes with getting the work done”)
- Also asking to report if there are **exposure related symptoms**, identify the **source of the hazard** and provide **suggestions for eliminating/reducing the exposure**
- Annotated **pictures** can be attached (… “circles and arrows and a paragraph” …)
- Results can be **emailed** to supervisor, H&S rep, (MOL?), … anyone you have an email address for
- A tool to **facilitate the IRS process**

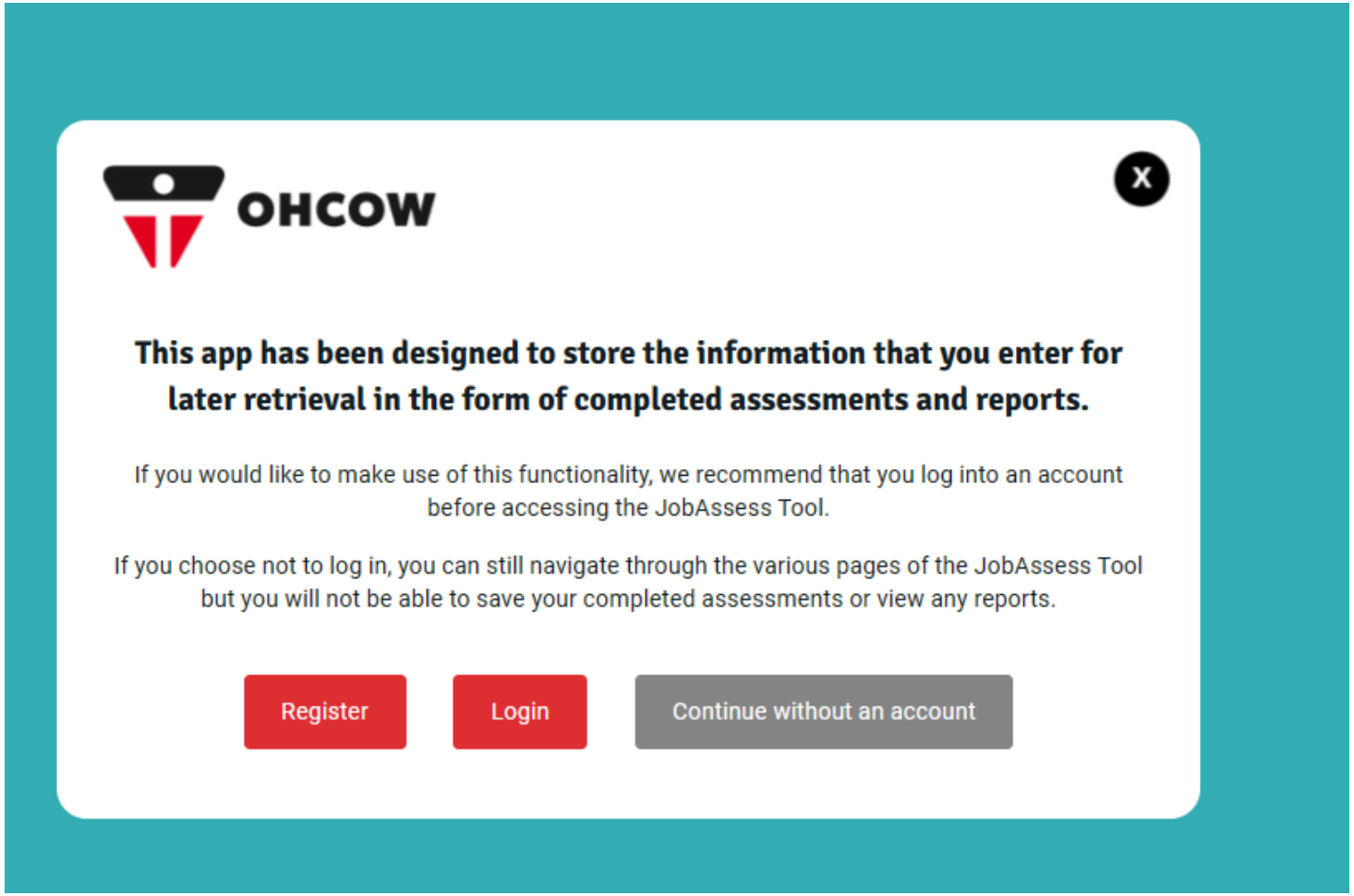
https://my.ohcow.on.ca/tools-and-apps/

TOOL

JobAssess Tool

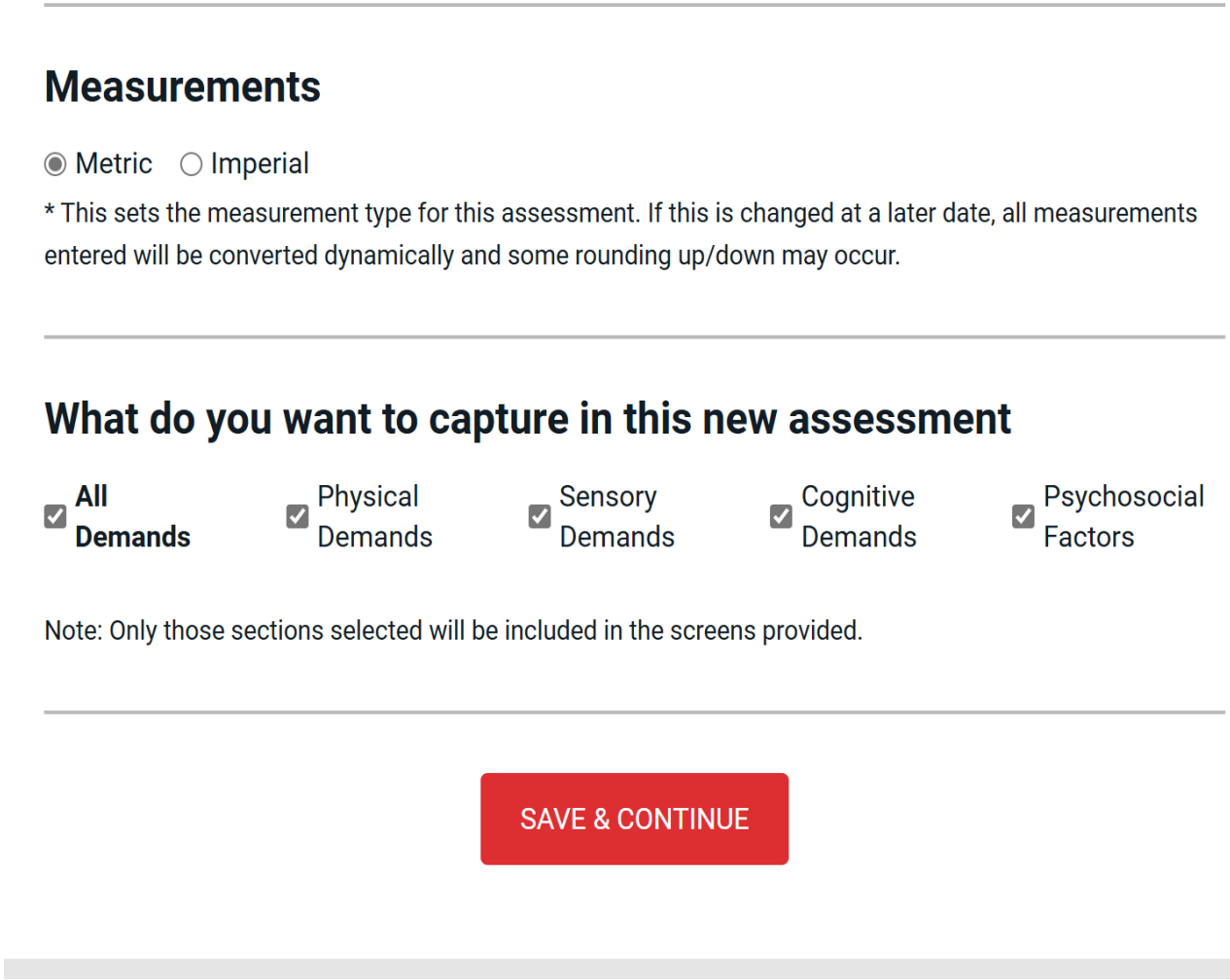
Accurately and efficiently capture the Physical, Sensory, Cognitive and Psychosocial demands of any job.

VIEW TOOL



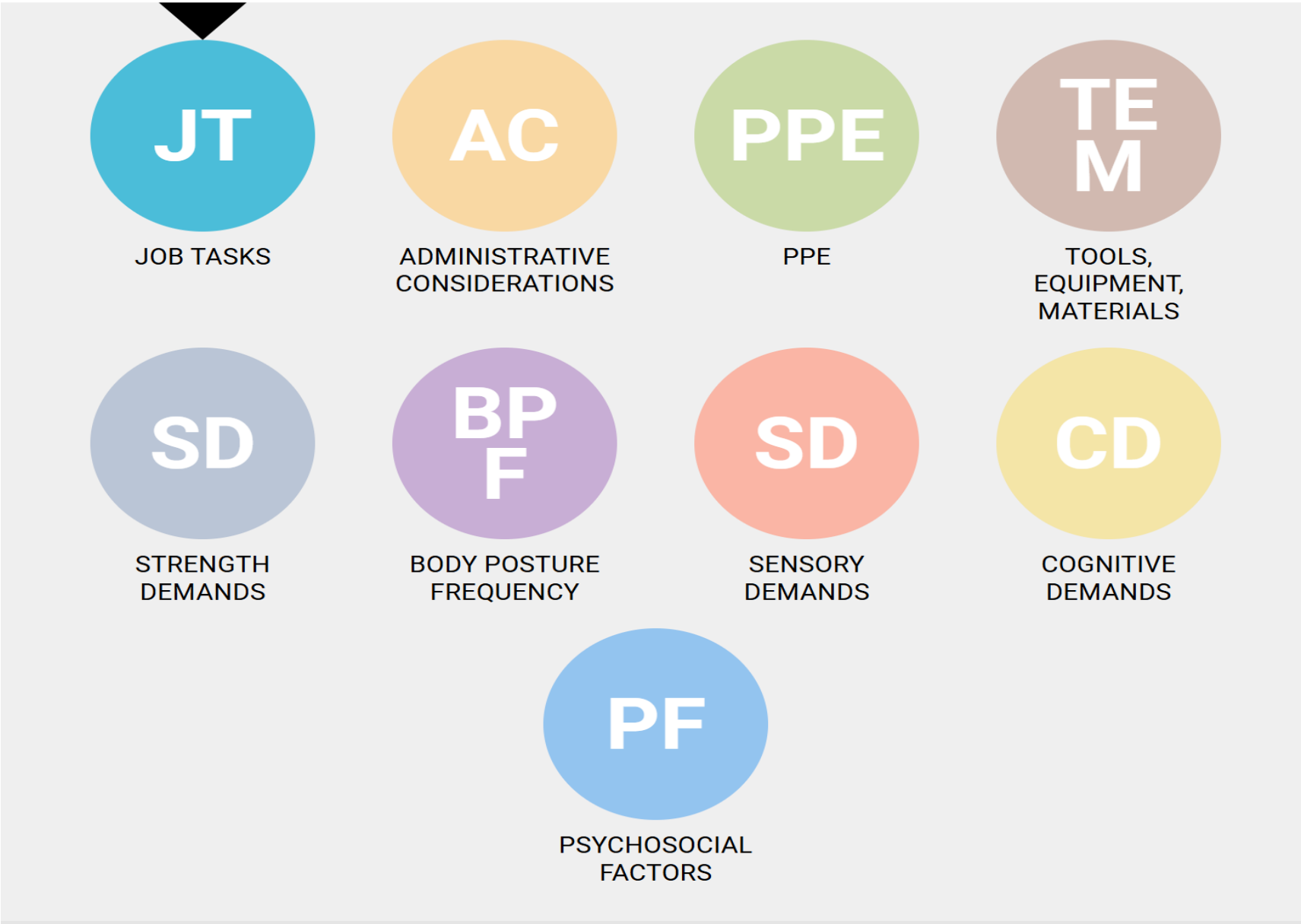
Job Assess - Features and Workflow

- **Comprehensive Coverage:**
  - Physical, sensory, cognitive, and psychosocial demands.
- **Customizable:**
  - Select relevant demands for specific job assessments.



Job Assess - Features and Workflow

- Structured process with 9 key sections
- Organized into essential areas for thorough analysis
- Can go back and forth between sections
- Save work and return as needed



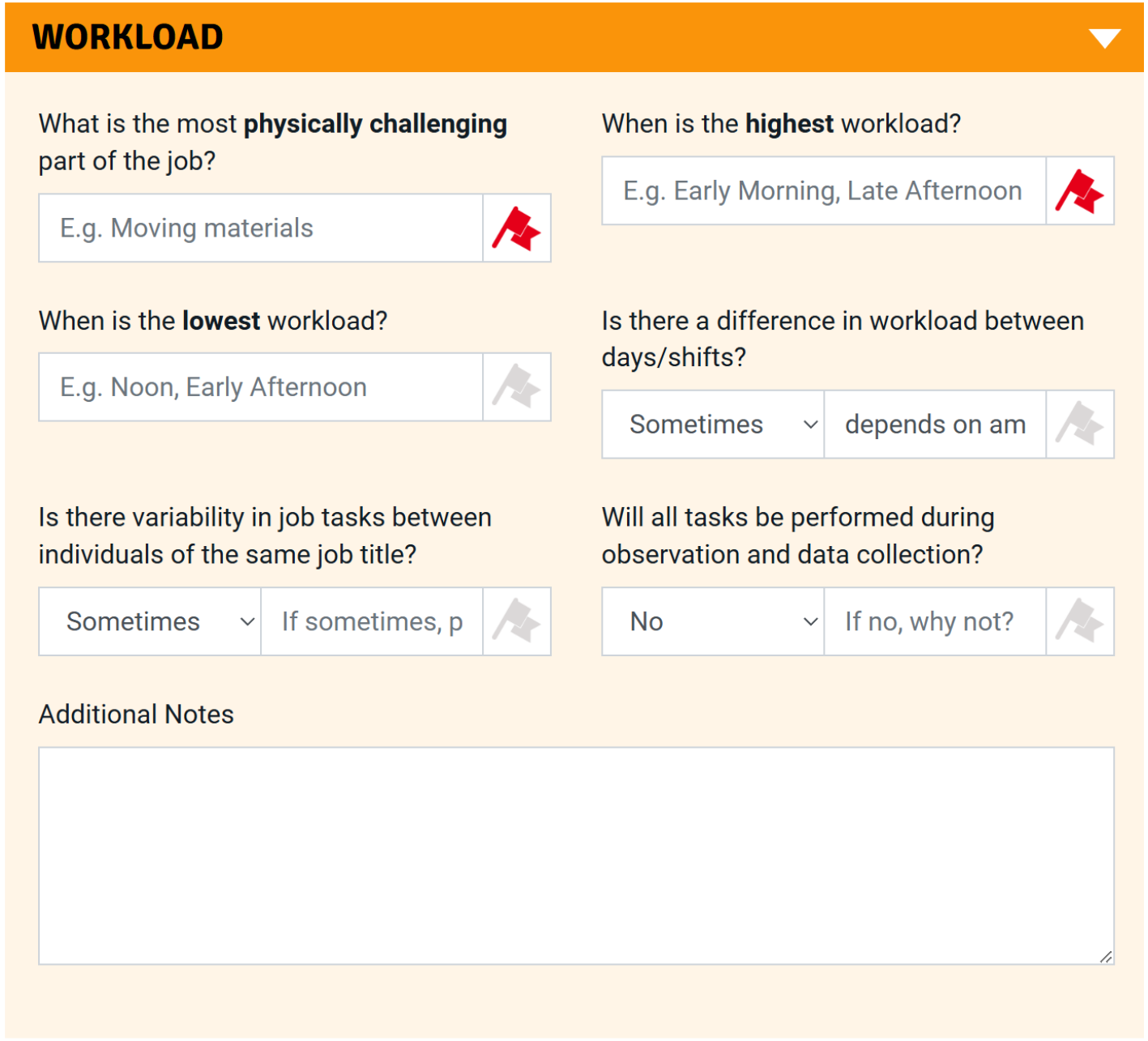
Job Assess - Features and Workflow

Red Flagging

- Flag icon for highlighting areas of concern

Additional Notes

- Comments, details, notes area available to help describe nuances of job



LIFTING

- Low Level Lift
- Waist Level Lift
- Above Shoulder Lift

CARRYING

- Front Carry
- Side Carry (Right hand)
- Side Carry (Left hand)
- On Shoulder

PUSHING / PULLING

GRASPING / PINCHING

LIFTING

Low Level Lift

Force Load Average — Kg

Force Load Maximum — Kg

Duration — Choose one

Frequency (% of workday) — Choose one

Efforts per Minute / Cycle

per — Choose one

Height — m

Moving Distance — m

Borg Scale

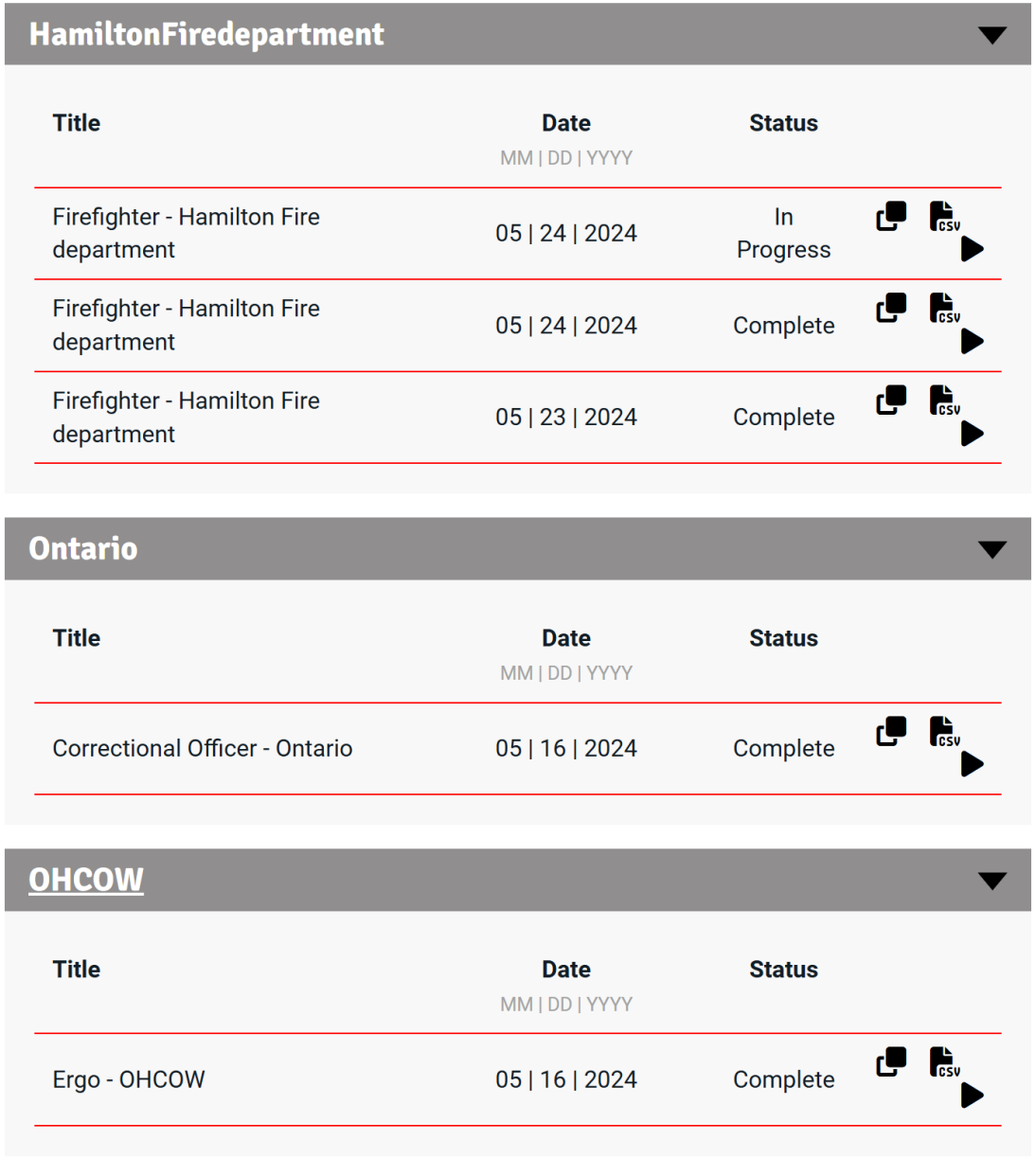
0	1	2	3	4	5	6	7	8	9	10

No Exertion

Notes / Comments

Job Assess - Features and Workflow

- **Final Report Generation:**
  - Download results for individual use or further analysis
  - Exportable to PDF
  - Exportable to CSV (excel) - compare results
- **Duplicate Existing JDAs:**
  - Use as a starting point for new analyses.
- **Access and Manage JDAs:**
  - View completed assessments and final reports.
  - Archive older JDAs for future reference



RULA – Rapid Upper Limb Assessment

Screening method to evaluate trunk/neck/upper extremities MSD risk in single postures.

Important to identify riskier and prolonged postures. Use video and photo analysis.

Factors:
- Posture
- Force
- Repetition

Missing: Duration, recovery time, HAV, one sided

Score	Level of MSD Risk
1-2	neglibible risk, no action required
3-4	low risk, change may be needed
5-6	medium risk, further investigation, change soon
6+	very high risk, implement change now

RULA Employee Assessment Worksheet

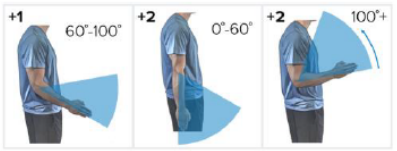
Task Name: Date:

A. Arm and Wrist Analysis

Step 1: Locate Upper Arm Position:

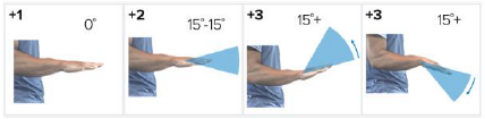
Step 1a: Adjust...
If shoulder is raised: +1
If upper arm is abducted: +1
If arm is supported or person is leaning: -1

Step 2: Locate Lower Arm Position:



Step 2a: Adjust...
If either arm is working across midline or out to side of body: Add +1

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

Step 5: Look-up Posture Score in Table A:
Using values from steps 1-4 above, locate score in Table A

Step 6: Add Muscle Use Score
If posture mainly static (i.e. held>1 minute),
Or if action repeated occurs 4X per minute: +1

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

Step 8: Find Row in Table C
Add values from steps 5-7 to obtain Wrist and Arm Score. Find row in **Table C**.

Upper Arm Score
Lower Arm Score
Wrist Twist Score
Wrist Score
Posture Score A
+
Muscle Use Score
+
Force / Load Score
=
Wrist & Arm Score

Scores

Table A		Wrist Score							
		1		2		3		4	
Upper Arm	Lower Arm	Wrist Twist		Wrist Twist		Wrist Twist		Wrist Twist	
		1	2	1	2	1	2	1	2
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	4	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	7	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

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

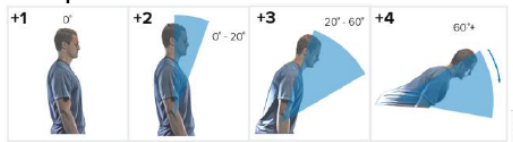
RULA Score

B. Neck, Trunk and Leg Analysis

Step 9: Locate Neck Position:

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

Step 10: Locate Trunk Position:



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

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

Step 12: Look-up Posture Score in Table B:
Using values from steps 9-11 above, locate score in Table B

Step 13: Add Muscle Use Score
If posture mainly static (i.e. held>1 minute),
Or if action repeated occurs 4X per minute: +1

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

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**.

Neck Score
Trunk Score
Leg Score
Posture B Score
+
Muscle Use Score
+
Force / Load Score
=
Neck, Trunk, Leg Score

based on RULA: a survey method for the investigation of work-related upper limb disorders, McAtamney & Corlett, Applied Ergonomics 1993, 24(2), 91-99

REBA - Rapid Entire Body Assessment

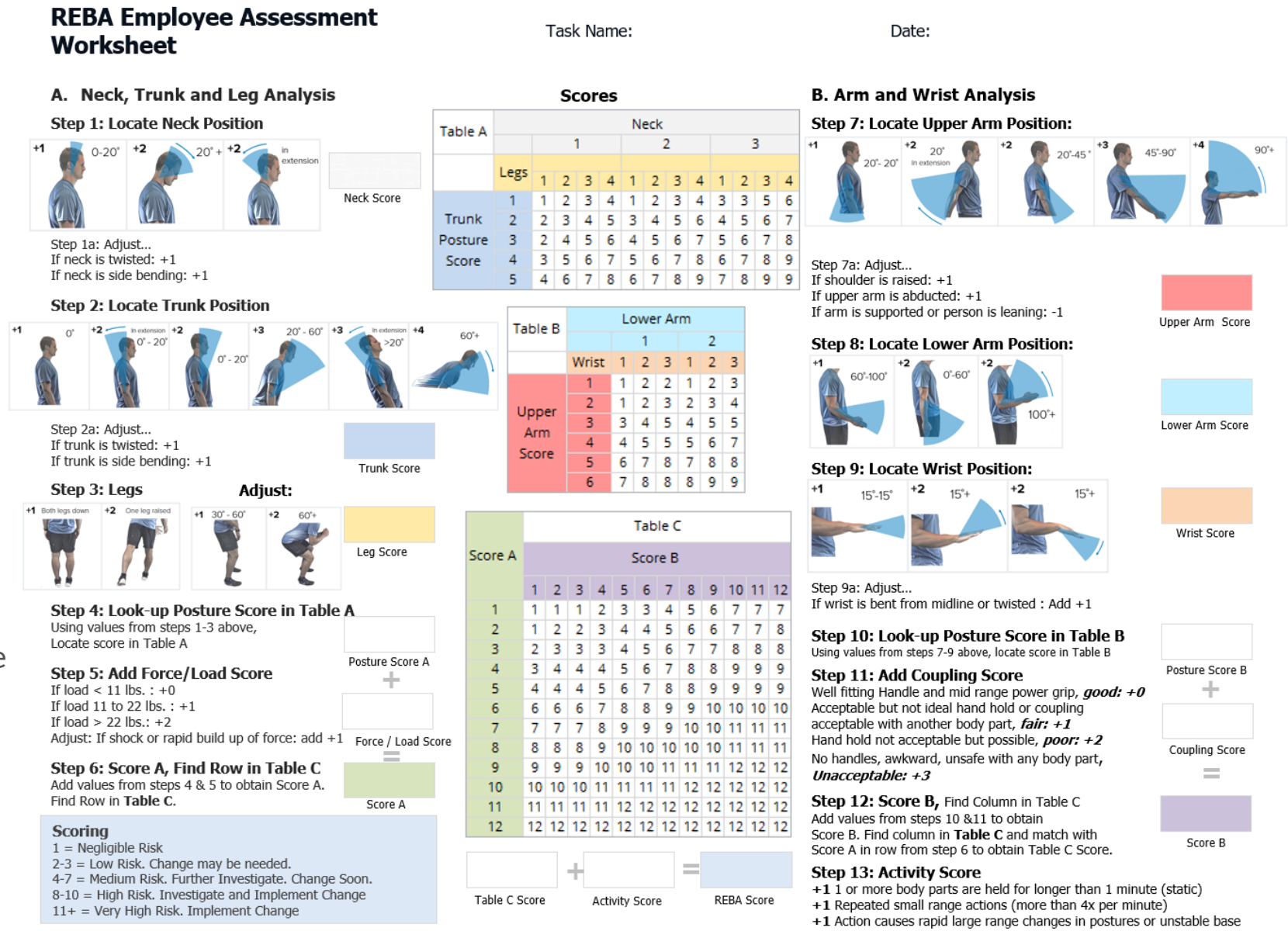
Screening method for postural analysis

Important to identify riskier and prolonged postures. Use video and photo analysis.

Factors:
- Posture
- Force
- Repetition
- Coupling

Missing: Duration, recovery time, HAV, one sided

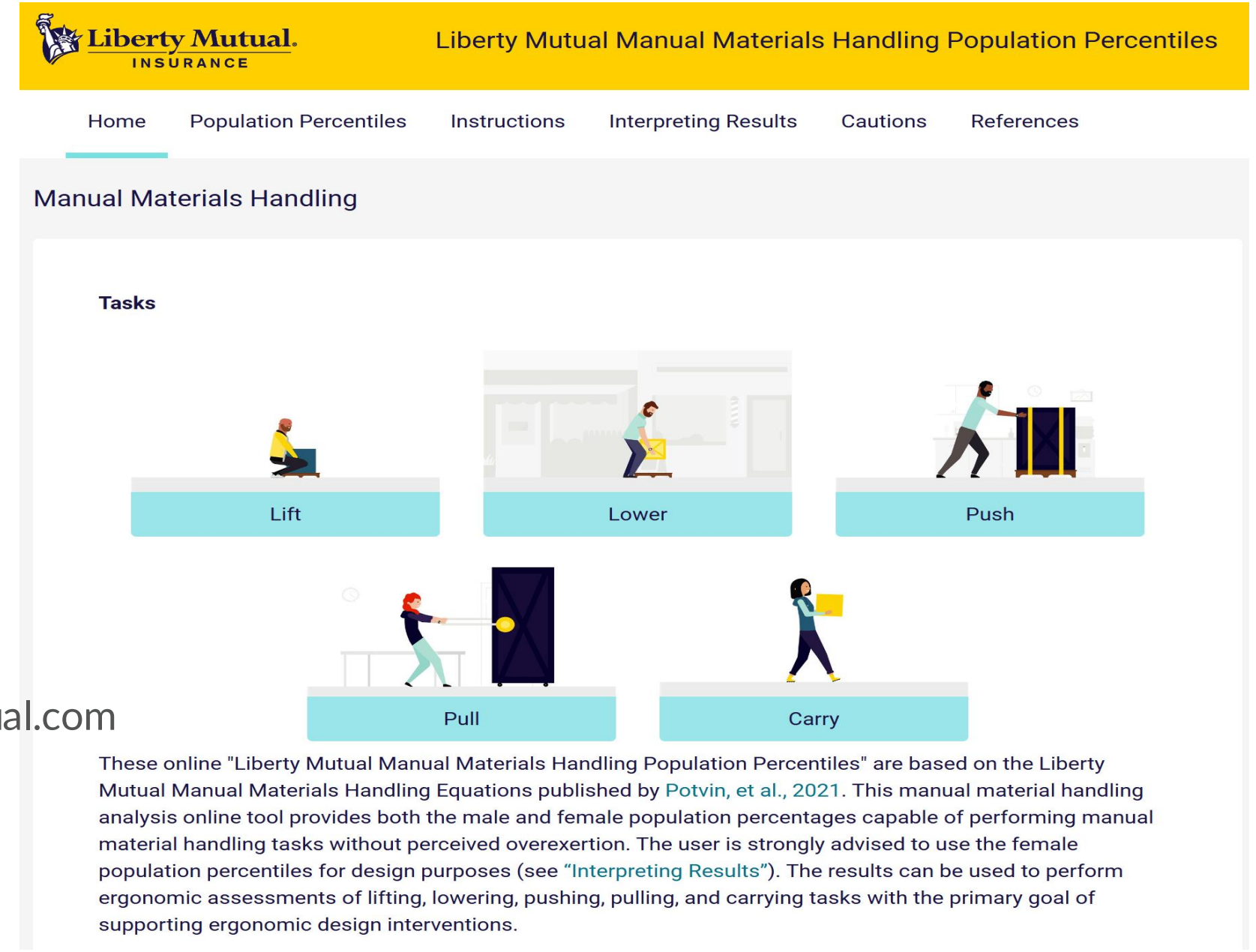
Score	Level of MSD Risk
1	negligible risk, no action required
2-3	low risk, change may be needed
4-7	medium risk, further investigation, change soon
8-10	high risk, investigate and implement change
11+	very high risk, implement change



Liberty Mutual Tables

www.libertymmhtables.libertymutual.com

Provides both the male and female population percentages capable of performing manual material handling tasks without perceived overexertion



OHCOW

https://libertymmhtables. libertymutual.com

Liberty Mutual Tables

Tasks should **not** be evaluated based solely on population percentages. Other important considerations are:

- **Injuries**
- **Bending**
- **Twisting**
- **Reaching**
- **One-Handed Lifts**
- **Hand-Holds**

- **Do not use** this online tool to determine whether male or female workers can perform certain jobs and then place workers accordingly
- **Do use** this online tool for designing manual handling jobs with physical requirements such that as many workers as possible can perform them without risk of injury

libertymmhtables.libertymutual.com/cautions/

Sample Job design: Is this job safe?

Task Type

Lift

System of Units(SI)

Imperial Units

Hand Coupling

- Good
- Fair
- Poor

Frequency Lifts / Minute

5

Object Weight (lb)

30

Start Hand Height (in)

12

End Hand Height (in)

60

Start Hand Distance (in)

12

End Hand Distance (in)

20

Calculate

Population Percentage	
MALE:	71%
FEMALE:	<1%

www.libertymmhtables.libertymutual.com

Summary

- Intro to MSDs associated with MMH:
  - Commonly injured areas in MMH
  - Stages of MSD development
- Recognizing MSD hazards
  - Risk factors for MSDs
  - Methods for controlling risk factors
- Manual materials handling
  - Methods for safe lifting, carrying, pushing and pulling
- Assessing risk
  - Levels of hazard identification
  - Methods of assessment (body mapping, surveys, checklists, tools and apps)

Questions?

Contact OHCOW

Phone toll free: 1-877-0336
Email: ask@ohcow.on.ca

www.ohcow.on.ca

OHCOW
Occupational Health Clinics for Ontario Workers Inc.
Centres de santé des travailleurs (ses) de l'Ontario Inc.

Connect with OHCOW on social media

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