


Ergonomics 101

*Protecting our bodies
while we work*

Presented By:

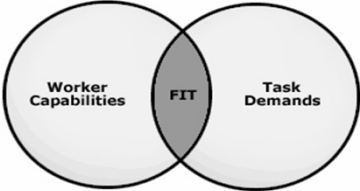
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Ergonomics

Encompassing:


- Biomechanics
- Biology
- Physics
- Psychology



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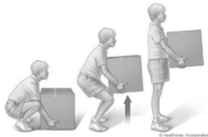
Presentation Overview


- ❖ OHCOW
- ❖ Introduction to Ergonomics
- ❖ Musculoskeletal Disorders & Prevention
- ❖ Identifying Risk Factors
- ❖ Workplace Injuries
- ❖ Ergonomic Recommendations
- ❖ Building a Business Case
- ❖ Questions

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Physical Ergonomics

- ❖ Lifting
- ❖ Carrying
- ❖ Pushing/Pulling
- ❖ Walking/Standing/Sitting
- ❖ Reaching
- ❖ Handling
- ❖ Environment (heat/cold)
- ❖ Etc.





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OHCOW

Multidisciplinary Team


- Physicians
- Nurses
- Hygienists
- Ergonomists
- Administration




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Services


- Inquiries
- Individual Workers
- Group Evaluations
- Education
- Research

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Cognitive Ergonomics – Human Factors



- ❖ Information Processing
 - Perception
 - Memory
 - Decision making
 - Mental workload
 - Attention
 - Compatibility

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Knowing the Risks

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MSD Prevention - WHY

- Musculoskeletal Disorder Statistics
 - #1 type of claim reported to WSIB
 - 42% of all lost-time claims
 - 50% of all lost-time days
 - a cost of \$12 billion to employers (between 1996 – 2004)

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Musculoskeletal Disorders

- ❖ Injuries & disorders of the musculoskeletal system, which includes:
 - Muscles, tendons, tendon sheaths
 - Nerves, bursa, blood vessels
 - Joints, spinal discs, ligaments
- ❖ Not the result of an acute event (slip, trip, or fall) but rather gradual or chronic development
- ❖ Also known as:
 - Repetitive Strain Injuries (RSI)
 - Cumulative Trauma Disorders
 - Repetitive Trauma Disorders

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The "big" three

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Examples of MSDs

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FORCE

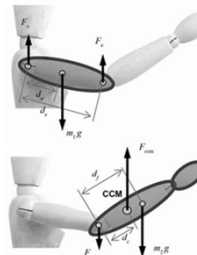
High force demands = increased MSD risk


Force-related MSD hazards can be present when lifting, pushing, pulling, carrying, gripping, using tools.

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Force

- ❖ External forces
 - Applied to the body by outside objects
 - *weight of the box being held*
- ❖ Internal forces
 - Generated by muscles in response to task demands
 - *force required of the shoulder/neck to support the arms*





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Awkward Postures

- ❖ Can cause pinching or impingement on tissues
- ❖ Can lead to asymmetrical loading and tissue overload
- ❖ Can be a direct result of poor ergonomic design

Awkward or static postures = increased MSD risk
Posture-related MSD hazards can be present when bending, twisting, reaching, kneeling.





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Repetition

- ❖ Performing same or similar movements or tasks over a given period of time
- ❖ ↑ repetitions = ↑ exertion or effort
- ❖ Requires greater recovery time


Repetitive movements/actions = increased MSD risk
Repetition-related MSD hazards can be present when doing the same thing over and over again, with little time for rest.



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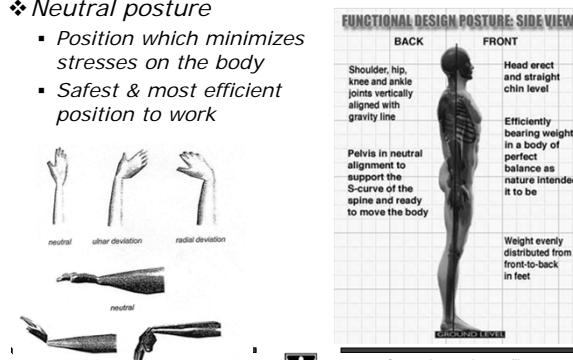
Static Postures


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

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Posture


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



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Specific Areas of Concern

- ❖ **Tendons**
 - Found throughout the body
 - At risk for developing tendonitis
 - Common sites:
 - Shoulder / neck
 - Lower Arm
 - Wrists
- ❖ **Low Back**
 - Low back pain
 - Degenerative disc disease

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Tendonitis

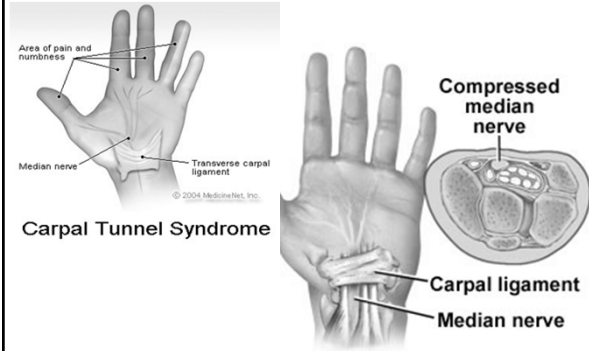
- ❖ **Tendons**
 - flexible band of fibrous tissue
 - Connect muscle to bone
 - Glide easily & smoothly as muscle contracts
- ❖ **Tendonitis**
 - Normal gliding motion becomes impaired and leads to inflammation of the tendon
 - Action of pulling the muscle becomes irritating / painful
 - Commonly found in tendons which have a poor blood supply (resulting in tissue damage and poor healing response)

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Carpal Tunnel Syndrome



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Causes

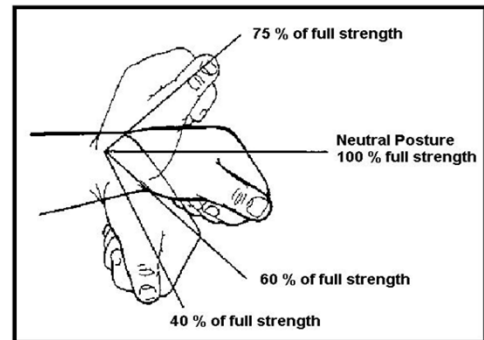
- ❖ **Age related tendon changes**
 - Tendons become harder and lose elasticity with age
- ❖ **Putting the tendon under too much strain**
 - Lack of proper warm-up and rest
- ❖ **As a result of injury**
 - develops because an injury has not completely healed
 - Example: shoulder tendonitis developed after a rotator cuff injury
- ❖ **REPETITIVE STRAIN on the tendon**
 - **Overuse of a body part**

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Wrist Posture & Strength



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Carpal Tunnel Syndrome

- ❖ Occurs when the median nerve (runs from the forearm into the hand) becomes pressed or squeezed at the wrist
- ❖ Women are 3 x more likely to develop CTS
 - perhaps because the carpal tunnel itself may be smaller in women than in men

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Low Back Injuries



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Low Back Pain (LBP)

- ❖ 70 to 85 % of all people have back pain at some time in their life
- ❖ Not a question of "IF" but a question of "WHEN"
- ❖ LBP is the most frequent cause of activity limitation in people under 45 yrs old and the 3rd leading cause in those between 45-64 yrs

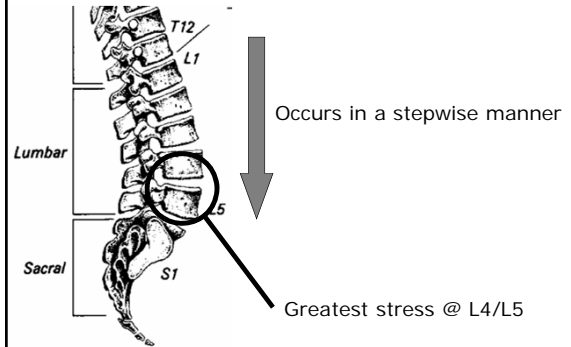
(National Institutes of Health)

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Disc Deformation & Stress



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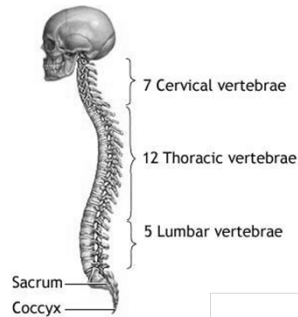
Understanding the Back

Four Types of Vertebrae:

1. Cervical
2. Thoracic
3. Lumbar
4. Sacral

Support the body and
protect the spine

Lumbar are larger and
designed for weight
bearing



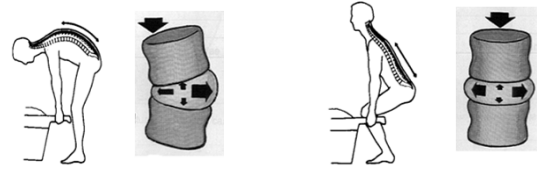
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Lifting

- ❖ discs can tolerate larger compressive loads when the back is straight
- ❖ discs are weaker when lifting in a flexed position



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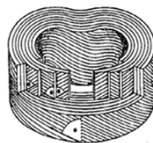
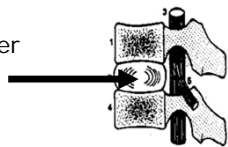
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Inter-vertebral Discs

Serve as a "shock" absorber
between the vertebrae

Discs are attached to the
vertebrae

Ligaments and muscles control
movement and support the spine



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Twisting

- ❖ Discs become weaker when lifting is performed in conjunction with a twisting motion




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Disc Degeneration


❖ Chronic loading of the tissues over time



Stage 1



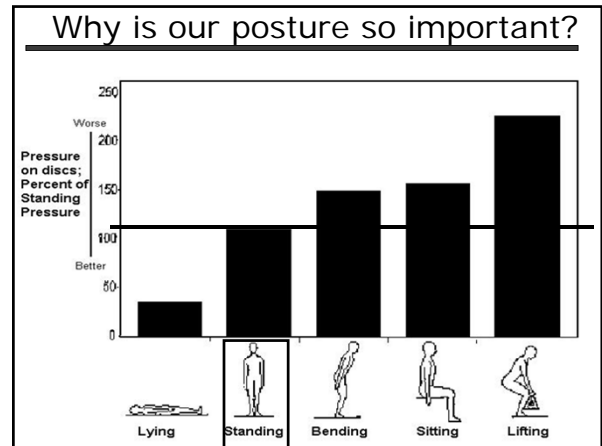
Stage 2 "Bulge"



Stage 3 "Rupture"

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Examples of Disc Problems

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Standing

❖ Intervertebral disc pressure is lower

- However, standing uses about 20% more energy so we get tired quickly

❖ Tips to minimize injury risks

- **Move around**
 - improves circulation & reduces muscle fatigue
- **Move around**
 - avoid twisting motions
- **Lean when you can**
 - support your body weight
- **Wear proper footwear**

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Principles of Lifting

Back Straight

Avoid Twisting

Close to Body

Keep Smooth



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Arch Support

❖ Arches

- Bones of the foot form arches
- Supported by ligaments & muscles
- Serve as shock absorbers (spread energy before its transferred higher up the leg)

❖ Losing the arch

- Flat foot / overuse
- Changes biomechanics of the knees, hips

❖ Recommendations:

- Wear shoes with arch support (or orthotics)
- Heel should be slightly elevated (1/4 inch)
- Avoid FLAT shoes or heels > 2 inches

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These boots WEREN'T made for walking



- ❖ Alter our "natural" posture
- ❖ Downward foot position = flexed position of knees, hips, & low back, preventing muscles to stretch. Can lead to stiffness, pain, and injury.



- ❖ Tilt the pelvis & alter spine's natural curvature thereby increasing pressure on discs
 - The higher the heel, the greater forward pelvis tilting

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Ergonomic Legislation

- ❖ MOL *guidelines*, not standards
 - *Pains & Strains* campaign
- ❖ OSHA "General Duty" Clause
 - Section 25(2)(h)
 - Take every precaution reasonable for the protection of a worker
- ❖ British Columbia Ergo Regulations
 - Passed in 1998
 - MSI decreased by 19%
 - MSI claims reduced by 40%



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Solutions



Anti-Fatigue Mats



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MSD Prevention Cont.

- ❖ Joint Health & Safety Committee (JHSC)
 - great starting point
 - initiate an Ergonomics Committee
 - utilize government resources:
 - **OHCOW** & other H&S organizations
 - OHSCO MSD Prevention Guidelines:
 - Provides Ontario workplaces with a **generic** framework for MSD prevention
 - Available for free download through **WSIB website**

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MSD Prevention

WHERE DO YOU START

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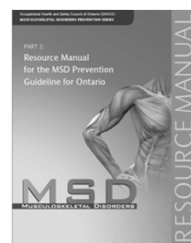


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MSD Prevention Series



Part 1: MSD
Prevention
Guideline





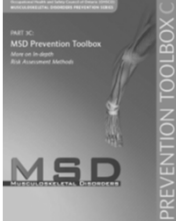
Part 2: Resource
Manual

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Part 3: Toolbox

Part 3A: Getting Started
 Part 3B: Beyond the Basics
 Part 3C: In-depth Risk Assessment Methods

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Library Ergonomics

❖ 3 key areas of potential concern

- Computer workstations
 - Seated
 - Standing
 - *shared workstations*
- Manual material handling
 - Lifting / pushing / pulling / carrying
- Repetition of tasks
 - "Even the little things can add up"

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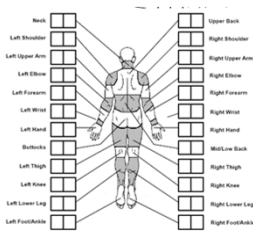


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Raising Awareness

❖ Awareness raising activities

- Health & wellness day / week / month
- Body Mapping
- Staff surveys
 - Discomfort Survey
 - Job Content Questionnaire




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Computer Workstations

- Canadian Standards Association
 - Guideline on Office Ergonomics
 - CSA-Z412
- Office Ergonomic Handbook
 - Produced by OHCOW
 - Free download:
www.ohcow.on.ca/resources/workbooks.html



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Assessing Hazards

Reactive Approach	Proactive Approach
<ul style="list-style-type: none"> - Looking at past injury data - past WSIB claims - injury trends in body parts - injury trends in tasks being performed 	<ul style="list-style-type: none"> - Ergonomic assessments - Looking at results from discomfort surveys - Informal discussion with staff members

* Although reactive, these are a GREAT starting point

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Adjustability, Adjustability, ADJUSTABILITY

❖ Integrated into the workstation through:

- Proper seating
- Height adjustable monitor arms
- Keyboard / mouse tray
- Wireless equipment
 - keyboard, mouse, telephone headset

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Manual Material Handling

- ❖ Focus should NOT be on training HOW TO LIFT
 - But rather asking “why do I have to lift?”
 - Focus on reducing and eliminating lifting
- ❖ Investing in NEW TECHNOLOGY is key
 - Replacing non-adjustable equipment
 - Providing mechanical assistance

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Reducing MMH

- ❖ Library bin “Ergo Trolley”
 - Used for bulk collection of returns
 - Auto leveling floor
 - Minimal effort to move



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Reducing MMH



- ❖ Replace carts w/
 - Fixed height shelving
 - Difficult to push & maneuver

❖ “Ergo Cart”

- battery powered technology
- Shelf automatically lowers during sorting
- Book stack electrically tilts into horizontal position
- Low rolling resistance wheels



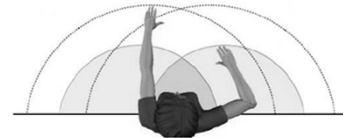
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Reducing Reaching

- ❖ Often the biggest barrier is COUNTER DEPTH
 - Designs tend to focus on appearance for the customer and FORGET about the users
- ❖ People have a “natural envelope”
 - Reaching beyond this point will require bending



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Reducing MMH

❖ “Ergo Volume”

- Similar to Ergo Cart
- Adjustable tension to fit load
- Auto-leveling feature
- Trolley floor automatically raises and lowers
- Oversized, low-friction wheels



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Reducing Reaching

❖ Recommendations:

- Engineering Controls:
 - Reduce counter depth
 - Add a secondary shelf on the customer side to save space for the user
- Administrative Control:
 - Control where customers place items through the use of signage directly on the countertop

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Reducing Repetition

- ❖ Start by fixing the “little things”
 - Opening / closing DVD cases



- Awkward gripping
- Awkward wrist motions
- Forceful pinching



- Use clear cases
- Why open them?

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Employer Costs

- ❖ Can be FIVE times higher due to hidden or indirect costs due to:

- Workplace case management (Human Resources) or contractor
- Legal costs
- Time and resources needed to investigate incidents
- Training for temporary or new hires
- Lost productivity
- Overtime
- Surcharges from WSIB – Increased premiums
- Potential Ministry of Labour orders
- WSIB ‘work-well’ audit
- Damage to corporate reputation and staff morale

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Building a Business Case for Ergonomics

- ❖ Cost of ergonomic improvement VS

- Cost of the potential injury if we don't change things
- Use previous workplace stats on the number of injuries as well as the type of injuries
- Use WSIB's statistics on the cost of injuries

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Take Home Message

- ❖ **DO NOT IGNORE** early warning signs
 - ❖ Recognize discomfort & report it before pain

- ❖ Identify all potential risk factors
 - ❖ Get involved in ergonomics & wellness
 - ❖ Think while doing tasks and ask “why”
 - ❖ Why is this so heavy?
 - ❖ Why am I in this posture?
 - ❖ Why do I have to reach so far?

- ❖ Invest in new technology
 - ❖ Adjustability, Adjustability, ADJUSTABILITY
 - ❖ Seek mechanical assistance whenever possible

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Costs of an Injury

- ❖ Avg. cost of a LTI (Lost Time Injury)
 - \$30,000

- ❖ BUT the avg. cost of a “High-Impact” claim ranges from \$33,000 to \$52,000

- High Impact Claims:
 - Shoulder – sprains, strains, rotator cuff tendonitis, bruises, dislocations
 - Low back – sprains, strains, herniated or slipped discs
 - Fractures – slips, trips, falls, struck by

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ADDITIONAL RESOURCES

OHCOW website & fact sheets:

www.ohcow.on.ca
www.ohcow.on.ca/resources

Ergonomic Products & Seating:

www.ergonow.com
www.ergocentric.com

Ergonomic Library Carts

www.lyngsoesystems.com

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