Musculoskeletal Disorders: Recognition, Causes, & Prevention

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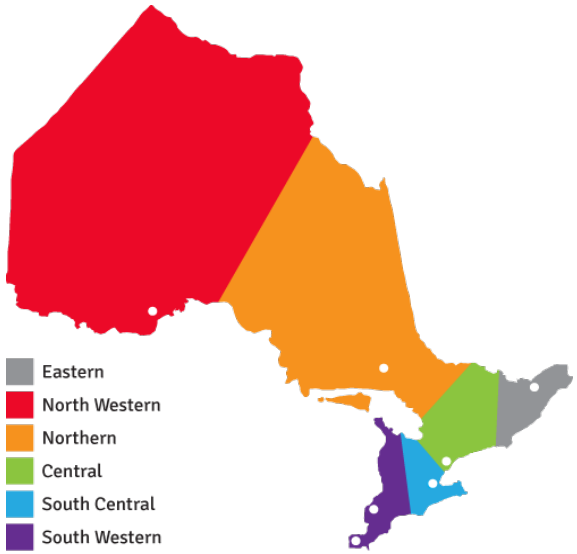
Ergonomists

Occupational Health Clinics for Ontario Workers

Presentation Overview

- Statistics
- Ergonomics
- Musculoskeletal Disorders (MSD)
- Ergonomic Risk Factors
- Injury Mechanisms
- Back & Shoulder:
  - Anatomy, injuries, and ergonomic risk factors
- Hierarchy of Controls
- Ergonomic Design Guidelines
- Physical Demands Descriptions
- WSIB Denial
- How OHCOW can help

Occupational Health Clinics for Ontario Workers (OHCOW)



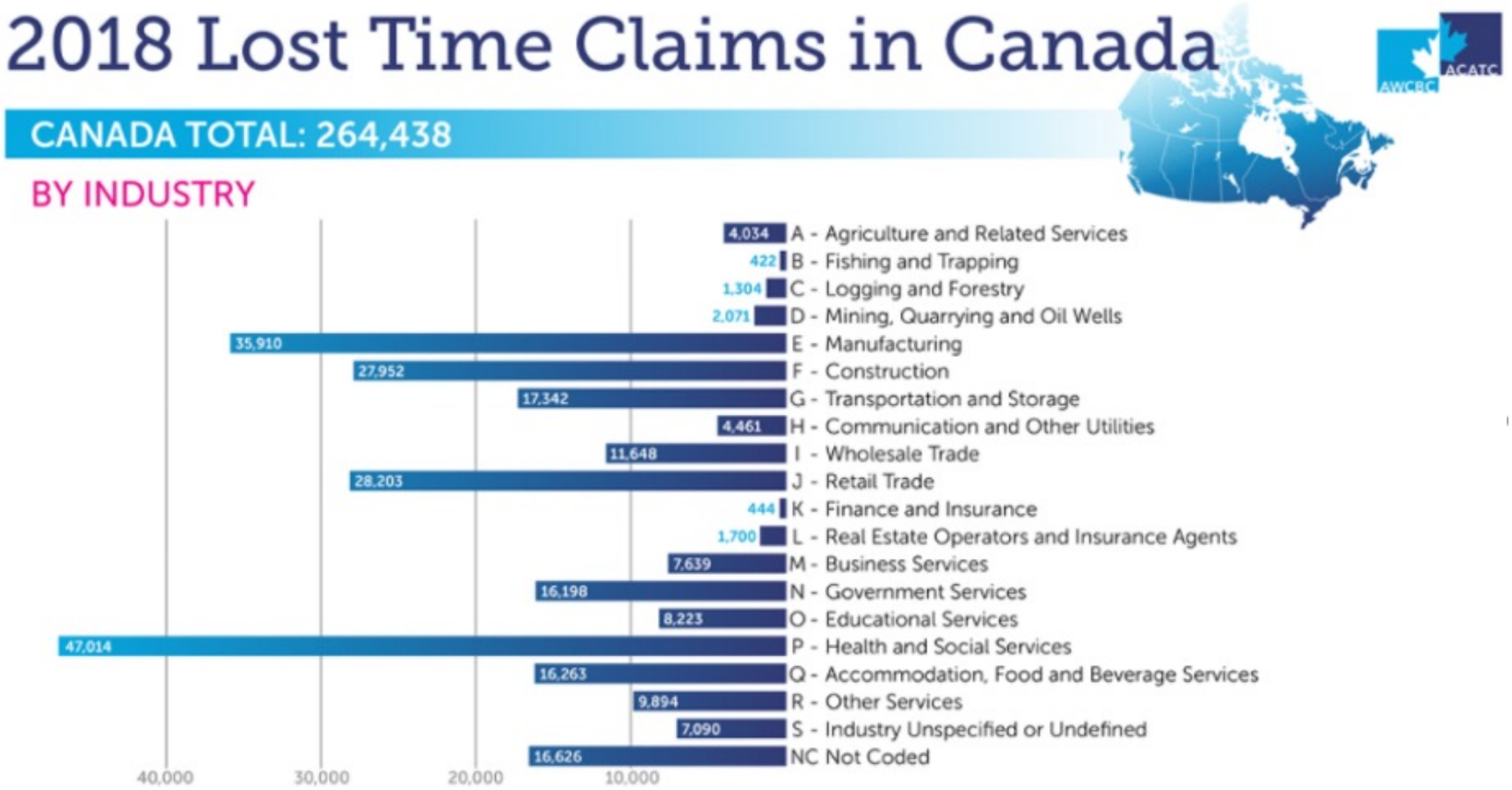
Multidisciplinary Team

- Physicians
- Nurses
- Occupational Hygienists
- Ergonomists
- Administration

- INDIVIDUAL WORKERS
- GROUP EVALUATIONS
- INQUIRIES
- EDUCATION
- RESEARCH

- Funded through the Ministry of Labour (&WSIB premiums)
- Board of Directors are labour representatives
- FREE SERVICE

Statistics



Source: https://awcbc.org/en/statistics/#nwisp

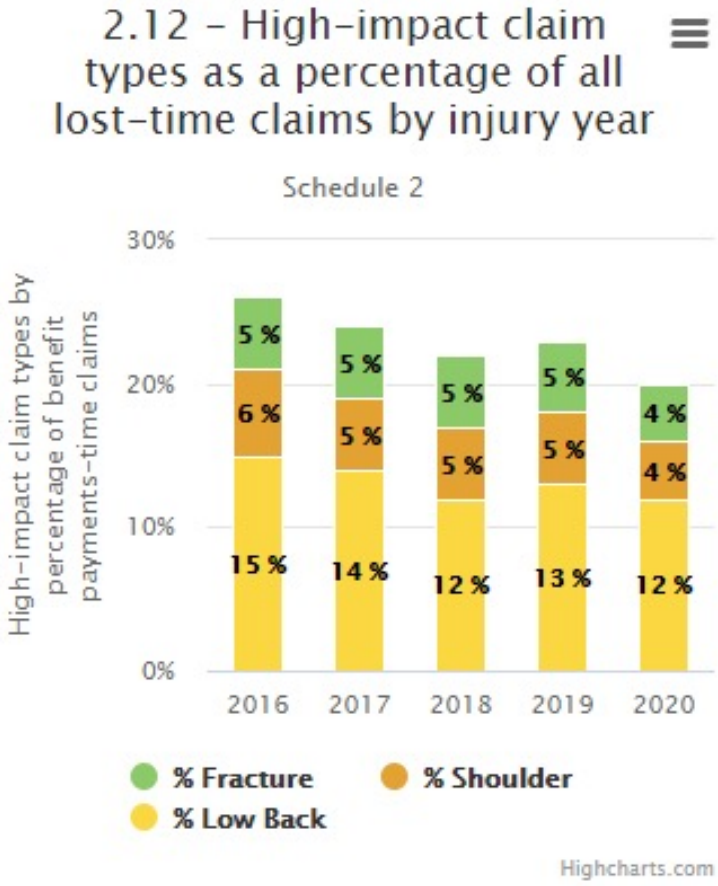
Direct Costs of an Injury

- 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

Direct Costs of an Injury

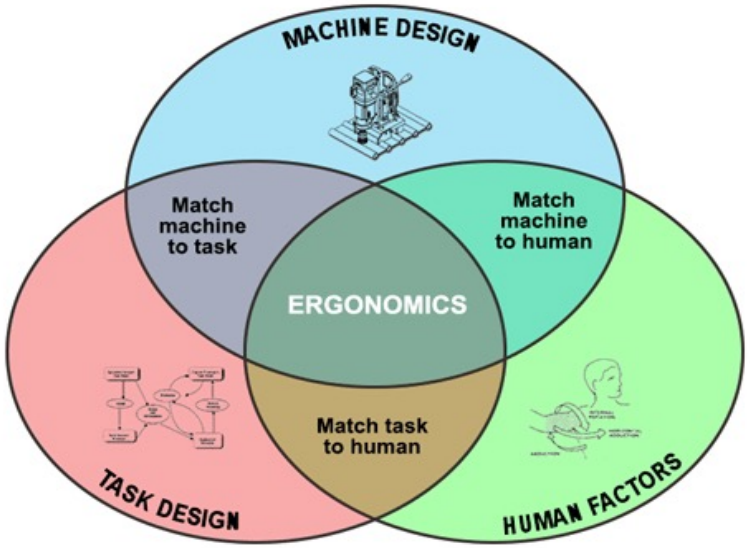


Ergonomics

Matching job design, equipment, and workstations to workers

Encompassing the fields of:

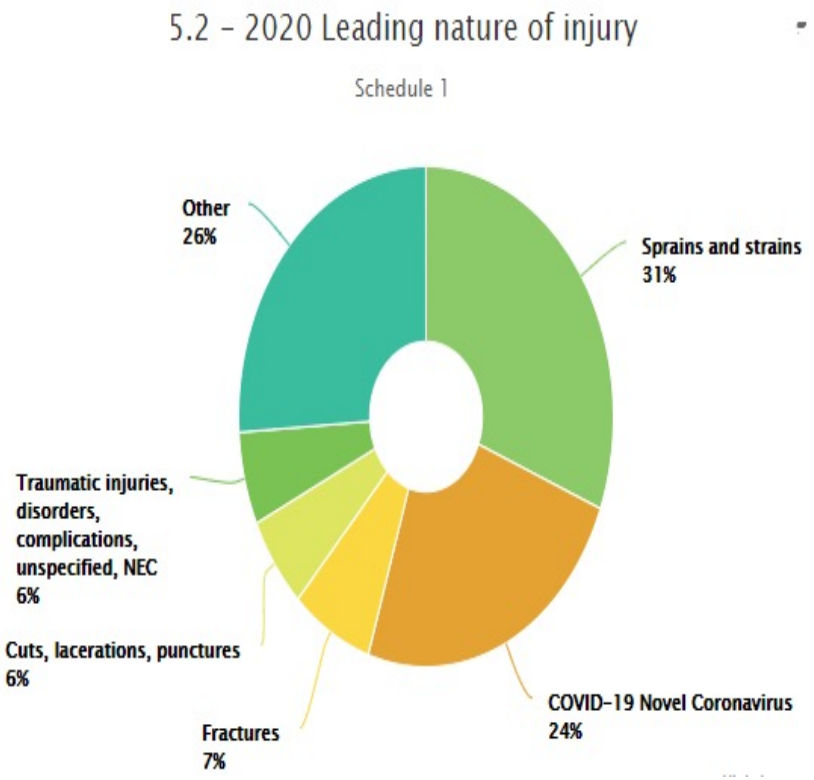
- Biomechanics
- Engineering
- Biology
- Psychology



"Working smarter *not* harder"

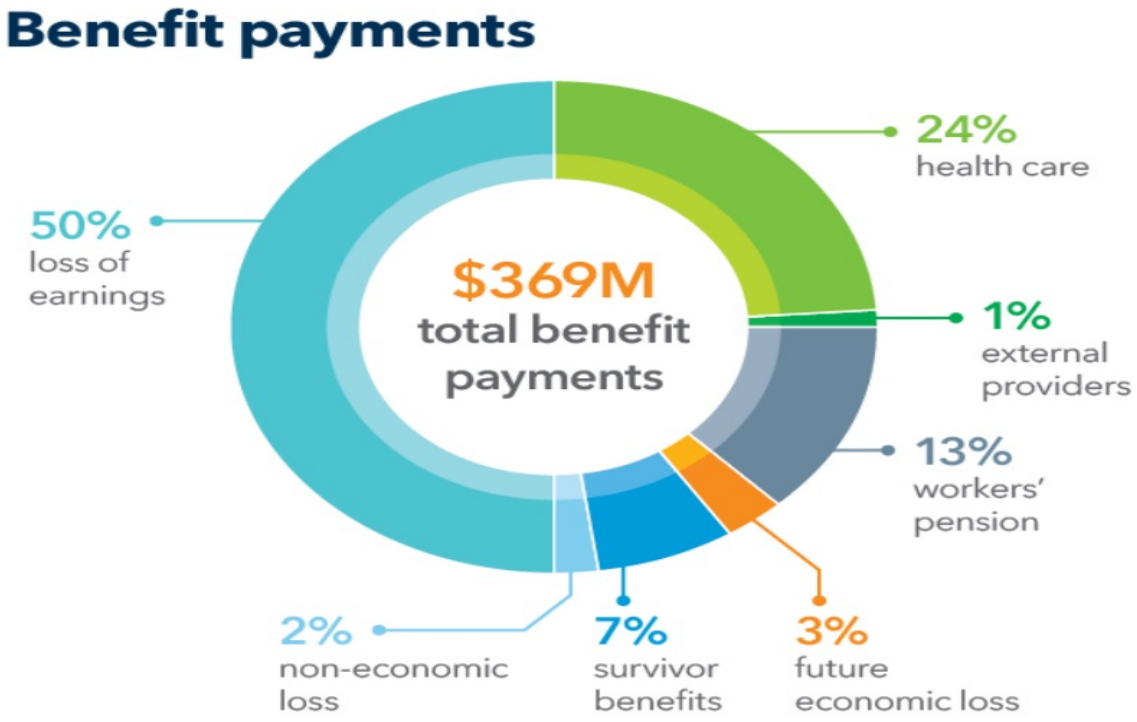
Why Ergonomics?

2020 Injury Characteristics:



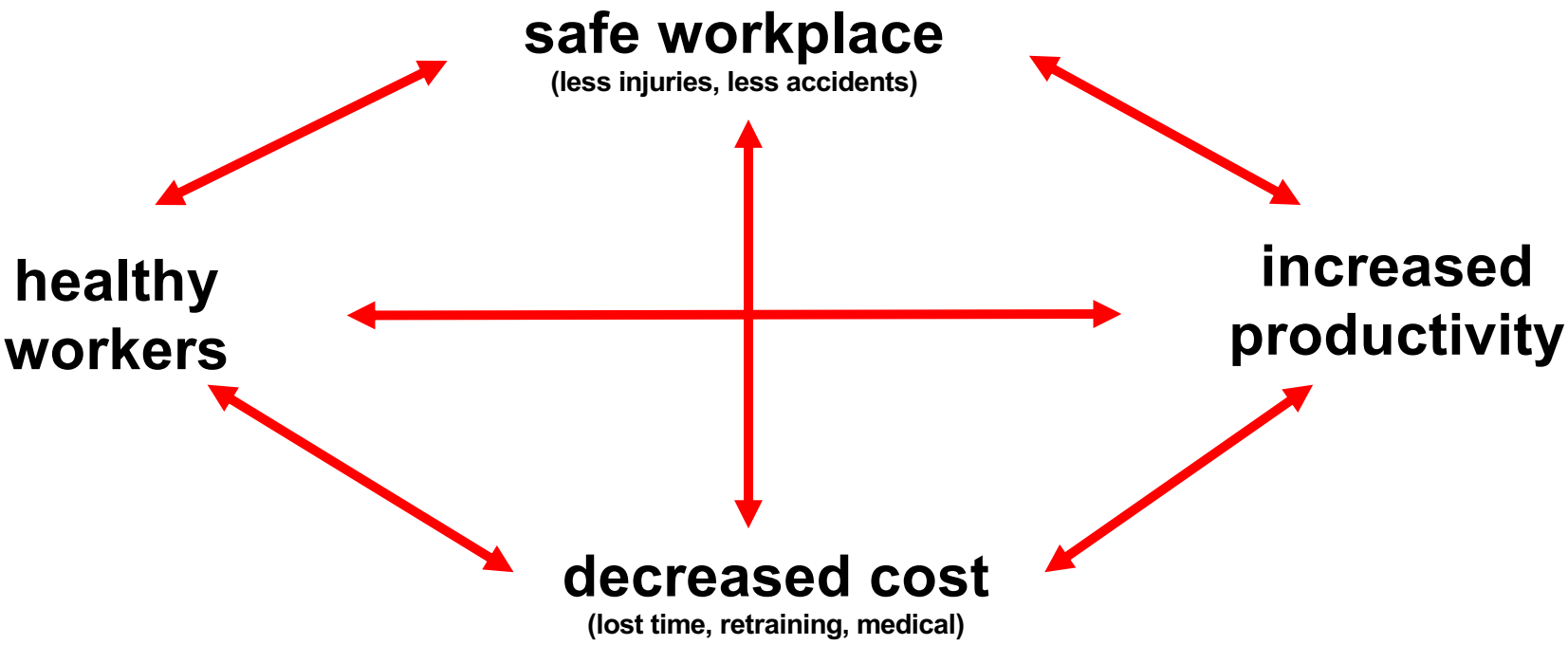
Resource: www.wsibstatistics.ca

Why Ergonomics?



Resource: www.wsibstatistics.ca

Why Is Ergonomics Important?



What is an MSD?

- Your body is made up of:
  - *muscles, tendons, ligaments, joints, vertebrae, vertebral discs, nerves*, and other tissues
  - This is known as the *musculoskeletal system*.

- When you injure a part of this system it is called a **Musculoskeletal Disorder or MSD**

Work Related MSD

Wok-related MSD are injuries and disorders of the musculoskeletal system where exposure to various risk factors present in the workplace may have either *contributed to the disorders' development, or aggravated a pre-existing condition*.

(OHSCO MSD Strategy Development sub-committee, March 2005)

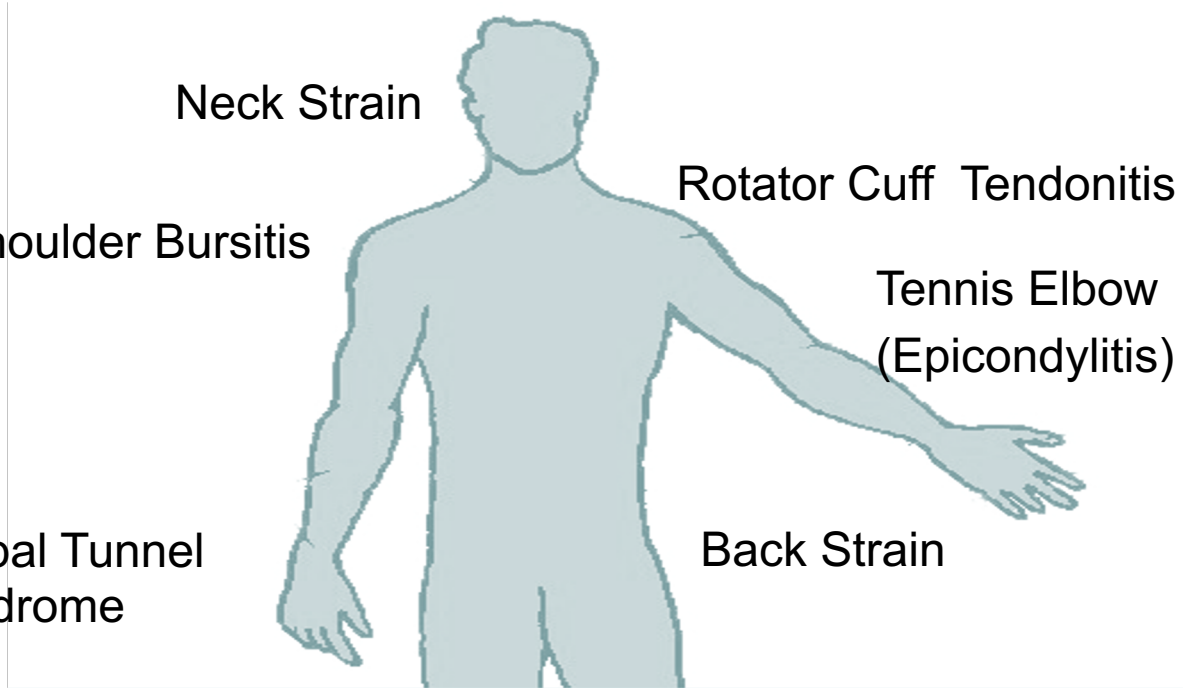
WMSD & Other Common names

Work-Related Musculoskeletal Disorder

Also Called:

- RSI – Repetitive Strain Injury
- CTD – Cumulative Trauma Disorder
- RMI – Repetitive Motion Injury
- MSI – Musculoskeletal Injury

Examples of MSD



Symptoms and Signs

Symptom	Signs (what you might See, Say or Do)
Pain (with or without movement)	-Protect their hand and wrist -Say it hurts when they sneeze or cough -Wear a splint -Use awkward postures
Stiffness and Swelling	-Have difficulty standing up or moving around -Have difficulty getting out of bed in the morning -Massaging their muscles, lower back, arms
Numbness and Tingling	-Shake out an area that hurts
Tenderness	-Use slow restrictive movements -Protect, hold or support wrist or other area -Rub an affected area

Three Stages of MSD Development

Stage 1

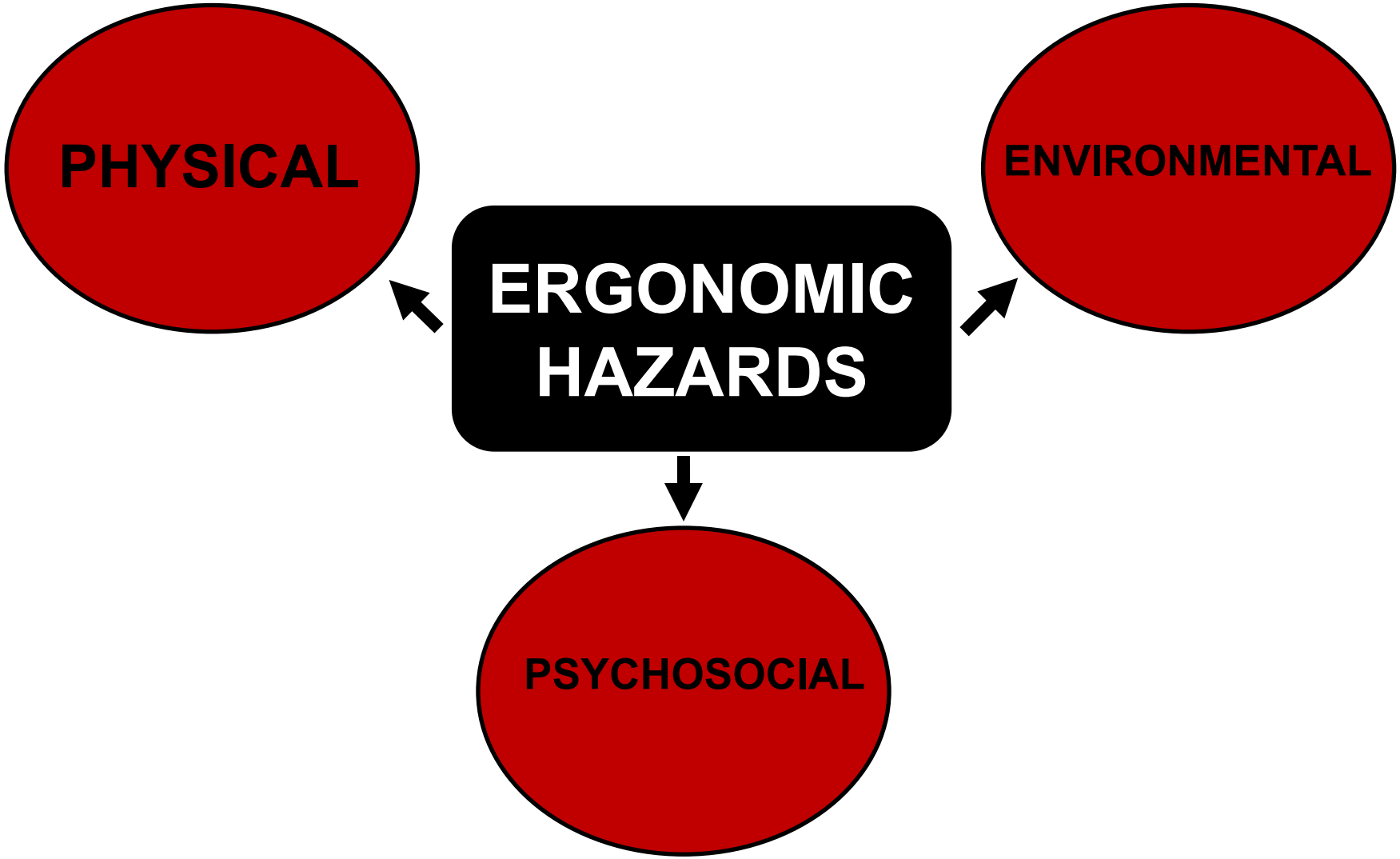
- **Symptoms**
  - Pain, aching, fatigue
- **Onset**
  - Weeks or months
- **Job Performance**
  - Not affected
- **Visible Signs**
  - None
- **Treatment**
  - May be reversible if treated Early

Stage 2

- **Symptoms**
  - Pain, aching, fatigue, altered sleep
- **Onset**
  - Months
- **Job Performance**
  - Decreased
- **Visible Signs**
  - May be present
- **Treatment**
  - Difficult and slower recovery

Stage 3

- **Symptoms**
  - Constant pain aches, fatigue, sleep difficulty
- **Onset**
  - Months to years
- **Job Performance**
  - Unable to perform job duties
- **Visible Signs**
  - Often present
- **Treatment**
  - Greater risk of permanent damage


PHYSICAL
ENVIRONMENTAL
ERGONOMIC HAZARDS
PSYCHOSOCIAL

Physical MSD Hazards

REPETITION

Force

Static Postures

CONTACT STRESS

AWKWARD POSTURES

VIBRATION

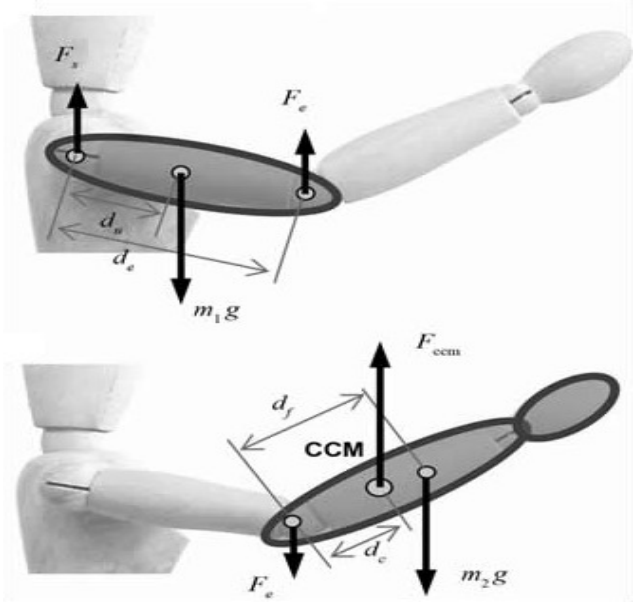
Temperature

Primary Risk Factors

- MSD are usually associated with physical demands of work activities including:
  - Lifting or pushing heavy loads
  - Reaching or bending in awkward postures
  - Holding the same position for a long time
  - Repetitive movements with little rest or recovery

Force

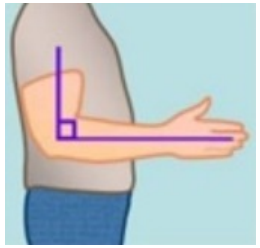
- External forces
  - Applied to the body by outside objects
  - *weight of the box being held*
- Internal forces
  - Generated by muscles in response to task demands
  - *force required of the shoulder/neck to support the arms*

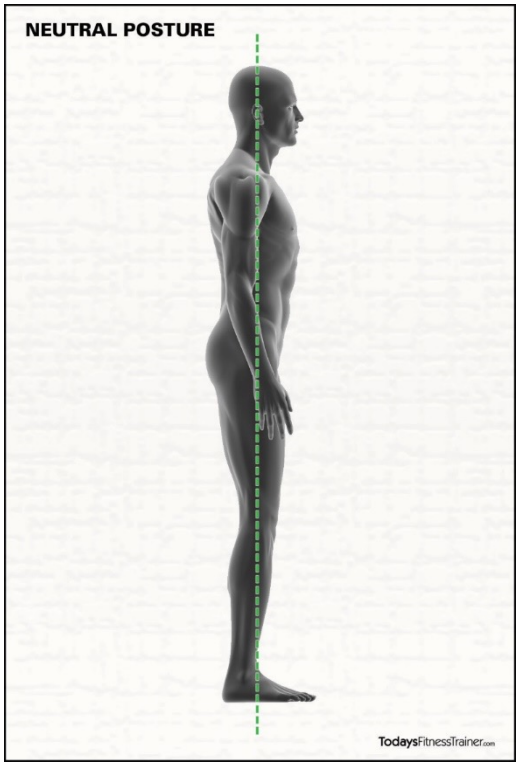


Examples of High Force Tasks

Posture

- Neutral posture
  - Position which minimizes stresses on the body
  - Typically near the mid-range of any joint's range of motion
  - Safest & most efficient position to work





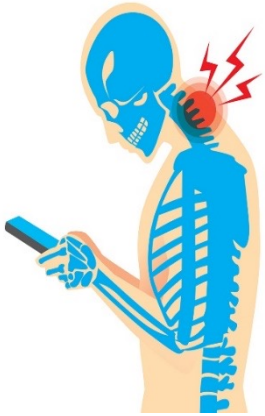
Awkward Postures

- Deviations from neutral posture
- May cause pinching or impingement of tissues
- May lead to asymmetrical loading and tissue overload
- Can limit strength capabilities
- May be a direct result of poor ergonomic design

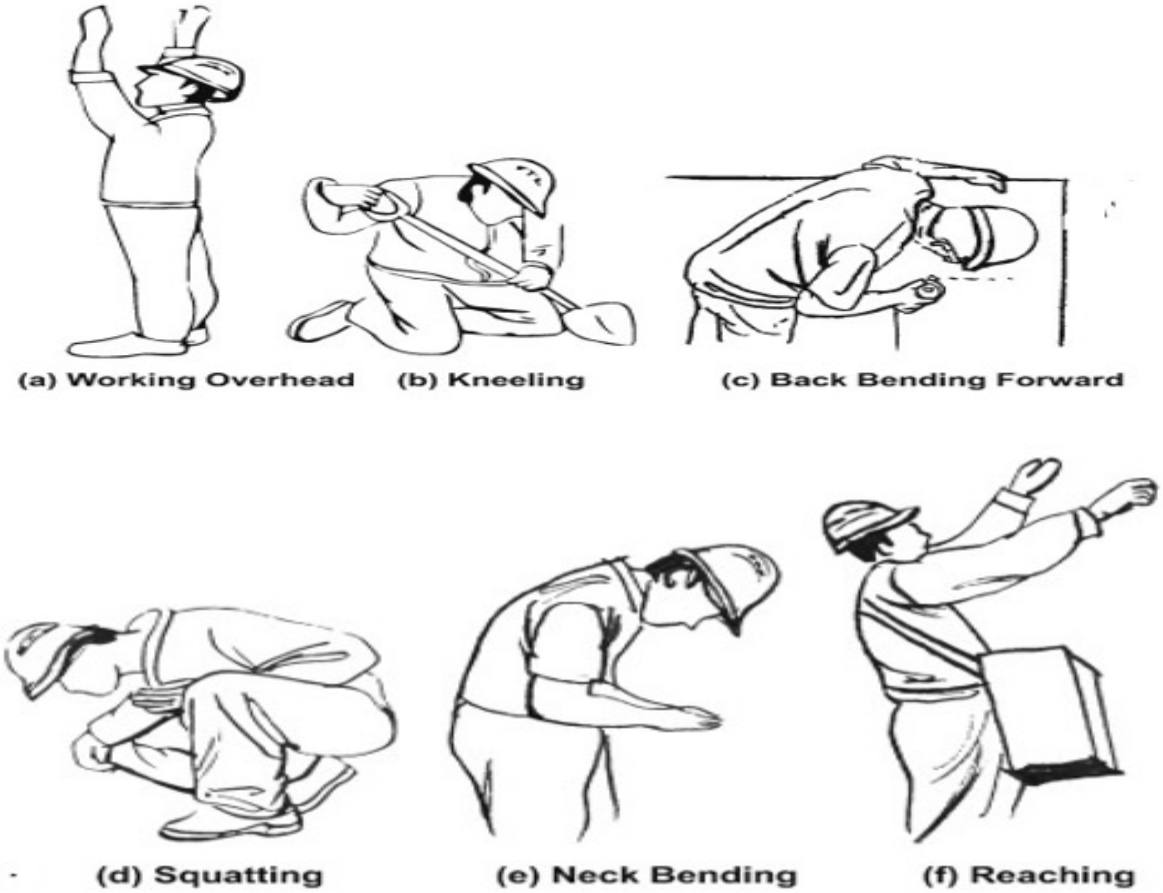
Examples of Awkward Postures

Static Postures

- Postures held for an extended/prolonged period of time
- Reduce blood flow to the muscles
- May lead to early onset of fatigue
- May significantly increase the amount of recovery required



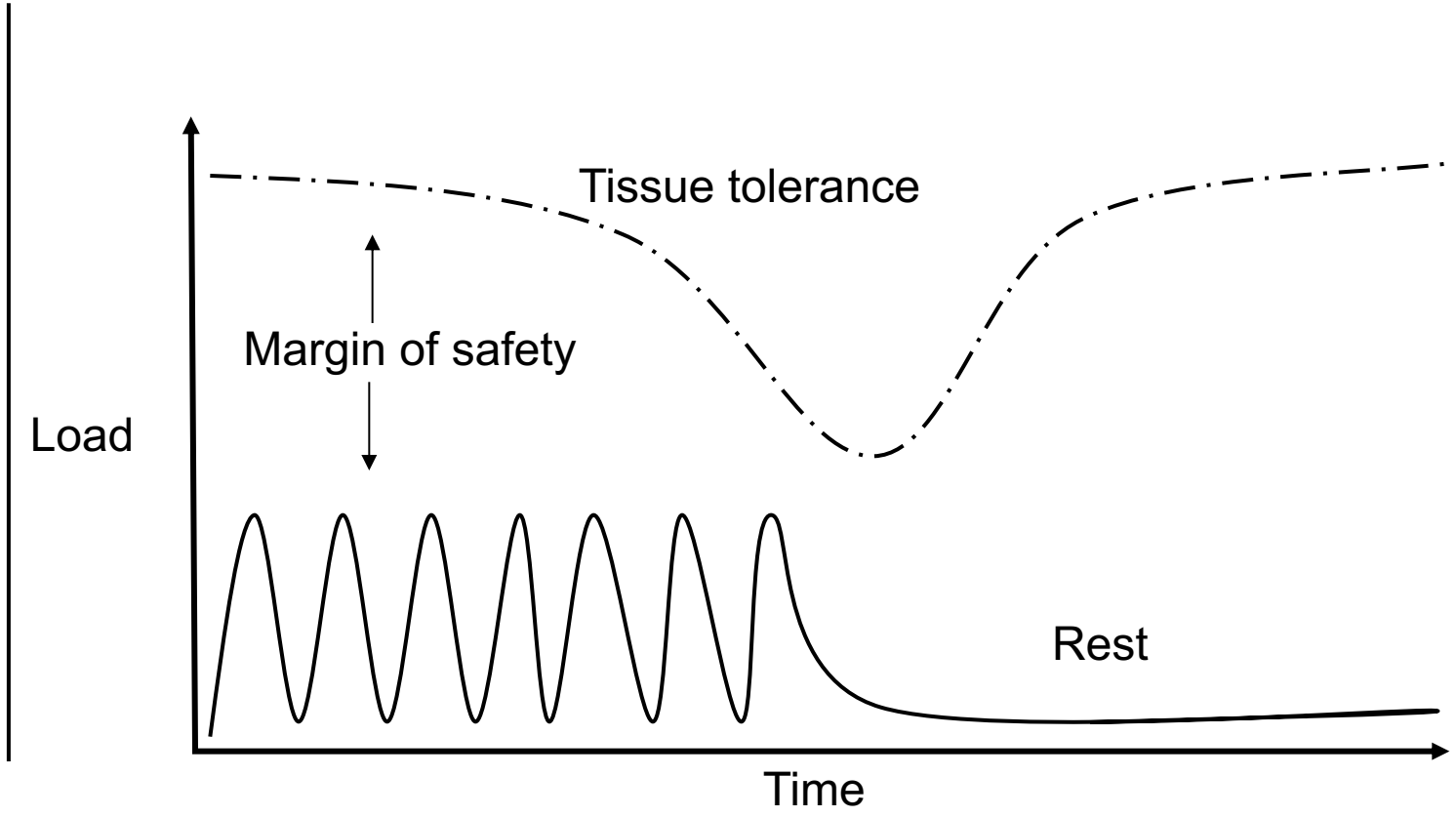
Examples of Static Postures



Repetition

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

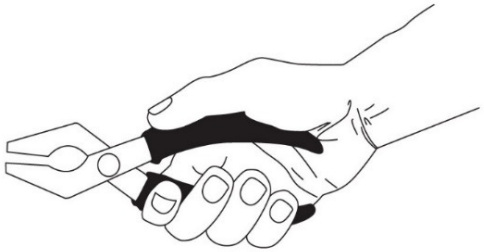
Repetition/Duration



Examples of Repetitive Tasks

Contact Stress

- Stress on tissues of the body that come in to contact with hard or sharp objects
- Direct pressure on underlying tendons and nerves resulting in decreased blood flow
  - Examples: Kneeling on hard surface
  - Resting your wrists on the edge of a desk
  - Tool handle length



Vibration

Whole Body Vibration

- Typically tractors, heavy equip., vehicles, etc.
- Different frequencies affect different areas
- Increased risk of cumulative low back disorders

Segmental Vibration (Hand & Arm)

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

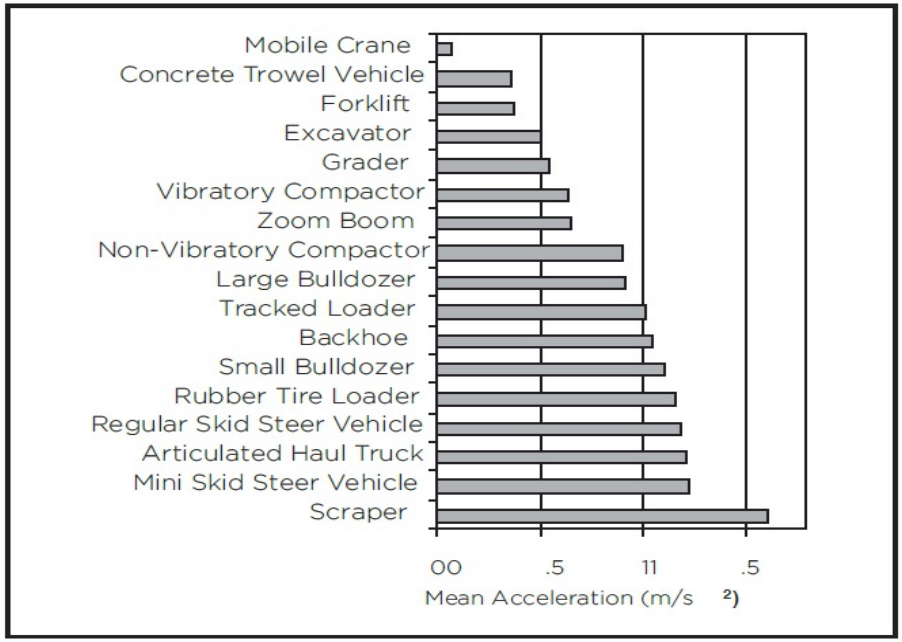
Source: Kodak's Ergonomic Design for People at Work, 2004

Vibration

3 Sources of Vibration from Heavy Equipment

1. Low-frequency caused by the tires and terrain
2. High-frequency from the engine and transmission
3. Shock from running into potholes or obstacles

Chart 1: Vibration Magnitude of Equipment



For eight hours of continuous work, the magnitude of vibration should not exceed 0.5 m/s².

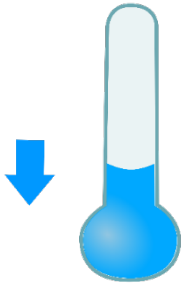
Source: ISO 2631; The European Vibration Directive.

Infrastructure Health & Safety Association
www.ihsa.ca

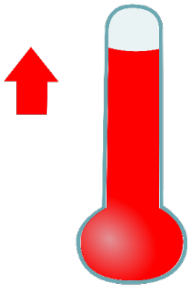
Extreme Temperatures

Extreme Temperatures

- Cold
  - Muscles and Tendons become less flexible
  - Blood circulation is reduced in arms and hands

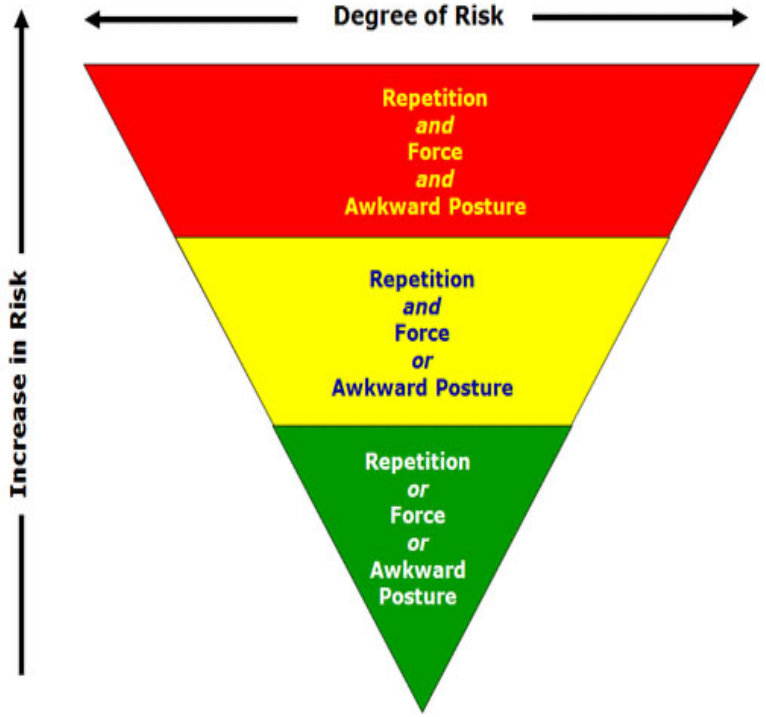


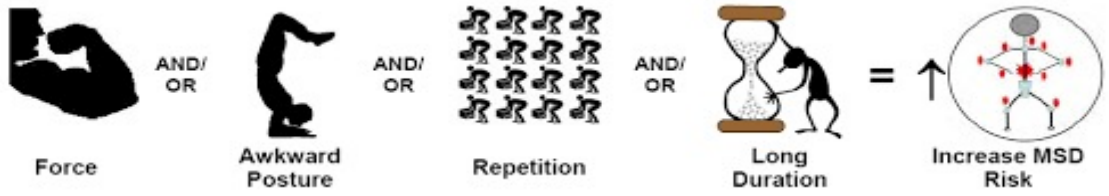
- Hot/ Humid
  - Imposes strain on the body and increases dehydration
  - Deterioration of concentration and fine motor skills



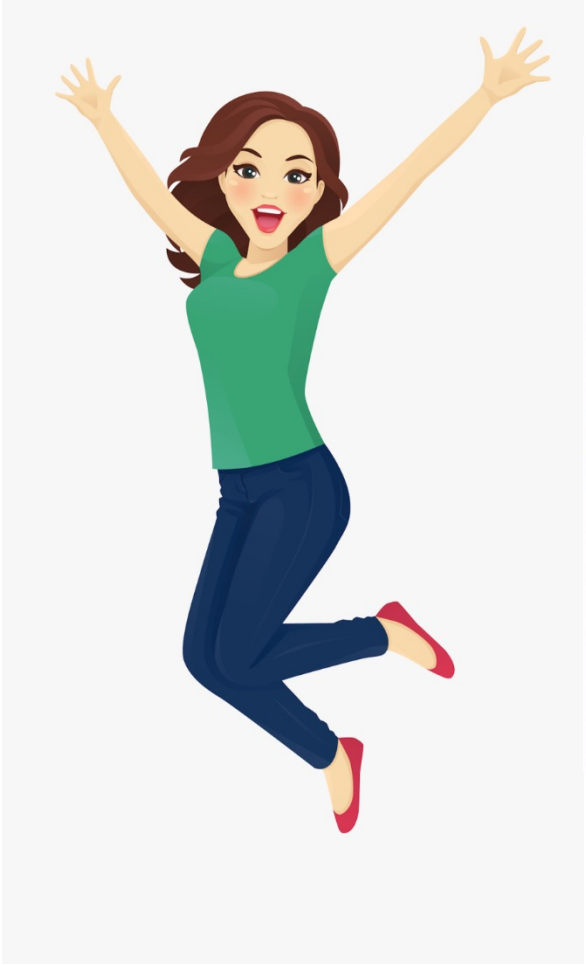
Synergistic Effect

- **Very Important!**
- Combinations of force, posture, repetition, etc. can greatly increase the level of risk
- ↑ exposure time = ↑ injury risk

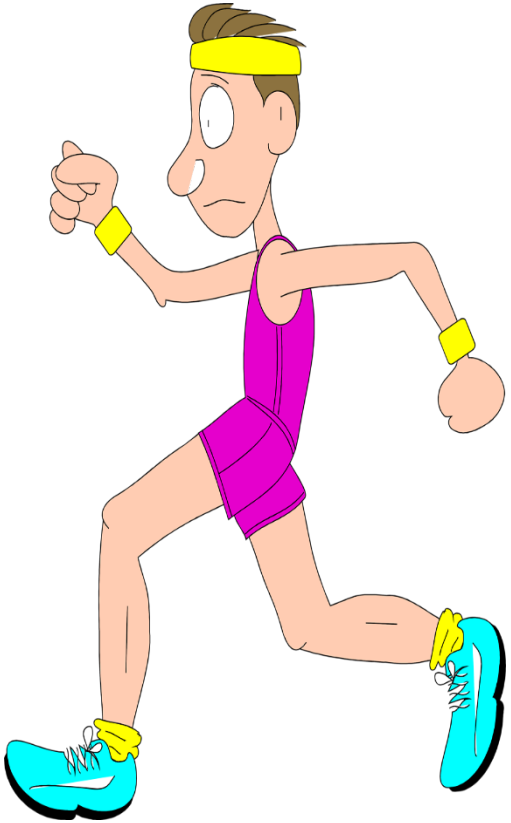




Movement Break



Be Back in 5 Minutes!



The Function of Tissues

Bones – add structural stability

Muscles – create movement by contracting and relaxing

Tendons – connect the muscle to the bone (to create movement)

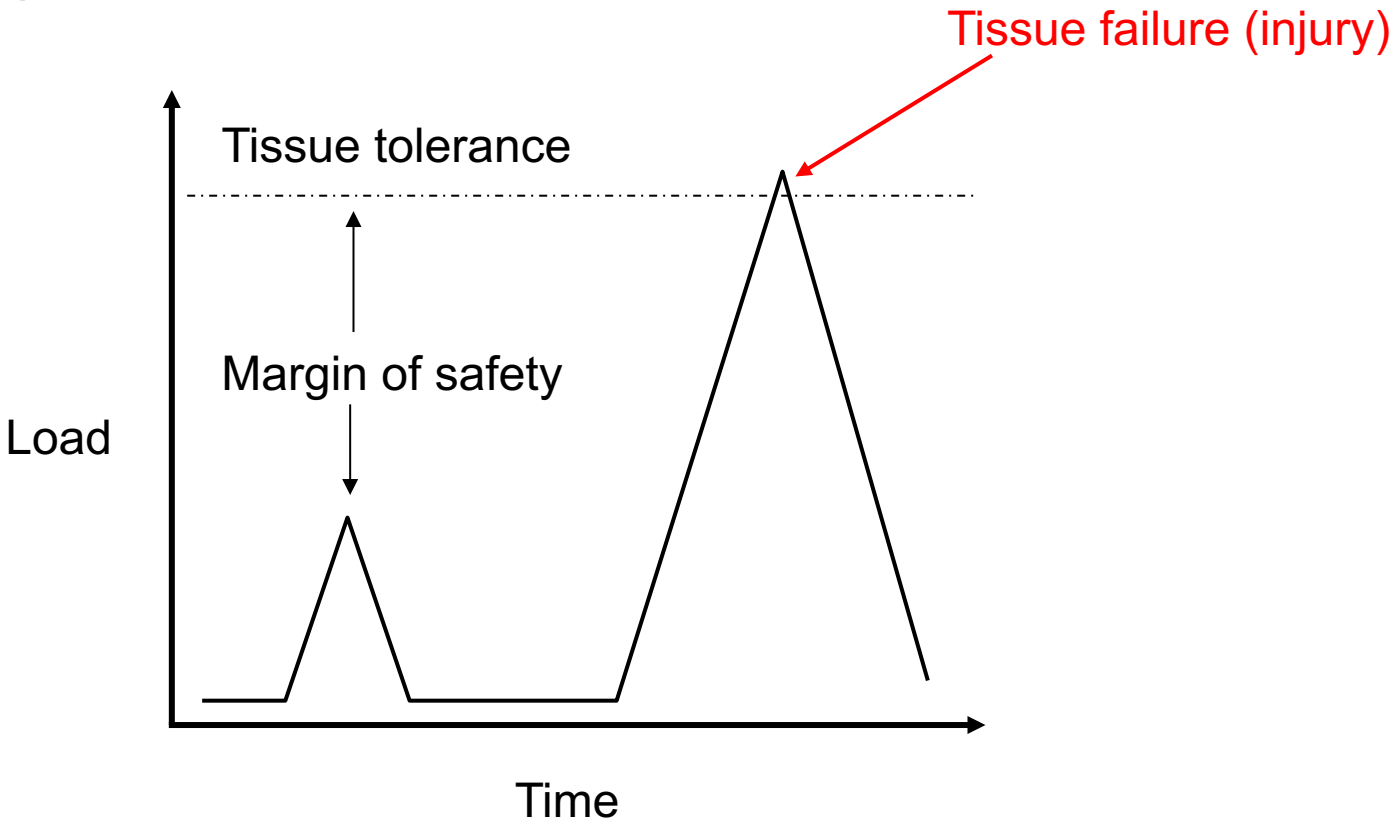
Ligaments – connect bone to bone

Nerves – carry messages to and from the brain

Intervertebral Discs – provide shock absorption and allows mobility

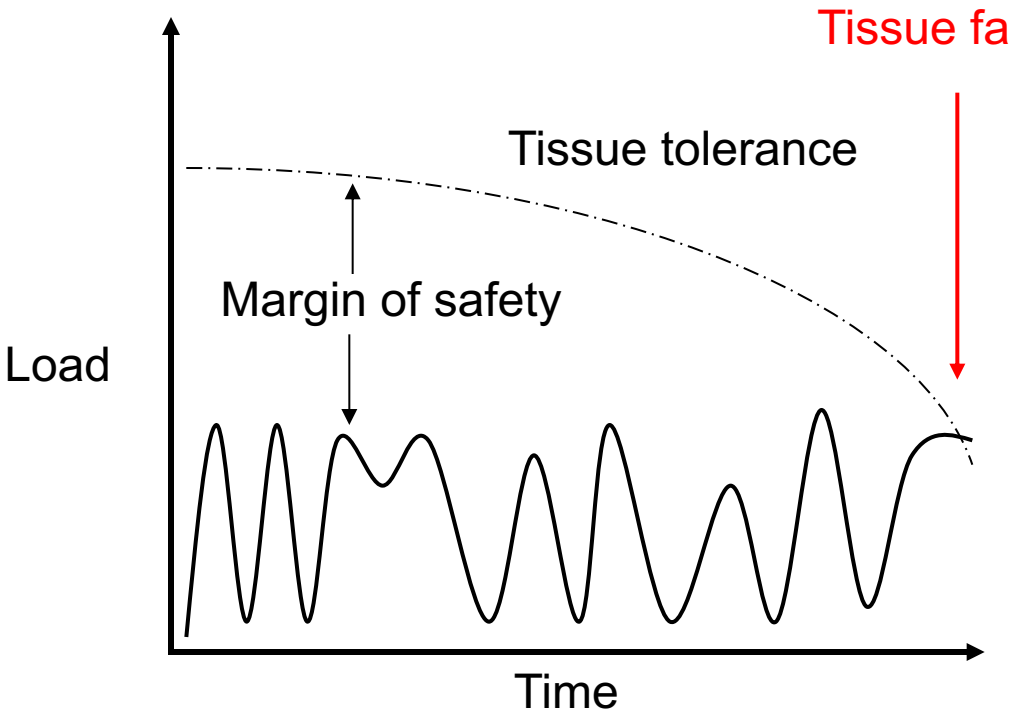
Injury Mechanisms

- **Acute**



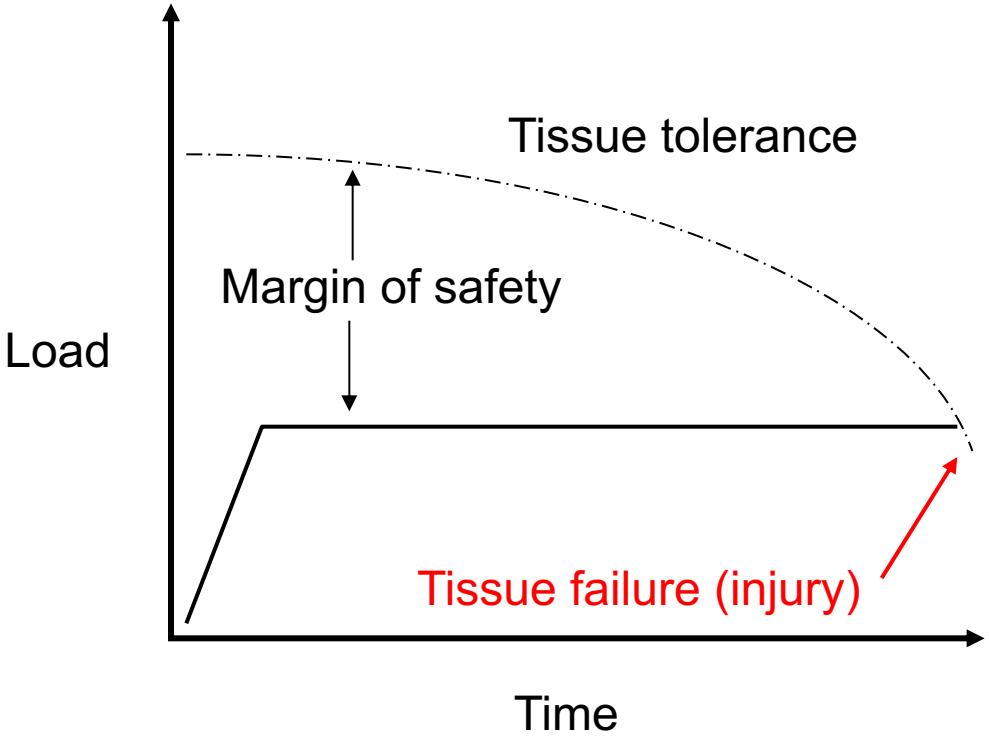
Injury Mechanisms

- **Cumulative - repeated**



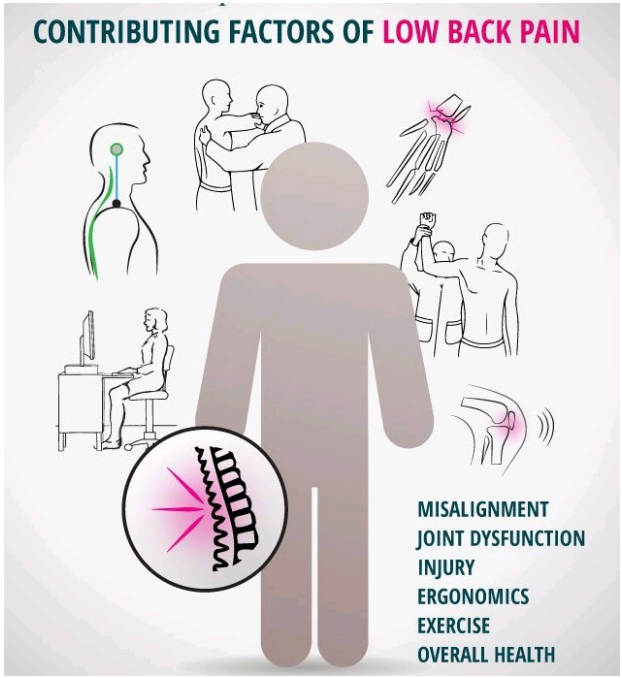
Injury Mechanisms

- **Cumulative - sustained**



Low Back Pain Statistics

- In a 6 month period, 5 in 10 Canadians suffered low back pain
- Up to 85% of working people can expect to experience low back pain in their lifetime
- The estimated costs of low back pain in Canada is between 6 and 12 billion dollars annually
- Low back is the most common injury in Ontario
- Accounts for 16% of lost time claims



Canadian Chiropractic Association, 2018

Low Back Pain Healthcare

- Several studies have found evidence for a causal relationship between nursing tasks and back disorders (Yassi & Lockhart, 2013)

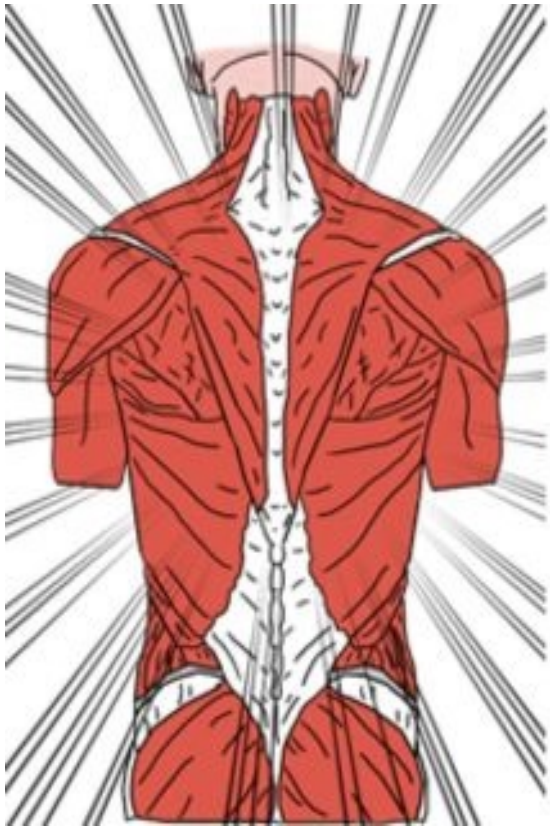
- MSD among healthcare workers are associated with excessive back loading due to manual patient handling, applying excessive forces during pushing/pulling objects, required use of awkward postures during patient care, and working long hours and shiftwork

Low Back Pain & MMH

- MMH is the most common cause of back pain
- 3 out 4 Canadians who's job entails MMH suffer from back pain
- Manual Material Handling (MMH) includes manually lifting, carrying, lowering, pushing or pulling objects
- Injuries that occur because of MMH are generally musculoskeletal in nature

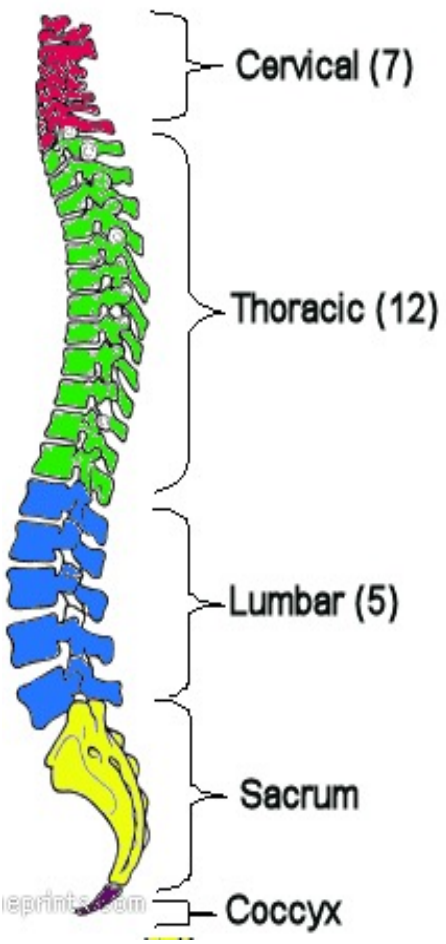
MOL, 2019 & CCOHS, 2020

Back Anatomy



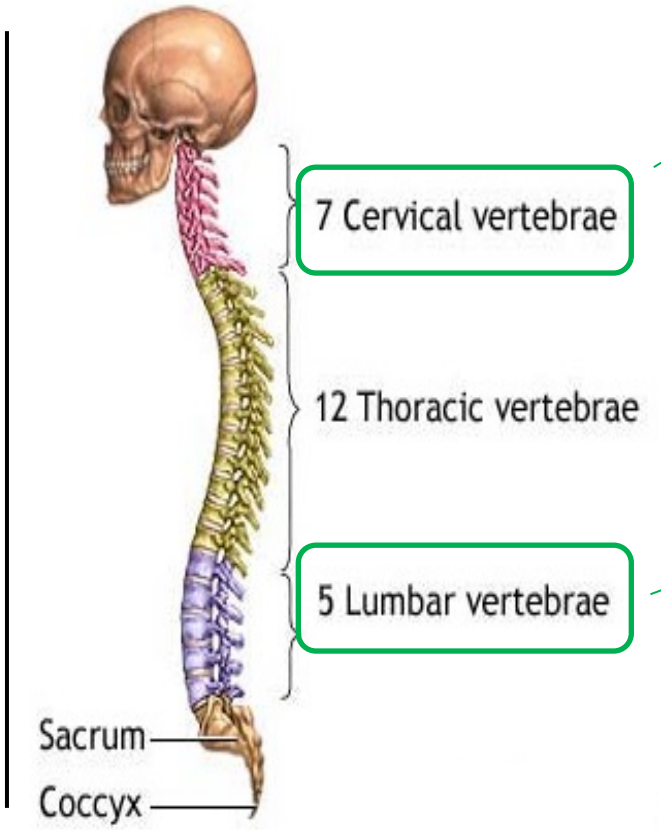
A healthy back relies on your skeletal system, soft tissue system, and your nervous system to function properly.

The Spine



- Vertebrae
- Protection
- Support
- Muscle Attachment
- Movement

The Spine



Cervical Vertebrae

- Smallest and most mobile vertebrae
- Support the head
- Flexion, extension, lateral flexion, and rotation

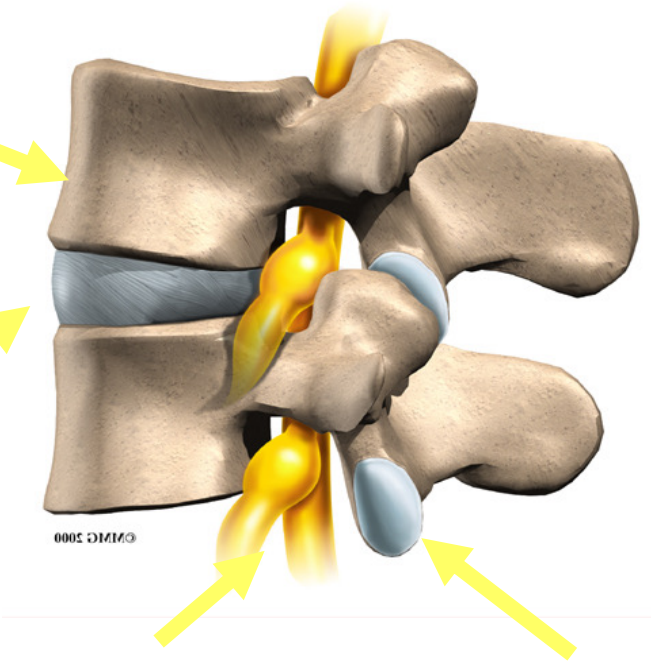
Lumbar Vertebrae

- Largest
- Support a large portion of the body's weight
- Flexion, extension, lateral flexion, and rotation

The Spine

Vertebrae (bone)

- Protect & support the spinal cord



Intervertebral Disc

- Shock absorbers between vertebrae
- Bear the majority of the weight put on the spine

Spinal Cord

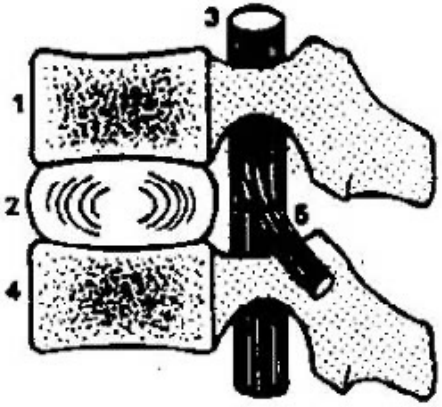
- Nerve which delivers messages from the brain to the body

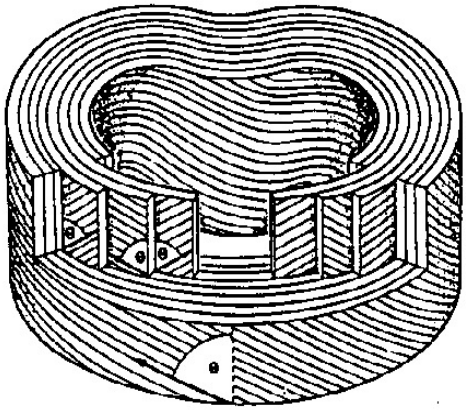
Cartilage

- Cushions joints, allows for gliding movement, and disperses body weight

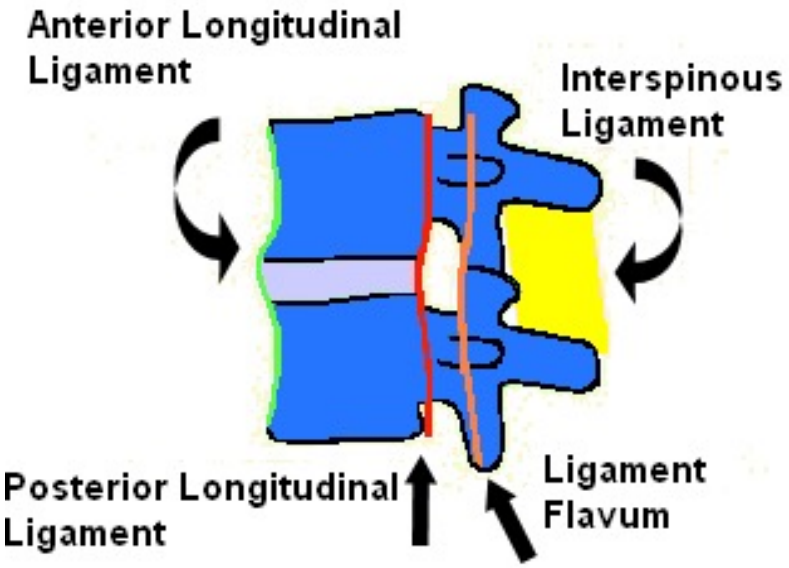
Intervertebral Discs

- "Shock" absorber
- Permit movement
- Composition
  - Annulus - outer layer
  - Nucleus – gelatinous fluid filled center
- Aging
  - Deterioration begins in 30's
  - Decreased fluid and size
  - Decreased function





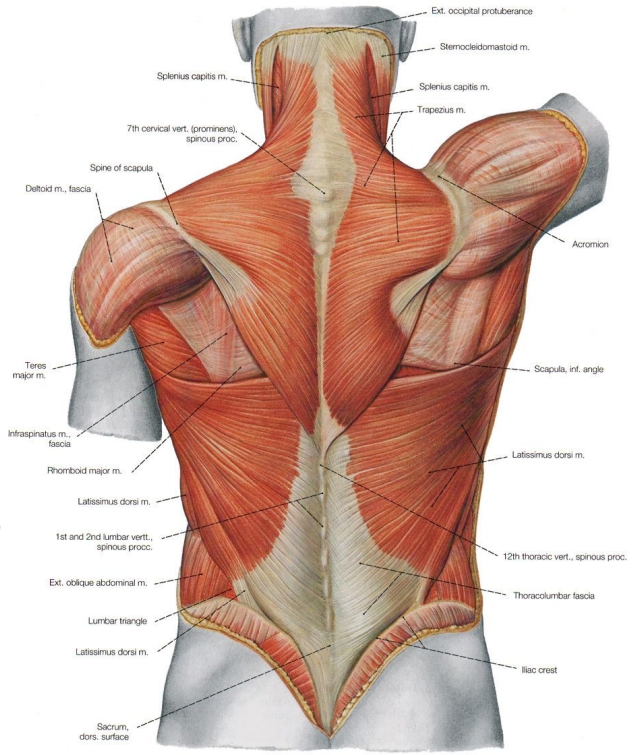
Vertebral Ligaments



- Tough elastic fibers
- Connect vertebrae as one structure
- Prevents excessive movement
- Helps stabilize spinal column

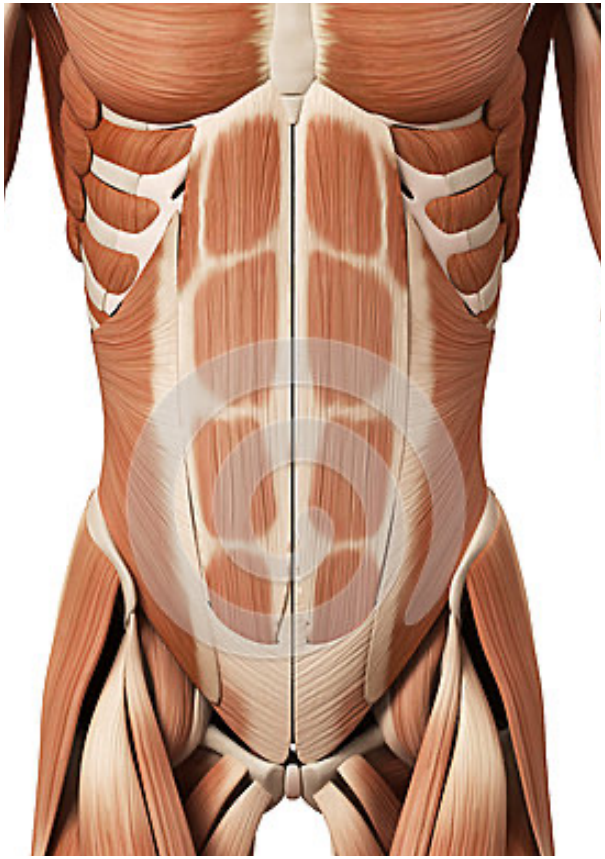
Musculature- Low Back

- Provide stabilization
- Maintains vertebral alignment
- Allows voluntary movement
- Small in relation to leg musculature
- Lower force production in relation to leg musculature



Musculature - Abdominals

- Provide stabilization
- Maintain vertebral alignment
- Allows voluntary movement
- Support abdominal contents
- Decreased strength due to
  - Poor posture
  - Poor physical conditioning
  - Poor posterior chain flexibility



Low Back Pain Causes

- Muscular strain – most common
  - Acute or Cumulative
- Ligamentous strain
  - Acute or Cumulative
  - Often associated with Muscular strain
- Disc degeneration
  - Protrusion
  - Herniation
  - Prolapse
- Arthritis or related conditions
  - May result from
    - Previous acute injury
    - Cumulative trauma
    - Other factors

Acute ⟺ Cumulative

- Difficult to differentiate
- Injury usually combination
- Daily “wear and tear” lowers tissue tolerance
  - Leads to weakening of structures and acute injury
  - May lead to degeneration
- Acute = increased risk (leads) to chronic
  - May appear “acute” but culmination of wear
  - Strain can lead to disc issues
- Cumulative (degeneration) = increased risk of acute
  - Lack of recovery can lead to muscle strain
- Previous injury increases overall risk

Muscle/Ligament Strain

Injury to a muscle, ligament, or associated tendon

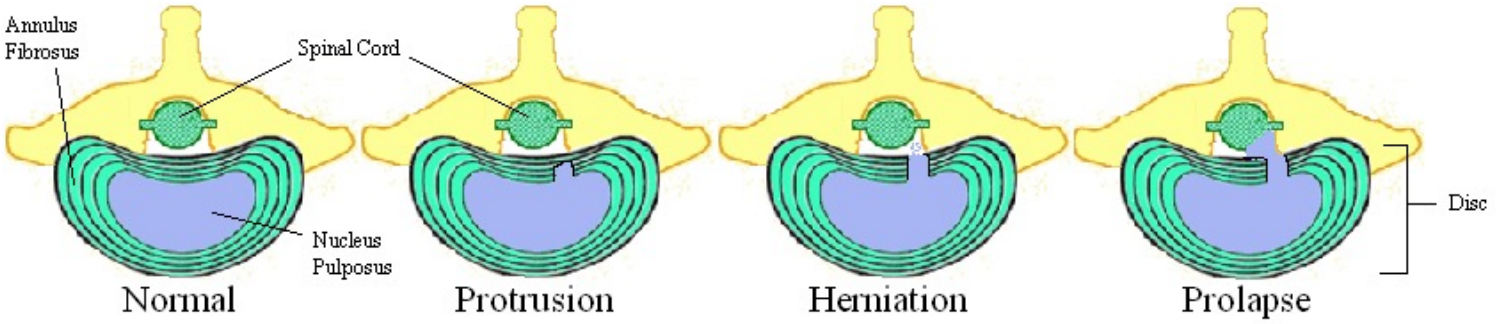
- Caused by
  - Overstretching of muscle or joint
  - Overexertion of muscle
  - Rapid change of posture requiring forceful “braking”
  - Repetitive loading with limited recovery
- May lead to
  - Partial or complete tearing of muscle, ligament, or tendon
  - Joint instability
  - Temporary or permanent postural changes
  - Temporary or permanent movement alterations

Back Degeneration

- Wearing of Intervertebral Discs (IVD)
- Increased with aging
- Can result from chronic loading of tissues
- Loading = unnatural postures (away from neutral), force exerted, and duration/frequency of time spent in unnatural postures

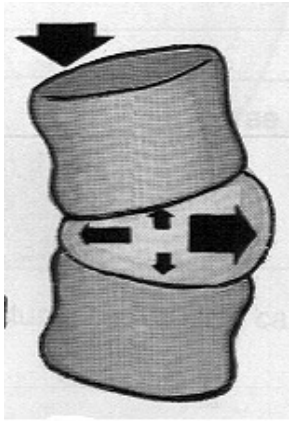
Stages of IVD Degeneration

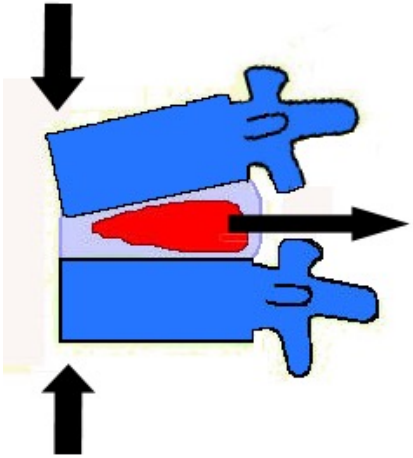
- Protrusion - fluid inside disc stretches fibers
- Herniation - rupture of fibers, fluid expelled into area of weak fibers
- Prolapse – complete rupture of fibers, fluid migrates into vertebral canal



What happens when we bend?

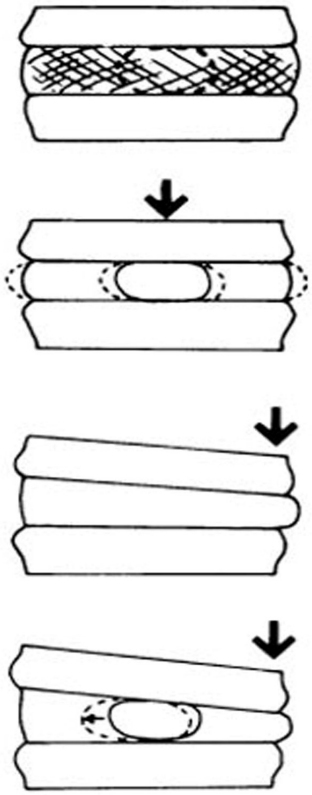
- Awkward Posture
  - Prolonged bending increases stress
  - Results in movement of nucleus against annular fibers

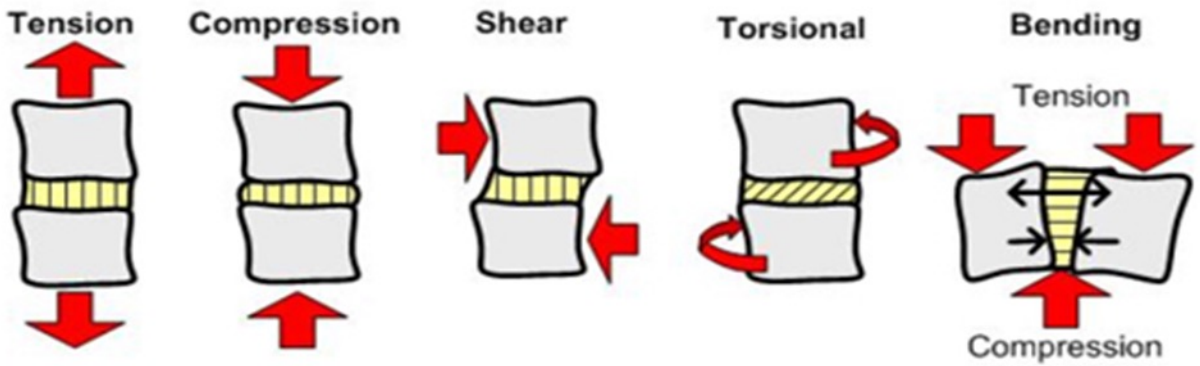




What Happens When We Lift?

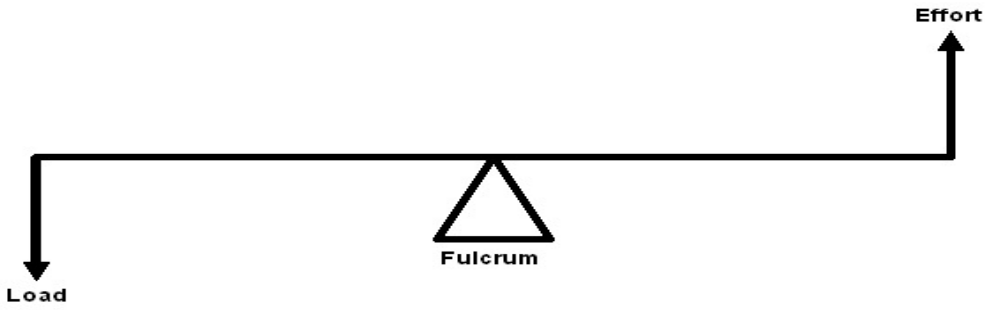
- Fatigue of unconditioned musculature
- Uneven pressure placed on disc
- High force, awkward posture, high repetition = increase stress



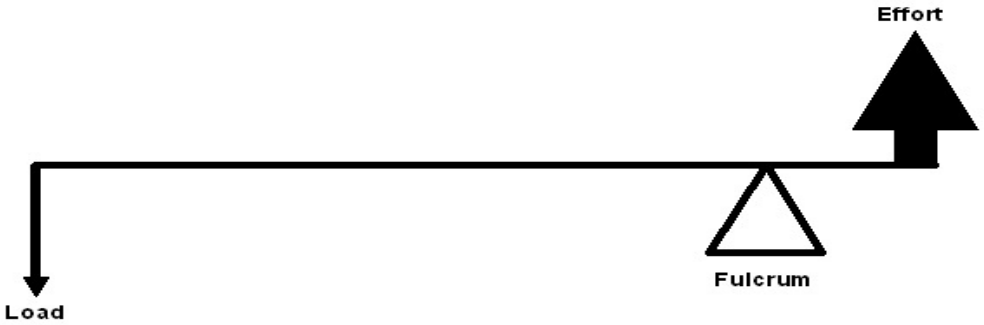


Biomechanics - Levers

- Fulcrum in the center - effort force equals load force

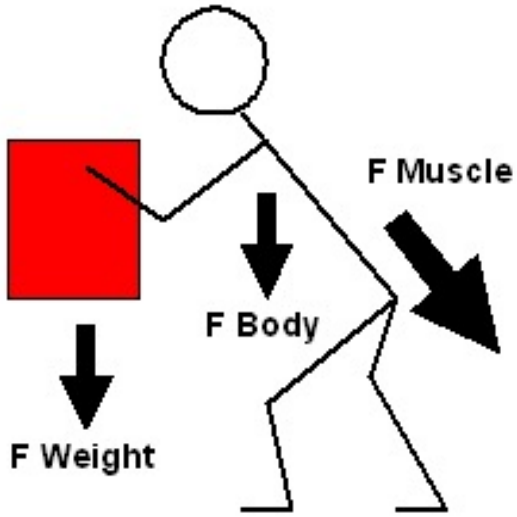


- Increase distance of load force, increase effort force required



Biomechanics - Lower Back

- Load force = object lifted
- Effort force = torso musculature
- Torso (back and abdominals) = fulcrum
- Increased horizontal distance from fulcrum (torso) to the load (object lifted) = increased effort force required (torso muscle)
- Result = increased stress placed on the muscles and joints of the low back



Primary Injury Risk Factors

- Force
  - Concentric - push, pull, lift, carry
  - Eccentric - lower, braking
  - Isometric – no movement, resistance
- Awkward Postures
  - Deviation from neutral
  - Reaching, bending, twisting
- Static Postures
  - Extended time
- Repetition
  - Similar movements performed over time with minimal recovery

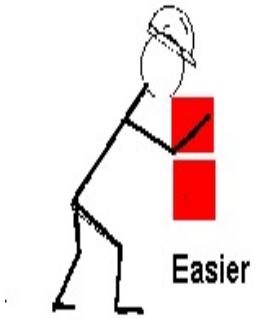
Low Back Injury Risk Factors

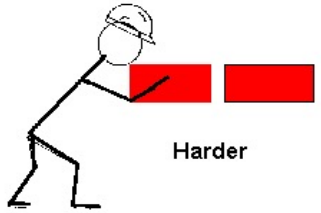
- Force - lifting, pushing, pulling, carrying, lowering, holding against resistance, etc.
- Sustained awkward postures - bending, stooping, twisting, reaching, etc.
- Repeated torso movements - flexion, extension, rotation, etc.

Increased by any combination of the above

Low Back Injury Risk - Force

- Weight
  - Heavier loads
    - Increased difficulty
    - Increased probability of poor technique
    - Increased probability of jerking
- Vertical location
  - Higher starting point
    - Increased difficulty
    - Decreased use of larger leg musculature
- Horizontal location
  - Further object is from person performing lift
    - Increased muscle force required
    - Smaller muscles required
    - Increased difficulty
    - Decreased grip





Low Back Injury Risk - Force

- Load composition, structure, and size
  - Loads consisting of pliable material – people, bags, etc.
    - Very difficult to grip
    - Difficult to maneuver
    - May create uneven weight distribution and shift
    - Increased probability of poor technique
  - Larger loads
    - Further away from body
    - More difficult to grip
    - Increased probability of poor technique
  - Asymmetrical loads
    - Create awkward postures
    - Unbalanced loading
    - Increased stress upon IVD

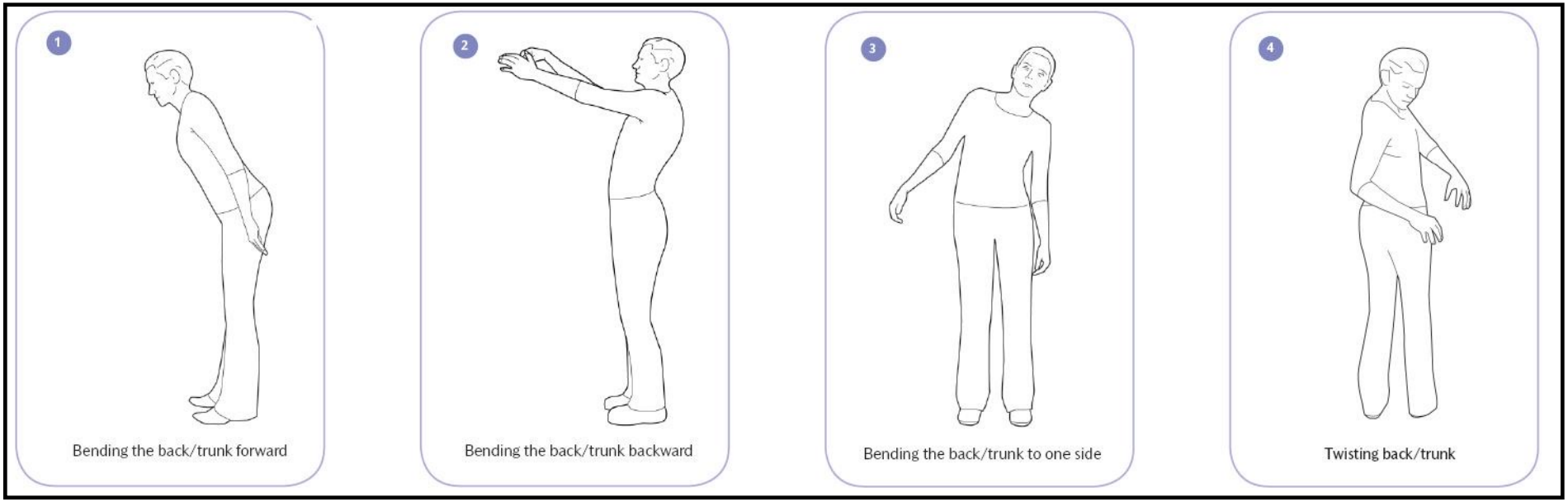
Low Back Injury Risk - Force

- Mechanism of lift
  - High speed movements – explosive, jerking
    - Decrease control
    - Uneven stresses placed upon the body
    - Increased probability of lifting too heavy
    - Increased probability of extremely awkward postures
    - Increased probability of poor technique
- Required load movement
  - Lift, lower, push, pull, carry, brake (resist movement)
    - Equal force required to lift and to lower
    - Increased awkward postures to pull than push
    - Increased risk while carrying based upon weight, composition, and size of load as well as distance required
    - Increased risk with braking or resisting movement

Low Back Injury Risk – Awkward Postures

- Bending, twisting, and reaching affected by
  - Vertical Location
    - Low start height
      - May require increased torso flexion
    - High finish height
      - May require increase torso extension
  - Horizontal Location
    - Load further away
      - May require increased torso flexion
      - May require increase torso rotation
  - Load Composition, Structure, and Size
    - Pliable material
      - Increased awkward posture in order to grip, maneuver, and maintain control
    - Larger loads
      - Increased awkward posture (flexion, rotation) in order to grip
    - Asymmetrical loads
      - Unbalanced loads may create increased lateral flexion and torso rotation

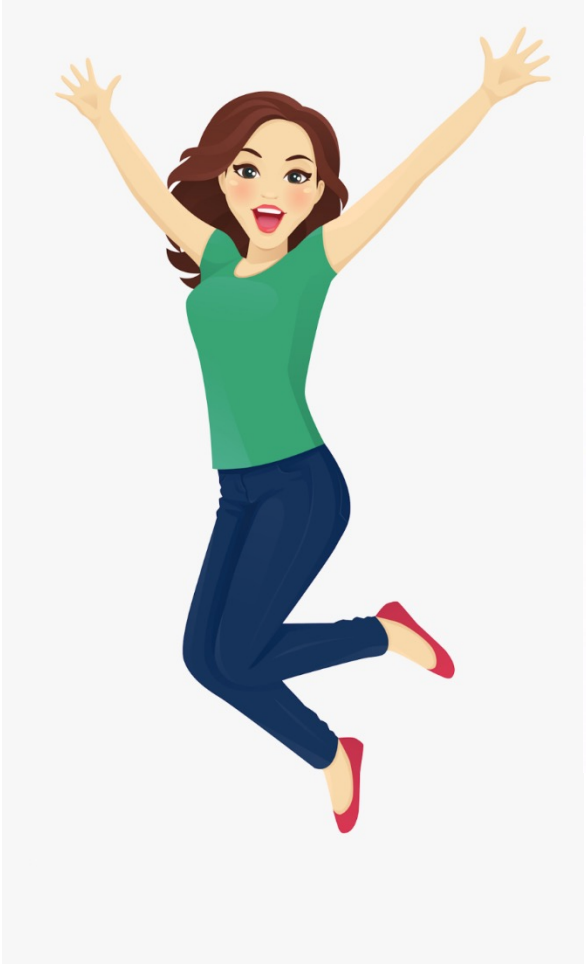
Awkward Back Postures



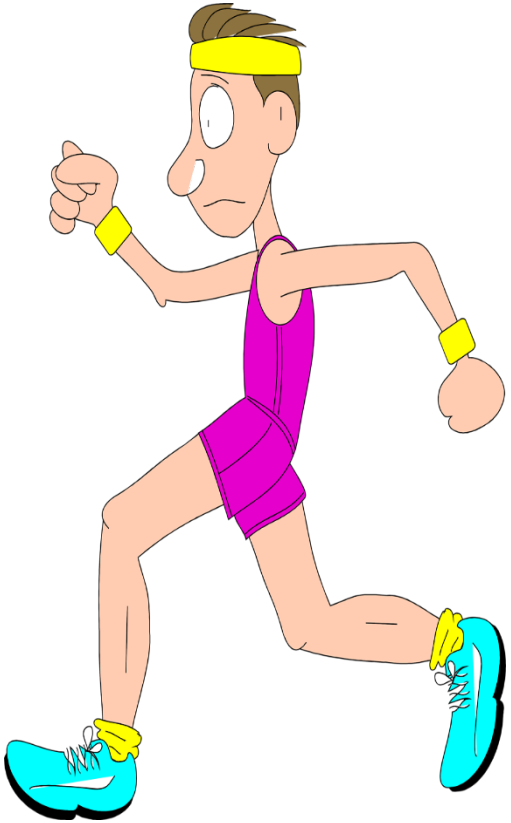
Low Back Injury Risk – Static Postures & Repetition

Any prolonged posture and/or repetitive motions **greatly increase** all risk factors associated with Force and Awkward Postures

Movement Break



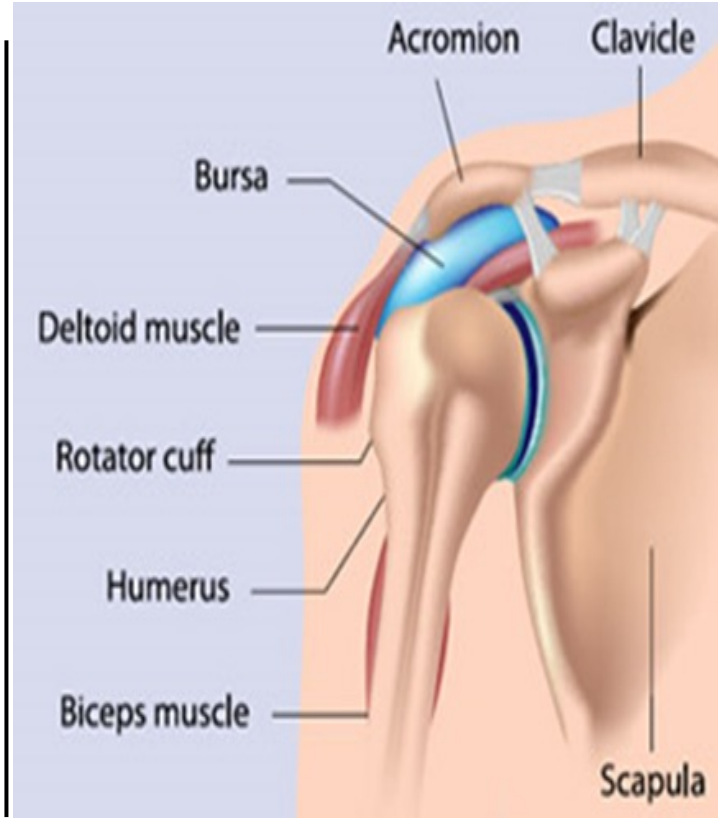
Be Back in 5 Minutes!



Shoulder Injury Statistics

- Occupational shoulder injuries affect nearly 10,000 workers in Canada, and account for more than $450 million in disability benefit and compensation payments.
- MSD among healthcare workers associated with excessive shoulder loading due to manual patient handling, applying excessive forces during pushing/pulling objects, required use of awkward postures during patient care, and working long hours and shiftwork

Shoulder Anatomy



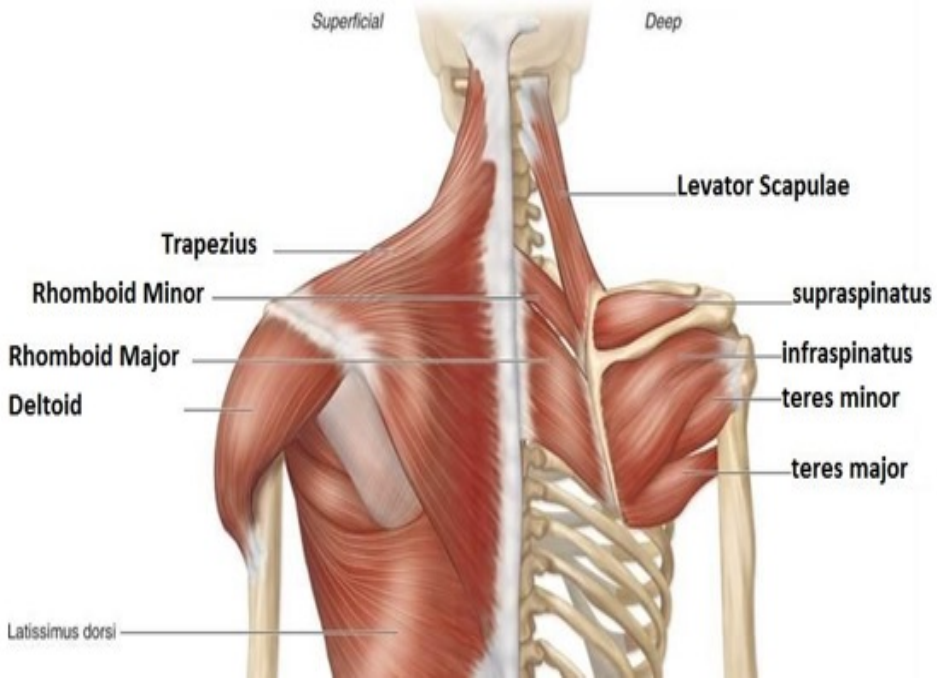
“Ball and Socket” joint

↑ **Range of Motion**

↓ **Stability**

Musculature- Shoulder

- Protect the shoulder joint
- Stabilize the shoulder joint
- Small muscles
- Main stabilizers very small

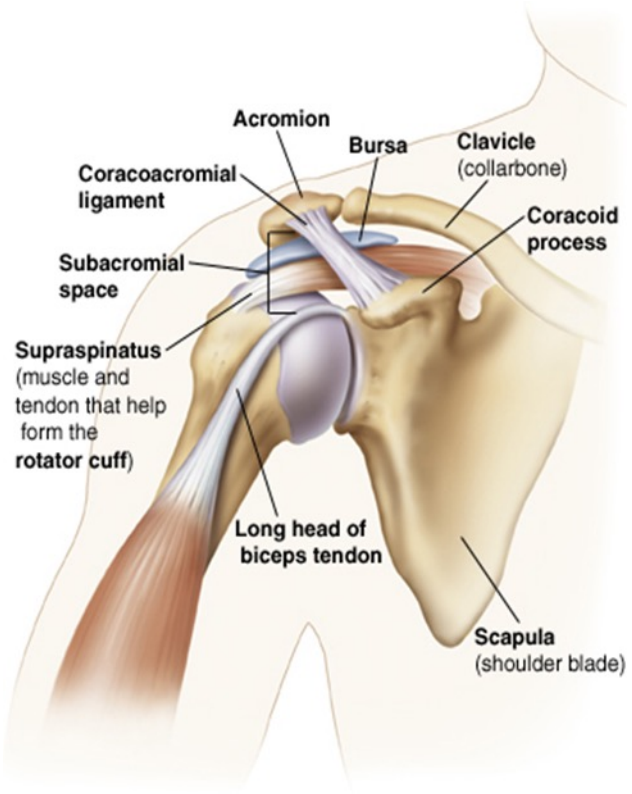


Shoulder Injuries

- Muscular strain/tear – Rotator Cuff - most common
  - Acute or Cumulative
- Inflammation related
  - Tendonitis
  - Burstitis
- Subluxation/Dislocation
  - Acute or Cumulative
- Labral tear
  - Acute or Cumulative
- Impingement Syndrome
  - Cumulative
- Adhesive Capsulitis (“Frozen Shoulder”)
  - Cumulative
- Osteoarthritis (OA) or related conditions
  - Previous acute injury, cumulative trauma, other factors

Shoulder Injuries

- **Strain -** injury (micro tear) to muscle and/or tendon
- **Sprain -** stretch and/or tear of a ligament (joint stabilizer)
- **Impingement syndrome -** not enough space below the acromion for the tendons to pass freely, leads to "squeezing" of the tendon
- **Tendinitis -** tendons become irritated and inflamed
- **Bursitis -** bursa become irritated and inflamed
- **Rotator cuff tear -** tear of one or more tendons of the four rotator cuff muscles

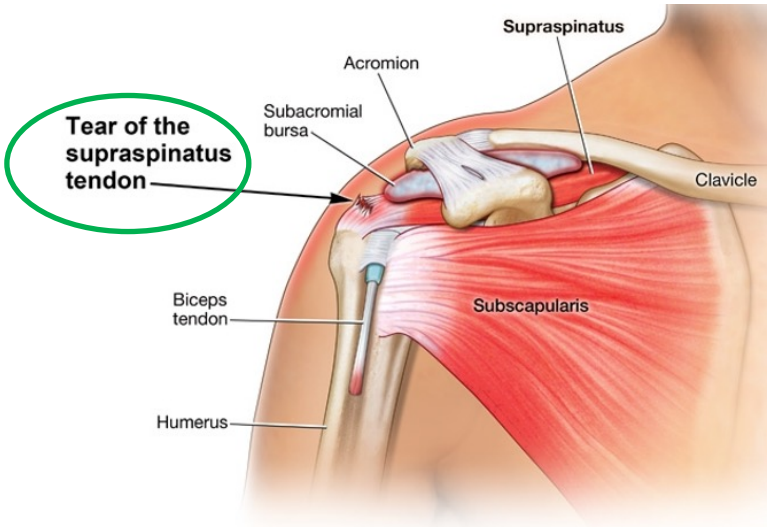


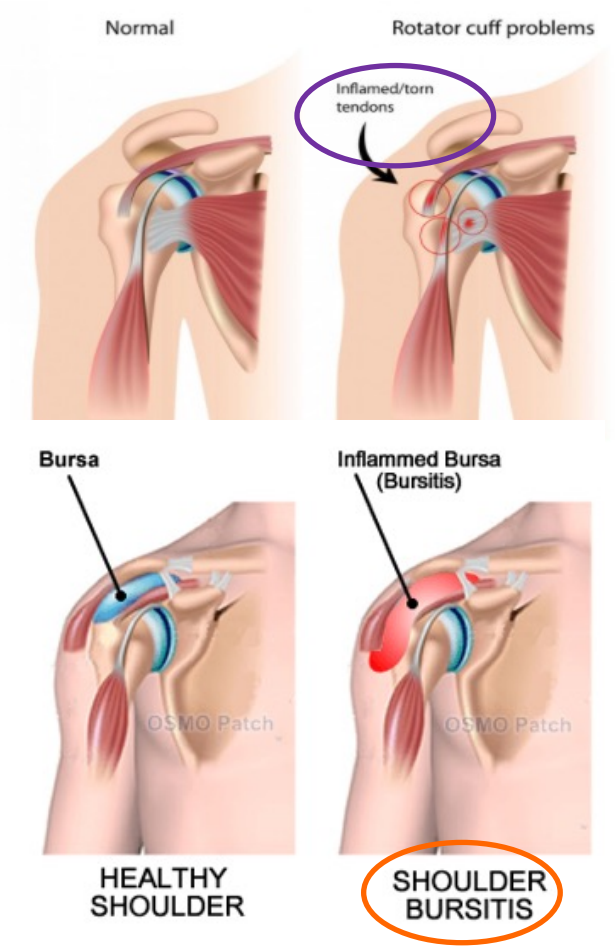
Acute ⟺ Cumulative

- Difficult to differentiate
- Injury usually combination
- Daily “wear and tear” lowers tissue tolerance
  - Leads to weakening of structures and acute injury
  - May lead to muscle strain/tear, subluxation, labral tear
- Acute = increased risk (leads) to chronic
  - May lead to subluxation, labral tear, frozen shoulder, impingement, OA
- Cumulative = increased risk of acute
  - Bursitis, tendonitis may lead to muscle tear, labral tear, dislocation
- Previous injury increases overall risk

Common Shoulder Injuries

- Tendonitis
- Bursitis
- Rotator Cuff Tear





Primary Injury Risk Factors

- Force
  - Concentric - push, pull, lift, carry
  - Eccentric - lower, braking
  - Isometric – no movement, resistance
- Awkward Postures
  - Deviation from neutral
  - Reaching in any direction – arm stretched, rotation
- Static Postures
  - Extended time
- Repetition
  - Similar movements performed over time with minimal recovery

Shoulder Injury Risk Factors

- Force - lifting, pushing, pulling, carrying, lowering, holding against resistance, etc.
- Sustained awkward postures – reaching overhead, reaching forward, reaching laterally, external rotation, internal rotation, etc.
- Repeated arm movements - flexion, extension, rotation, etc.

Increased by any combination of the above

Shoulder Injury Risk - Force

- Weight
  - Heavier loads
    - Increased difficulty
    - Increased probability of poor technique
    - Increased probability of jerking
- Vertical location
  - Higher starting point
    - Increased difficulty to raise or lower
    - Increased reach requirements leading to awkward posture
- Horizontal location
  - Further object is from person performing lift
    - Increased muscle force required
    - Smaller muscles required – greater shoulder strength
    - Increased difficulty

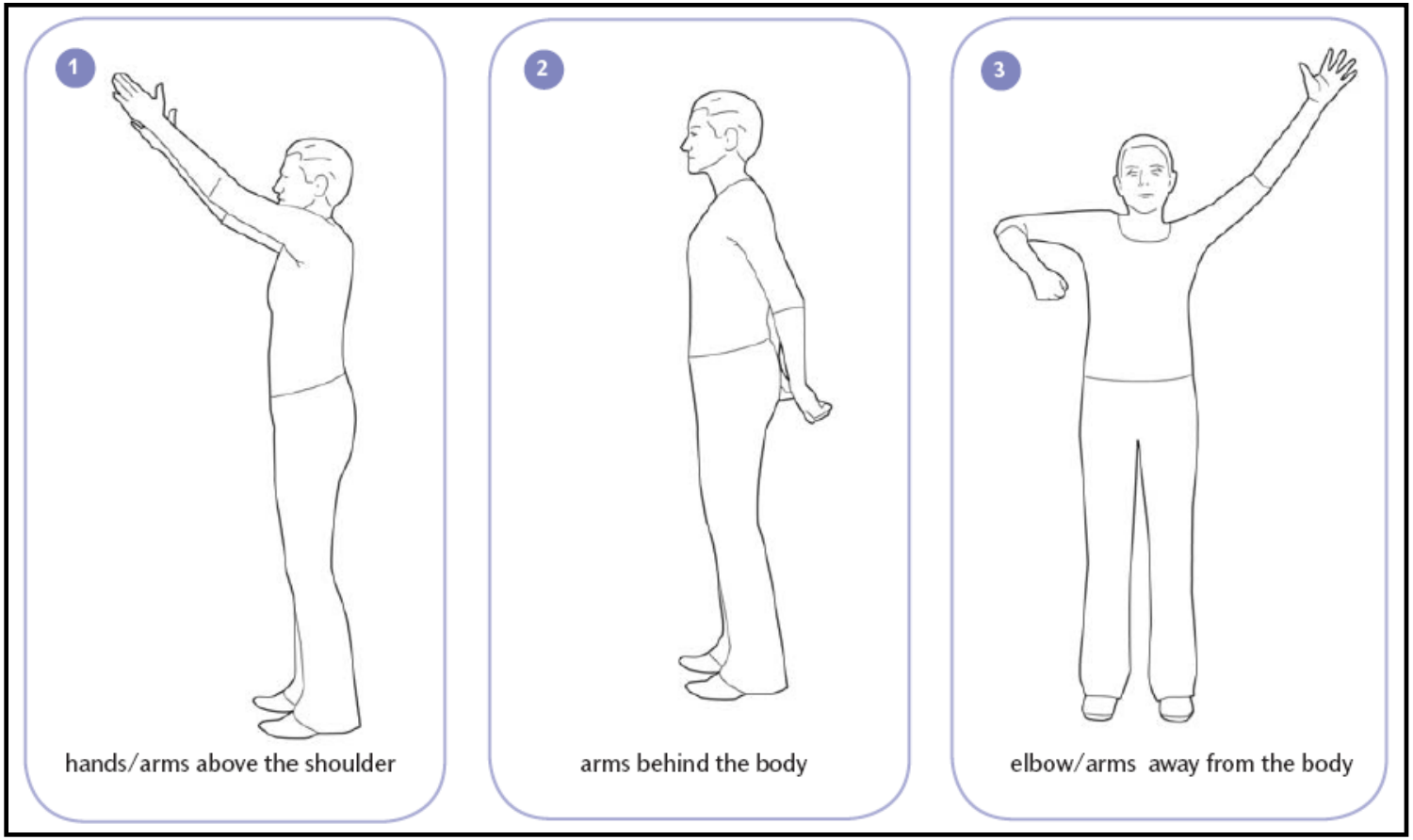
Shoulder Injury Risk - Force

- Mechanism of lift
  - High speed movements – explosive, jerking
    - Decrease control
    - Uneven stresses placed upon the arms
    - Increased probability of lifting too heavy
    - Increased probability of extremely awkward postures
    - Increased probability of poor technique
- Required load movement
  - Lift, lower, push, pull, carry, brake (resist movement)
    - Equal force required to lift and to lower
    - Increased awkward postures to pull than push
    - Increased risk while carrying based upon weight, composition, and size of load as well as distance required
    - Increased risk with braking or resisting movement

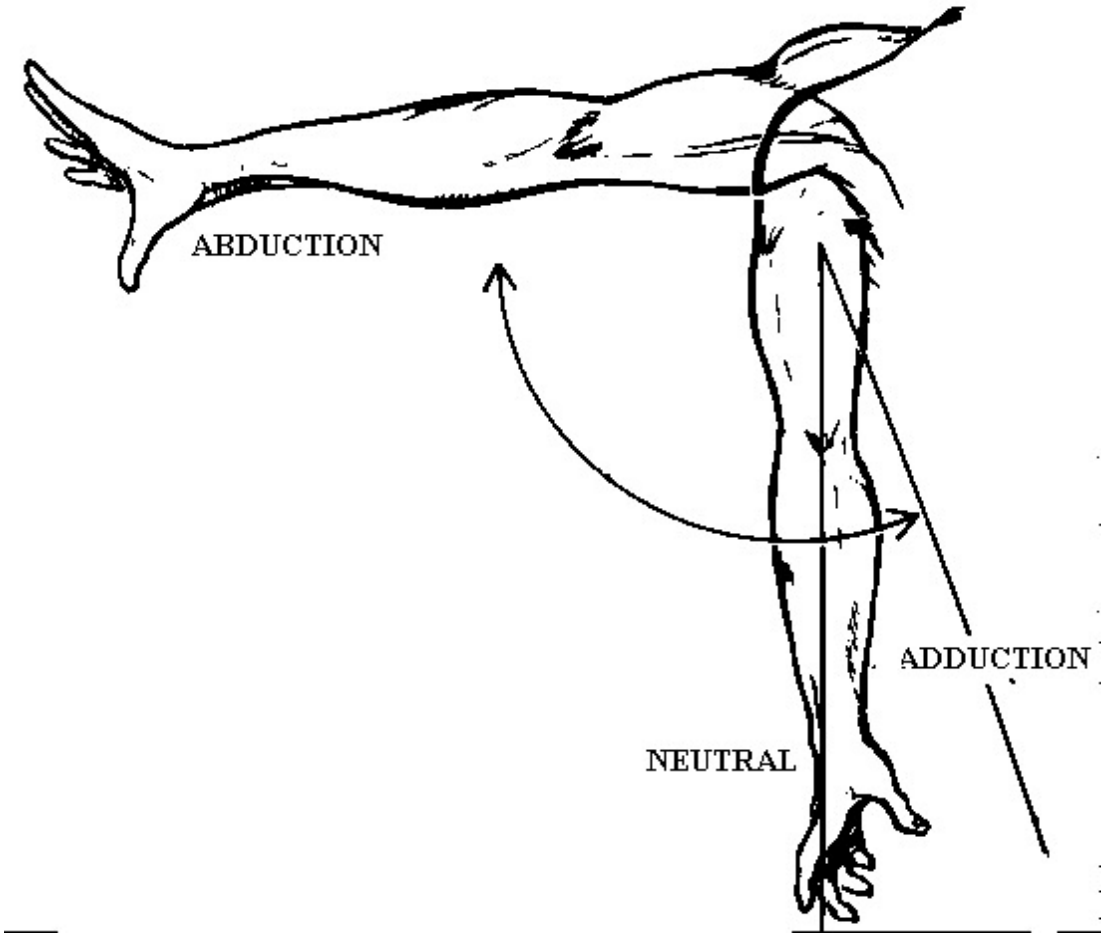
Shoulder Injury Risk – Awkward Postures

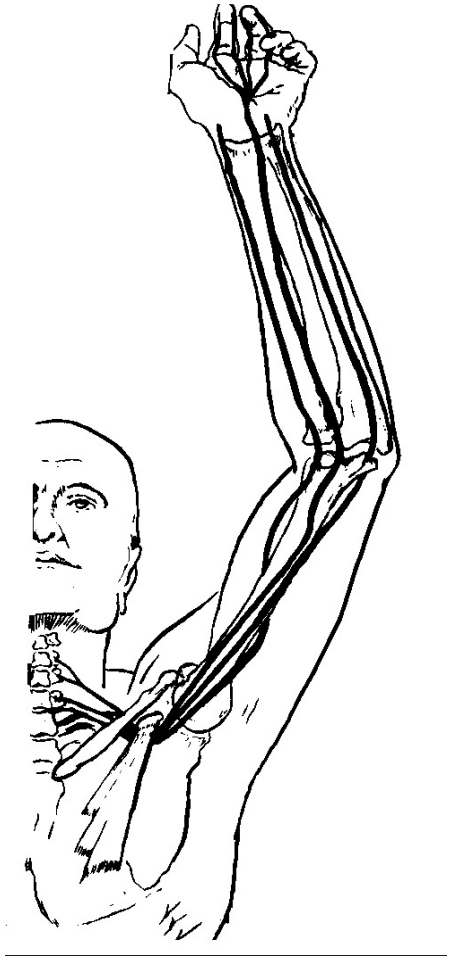
- Reaching – overhead, laterally, forward affected by
  - Vertical Location
    - Low start height
      - Requires increased shoulder strength
    - High finish height
      - Requires increased vertical arm movement
  - Horizontal Location
    - Load further away
      - Requires increased arm extension
      - Decreases strength capability
  - Load Composition, Structure, and Size
    - Pliable material
      - Increased awkward posture in order to grip, maneuver, and maintain control
    - Larger loads
      - Increased reach requirements in order to grip
    - Asymmetrical loads
      - Unbalanced loads may require independent arm placement

Awkward Shoulder Postures



Awkward Shoulder Postures



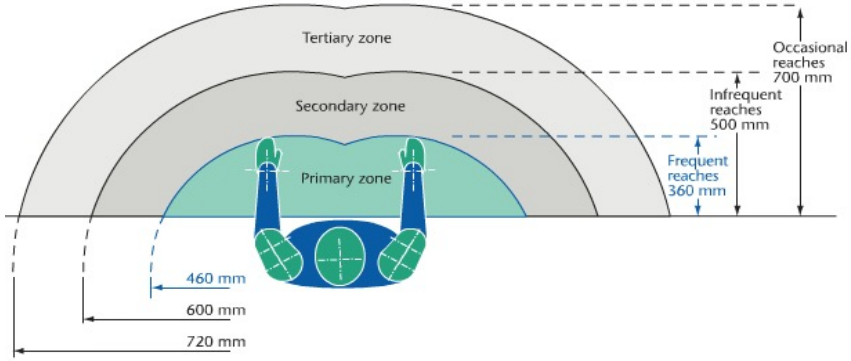


Shoulder Injury Risk – Static Postures & Repetition

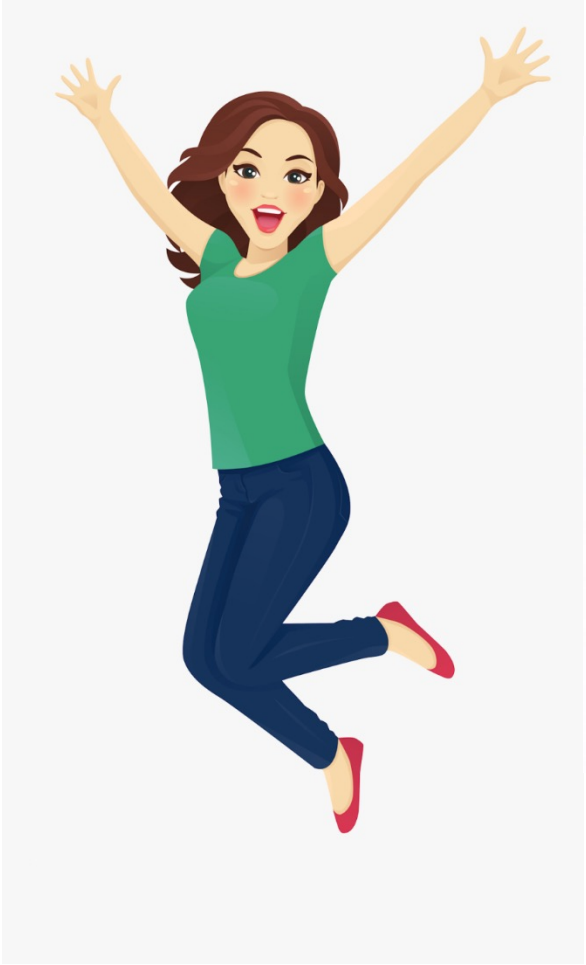
Any prolonged posture and/or repetitive motions **greatly increase** all risk factors associated with Force and Awkward Postures

Back and Shoulder Injury Risks are Related

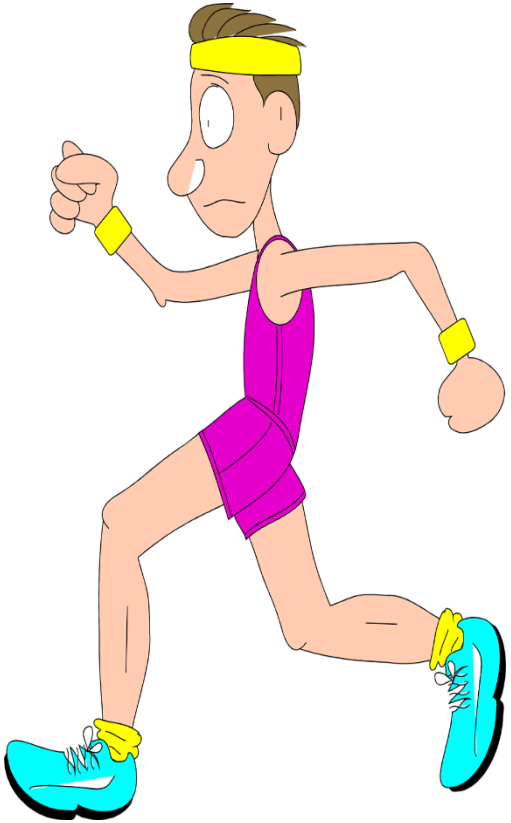
- Increased force requirements
  - Heavier loads place stress upon the weakest structures
  - Heavier loads create poor movement techniques
- Awkward postures are related
  - Reaching leads to incorrect torso alignment
  - Twisting leads to excess reaching



Movement Break

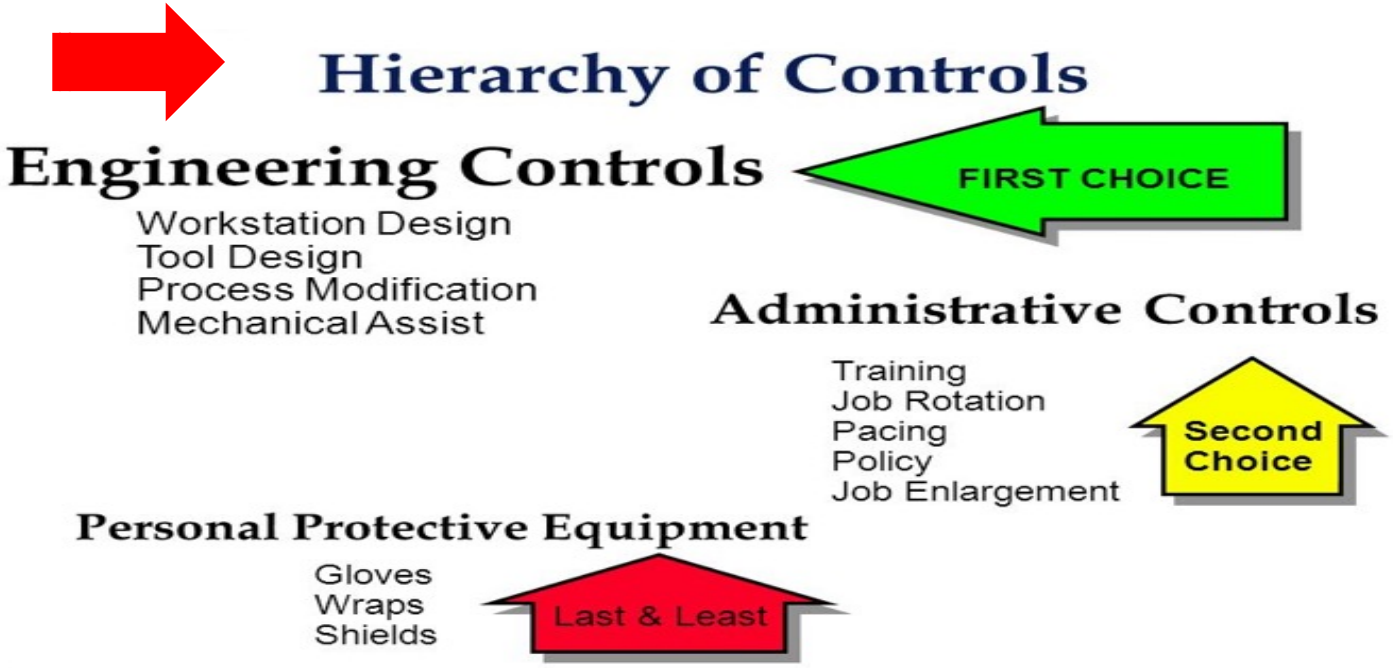


Be Back in 5 Minutes!



How to Prevent or Reduce the Risk of Injuries

- **Hazard Identification**
- **Hazard Elimination**
- **Hazard Control**



Engineering Controls

Eliminate or reduce exposure by:

- Modifying workstations
- Providing new tools or equipment
- Changing tools or equipment
- Modifying production process
- Re-designing the job task

Administrative Controls

Reduce exposure through:

- Policies and procedures
- Changing work schedules
- Adjusting staffing levels
- Employee training

Personal Protective Equipment

Providing PPE cannot effectively control most MSD hazards

Ergonomic Design Principles

Back & Shoulder Injury Prevention:

- Eliminate heavy MMH
- Decrease MMH demands
- Reduce stressful body movements
- Pace of work and rest breaks

Mechanical Lifts
2 Person Lift
Reduce weight

Lift → Lower
Carry → Push
Push → Pull

Shorter more frequent breaks: muscle tension increases with stress; **MOVE**

Ensure adequate space
Locate objects close
Handles
Keep loads close to the body

Source: CCOHS, 2016

Ergonomic Design Principles

- Minimize
  - Reaching
  - Bending
  - Awkward Postures
  - Repetition
  - Static Postures
  - Heavy Lifting or High Forces

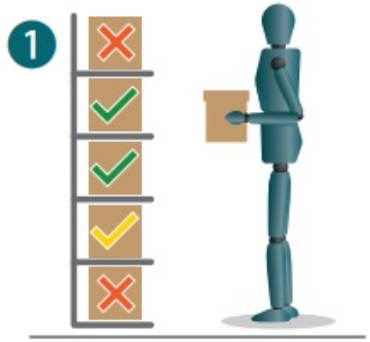
Ergonomic Design Principles

Shoulder Injury Prevention:

- Place items between shoulders and waist height
- Avoid reaching above shoulder
- Reduce any excessive reaching
- Avoid greater than 45° shoulder flexion and abduction

BACK. SHOULDERS. NECK. HANDS.

Happy and Healthy at Work



Store it off the floor

- Store heavy objects between knee and shoulder level. Waist level is best.
- Store items off the floor to minimize bending.
- Use tables, benches or stands to get work off the floor.
- Use carts or equipment to move heavy items.

Keep it close

- Perform tasks close to your body.
- Avoid leaning and stretching forward to reduce stress on your lower back.
- Avoid side reaches that twist the spine.
- Your smart workstation: keep common tasks close; less common tasks out of the way.

Hands below head

- Use a stool, platform, ladder or hoist so work is below head/shoulder height.
- Choose lighter tools and materials for overhead work.
- Use a bit extender for drills/screw guns.
- Find other tools/assists to limit overhead work.

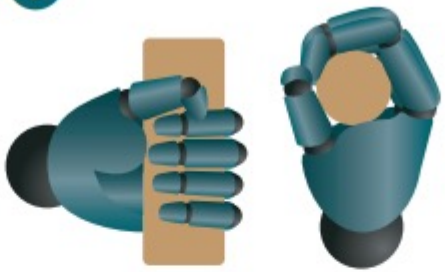
Source: www.msdprevention.com

4

Look straight ahead

- Position your work and equipment to keep your gaze straight ahead.
- Position your work below eye level to align your vision with the task.
- Arrange your workspace so common items are centred to your body.
- Remember to give your neck a break.

5



Get a (good) grip

- High force work: power grip (full hand). Low force, precision work: pinch grip.
- Choose a tool and grip that puts your wrist in a strong, natural posture.
- Choosing tools: good shape for the task, fits your hand, edges don't dig in.
- Power tools with low vibration and no kickback are best.

6

Change it up

- Include micro breaks in your tasks for body recovery and fatigue prevention.
- Fatigue can occur during long duration efforts and repetitive tasks.
- Rotate different tasks to provide working rests.
- Tasks that have MSD hazards and little recovery time have a high priority for change.

Source: www.msdprevention.com

Lifting Techniques

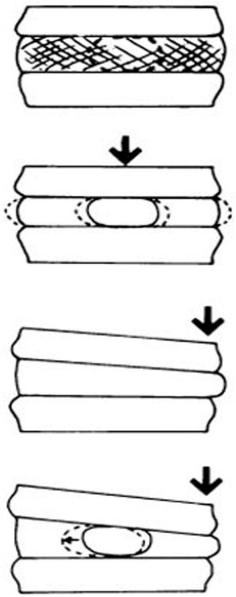
Some general guidelines to follow when you lift include:

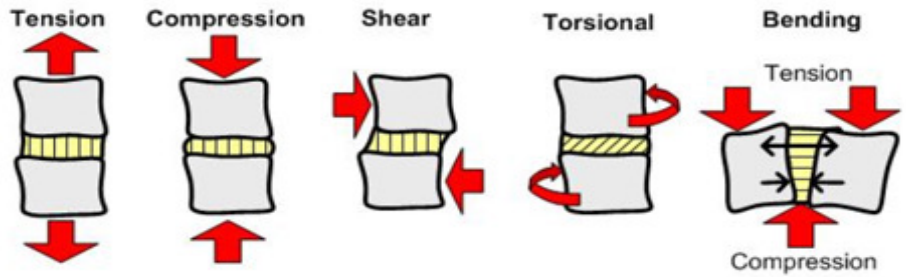
- Keep your head and neck in proper alignment with your torso
- Maintain the natural curves of your spine;
- Bend with your hips and knees, rather than from your back.
- Avoid twisting at the waist – move your feet
- Keep the load being moved close to your body.
- Keep your feet shoulder-width apart to maintain your balance.
- Use the muscles in your legs to lift and/or pull.

Source: American Academy of Orthopedic Surgeons, 2021

Back Straight - Neutral Spine

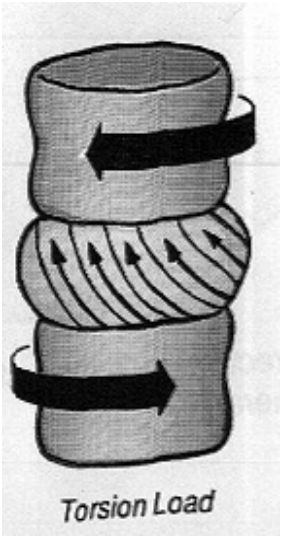
- Aligns torso
- Maintains spine's natural curves
- Keeps torso moving smoothly



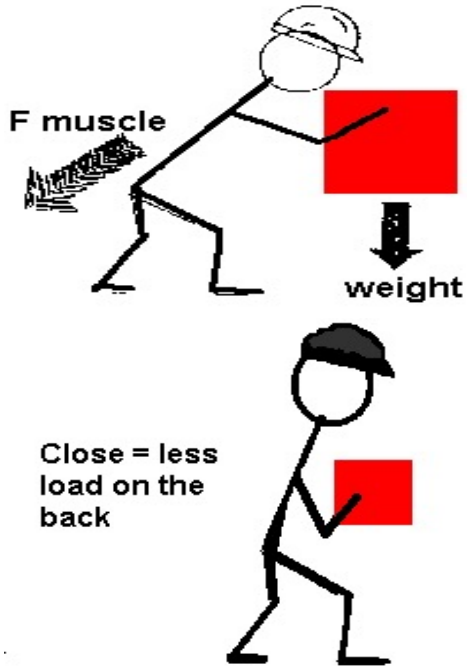


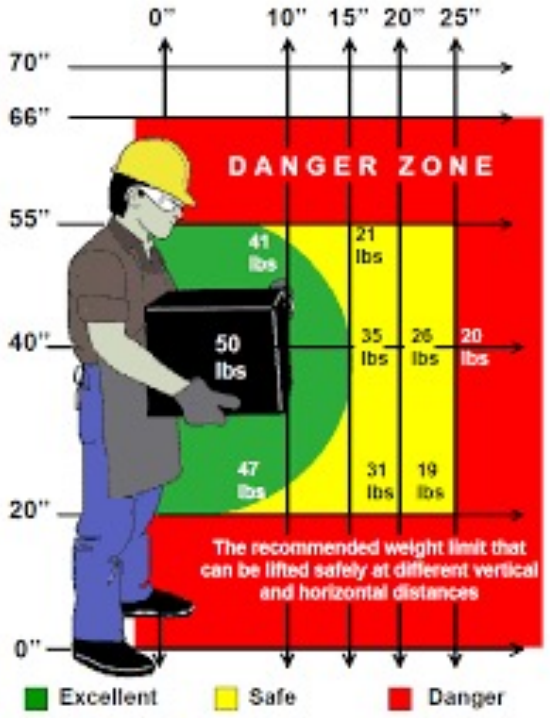
Avoid Twisting

- Discs are more at risk for injury when lifting and twisting
- Avoid twisting by moving the feet



Close to the Body



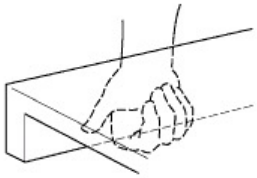


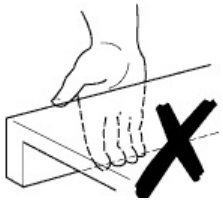
Keep Smooth

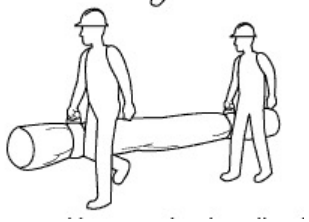
- Avoid “Jerking” motions - decreases the ability of the tissues to adequately stabilize
- Avoid sudden release of force
- Communication is key when lifting with a partner

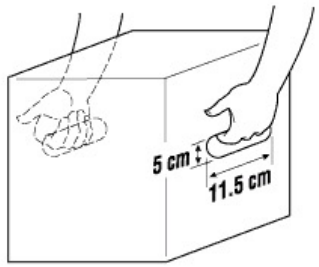
Grip

- Poor coupling (grip) increases the risk of injury
- Tools Available









Source: www.ccohs.ca

Carrying Loads

- Minimize if possible
- Move feet - do not twist
- Use an Aid
  - Wheelbarrow
  - Dolly
  - Cart
- Dolly Use
  - Push not pull
  - Knees bent
  - Neutral posture

Pushing & Pulling

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

Pushing & Pulling

Reduce the distance to push or pull:

- Relocation of material that is moved
- Improve production process to eliminate unnecessary material handling steps

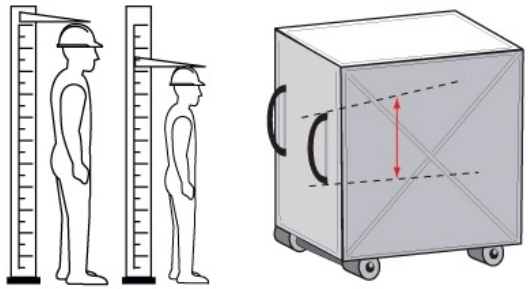
Eliminate Pushing/Pulling:

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

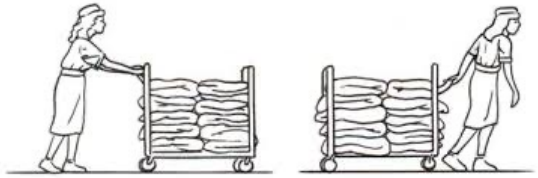
Pushing & Pulling

Optimizing Pushing/Pulling Tasks:

- Eliminate 1 handed pushing/pulling tasks
- Provide variable handle heights to accommodate short/tall employees
- Ensure wrists are not fully pronated (palm down)when pulling
- Replace a pull with a push whenever possible
- Use ramps with a slope of less than 10%
- Keep the load within shoulder to mid thigh vertical range

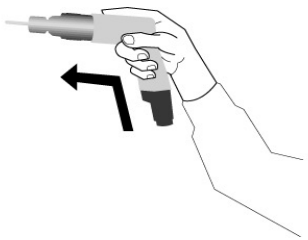


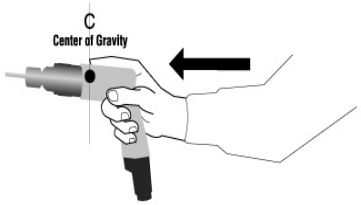
Vertical handles are good for workers of various heights.



Tool Selection

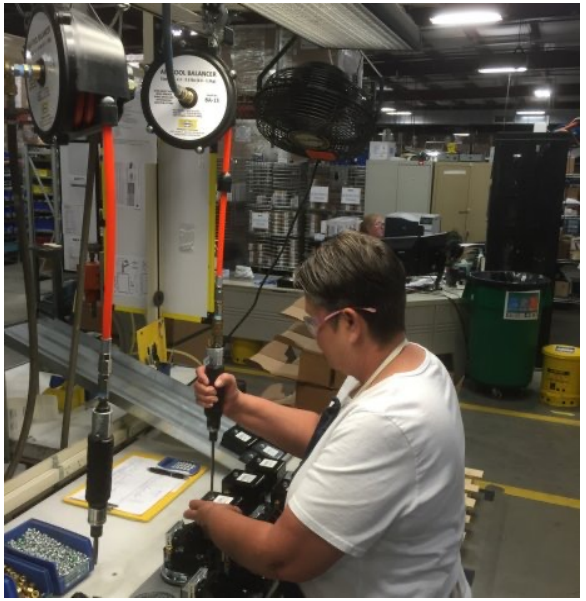
- Select tools that allow minimize twisting and allow the wrists to remain straight
- Select tools that allow operators to use a power grip
- Tools should weigh no more than 5 lbs if used above shoulder height and/or away from the body;
- Tools should be evenly weighted
- Vibrating tools should have dampening built in
- Wear proper fitted gloves to reduce exposure to vibration





Tool Selection

- Use lighter weight tools if possible (more comfortable and require less force)
- Longer triggers to allow 2-3 finger activation
- Studies by NIOSH & CSA (IHSA) showed that using a power tool may reduce the workers risk of injury to the hands, wrists and low back



Centre of Research Expertise for the Prevention of Musculoskeletal Disorders; Construction Fact Sheet

Healthcare Lifting Techniques

Sitting Up in Bed

- To move a person who is lying in bed to a wheelchair, put the chair close to the bed and lock the wheels.
- If the person is not strong enough to push up with his or her hands to a sitting position, place one of your arms under the person's legs and your other arm under his or her back.
- Move the person's legs over the edge of the bed while pivoting his or her body so that the person ends up sitting on the edge of the bed.
- Keep your feet shoulder-width apart, your knees bent, and your back in a natural straight position.

Source: American Academy of Orthopedic Surgeons, 2021

Healthcare Lifting Techniques

Standing Up

- Position the person's feet on the floor and slightly apart.
- Face the person and place his or her hands on the bed or on your shoulders.
- Your feet should be shoulder-width apart with your knees bent.
- Place your arms around the person's back and clasp your hands together. Hold the person close to you, lean back, and shift your weight.
- Nurses, physical therapists, and others in hospitals often use transfer belts fastened around a person's waist to help with these types of movements. The caregiver then grasps the belt when lifting the patient.

Source: American Academy of Orthopedic Surgeons, 2021

Healthcare Lifting Techniques

Sitting Down

- Pivot toward the wheelchair, bend your knees, and lower the person into the chair.
- Make sure the person has both hands on the arms of the chair before you lower him or her down.

Source: American Academy of Orthopedic Surgeons, 2021

Transfer Belt

Benefits:

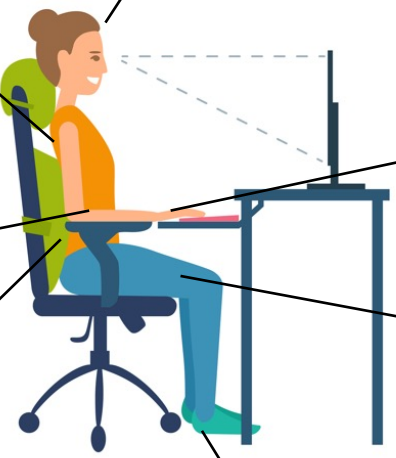
- Helps protect both the patient and caregiver from injury
- Provides a secure grip
- Provides a safer means of transferring patients

Source: American Academy of Orthopedic Surgeons, 2021

Proper Sitting Posture

A straight (not twisted) upper torso

Neck is upright (i.e. not turned, tilted, flexed or extended)



Upper arms hanging vertically alongside the torso with shoulders relaxed, forearms horizontal, and elbows close to the body

Straight (not bent) wrists

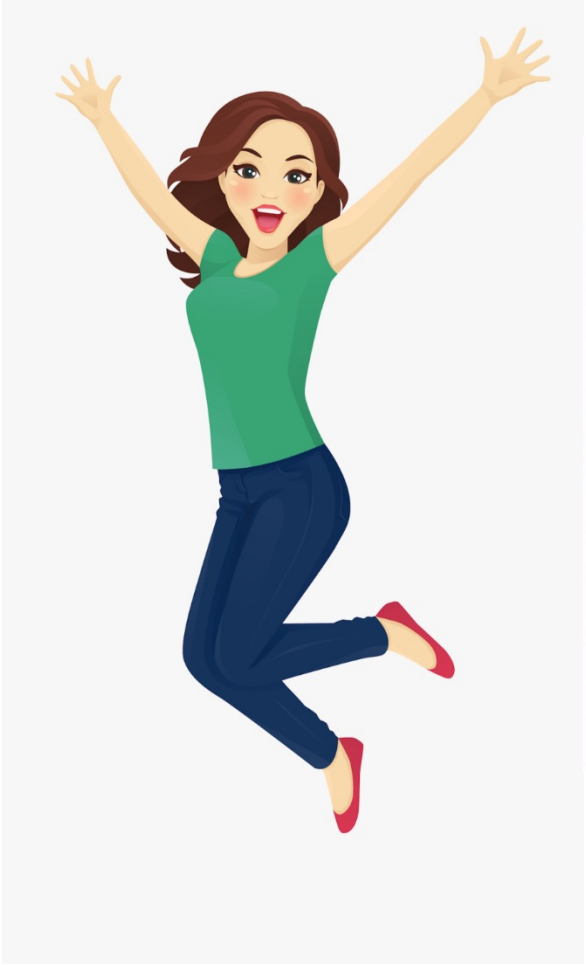
Thighs approximately in a horizontal position and lower legs vertical with feet resting on the floor or a footrest

An erect or upright spine

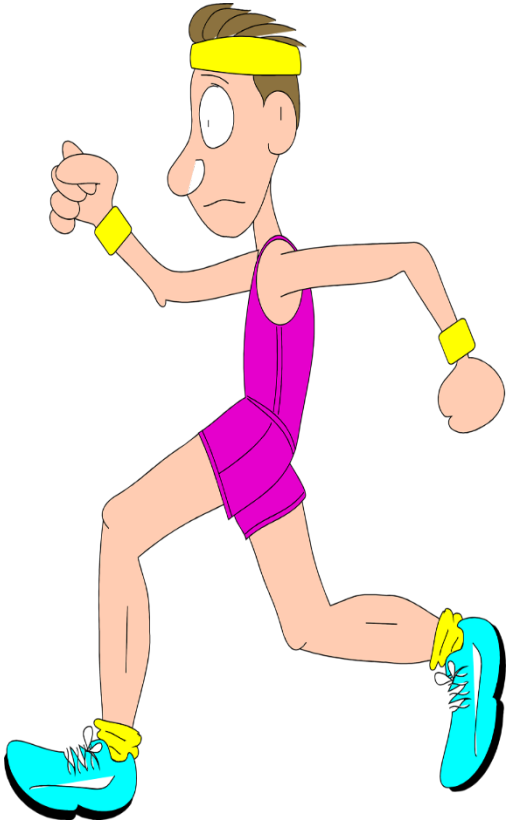
Soles of the feet making an angle of 90° with the lower legs

Source: **CSA Standard Z412-17**

Movement Break



Be Back in 5 Minutes!



How do we quantify these job-specific hazards?

PHYSICAL DEMANDS DESCRIPTION (PDD)

PDD vs PDA

What is a PDD

A Physical Demands Description is simply a detailed, objective description of the physical aspects of a particular job.

There is no analysis being performed. For this reason, the word ‘Description’ is used rather than ‘Analysis’.

PDD

A good PDD can assist with:

Cautioned Uses of PDD Information

Job Matching to Restrictions – Using PDDs as the sole source of information for matching workers with restrictions to potential jobs is very problematic. There may be ways that a job or specific tasks could be modified in order to accommodate a worker with an impairment that are not captured in a PDD. It should be used as only one source of information in a larger process.

Risk Assessment – PDDs themselves are not an assessment or measure of risk. They can inform where further investigation is needed, but should not be used as a determination of risk.

Body Postures – PDDs *cannot* be used to identify specific body postures for a task. Every worker is different and therefore it is impossible to document a common posture such as angle of back flexion or shoulder abduction. Stature, arm length, etc. can all have an impact on a worker's posture.

Objective vs. Subjective PDD Information

- Absolute measurements are key
- Reduce generalizations and guess work
- A PDD should reflect the job not the worker
- Relying on subjective information may be problematic

DISABILITY PREVENTION VS DISABILITY MANAGEMENT

DEFINITION:

DISABILITY MANAGEMENT

Compares the physical demands of a job as it is currently performed to a worker's restrictions. If there is not a direct match, the worker is determined to be unable to perform the job or essential tasks that cannot be performed are downloaded onto another worker.

DEFINITION:

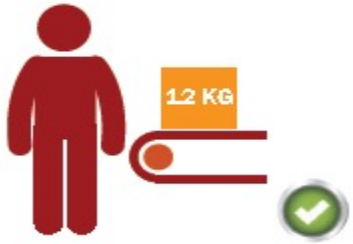
DISABILITY PREVENTION

Compares the physical demands of the pre-injury job to a worker's restrictions. Where there is a barrier or mismatch, creative solutions are considered and the best one is implemented in order to remove the barrier(s) and allow full performance of the essential duties.

EXAMPLE: A worker is returning to work. The restriction is no lifting or carrying more than 10 Kg. Currently, the job requires carrying a 12 Kg box.

Worker cannot do the job

Another worker performs the task



What Makes a PDD Good?

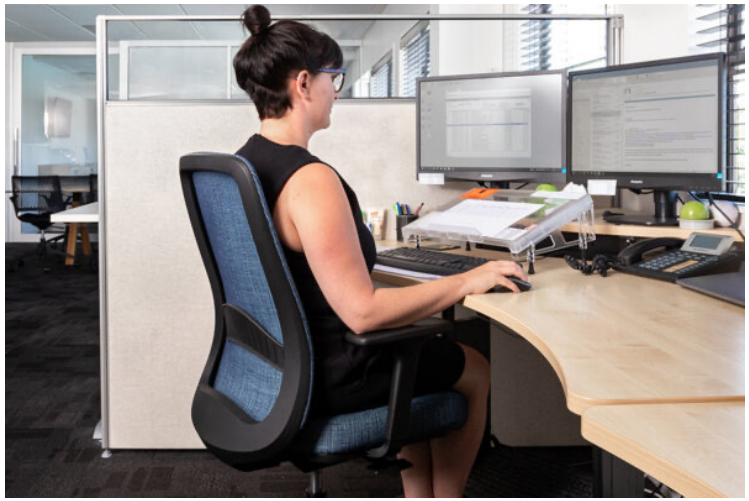
- Job Specific with included description of each task
- Weights both maximum and average
- Heights (vertical and horizontal) of all equipment, storage space etc.
- Equipment and tools: include weight, size (H, L, D)
- Duration and frequency of each task
- Pictures and videos
- Force measurements (initial and sustained)
- Distance (walked carried) measurement, average

Tools/Equipment

Identify brand & model

Measure the weight

Take a photo



GOOD PHOTO VS. BAD PHOTO

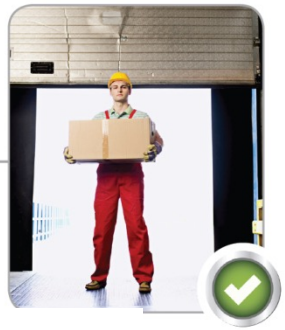
90 DEGREES TO WORKER

✔ 90 Degree View of Worker
✔ Task Clearly Visible

✘ 90 Degree View of Worker
✘ Task Clearly Visible

CLEARLY VISIBLE WORKER

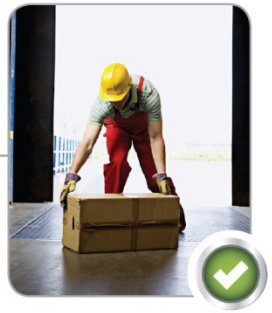
✔ 90 Degree View of Worker
✔ Task Clearly Visible
✔ Minimal Background



✘ Task Clearly Visible
✘ Minimal Background

MINIMIZE UNECESSARY BACKGROUND

✔ 90 Degree View of Worker
✔ Task Clearly Visible
✔ Minimal Background



✘ 90 Degree View of Worker
✘ Minimal Background

PHYSICAL DEMAND TASK ELEMENTS

PSW Example

Physical Demands Description

Job Title:	Personal Support Worker

Date:	18-Oct-17
Department:	Community Care
Work Hours:	7:00 am - 3:00 pm
Schedule:	M,T,W,Th,F
Shift:	Day Shift

Completed By:	Dr. Mike Sonne
Verified By	Valerie Wolfe
PPE:	Latex Gloves, Scrubs

Description of the Job:

The Personal Support Worker works under the direction of the RPN and/or RN to provide excellent personal care to residents and is accountable to the PSW Coordinator. Primary functions include providing care according to the established resident care plan including all components of activities of daily living and supporting participation in recreational and therapeutic activities. The Personal Support Worker is required to perform their duties in a manner consistent with the Mission, Vision, and Values of the home to ensure resident safety and demonstrate customer service excellence.

Summary of Essential Tasks	Task Name	Frequency (mins per day)	Duration (mins)	% of Work Time
1	Bathing Residents	Occassional	26 minutes - 2.5 hours	6-33%
2	Toileting Residents	Occassional	26 minutes - 2.5 hours	6-33%
3	Nutrition for Residents	Infrequent	6 - 25 minutes	2-5%
4	Transfers	Occassional	26 minutes - 2.5 hours	6-33%
5				

Summary of Non Essential Tasks	Task Name	Frequency	Duration	% of Work Time
1	Reporting and Administration	Infrequent	600	10
2				
3				

Environmental Factors											
Indoor	Yes	Rugged Terrain	No	Cold	No	Slippery	No	Vibration	No	Gas/Fumes	No
Outdoor	No	Weather	No	Dry	No	Dark	No	Traffic	No	Magnetic Fields	No
Flat Surface	Yes	Hot	No	Wet	No	Bright	No	Biological Agents	Yes	Congested Area	No
						Noise	Yes	Chemicals	No	Other	No

Summary of Tools and Equipment				
Tool/Equipment	Make	Model	Weight (kg)	Dimensions (l x w x h, cm)
Hoyer Lift	Hoyer	6 point cradle	50 kg	61 x 104 x 130
Wheel Chair	Karman	Lightweight Deluxe	20 kg	86 x 30 x 93
Nutrition Cart	DR Instruments	Nutrition Cart V1	100 kg	113 x 62 x 96

Reporting

Finalize PDD Document

- Does it contain enough useful information for an outsider to understand the situation?
- Additional photos can be added to extra pages.

Distribute for Approval & Sign-off

- Send to everyone who was involved in preparation phase.
- Final opportunity for people to review, verify accuracy, and comment.

File & Backup

- Locked file formats such as .pdf may help to control PDD content.

When to Update the PDD

Timeline for Review & Updates

- Ideally, have all PDD reviewed annually

POSSIBLE TRIGGERS FOR IMMEDIATE UPDATES:

- New machine(s)
- New tool(s)
- New product(s)
- Process change
- Work reorganization
- Increase/Decrease in quotas
- Increase in responsibilities

Use of Data for MDS Prevention

- If the right data is collected, it may be useful in certain risk assessment tools i.e. NIOSH Lifting Equation, Snook Tables, etc.

PDD

- PDD are useful in gathering job specific information
  - Ensure all tasks are accounted for in the PDD to obtain an accurate representation of the physical demands
  - Separate PDD for each task may have been done so it is important that all of the PDD are looked at
  - The information in a PDD can be used to quantify exposure to the hazards
    - For example frequency and duration of postures
    - Professionals may be able to perform calculations based on the data provided and compare it to standards or guidelines
- Check to see who completed the PDD as well as their qualifications, if it was signed off on, and the date it was completed

Having a Good PDD to send to WSIB does not guarantee the claim will be approved.

Reasons for Denial

- Performing regular job duties
- Variation in job duties
- No change in duties
- No specific accident or injury
- No significant risk factors present
- Underlying conditions

Reasons for Denial

Performing regular job duties

- Does not mean the risk factors were not present to begin with

Variation in Job Duties

- Do the different duties require the same muscle groups?
- Frequency of variation (hourly, daily, weekly)
- PDD may not be an accurate representation of the duties performed and or frequency of which they were performed

Reasons for Denial

No change in job duties

- Does not mean that the hazards did not exist
- Often stated in combination with years performing the job (i.e. worker has been performing the duties for 10 years without incident)
- Most MSD are cumulative; therefore increased exposure increases the risk of developing an MSD
- Get a complete history (i.e. changes may have taken place over a more extended period)

Reasons for Denial

No significant risk factors present

- Analyze the PDD and compare the workers anthropometrics to the values indicated (i.e. above shoulder work)
- Look at production and frequencies of all tasks
- Look at total time performing tasks (i.e. reaching below waist, forward and above shoulder)

Reasons for Denial

Underlying conditions

- Predispose but do not cause an injury
- Frequent exposure to the ergonomic hazards can lead to a MSD

No specific accident or injury

- MSD often occur performing regular job duties
- Constant exposure to the hazards leads to failure within the musculoskeletal system

How OHCOW Can Help?

- CUPE representative can refer the WSIB file to OHCOW where it will be reviewed by the appropriate occupational professional
- Review of the file by the discipline professional will determine if the risk factors are present to cause the injury
- Epidemiology, literature, and design/exposure guidelines will be reviewed in order to support the claim as being work-related
- A final report will be generated using all of the evidence gathered.

OHCOW

Example

Background:

- Dialysis nurse with right hand CTS

Reasons for Denial:

- Unable to determine an accident occurred in the workplace
- The job duties do not carry risk factors for developing an injury over time and there was no significant event that occurred to cause your discomfort

Patient File:

- Contained a PDA, Internal ergonomic report, MOL report, as well as all other documents sent into the WSIB

Example

Patient Interview:

- OHCOW Ergonomist conducted a patient interview to discuss contents of the file and obtain specific information pertaining to the duties

PDA, Internal Report & MOL Report:

- Reviewed information, data and recommendations in these documents and compared them to MMH guidelines as well as literature
- Important note is the MOL used a 75% female population to compare to and patient was within the 25% female population

Epidemiology & Literature Review Conducted

- Focus on the hazards that contribute to CTS

Conclusion

- Not all duties were represented in the PDA.
- The internal ergonomic report identified that there was a medium risk to the development of upper limb MSD and recommended predominately administrative controls that are less effective and put the onus on the worker.
- MOL ergonomic report stated that the forces were within ergonomic guidelines yet no information on how the data was collected and analyzed was provided.
- In comparing the duties to the recommended guidelines it is apparent that the duties fall outside what is recommended.
- Based on the epidemiological, biomechanical, and physiological studies reviewed, evidence suggests that exposure to such factors can play a significant role in the development of carpal tunnel syndrome.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QUESTIONS
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