Office Ergonomics
(aka MSD Reduction for Inside Workers)

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Defining Ergonomics

- The science of designing or adjusting work by fitting the job to the worker, not the worker to the job
- Considers our physical, physiological, biomechanical, and psychological capabilities
- Optimizes the effectiveness and productivity of work systems

How MSDs Occur

The accumulation of tissue damage due to daily wear & tear or overexertion

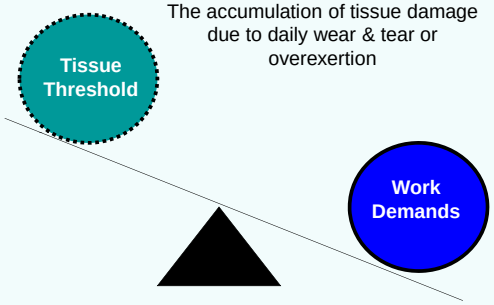
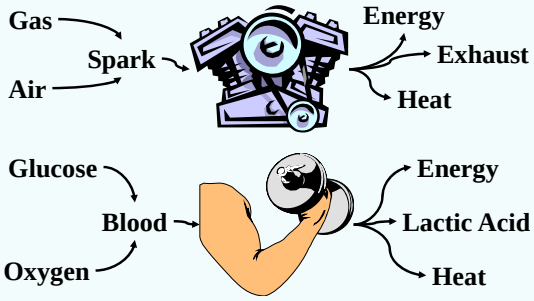


Illustration taken from BCRSP

The Role of Fatigue!

- Precursor to the development of an injury
- Occurs as a result of inadequate blood supply to transport oxygen to the muscle tissue during work

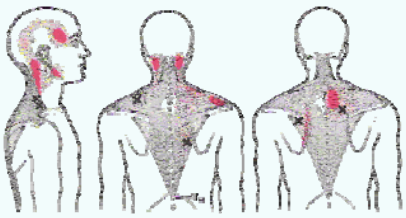
Feeding Our Muscles



Courtesy Washington L&I

Fatigue = Muscle Tension

- Often striking the neck, shoulders, upper and lower back and can trigger headaches



Identifying Office MSD Hazards

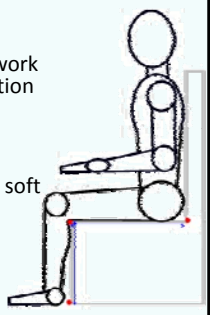
1. Physical Hazards

- Job Task Factors
  - Awkward Postures
  - Static Postures
  - Force
  - Repetition
  - Contact Stress

These are all influenced by personal behaviours

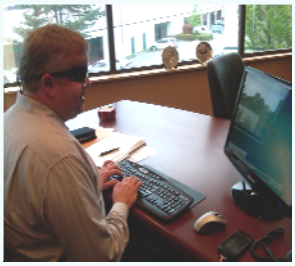
Awkward Postures

- Neutral Posture
  - Muscles and joints are able to work in the strongest and safest position
- Awkward Posture
  - Deviation from neutral posture
  - Transfers force applied to other soft tissues (tendons, ligaments, cartilage, etc.)
- Follow the 90-90-90 rule (with flexibility)



Static Posture

Muscles in constant state of contraction
↓
Interferes with blood flow
↓
Builds up waste products
↓
Tissues become fatigued
↓
Soft-tissue degeneration

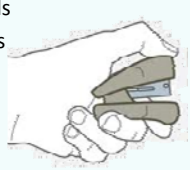


Repetition

- Use of the same muscles and joints over and over again in a similar manner, resulting in fatigued tissues
- Repetition + awkward postures = bad
- Repetition + forceful exertions = bad
- Repetition + forceful exertions + awkward postures = very, very bad

Force

- The more force, the quicker the wear and tear effect while increasing compression on blood vessels
  - Aggressive keying (membrane vs mechanical keyswitches)
  - Worn out keys or dirty keyboards
  - Grasping heavy binders or books
  - Stapling /staple removal
  - Butterfly clips



Contact Stress

- Contact between soft tissues and a hard surface
  - impairs blood flow, increases wear and tear as well as rate of fatigue

- Can be repetitive (e.g. using hand as a hammer)

- Can be sustained (e.g. resting forearms on edge of desktop, legs compressed on seatpan)

Physical Hazards (Continued)

- Workplace Factors
  - Furnishings
  - Equipment and Accessories
  - Environmental Factors

Out of the hands of the workers

Layout /Type of Furnishings

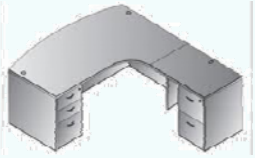
- Suitable size and style for tasks?
  - Does it accommodate necessary equipment and reference material?
  - Does the shape of desk hinder free movement?

Straight Desk

- Computer is placed centrally or off to one side
- Workable space is limited for paper work or reference materials
- Suited for – limited variety of tasks and data entry

L-shaped or U-shaped

- One side is used for the computer and the other side(s) are for telephone, reference materials and general paper work
- Suited for - variety of tasks, frequently switching between these tasks



Corner Configuration

- Originally designed for use with CRT monitors
- Clearance and reach concerns
- Interference with armrests
- Watch for cut-out versions (sharp edges, pinch points)

Other Workstations

- Horizontal Split
- Sit-Stand Station

Portable Sit-Stand Oprtions

- Computer Task Mate
- ErgoTron Workfit S

Clearance Issues

- Limit
  - calendars
  - piles of work
  - personal items
  - reference materials
  - in/out baskets
  - boxes under desk
  - garbage cans
- Learn to file!

It's not just about the Chair!

Do you know the features of your chair?

Key Chair Adjustments

- Seat Height
- Seat Pan Depth
- Backrest Height / Lumbar Support
- Armrests
- Floating Back Rest

Alternative Seating Devices

Footrests

- A footrest is recommended if
  - feet cannot rest comfortably on the floor while seated
  - workstation height causes an elevated chair height, preventing feet from resting on floor
- Non-locking preferred over locking or stationary

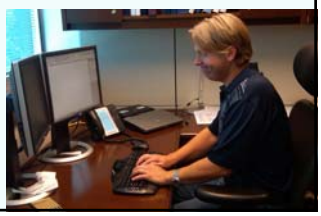
Monitor Placement

Centered in front of body; larger monitors may require adjustment with text

Top of visual screen at eye level

Monitor Height

- Too high forces the eyes to open wider, allowing for more pollutants to enter and increases dryness
- Prolonged neck extension or flexion fatigues the muscles that support the head (neck, shoulder and back)

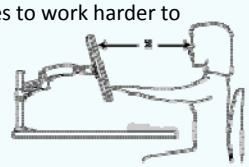


Multifocal Lenses

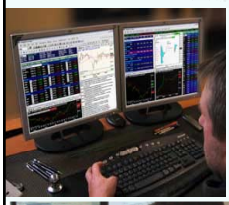
- Monitor should be lower than eye level to allow the neck to maintain neutral-avoid "bifocal bob"
- Obtain progressive lenses that are specifically ground for use with a computer (OPALs)or,
- Lenses ground specifically with a single focal (monofocal) view-computer glasses

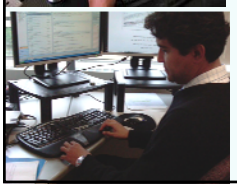
Recommended Viewing Distance

- Arm's length is standard but depends on many factors
  - Sit where you can easily read all text with back supported against chair
  - **Too far** can cause you to lean forward to see text
  - **Too close** may cause your eyes to work harder to focus (convergence problems)



Dual Monitors



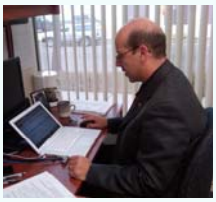


- Centred evenly, side by side, directly in front of user unless one is used more than the other
- Top of the screens should be at the same height
- Recommended viewing distance is farther than for a single monitor
- Colour schemes, contrast levels and brightness should be similar

Different Sized Dual Monitors

- Position larger monitor so top of screen is eye level or slightly below, then adjust the top of the smaller screen to match
- Place tight to each other
- Angle monitors inwards

Laptops



- Obtain an external keyboard and mouse
- Elevate laptop screen or get external monitor
- Take microbreaks
- Limit usage as much as possible

Smart Phones and Tablets

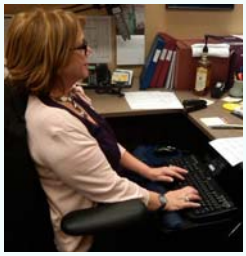
- Frequent use can lead to discomfort
- Thumb, wrist or forearm pain
- Neck and eye strain from viewing small screen
- Tablets present same concerns as laptops
  - Most complaints are related to head and neck positioning

Keyboards and Platforms

- Positioned directly in front of user & monitor at elbow height
- Flat or slight downward tilt
- Lower keyboard feet

Height of Keyboard

- Incorrect Height



- Correct Height

Trays/Platforms

Keyboard Wrist Postures

Larger shoulder breadth width may require an alternative keyboard style to decrease ulnar deviation

Alternative Keyboards

- Standard sized keyboards can cause awkward postures of the wrist
- Wave or split options

Mousing Basics

- Mouse at same height as keyboard
- Position as close to center of body as possible

Mouse Options

- Sensitivity adjustments
- Scroll feature
- Right and left handed use
- Track ball options are good as long as the thumb is not involved

Palm Supports

For Keyboard

- Only needed if wrist cannot maintain a neutral position
- Often built in to keyboards

For Mouse

- Maintains neutral wrist posture while mousing

Document Holders

- Use when referring between documents and computer
- Eliminates neck flexion and trunk rotation
- Position directly in front of monitor or as close as possible off to one side

Environmental Factors

- Lighting
- Heating, ventilation and air conditioning
- Noise

2. Organizational Hazards

- Organization of Work
  - Schedules and Breaks
  - Pacing and Deadlines
  - Communications and Training
  - Work Procedures
- Organizational Culture (psychosocial influences)
  - perceived characteristics of the work environment

3. Personal Factors

- Anthropometry
- Health Status & Medical History
- Fitness & Lifestyle
- Work Habits

Remember….

Even if you have a "perfectly" set-up workstation, if you sit for 8 hours you will still have aches and pains!!

Thank you!

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