Disclaimer

- None of the information in this training program should be construed as medical advice.
- Each person should consult the appropriate medical professional or therapist about optimum exercise regimens or treatments for suspected disorders.
Goal

• Reduce ergonomics-related injuries through education.
• Why?
  - A typical employee spends about 2,000 hours per year in the workplace.
  - Poor ergonomic conditions can take a toll on the human body.

Objectives

At the end of this session, you will be able to:
• Identify common ergonomic disorders.
• Understand the relationship between the human body and the work environment.
• Explore ergonomic assessment methods.
• Review practical applications to reduce the risk of injuries:
  - in an office environment,
  - in non-office environments, and
  - outside of work.
Ergonomic Injuries
Causes and Examples

What Is an Ergonomic Injury?
• Ergonomic injuries are caused by the presence of ergonomic risk factors, including:
  - awkward or sustained postures
  - force or contact pressure
  - exposure to extreme temperatures
  - quick motions or repetition
  - exertion or strain
  - exposure to vibration.
• Over time, one or more of these risk factors could lead to pain, injury, or disability.

Ergonomic Disorders
• Musculoskeletal Disorders (MSDs)
• Repetitive Motion Injuries (RMIs)
• Repetitive Strain Injuries (RSIs)
• Cumulative Trauma Disorders (CTDs)
History of Ergonomic Disorders

- Bricklayer’s Shoulder – Bursitis
- Carpenter’s Elbow – Epicondylitis
- Sheep Shearer’s Wrist – Carpal Tunnel Syndrome

Your Body
Function and Structure

Back Injury Prevention

- Of the lost workday workers’ compensation claims in 2016*
  - 30 percent involved upper extremities
  - 24 percent involved the trunk
- Teaching people about the structure and function of the back can help prevent injuries.
- Make this information a basic part of any workplace’s safety training.
Back Pain by the Numbers

- 85 percent of U.S. workers experience back pain during their working years.
- Strains were the leading nature of workers’ compensation claims (25 percent) in Texas in 2016.

Factors in Back Injury

- Poor physical conditioning
- Poor health habits
- Low stress tolerance levels
- Aging
- Fatigue
- Off-work activities
- Body mechanics

Body Areas

- Skeletal
- Muscular
- Nerves
Muscles

- Provide support
- Stretch and contract to produce movement

Nerves

Thirty-one pairs of nerves branch out from the spinal cord.
Ergonomic Assessment Tools

Qualitative Methods
- Qualitative assessment tools use observational data about a particular job.
- These methods usually require the least amount of formal training or effort to conduct.
- Examples:
  - OSHA Screening Tool
  - OSHA Computer Workstations Evaluation Checklist
  - WISHA Checklist

OSHA Screening Tool
- A very basic screening tool that can be used to identify areas of concern for potential MSD risk factors.
- Can also be used when an MSD is reported to an employer.
- Limitations:
  - No quantitative measurement to say how hazardous the job is.
  - Used purely for screening purposes.
OSHA Computer Workstations Evaluation Checklist

- A tool to provide a way for employers to comply with OSHA’s MSD hazard identification and controls requirement.
- Deals with neck, shoulder, hand, wrist, arm, back, and legs.
- Not appropriate for jobs without a computer workstation.

Washington Industrial Safety and Health Act Checklists

- Control exposure to MSD hazards in a labor-intensive workplace.
- Limitations:
  - Checklist is general
  - Best used as a preliminary tool
  - Must be followed up with risk analysis
- Caution Zone Checklist is conducted first.
- Hazard Zone Checklist is then conducted on all identified caution zones.

Semi-Quantitative Methods

- Semi-quantitative assessment tools use a combination of judgment data and simple quantitative data.
- Requires more effort to collect and analyze pertinent data.
- Examples:
  - Rapid upper limb assessment (RULA)
  - Rapid entire body assessment (REBA)
  - Rodgers Muscle Fatigue Assessment
Rapid Upper Limb Assessment (RULA)

• To investigate the exposure to risk factors for upper limb disorders.
• Risk factors considered include repetition, awkward or static postures, force, and time worked without a break.
• Limitations: some factors are weighted equally (example: a 5° twist or a 20° twist).

Rapid Entire Body Assessment (REBA)

• This tool is used to evaluate whole-body postural MSDs and risks associated with job tasks.
• Risk factors considered include awkward postures, load or force, coupling, and activity level.
• Has the same limitations as RULA.

Rodgers Muscle Fatigue Assessment

• Looks at the muscular effort (both static and dynamic) in relation to recovery time.
• Appropriate for jobs that require high frequency and duration and that have awkward postures.
• NOT appropriate for: non-fatiguing or seated jobs.
Quantitative Methods

- Quantitative assessment tools focus on measurable data based on static or dynamic strength criteria.
- Require more thorough knowledge and expertise to accurately perform calculations.
- Examples:
  - NIOSH Lifting Equation

NIOSH Lifting Equation

- The primary function of the NIOSH Lifting Equation is to find the **recommended weight limit (RWL)**, which defines the maximum acceptable weight load for a healthy employee to lift during the course of an eight-hour shift.
- It can also be used to find the lifting index (LI), which provides an estimate of the level of physical stress and MSD risk associated with lifting tasks.

Recommended Weight Limit (RWL)

\[ LC \times HM \times VM \times DM \times AM \times FM \times CM = RWL \]

- Is this weight too heavy for the task?
- Always uses a load constant (LC) of 51 pounds.
- “M” is the appropriate multiplier.
- Other variables:
  - H = Horizontal location of the object relative to the body
  - V = Vertical location of the object relative to the floor
  - D = Distance the object is moved vertically
  - A = Asymmetry angle or twisting requirement
  - F = Frequency and duration of lifting activity
  - C = Coupling or quality of the employee’s grip on the object
Reducing the Risk
Office Environments
Non-office Environments
Outside of Work

Office Environments

Work station setups typically include:
- phone
- chair
- desk
- monitor
- keyboard
- mouse
- lighting.

Out of Whack!
Hacker’s Hunch
Neutral Position – Standing

- Stand tall, shoulders back
- Pull in your stomach
- ‘Plumb line’ through midline of ear, shoulder, hips, knees, and ankles

Neutral Position – Sitting

- Sit tall
- Straight line – ears, shoulders, and hips
- 90° degree angle at elbows, hips, and knees
- Adjustable work surfaces

Risk Factors

Contributing factors:
- Excessive force
- Excessive repetition
- Awkward posture
- Localized pressure

Option:
- Use an electric stapler.
Telephone

Problems:
• Trapping receiver
• Constriction of median nerve
• Fatigue; head or neck pain

Option:
• Replace phone with a headset or speaker phone.

Office Chairs

Chair contact points:
1. Upper back
2. Lower back
3. Arms
4. Sitting area
5. Seat tilt
6. Seat height

Hazards?
Work Areas

- Adjustable height is best.
- Pad sharp edges.
- Maintain adequate leg room.
  - Don’t store items under your work area.

Work Surface

- If work surface is large, avoid excessive reaching.
- If work surface is small, remove clutter.

Monitors

- Place the monitor directly in front of you and as far away as possible while still being able to read clearly.
- Tilt the top of monitor farther from the eyes than the bottom.
- Adjust the monitor so the first line of text is at eye level.
What’s Wrong?

Keyboards

• Strike keys softly.
• Keep wrists in a neutral position.
• Don’t rest palms or wrists while keyboarding.
• Provide arm support.

Wrist Postures

The Arch

The Natural

The Lazy
Mouse

- Use mouse close to keyboard.
- Learn to mouse with both hands.
- Learn keystroke substitutes.
- Use whole arm and shoulder, not just wrist.
- Don’t angle wrist.
- Let go when not using.

Keep the Mouse Close

Wrong

Right

Self-Help Ergonomics

Everyone can do something.

- Clean and organize your work area.
- Keep only needed items in your work area.
- Keep frequently used items close.
- Move, stretch, or exercise.
- Take micro-breaks.
Non-Office Environments

Types of non-office environments:
• warehouse
• construction site
• vehicle
• agricultural
• commercial retail
• manufacturing
• medical

Actions and Controls

Contributing Actions
• Repetitive motion tasks
• Standing in place
• Materials handling
• Lifting in restricted areas

Control Types
• Engineering
• Administrative
• Work Practices

Repetitive Motion Tasks

• Tasks that consist of persistent and continual movement that can cause localized MSDs
• Can include things like butchering, moving boxes, carpentry, gardening, or assembly line tasks
Standing in Place

- Static standing can cause sore feet, leg swelling, varicose veins, general muscular fatigue, lower back pain, and neck stiffness.
- Found among retail workers, machine operators, assembly line workers, medical personnel, and others.

Materials Handling

- Handling means the employee’s hands move items by lifting, lowering, filling, emptying, or carrying them.
- Main physical risk factors include awkward postures, repetitive motions, forceful exertions, pressure points, and static standing.

Lifting in Restricted Areas

- Restricted work areas can cause awkward postures that create uneven pressure on the spine, shoulder, knees, and hips while lifting.
- Actions include:
  - bending
  - twisting
  - reaching
Engineering Controls

- Engineering controls are the preferred method of minimizing ergonomic risk factors because they are more permanent and effective.

- These include modifying, redesigning, or replacing:
  - work stations and work areas;
  - materials, objects, or containers’ design and handling;
  - hand tools used; or
  - equipment.

An example of an engineering control is installing height-adjustable workstations so employees can set them for the best height for a given task.

Administrative Controls

Administrative controls are changes in the way work is assigned or scheduled that reduce the frequency or duration of exposure to ergonomic risk factors.
### Administrative Controls

**Job rotation**
- Rotating employees among different tasks

**Job enlargement**
- Expanding the job tasks to use different muscle groups

**Work scheduling**
- Can help avoid excessive overtime or extended workdays

**Proper maintenance and housekeeping**
- Can reduce or eliminate awkward postures associated with reaching, bending, or twisting

**Sufficient breaks**
- Institute work-rest cycles with adequate recovery times

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### Work Practices

- Documented safety program for ensuring safe and proper work practices that are understood and followed by managers, supervisors, and employees.

- Should include procedures for:
  - proper work techniques,
  - employee training and conditioning, and
  - proper housekeeping.

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### Outside of Work

- Reduce outside factors that can contribute to higher likelihoods of ergonomic injuries.

- These can include:
  - dehydration
  - weak muscles
  - stress.
Dehydration

- Dehydration leads to aches and pains.
- Drink eight 8 ounces glasses of water daily.
- Liquor and caffeine don’t count. They are two powerful dehydrating agents. If you consume these, drink more water.

Weak Muscles: Strengthen Core

Stand up straight
- Whenever you are standing, make a conscious effort to stand straight, with your shoulders back.
- Draw your navel in and toward your spine to engage your abdominal muscles.
- Practice against the wall.

Strengthen Core

Consult with your doctor before starting any new strengthening program.
Stress Reduction

- Static positions are unavoidable to some degree.
- Simple stretching exercises can be performed either while seated or standing in place. Stretching:
  - helps to increase blood flow, and
  - reduces muscle fatigue.

Summary

In this session, we:
- identified common ergonomic injury causes and examples;
- examined the relationship between the human body and the work environment;
- explored the methods of ergonomic assessment; and
- reviewed practical applications to reduce the risk of injury in:
  - an office environment,
  - non-office environments, and
  - outside work.