



**Bureau of Workers'
Compensation**

UNDERSTANDING & IDENTIFYING ERGONOMIC RISK FACTORS



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OBJECTIVES

- Define ergonomics.
- Discuss ergonomic related injury frequency and cost.
- Discuss occupational risk factors that may cause musculoskeletal disorder injuries (MSDs).
- Discuss ergonomic control measures.
- Discuss various ergonomic resources and assessments.



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DEFINITION OF ERGONOMICS

- Fitting the task to the worker.
- Study of the relationship between worker and workplace.
- Balancing job demands and worker capabilities.



DOES OSHA HAVE AN ERGONOMIC STANDARD?



OSHA ERGONOMICS HAZARD CITATIONS

General Duty Clause

Section 5.(a)(1)

- Each Employer shall furnish to each of his employees employment and place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employee.



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OSHA ERGONOMICS CITATION CRITERIA

- Does an ergonomic hazard exist?
- Is the hazard causing, or is it likely to cause an injury?
- Does the recognized hazard cause serious physical harm to employees?
- Does a feasible means exist to reduce the hazard?



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Liberty Mutual. INSURANCE

- Top10 causes of the most serious nonfatal workplace injuries by direct cost and lost workdays.
- The *Liberty Mutual Workplace Safety Index* is based on information from:
 - Liberty Mutual;
 - Bureau of Labor Statics (BLS);
 - National Academy of Social Insurance.



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Accident Causes	Estimated National Workers' Compensation Direct Cost
Overexertion involving outside sources (handling objects)	\$12.63 billion
Falls on the same level	\$ 10.26 billion
Struck by object or equipment (being hit by objects)	\$5.66 billion
Falls to a lower level	\$ 5.07 billion
Other exertions and bodily reactions (awkward postures)	\$4.01 billion
Vehicle (motor crashes)	\$ 3.59 billion
Slips or trip without a fall	\$ 2.52 billion
Caught in or compressed by equipment or objects	\$2.19 billion
Struck against object or equipment (person colliding with objects or equipment)	\$ 1.87 billion
Vehicles (off-road vehicles incidents)	\$ 1.39 billion

OHIO BWC LOST TIME CLAIM INCIDENTS & COST 2020

Diagnosis	Number of Claims	Average Incurred Claims Cost
Carpal Tunnel Syndrome (CTS)	102	\$24,988
Disc Disorders	476	\$53,619
Sprain Upper Extremities	1,867	\$19,350



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ACUTE VS CHRONIC

Acute:

- Result from a one-time event.

Chronic:

- Result from cumulative events over time.
- Repetitive exposure to micro-traumas result in Musculoskeletal Disorder Injuries (MSDs).
- MSD symptoms are often ignored until the worker experiences chronic pain and a decrease in strength or function.

MSD UPPER EXTREMITY SYMPTOMS

- Tingling
- Numbness
- Chronic pain
- Decreased strength
- Swelling
- Change in skin color
- Pain from exertions



MSD INJURY TYPES

- Tendon
- Nerve
- Neurovascular



TENDON DISORDERS

Tendon disorders

- Effects the tendons and their sheaths.
- Often occur at or near a joint
- Tendon rubs against the bones and or ligament

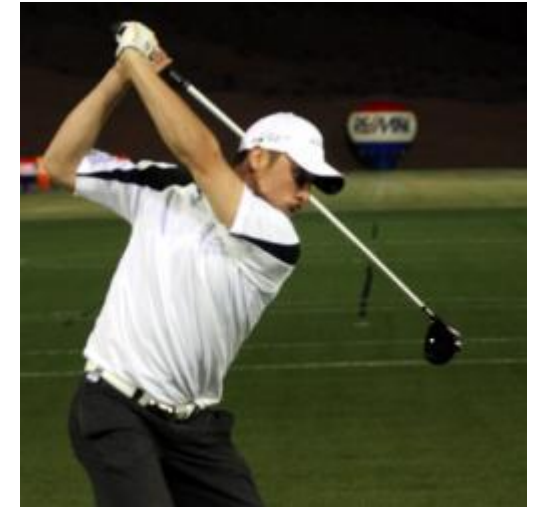


wiseGEEK

TENDON DISORDERS

Epicondylitis- Irritation to the tendon attached to the epicondyle of the elbow.

- Lateral epicondylitis-tennis elbow
- Medial epicondylitis-golfers elbow



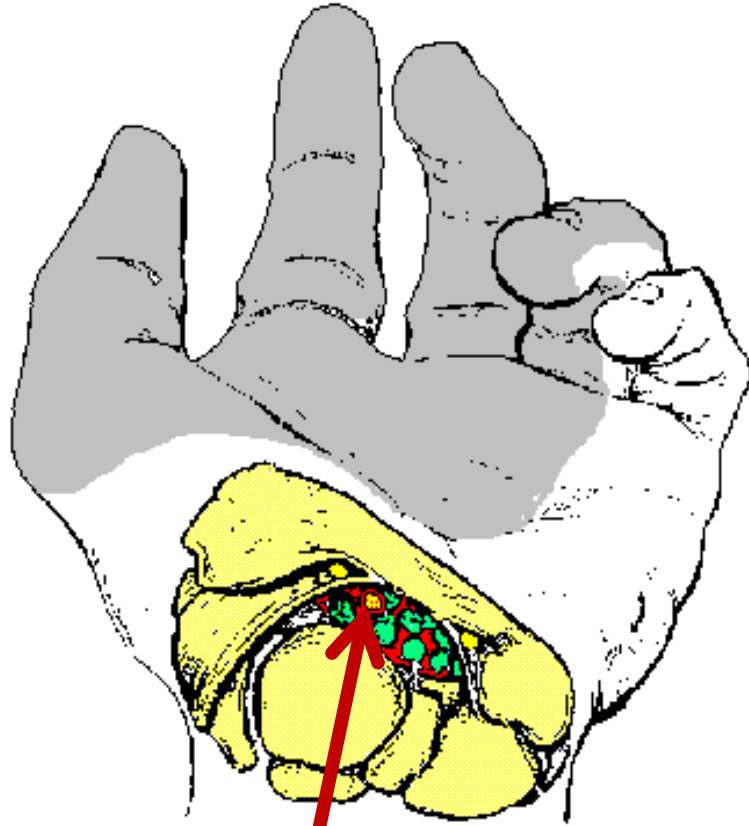


NERVE DISORDERS

- Nerve disorders can occur when work tasks expose the nerves to high force, repetition, and pressure.



Carpel Tunnel Syndrome (CTS)-Median nerve is entrapped due to swelling of the tendon sheaths.



Median Nerve



Palmar Side

Dorsal Side

Median Nerve

NEUROVASCULAR DISORDERS

- Involve the nerves and adjacent blood vessels.
- Vibration syndrome-Episodes of finger blanching due to complete closure of the digital arteries.



WHAT IS AN ERGONOMICS RISK FACTOR ?

- Elements or characteristics of a job task that have been identified to increase the likelihood of developing an MSD injury.



MSD RISK FACTORS

If a worker is exposed to combinations of

- **Repetition**
- **Forceful exertions**
- **Awkward postures**
- **Insufficient recovery time**

they are at risk of developing a

Musculoskeletal **D**isorder

WHAT'S CONSIDERED REPETITIVE ?

“Performance of the same motions or motion pattern every few seconds for more than two hours at a time.”

Silverstein



FORCE

- Mechanical stress to the soft tissues that compresses the tendons and nerves
- Sources of mechanical force:
 - tools
 - sharp edge of a desk or worktable



FORCE

- Categories of applied force:

LOW

0-2 lb.

MEDIUM

2-10 lb.

HIGH

10-30 lb.

Fine, L. J. et al., 1986



AWKWARD POSTURES

Job tasks that require the worker to assume awkward postures increases musculoskeletal joint force.



WWW.THERUBBERBOY.COM PHOTO BY SUPER SNAIL



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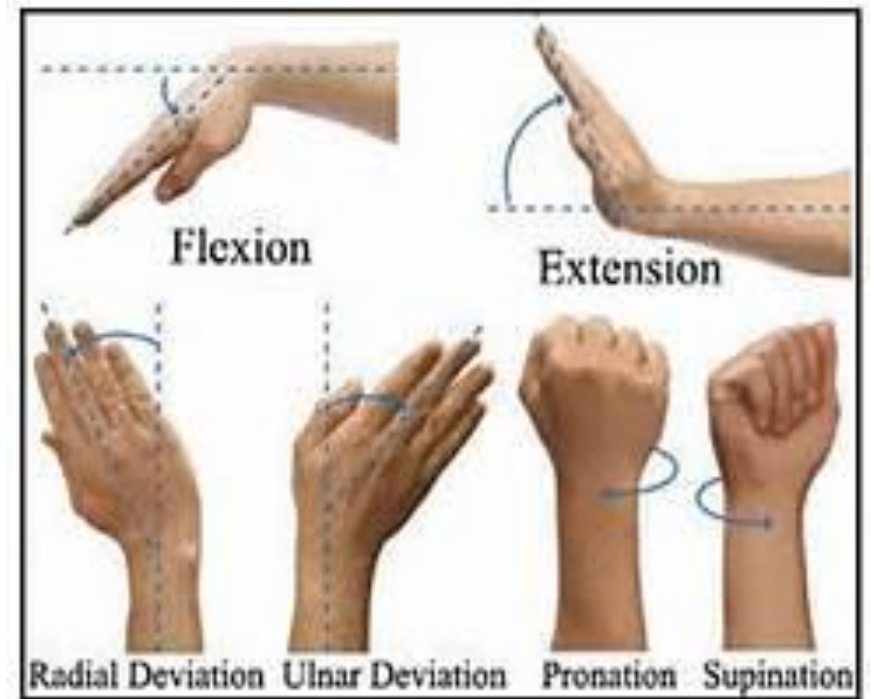
WWW.THERUBBERBOY.COM PHOTO BY SUPER SNAIL

NEUTRAL POSTURE



AWKWARD WRIST POSTURE

- As the angle of the wrist joints increase or decrease beyond midpoint, there is a decrease in hand strength.
- Hand grasping power is reduced up to 25% when the wrist is bent downward or to the side.



ERGONOMIC CONTROL MEASURES

Administrative Controls

- Training/education
- Job rotation
- Pacing
- Methods, policy & guidelines
- Job enlargement

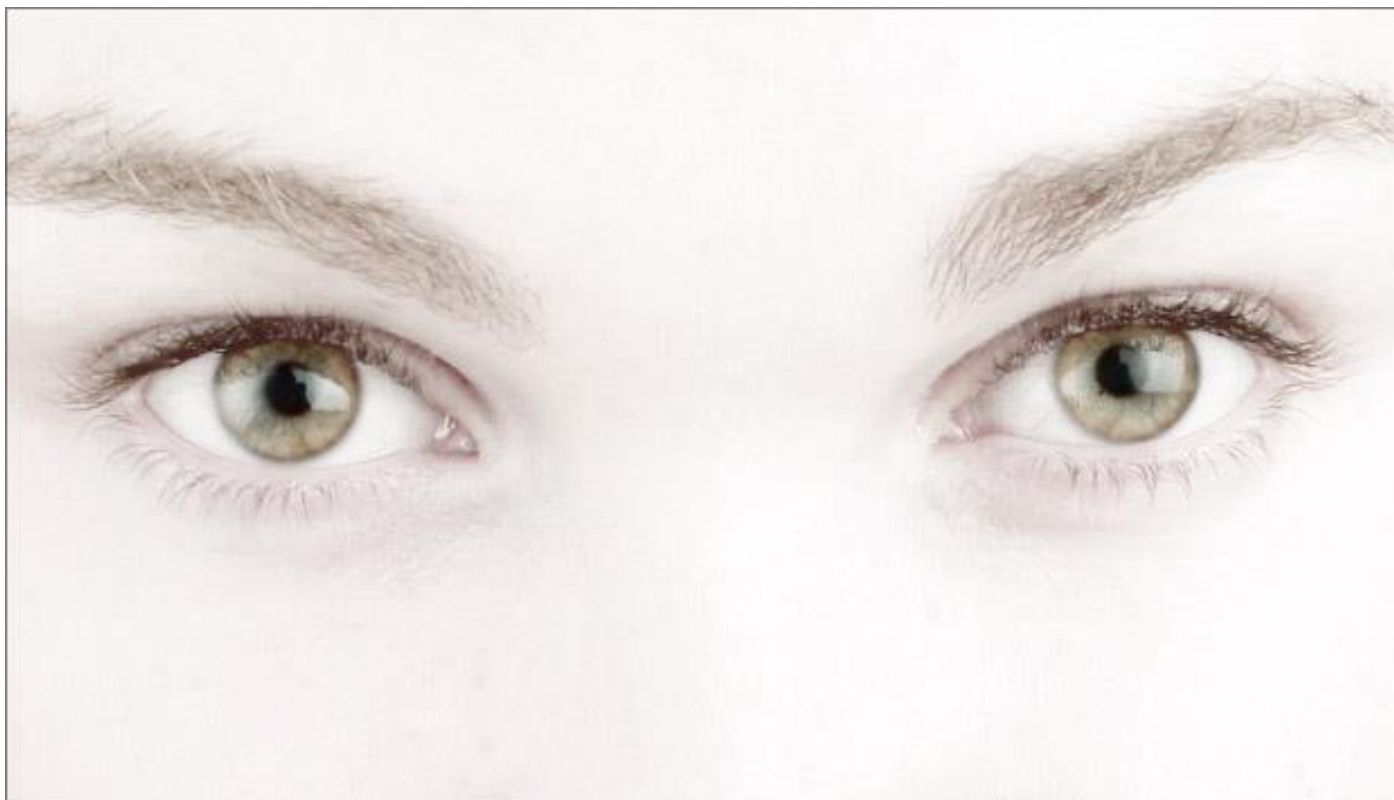
**Administrative controls can reduce the exposure to ergonomic risk factors, but they don't eliminate the risk factors.*

Engineering Controls

- Workstation design
- Workstation modifications
- Product flow
- Process modifications
- Mechanical assist



ERGO EYES



Manual Post Driving





MATERIAL HANDLING



POWERED DOLLY



LIFT GATES



WATER METER READING



RADIO METER SYSTEM



MANUAL LIFTING



VACUUM LIFT



LOADING COT INTO AN AMBULANCE



Power Ambulance Cot and Loading System



Cardio-Palmary Resuscitation



CARDIOPULMONARY RESUSCITATION (CPR) DEVICE





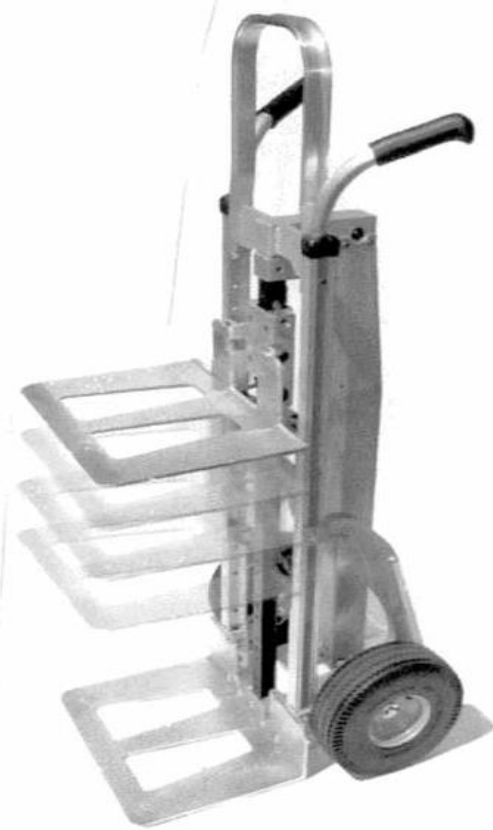
HEIGHT ADJUSTABLE LIFTERS

Work Safe.
Work Smart.
Work Done.



Lifting Buddy

- <http://www.thehumansolution.com>
- <http://www.roni.com>



Lift-O-Flex



TREE TRIMMING BRUSH REMOVAL



VERMEER MINI SKID STEER



AUTOMOTIVE RECYCLING



ENVIRO RACK-AUTOMOTIVE FLUID REMOVAL AND DISMANTLING SYSTEM



WRIST SPLINTS



- Evidence suggest that workers' with Carpal Tunnel Syndrome (CTS) can actually aggravate their injury by wearing a wrist splint while working.

Sources:

Cumulative Trauma Disorders: A Practical Guide to Prevention and Control. Government Institutes, Maryland; 1997

Cumulative Trauma Disorders: A manual for musculoskeletal disease of the upper limbs. Taylor & Francis Inc., Pennsylvania; 1992



LIFTING TRAINING

Research: Effect of training and lifting equipment for preventing back pain in lifting and handling: systematic review.

- The findings challenge widespread practice of advising workers on correct lifting technique.

Source: BMJ 2008,336:429

The BMJ previously known as the British Medical Journal is published by BMJ Group, a wholly owned subsidiary of the British medical Association.



BACK BELTS



- NIOSH **does not** recommend the use of back belts to prevent injuries among workers who have never been injured.
- Companies **should not** rely on back belts as a "cure all" for back injury, but should begin to undertake prevention measures which reduce the risks of lifting tasks.
- Although back belts are being bought and sold under the premise they reduce the risk of back injury, there is **insufficient scientific evidence** that they actually deliver what is promised.

*Source: NIOSH, Workplace use of Back Belts- Review and Recommendations
(Pub-No. 94-122)*

RESOURCES



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OSHA ERGONOMICS GUIDELINES

- OSHA developed industry-specific and task-specific guidelines to assist in reducing and preventing workplace musculoskeletal disorders.
- OSHAs voluntary guideline tools assist employers in recognizing and controlling ergonomics-related risk factors.

OSHA ERGONOMICS GUIDELINES

- Beverage Distribution
- Ergonomic Program Management Guidelines for Meatpacking Plants
- Foundries
- Nursing Homes
- Poultry Processing
- Retail Grocery Stores
- Shipyards

OSHA ERGONOMIC eTOOLS

- OSHA eTools provide interactive web-based information to address ergonomic hazards in specific industries.



OSHA ERGONOMIC eTOOLS

- Baggage Handling
- Beverage Delivery
- Computer Workstations
- Electrical Contractors
- Grocery Warehousing
- Printing Industry
- Sewing

*[eTools](#), [eMatrix](#), [Expert Advisors](#) and [v-Tools](#) /
[Occupational Safety and Health Administration](#)
([osha.gov](#))*



NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY & HEALTH (NIOSH) GUIDELINES

- Ergonomic Solutions for Retailers: Prevention of Material Handling Injuries in the Grocery Sector.
- Ergonomic Guidelines for Manual Material Handling.
- A Guide to Selecting Non-Powered Hand Tools.
- Elements of Ergonomics Programs.

ONLINE ERGONOMIC CALCULATOR

eREBA-A survey tool that will assess lower and upper limb postures.

eRULA-A survey tool that will assess the neck, trunk and upper limb postures.

- <http://www.ergopage.com/?q=node/27>

NIOSH Lifting Equation-Tool used to assess the manual material handling risks associated with lifting and lowering tasks in the workplace.

- http://www.ccohs.ca/oshanswers/ergonomics/niosh/calculating_rwl.html



FREE ONLINE ERGONOMIC CALCULATORS

- Ohio BWC Lifting Guidelines-Tool used to help design lifting tasks to reduce the frequency and severity of initial and recurring back claims
 - <https://www.bwc.ohio.gov/employer/programs/safety/Ergoliftguide.asp>
- OSHA Injury Cost Calculator-Tool uses a company's profit margin, the average costs of an injury or illness, and an indirect cost multiplier to project the amount of sales a company needs to generate to cover those costs.
 - <http://www.osha.gov/dcsp/smallbusiness/safetypays/estimator.html>



ONLINE ERGONOMIC RESOURCES

Human Factors and Ergonomic Society

- <https://www.hfes.org//Web/Default.aspx>

OSHA

- <https://www.osha.gov/SLTC/ergonomics/index.html>

Washington State Department of Labor and Industry

- <http://www.lni.wa.gov/safety/>

QUESTIONS

