ERGONOMICS

By
Raylene M. Blandino M.S., PA-C
ERGONOMICS-What is it?

- Derived from two Greek words:
  - "Nomoi" meaning natural laws
  - "Ergon" meaning work
- Hence, ergonomists study human capabilities in relationship to work demands
As early as 18th century doctors noted that workers who required to maintain body positions for long periods of time developed musculoskeletal problems.

Within last 20 years research has clearly established connections between certain job tasks and RSI or MSD.
What two elements are at work?

1) **Static work**: musculoskeletal effort required to hold a certain position, even a comfortable one.

Example: sit & work at computers; keeping head and torso upright requires small or great amounts of static work depending on the efficiency of the body positions we chose.
Elements at work (cont)

- **Force**: amount of tension our muscles generate.
  Example: tilting your head forward or backward from a neutral, vertical position quadruples the amount of force acting on your lower neck vertebrae.

- Increased force is $\frac{d}{t}$ increase in muscular tension needed to support head in a tilted position.
3 Main Ergonomic Principles:

1. Work activities should permit worker to adopt several different healthy and safe postures.
2. Muscle forces should be done by the largest appropriate muscle groups available.
3. Work activities s/b performed with joints at about mid-point of their ROM (esp. head, trunk, UE)
FACTS

- The average person working at a keyboard can perform 50,000 to 200,000 keystrokes a day.
- Overexertion, falls & RMI are the most common cause of workplace injury.
- An average of 125,000 back injuries due to improper lifting each year.
- Muscles overuse results in tiny tears in the muscles and scarring; these contribute inflammation and muscle stiffness.
A Bit of Anatomy!!

- Overuse and small repetitive movements ie: CTD, RSI, MSD disturb balance of muscles, tendons, ligaments and nerves.
- Brachial plexus: nerve group that supply muscles and skin of UE, course down side of front of neck and become median, ulnar and radial nerves.
- Nerves send signals to muscles to contract.
- When nerve compressed feel sensation somewhere b/w point of compression and fingertips.
What causes Nerve Compression or **Entrapment**?

1) Repeated motions

2) Tight muscles

3) Inflammation of surrounding tissues

4) Misalignment of the nerve
What are 4 Common Nerve injuries?

I. **Thoracic Outlet Syndrome:** brachial plexus compression d/t muscle tightness side of neck from poor head position or slumped posture.  
   **S/Sx:** numbness/tingling in hand, made worse w/overhead activities or cradling phone b/w ear and shoulder
II. **Radial tunnel syndrome:** compressed radial nerve @ outside of elbow d/t repetitive wrist & finger extension or turning of forearm

S/Sx: Sensations from elbow to base of thumb w/ wrist weakness a common sx
Nerve injuries (cont)

III. **Cubital tunnel syndrome**: ulnar nerve compression inside of the elbow d/t repetitive bending of elbow or resting your elbow on a hard surface

S/Sx: numbness or tingling ↑ and ↓ inside of arm w/ tingling to ring & little fingers
Nerve injuries (cont)

IV. **Carpal tunnel syndrome**: compression of median nerve at level of carpal tunnel

Where is carpal tunnel? Formed @ wrist by ligament over the carpal bones in hand

S/Sx: numbness or tingling in thumb, index, or middle finger & ½ of ring finger; often awakened @ night by hand “falling asleep”

Sx increased by driving or attempting to hold objects; dropping objects is a common complaint
Tendons and Tendonitis

- Tendons are connective tissue that attach muscle to bone; have little stretch or rebound
- Tendon overuse, static or prolonged position = inflammation or tendonitis
- Tendons of wrist & hand very small; @ high risk for injury w/ overuse
- “Tennis elbow” or lateral epicondylitis affects finger extensor tendons outside of elbow
- “Golfer’s elbow” or medical epicondylitis affects finger flexor tendons inside of elbow
What to do ??

PREVENT, PREVENT, PREVENT !!!

a) Warm up & stretch before activities that are repetitive, static or prolonged
b) Take frequent breaks from ANY sustained posture every 20-30 minutes
c) Respect pain- ▲ positions or stop painful activity
d) Recognize early signs of inflammatory process, & tx early
Maintain Neutral Posture

a) Maintain erect position of back & neck w/ shoulders relaxed
b) Position equipment & work directly in front of and close to your major tasks
c) Keep upper arms close to the body, elbows 90-100 degrees
d) Keep feet flat on floor, upper body weight resting on "sits bones"
e) Wrists as neutral as possible; safe zone for wrist movement is 15 degrees in all directions
f) Avoid bending neck forward for prolonged periods of time (*remember quadruple the force); use a copy holder

g) Avoid static positions for prolonged time; muscles fatigue---MOVE to ↑ circulation!
Modify Tasks:

a) Alternate activities frequently; rotate heavy &/or repetitive tasks w/ lighter less repetitive ones.
b) If sx become worse REASSESS task setup & look for alternative methods
c) Avoid repetitive or prolonged grip activities
d) Avoid pinching w/ wrist in flexion or wrist deviation (bending to side)
e) Take frequent breaks to stretch & rest hands
Body Mechanics

- Use the largest joints & muscles to do the job
- Use 2 hands to lift rather than one, even with light objects and tasks.
- Avoid lifting w/ the forearm in full pronation (palm down) or supination (palm up)
- Slide or push & pull objects instead of lifting
- Keep reaching to a minimum
- Carry objects close to body at waist level
Correct & Incorrect Techniques

Correct lifting technique

Incorrect lifting technique

The wrong way!

The right way!
Good and Bad of “TILT”

Negative tilt allows the wrist to be in a neutral position
ERGO REMINDERS from Stretchbreak.com

Keep your elbows close by your side.

Keep your wrists comfortably straight.

Avoid reaching out for the mouse or keyboard.
Practice Wellness at Work and Home!

Exercise

Nutrition

Relaxation

Body

Mind

Spirit
An ounce of Prevention is worth a pound of cure!

Ohhhhhhh.....I shouldn't have eaten that mouse