



A Union of Professionals

Health and Safety Program

ERGONOMICS: What's It All About?

ERGO/ NOM/ ICS

work / law / study of

The central “work law” of ergonomics is:

**Design the Job to fit the Worker.
Don't force the Worker to fit the Job!**

- ❖ While ergonomics is a rapidly growing field in its own right, much of ergonomics is basic, **common sense**.
- ❖ In fact, we practice ergonomics often without even thinking or knowing about it.
- ❖ For example, when we get into a car to drive, we automatically adjust the seat, mirrors and steering wheel for our individual needs.
- ❖ Using the same principles, your workplace must be adjustable to meet your individual needs.

WORK
shouldn't
HURT

What are the Risk Factors?

- Risk Factors are actions or conditions that increase your chance of being injured on the job.
- Any one or a combination of risk factors can cause an injury/illness.
- The more risk factors that you are exposed to, the greater the chance for developing an injury/illness.

Physical Risk Factors:

- ❑ **Repetition** – performing the same tasks in the same way with the same body part over and over all day.
- ❑ **Posture**
 - **Sustained Posture** – Prolonged fixed (static) postures without adequate breaks are considered an important factor contributing to developing a work-related injury/illness.
 - **Awkward Posture** - Working in awkward postures can stretch, pinch or squeeze soft tissues such as tendons, nerves and blood vessels.
 - **Forward Head Posture** – Slouching and rounded shoulders mechanically increases the weight of the head on the neck by 300%. Additionally, a rounded upper back requires that the head bend backward slightly to restore level vision. This causes pressure on the soft tissues at the base of the skull, leading to chronic headaches.

What are the risk factors?

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- ❑ **Forceful Exertions** – Exertion refers to the amount of physical force you use to perform a task. The greater the effort, the harder your muscles have to work.
- ❑ **Soft Tissue Contact Pressure** – Concentrated pressure on soft tissues, such as nerves and blood vessels.
- ❑ **Vibration** – Whole body vibration increases the risk of chronic low back pain. Over time, this can cause permanent damage to the spine. Use of some power tools, such as air hammers, can also cause health problems.

Work Organization and Job Design Risk Factors:

Work Organization and Job Design refers to the way our jobs are structured, carried out and supervised. Risk factors in this category include:

- ❑ Scheduling Demands
- ❑ Infrequent or Inflexible Breaks
- ❑ Limited Degree of Control over Work
- ❑ High Level of Stress
- ❑ Limited Support from Supervisors

Environmental Factors:

Environmental factors refer to the environment in which we perform our job. Risk factors in this category include:

- ❑ Temperature Extremes
- ❑ Noise
- ❑ Student Behavior/Violence

What are the risk factors?

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Non-Work Factors:

Many factors unrelated to work may contribute to health problems. Some non-work risk factors include:

- Medical Conditions (diabetes, pregnancy, obesity, rheumatoid arthritis, thyroid disease, gout, menopause, previous injuries, etc.)
- Sports (racket ball, tennis, golf and throwing sports.)
- Recreational Activities (crafts like knitting, sewing, playing musical instruments, etc.)
- Overall Fitness Level (a more sedentary life leads to tight muscles and sluggish circulation.)

Musculoskeletal Disorders (MSD's) What Are They?

MSD's are a category of illness that are the result of **gradual and repeated exposure** to workplace risk factors. MSD's include a wide range of injuries to the muscles, tendons, tendon sheaths, nerves, ligaments, and discs of our arms, hands, wrists, shoulders, neck, back, and feet.

- ❖ **Muscles** – can be strained, torn or crushed. Muscles are made up of thousands of tiny fibers filled with blood vessels that supply them with oxygen and nutrients.
 - ❖ **Tendons** – can be strained, torn or inflamed. Tendons are white rope-like tissue that attaches muscle to the bones. They transfer force and movement from muscle to bone.
 - ❖ **Tendon Sheaths** – can be inflamed. Tendon Sheaths are the protective wrapping for the tendons, which contain a fluid so that the tendon can slide back and forth within the sheath.
 - ❖ **Nerves** – can be pinched or compressed. Nerves transmit messages by electrical impulse throughout the body.
 - ❖ **Ligaments** – can be sprained or fibers torn from the bone. Ligaments are rope-like fibers that connect one bone to another to form a joint.
 - ❖ **Discs** – can slip or bulge. Discs are the shock absorber type material between the vertebrae of the spine.
- There are many different kinds of specific musculoskeletal disorder diagnoses – such as carpal tunnel syndrome, tendinitis, and sciatica. Unfortunately, it is not uncommon to have several different MSD's at once.

Musculoskeletal Disorders:

What are they?

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- MSD's are considered illnesses and not injuries because they develop over time and not from a single "trauma" like falling and breaking your arm.

MSD Warning Signs and Symptoms

- It is **extremely important** to recognize the warning signs of an MSD in order to take proactive steps to correct the problems causing the pain.
- MSD's can become completely and permanently disabling if conditions are not corrected.
- You owe it to yourself to see a physician if you are experiencing some of the following symptoms:
 - ❑ Chronic Pain – burning, aching, shooting, throbbing
 - ❑ Dull Aches
 - ❑ Tightness, Tenderness and/or Swelling
 - ❑ Muscle Fatigue
 - ❑ Decreased Range of Motion
 - ❑ Tingling, Numbness or Loss of Sensation – especially at night
 - ❑ A Feeling of Heaviness in your Hands and Arms
 - ❑ Difficulty Writing or Holding a Pen
 - ❑ Pain in Hand/Arm/Shoulder/Leg that Wakes You at Night
 - ❑ Frequent Clumsiness – you need to concentrate to grab your keys or hold a coffee mug
 - ❑ Difficulty Using Your Hands – turning door knobs, steering wheels, turning pages, buttoning
 - ❑ Frequent Self Massage of Neck, Hands, Forearm, Legs
 - ❑ Loss of Strength – difficulty opening jars, turning faucets
 - ❑ Cold Hands/Hands that Fall Asleep

MSD Symptoms: What You Might Expect

- MSD symptoms can be mild, but they can become so intense that it becomes difficult to perform everyday tasks such as opening a jar, pouring from a jug, or fastening a button.
- MSD's usually **develop gradually** over time and often symptoms appear in the middle of the night. Therefore, you might think the occasional pain is a sign of "old age" or that you slept "funny."
- Also, many of us ignore occasional pain thinking it will eventually go away.
- A serious MSD can develop only months after symptoms first appear, or it could take years.
- It is very important that you pay attention to these early warning signs and get proper medical attention immediately.
- The longer you wait the more damage can occur and it may be irreversible.
- In general, the more intense and frequent the symptoms, the more serious the MSD is likely to be.
- However, it is important to know that **symptoms will progress differently in each individual.**

Anatomy: What Causes the Pain

MSD illnesses can affect many parts of the body, including the hands, wrists, forearms, shoulders, neck, legs, feet and back. One of the most common areas of pain and injury are to the back.

THE BACK:

Back injuries/illnesses happen to workers from a variety of tasks, including heavy lifting, performing tasks in awkward postures, and constant standing or sitting.

Types of Injuries:

- ❑ The lower part of your back holds most of the body's weight. Even a minor problem with the bones, muscles, ligaments or tendons in this area can cause pain whenever a person stands, bends, or moves around.
- ❑ With inflammation the **muscles can spasm** and cause back pain and a reduction in the ability to move.
- ❑ A disc can **pinch or irritate a nerve** from the spinal cord, causing pain that runs down the leg below the knee, called **sciatica**.
- ❑ Sometimes problems with a disc can cause pain or numbness in your arms and fingers, called a **cervical herniated disc** (top part of the spine).
- ❑ The disk is subjected to different types of stress as we use our backs each day. Every time you bend or move, these discs compress with the motion of the spine.

Contributing Factors to Back injuries/illnesses:

- ❑ **Posture:** Poor or awkward posture plays a significant role in causing back pain. When you force your body to remain in the same position for long periods of time, it becomes tense and fatigued. Your back has natural curves that form an "S" shape which must be maintained to balance the weight of your body and keep your head up straight.
- ❑ **Poor Physical Condition:** Your stomach muscles provide much of the support needed by your back. Good physical condition in general is important for preventing strains, sprains, and other injuries.

Anatomy: What causes the pain?

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- ❑ **Stress:** Tense muscles are more susceptible to strains and spasms.
- ❑ **Overdoing It:** Not lifting properly also has a significant impact on the health of your back. You should always remember to **ASK FOR HELP** when lifting a student or any heavy load.

SCIATICA:

Sciatica is pain which runs along the large sciatic nerve from the lower back down through the buttocks and along the back of each leg.

This pain is usually caused by pressure on the nerve from a herniated disc, which is also known as a bulging or ruptured disc or a pinched nerve.

The pain experienced will vary by the individual, from mild and infrequent to severe and even disabling. Most of the time, sciatica only affects one side of the body. While sciatica can be very painful, it is rare that permanent nerve damage (tissue damage) will result.

One or more of the following symptoms may occur:

- Pain in the buttocks and/or leg that is worse when sitting
- Burning or tingling down the leg
- Weakness, numbness or difficulty moving the leg or foot
- A constant pain on one side of the buttocks
- A shooting pain that makes it difficult to stand up

TENDINITIS:

Muscles are attached to the bones by tendons. **Tendinitis** occurs when a tendon becomes inflamed (irritated, swollen). This inflammation is usually caused when a muscle/tendon is repeatedly tensed or rubbed against another structure, such as a bone.

Tendinitis can affect any area where in your body that there is a tendon. It commonly affects the hand and forearm region of the body, the elbow region, and the shoulder region, depending upon the activity and muscles used and which tendon is inflamed.

Anatomy: What causes the pain?

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Most commonly, **tendinitis** occurs as a result of injury or overuse of a susceptible body part. Risk factors for overuse/injury include poor posture, using the affected body part in an awkward position, and poor physical condition.

CARPAL TUNNEL SYNDROME:

Most everyone has heard of the term carpal tunnel syndrome. **Carpal tunnel syndrome** is where there is a pinched nerve at the wrist. This nerve is called the median nerve. It is the nerve that controls the first 3 or 4 fingers.

The median nerve enters the hand by passing between the bones of the wrist through a very narrow channel called the carpal tunnel. If anything causes that carpal tunnel area to close in on the nerve, such as the tendons swelling within that carpal tunnel, the nerve becomes pinched or irritated.

The nerve function is then reduced and the hand develops numbness, pain, and weakness and other symptoms. Risk factors for the development of CTS include forward head posture (slouching); sustained posture and repetition of tasks.

How To Get Good Medical Care

It is *extremely important* to find the right health care provider. Because most doctors are not trained in work-related injuries and illnesses, you may need to seek out different types of providers, and often more than one.

The treatment of MSD's:

- Vary by individual.
- The process may be lengthy.
- May require restricted work and leisure activities.
- May include changes to your vehicle, tools or work methods.

Generally, the treatment should start with a *conservative* approach, which may rely on one or more of the four treatments:

1. *Motion Restriction* of the affected limb using braces or splints;
2. *Heat or Cold Applications* to relieve pain and help the recovery process;
3. *Pain Medication* (request side effects);
4. *Specific Physical Exercises*, massage, physical and occupational therapy, and stretching.

The last possible treatment you should consider is surgery and always get a second opinion. The reason for this is that surgery doesn't always correct the problem, especially if you return to the same job that caused the illness in the first place.

Be aware that:

- ❑ MSD's may not show up on x-rays or MRI's.
- ❑ Splints can lead to further injury if not fitted/used properly.
- ❑ It is also important not to return to work too soon – these illnesses can become permanent.

Try to seek out specialists in soft tissue injuries and/or hand and upper extremities such as:

Occupational Medicine Physicians - Medicine dealing with the effects of the work environment on human health.

How to Get Good Medical Care

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Physiatrists - Physicians who specialize in Physical Medicine and Rehabilitation and are specialists in the diagnosis and treatment of musculoskeletal injuries and pain syndromes.

Osteopaths - Osteopaths diagnose, treat and provide preventative advice on the musculoskeletal system of the body, using manual techniques (e.g. soft tissue stretching, muscle relaxation, gentle mobilization) to alleviate stresses to improve the body's function.

Orthopedists - Orthopedic surgeons are the classic "Sports Doctor." This is based on the idea that most sports injuries are orthopedic related (muscle, tendon, ligament and bone injuries). They are often the specialists who cast broken bones.

Sports Medicine Specialists – usually work with and/or are orthopedists that specialize in specific areas of sports related medicine – both preventative and corrective.

Also consider treatments such as massage therapy, acupuncture and other holistic types of practice.

Seek referrals from:

- ❑ Your Union, co-workers, family and friends.
- ❑ Providers recommended by MSD patients – www.engr.unl.edu/ee/eeshop/findadoc.html.
- ❑ Physician referral service at local hospital.
- ❑ *Directory of Medical Specialists* in library.
- ❑ “Physician and Surgeon Guide” in Yellow Pages.
- ❑ The Association of Occupational and Environmental Clinics: 202-347-4976, www.aoec.org.

TYPES OF MUSCULOSKELETAL DISORDERS

There are many different kinds of MSD's – muscle and tendon disorders, peripheral nerve disorders, and circulation and nervous system disorders. It is not unusual to have several different injuries at once. Below is a description of some of the more common MSD's seen.

Muscle and Tendon Disorders

Disorder	Description/Cause	Symptoms
	<u>General</u>	
<i>Myositis</i>	Inflammation of muscle fibers and fascia (connective tissue). Caused by overuse. Causes muscle tenderness – worsened by stretching.	Muscles are sore to the touch, burning sensation
	<u>Hand and Forearm Region</u>	
<i>Extensor Tendinitis</i>	Affects Muscles that extend (straighten) the fingers. Caused by holding hands in the “stop traffic” position.	Pain on the top of the hand near the wrist.
Ganglion Cysts: a tendon sheath or synovial lining disorder	Bumps beneath the skin surface on top of the hand, above and inside the wrist, and around the nails and knuckles. . Ruptured sheath swells up with synovial fluid, causing a “Bible” bump. (People used to use Bibles to smash them.) From excessive bending and/or deviating the wrist or other joint.	Aching pain and weakness.

Type of Musculoskeletal Disorders

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<i>Flexor Tendinitis</i>	Affects muscles used to bend fingers. Caused by excessive finger motion or gripping of objects.	Pain in fingers.
Tenosynovitis Stenosing Tenosynovitis: Types: DeQuervain's Disease and Trigger Finger	Irritation caused by the tendon and tendon sheath rubbing together. Tendon moves with great difficulty through the swollen sheath. DeQuervain's Disease: affects tendons on side of wrist at base of thumb. Trigger Finger: tendon gets locked in swollen tendon sheath.	DeQuervain's Disease: acute pain where wrist and thumb meet when moving thumb or doing "wringing-out" tasks. Trigger Finger: locking of finger in bent position.
	Elbow Region	
<i>Lateral Epicondylitis</i>	Tendons become irritated. Pain is felt from the elbow down the forearm, and on the outside of the elbow. Known as tennis, bowler's or pitcher's elbow.	Pain on outside of elbow when straightening arms or contracting them against resistance.
<i>Medial Epicondylitis</i>	Known as golfer's elbow. From rotation of forearm and bending of wrist at the same time.	Pain on inside of elbow.
	<u>Shoulder Region</u>	
<i>Bicipital Tendinitis</i>	Where biceps muscle tendon attaches to the shoulder joint. From slumped posture or tasks that require reaching far or high.	Pain when raising arms to or from a task that is too high or too far away.
Rotator Cuff Tendinitis: the most common shoulder tendon disorder.	An inflammation of the band of tendons that run from the back of the shoulder to a narrow slot under the collar bone. Poor posture causes pinching of the tendons by bones in the shoulder.	Pain when reaching behind you with arms in "winged" position.

	<u>Neck and Scapular Region</u>	
Trapezius Myositis/Spasm	Inflammation of the trapezius muscle from repetitive trauma and/or overexertion injury.	Muscle guarding; pain between neck and shoulder; limited neck range of motion.
Paraspinals Rhomboid/Spasm	Inflammation of paraspinal and rhomboid muscles in the back from repetitive trauma and/or overexertion injury; may be caused by disk bulge or degenerative joint disease.	Muscle guarding; limited neck range of motion.

Peripheral Nerve Disorders

Disorder	Description/Causes	Symptoms
<p>Carpal Tunnel Syndrome: Affects median nerve in wrist. The carpal tunnel is the bracelet of bones and ligament below the wrist. All the fingers' tendons, tissues, arteries, veins and nerves pass through it.</p>	<p>The lining of the carpal tunnel becomes irritated and swells. Because the carpal tunnel can't expand in response to the swelling, there is pressure on the median nerve. Caused by excessive wrist and finger movement.</p>	<p>Pressure on the median nerve causes numbness and tingling in thumb and fingers; sleep interruption due to pain; numbness, and/or tingling in the hands; dropping objects.</p>
<p>Cubital Tunnel Syndrome: (Ulnar nerve in elbow)</p>	<p>Entrapment in the underarm of the ulnar nerve. From holding elbows bent at right angles for prolonged periods.</p>	<p>Loss of sensation, numbness, tingling and muscle atrophy.</p>
<p>Guyon's Canal Syndrome: (Ulnar nerve in wrist.)</p>	<p>Compression of the ulnar nerve in another wrist tunnel near the carpal tunnel.</p>	<p>Loss of sensation, numbness, tingling and muscle atrophy.</p>
<p>Radial Tunnel Syndrome: Radial nerve in forearm</p>	<p>Compression of the radial nerve.</p>	<p>Pain on both sides of the forearm, difficulty in making a fist. Sometimes mistaken for tennis elbow (lateral epicondylitis).</p>

<p>Tarsal Tunnel Syndrome</p>	<p>A condition in which the nerve that supplies feeling to the foot gets squeezed as it passes through the tarsal tunnel canal.</p>	<p>Numbness or pain; tingling sensation that shoots down into the</p>
<p>Cervical Radiculopathy:</p>	<p>Nerve roots become irritated by pressure from a bulging disk or by narrowing between vertebrae. Compression of the cervical disks in the neck making head movement painful.</p>	<p>Pain when moving head; weakness in shoulder and upper arms; possible numbness in fingers. Bulging Disk: muscle spasm in the neck in the morning, difficulty swallowing, limited neck movement.</p>
<p>Sciatica</p>	<p>Inflammation/compression of sciatic nerve (lower back, buttocks, back of leg). This nerve provides sensation and controls the muscles of the lower leg. May be caused by disk problems in low back, which can be aggravated by poor posture and extended periods of sitting.</p>	<p>One of the earliest signs of pressure on a nerve root is numbness in the area supplied by the nerve. Severe shooting pain running down back of thigh and leg; tingling or pain in foot; overall weakness of affected leg.</p>
<p>Spinal Stenosis</p>	<p>Degeneration of the spine resulting in a narrowing of the spinal canal - the bony tube where the spinal nerves are located.</p>	<p>Causes all of the nerves within the spinal canal to become inflamed, and fail to work properly. Causes numbness, which can involve both of the legs.</p>

Neurovascular Disorders

Disorder	Description/Causes	Symptoms
Thoracic Outlet Syndrome	Compression of blood vessels and arteries between neck and shoulder. Involves shoulders and arms. From carrying heavy loads; working with arms elevated; reaching above shoulder level.	Pain in arms; numbness, coldness, weakness in fingers, hand and forearm.
<i>Raynaud's Syndrome</i>	A disorder of blood circulation in the fingers, sometimes called "white finger," "wax finger," or "dead finger." It is most commonly associated with hand-arm vibration.	If not detected in the early stages, the disorder can permanently impair blood circulation in the fingers.