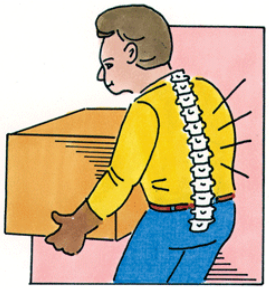
LIFTING AND ERGONOMICS



Most heavy objects are usually lifted by forklifts, hoists, dollies, and other types of equipment. However, sometimes it is necessary to load or unload materials by hand.

In addition, jobs can expose workers to specialized tasks, higher assembly line speeds, and increased repetition that can be related to chronic or acute injury. Workers' hands, wrists, arms, shoulders, backs, and legs may be subjected to repetitive twisting, forceful, or flexing motions; excessive vibration; and awkward postures during a typical workday. Recognizing ergonomic hazards in the workplace is the first step in improving worker protection.

BASICS OF SAFE LIFTING

To avoid injury, it is important to follow proper lifting procedures.

1. **Size up the load before trying to lift it**. Test the weight by moving one of the corners. If the load is too heavy or of an awkward shape, the best thing to do is:
    - Get help from a co-worker.
    - Use a mechanical lifting device.
    - Break down the load into smaller parts if you can.
2. **Make sure you can carry the load where you need to go before attempting to move it**. Also, make sure your path is clear of obstacles and that there are no hazards, such as spilled grease or oil in your path. Turn your body by changing foot positions, and have sure footing before setting out.
3. **Bend the knees.** This is the single most important rule when lifting moderate to heavy objects.
    - Position your feet close to the load.
    - Center yourself over the load.
    - Bend your knees and get a good hand hold.
    - Straighten your legs to lift straight up, smoothly.
    - Allow your legs, not your back, to do the work.
4. **Do not twist or turn your body once you have made the lift.** Keep the load close to your body, and keep it steady. Avoid any sudden twisting or turning.

5. **Set the load down properly.** Setting the load down is just as important as lifting it. Lower the load slowly by bending your knees, letting your legs do most of the work. Don't let go of the load until it is securely in place.

6. **Always push, not pull, the object when possible.** When moving an object on rollers, for example, pushing puts less strain on the back and is safer, should the object tip.

PLANNING AHEAD

Planning ahead makes sense. If you know certain loads will have to be carried from storage, place the objects on racks, not on the floor, whenever possible. That way, the load will not have to be lifted from the floor. Do not attempt to carry loads that are clearly too heavy for you. Long objects, such as pipes and lumber, may not be heavy, but the weight might not be balanced. Such objects should be carried by two or more people.

If a heavy load can be split up into smaller ones, you're better off doing that, even if loading takes a few extra minutes. Trying to lift it all at once may be asking for trouble.

When catching falling or tossed objects, your feet should be firmly planted, with your back straight and your knees slightly bent. Your legs should absorb the impact, not your back. If you're working on something low, bend your knees. Keep your back as straight as possible. Bending from the waist can lead to back pain. In both of these situations, frequent rest breaks are necessary to keep from getting back fatigue.

WHAT ARE BACK INJURIES?

Sprains and strains are the most common types of back injury. Your back can be injured by improper lifting, falling, auto accidents, and sports activities. But of these, lifting improperly is a big cause of back pain and injury.

Problems with the lower back are a frequent cause of lost work time and workers' compensation.

Here are some things that can go wrong with the back:

- **Strains and sprains** can result from injury to muscles and ligaments that support the back. A torn ligament will result in severe back pain.
- **Ruptured or slipped disk** occurs when the disk (vertebral cushion) presses on a nerve.
- **Chronic tension or stress** can result in muscle spasms and aggravate persistent and painful backache.

- **Other conditions** such as pain "referred to the back" from other organs, such as the kidneys and prostate, can result in nagging back pain.

WHY BACK PAIN HAPPENS

Using improper lifting techniques can lead to back injuries, but other factors can contribute to this age-old problem.

Poor posture

Whether you're standing, sitting, or reclining, posture affects the amount of strain put on your back. When standing correctly, the spine has a natural "S" curve. The shoulders are back and the "S" curve is directly over the pelvis.

Good sitting posture should put your knees slightly higher than your hips. Your hips should be to the rear of the chair with your lower back not overly arched. Also, your shoulders and upper back are not rounded. Reclining posture is important, too. Sleep on your side with knees bent, or sleep on your back. Sleeping on your stomach, especially on a sagging mattress with your head on a thick pillow, puts too much strain on the spine. Result: morning backache.

Poor physical condition

Your physical condition can lead to back pain. If you are overweight, and especially if you have developed a pot belly, extra strain upon your spine results. An estimate is that every extra pound up front puts 10 pounds of strain on your back.

Infrequent exercise is a major factor for chronic back pain, too. A sudden strain on generally unused back muscles leads to trouble. Proper diet and exercise is the sensible way to help avoid back problems.

Repetitive trauma

Many back injuries do not come from a single lift but occur from relatively minor strains over time.

Back injuries, as with other cumulative trauma disorders (CTDs), may arise from repeated injuries. As the worker repeats a particular irritating movement, the minor injuries begin to accumulate and weaken affected muscles or ligaments. Eventually a more serious injury may occur. Thus, a single overexertion may actually have little to do with an injury.

Remember to use mechanical lifting aids when appropriate, along with good lifting techniques, whenever you do any lifting.

Certain jobs require long hours of standing or sitting. Get up and stretch frequently if you are required to sit for long periods. If standing, ease the strain on your lower back by changing foot positions often, placing one foot on a rail or ledge. However, keep your weight evenly balanced when standing. Don't lean to one side.

WHAT IS ERGONOMICS?

Ergonomics is a discipline that involves arranging the environment to fit the person. An example of good ergonomic design can be as simple as a well-designed hand tool or as elaborate as adjustable workstations on a production line.

Following ergonomic principles helps reduce stress and eliminate many potential injuries and disorders associated with the overuse of muscles, bad posture, and repeated tasks. This is accomplished by designing tasks, work spaces, controls, displays, tools, lighting, and equipment to fit the employee's physical capabilities and limitations. It maximizes productivity by reducing employee fatigue and discomfort, a win-win situation for employee and employer.

Ergonomics is a concern in the office because office workplaces and some typical office tasks may cause problems or conditions that can be corrected or eliminated through proper ergonomic design. Some issues that may be related to ergonomics, such as overall office layout or your specific job duties, are out of your control. However, the issues discussed in this chapter are ones you may be able to affect quite easily through adaptations of your work space or your work habits.

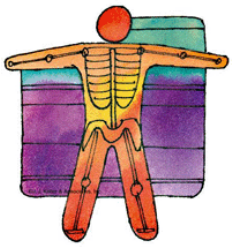
Ergonomic concerns in the office workplace center on:

- disorders related to ergonomic stressors;
- computer set-up;
- office/desktop layout; and
- repetitious or strenuous activities.

This chapter covers each of those, as well as exercises and other things you can do to lower your risk of suffering from any disorders associated with poor workplace set-up.

DISORDERS RELATED TO ERGONOMIC STRESSORS

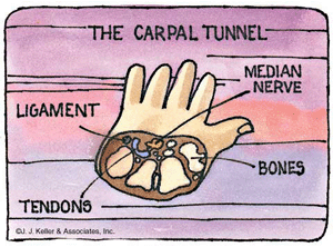
A variety of disorders and illnesses related to muscles and bones are caused by ergonomic stressors. These disorders involve all parts of the body and include disorders of the back, the neck, the upper or lower extremities, or the shoulders.



The most common of these disorders in the office are cumulative trauma disorders (CTDs) such as carpal tunnel syndrome, and back disorders caused by prolonged inactivity.

Cumulative Trauma Disorders

Cumulative trauma disorders are disorders of the musculo-skeletal and nervous systems which are caused or made worse by repetitive motions, forceful exertions, vibration, hard and sharp edges, sustained or awkward postures, or by exposure to noise over extended periods of time. Several of these factors, such as repetitive motions and sustained or awkward postures, are relatively common occurrences in the office workplace, and others have occurred in offices. You can modify your work habits to avoid these risk factors and resulting disorders by following the advice in this chapter.



The pressure of repetitive motion causes tingling, numbness, or severe pain in the wrist and hand. The pressure also results in a lack of strength in the hand and an inability to make a fist, hold objects, or perform other manual tasks. If the pressure continues, it can damage the nerve, causing permanent loss of sensation and even partial paralysis.

CTS develops in the hands and wrists when repetitive or forceful manual tasks are performed over a period of time. Because of the heavy use of computer keyboards and tasks such as data entry, CTS is relatively common among office workers. In addition, it affects a wide variety of other occupations, such as meat/poultry workers, carpenters, garment workers, assemblers, packers, product inspectors, machine operators, keypunch operators, and cashiers.

Back Disorders

Pulled or strained muscles, ligaments, tendons, and disks are perhaps the most common back problems and may occur in almost half of the work force at least once during their lifetime. Most workplace back disorders result from chronic or long-term injury to the back, rather than from one specific incident. Back disorders are frequently caused by:

- excessive or repetitive twisting, bending, and reaching;
- carrying, moving, or lifting loads that are too heavy or big;
- staying in one position for too long;
- poor physical condition; and
- poor posture.

The last three are the most common causes of back disorders in an office environment. Prolonged sitting stresses the body, particularly the lower back and the thighs, and may cause the lower back (lumbar) region to bow outward if there is inadequate support.

This abnormal curvature (called kyphosis) can lead to painful lower back problems, a fairly common complaint among office workers. Other factors which may contribute to back injuries include:

- aging;
- inactivity or seasonal activity;
- stress; and
- vibration.

The combined effect of several risk factors often results in the onset of CTDs or back problems. The ergonomic approach is to make things better than they were before; and you can do your part by using the recommendations in the following pages to work as safely as possible and avoid the nagging pain associated with the disorders described here.

COMPUTER SET-UP

Computer set-up is the primary ergonomic consideration in the office, due to the sheer number of office employees using computers at their desks. There are very few office jobs existing that don't require at least some time at a computer monitor. In addition, carpal tunnel cases in the office, the most frequently identified office disorder, are brought on primarily through computer usage.

The following aspects of your computer set-up should be designed to fit you and your work on the computer:

- keyboard;
- mouse;
- monitor; and
- chair.

Keyboard

Most carpal tunnel cases originate from improper keyboard design, placement, and/or usage. Trouble occurs due to the amount of time people spend doing the task of keyboarding and if the wrists are bent in relation to the keyboard.

Keyboard design might be addressed as a solution in an office with many data entry employees whose sole or main purpose is keying in of data all day long.

Some keyboards have been specially designed with a split set of keys, half further to the left side of the board, half further to the right, with a few inches space splitting the letters.

This type of keyboard, while still relatively new and uncommon, allows users to hold their hands more naturally, without the wrists bending. Therefore, with this more natural hand and wrist positioning, fewer carpal tunnel disorders result.

Keyboard placement is addressed in many offices as one way to correct bending wrists and avoid carpal tunnel syndrome. Keyboard location and height are two primary considerations that may be easier to correct than you think.

Ways in which you can affect keyboard placement include:

- adjusting desk and/or chair height (to a height where your wrists do not bend);
- using adjustable keyboard trays that move and tilt; and
- positioning yourself correctly to the keyboard (not too far and not too close, but at a comfortable distance).

Incorrect keyboard usage may be addressed in offices in a variety of ways, including instruction, frequently scheduled breaks, and tools such as wrist rests/pads or wrist splints that help correct wrist bend. Simply improving keyboard technique can eliminate some problems. The following table identifies common problems and suggested solutions.

Problems	**Solutions**
long fingernails (they don't let fingertips touch the key, thus wrist twists)	trim fingernails shorter
use of excessive force (keyboards are sensitive and require only a gentle touch)	strike keys more lightly
use of hunt-and-peck method	learn touch typing method
movement of entire hand and/or wrist to strike keys	keep your hand and wrist still, just move your fingers

Mouse

The placement and use of the mouse are its two main concerns. Placement should be as close as possible to the side of the keyboard to allow you to use it easily and comfortably, without too much arm, hand, wrist, or elbow extension. Do not place the mouse too far forward.

In addition, get a mouse that fits your hand, if at all possible. It should not be too big for your hand. This will minimize the travel your fingers must do to depress the keys.

Take into consideration your dominant hand. If you are left-handed, place the mouse to your left, not to the right, as is most commonly seen. And get the largest trackball possible so that the mouse moves easily, requiring minimal effort.

Monitor

There are several important issues to consider regarding monitors. Consider each of the following for your monitor:

- **placement of monitor** - with respect to your placement, it should not be too close, too far, too high, or too low, and your eyes should look straight ahead into it;
- **quality of monitor** - a high pixel number (1,024 x 768 or higher), a high refresh rate (76-Hz or higher), and high luminance and contrast are best;
- **light in relation to screen** - there should be no natural or artificial light reflecting off the screen (place at a right angle to any window, so no direct glare is on it from windows or other lights);
- **document holders** - these can be attached to the monitor or detached, and are highly recommended so you don't need to crane your neck to see.

Chair

Chairs are extremely important for your back to feel comfortable. Get a chair to fit your size, or an adjustable-height model. Most companies have at least some variety of models and sizes to try. If you simply cannot get comfortable with the chairs available in your office, request that your manager or safety manager try to obtain a different chair for you.

Change chair adjustments periodically throughout the day to suit how your back feels at the time. Usually start with your back straight up, sitting erect. As you tire and start to slump and lean forward and hunch your shoulders, adjust the back of the chair, moving it backward to rest the lower back muscles. You can adjust the chair several times during the day.

Gravity pulls on you, even when you're sitting down. If you sit in a chair that provides improper or no back support, your posture can give way, placing a lot of stress on your back. Injuries can develop over time.

You need a chair that fits you. That means selecting a chair for you personally or getting one designed with adjusting parts.

Select a chair with:

The correct height: Your feet should reach the floor or footrest, and your thighs should be horizontal. Blood can thus flow freely to the legs and feet. If you have leg problems, you may want to lower the chair and work surface or use a footrest. Upper backaches can also be attributed to improper chair height. Also, forearms should rest horizontally when at a keyboard.

A seat that is slightly concave with a downward-rounded edge: This prevents sliding forward and distributes your weight. You may want to tilt the seat slightly forward or backward.

Support for the entire back: Adjust the chair back at an angle and height so that your posture, including the lumbar curve of the lower back, is supported. This prevents lower backaches. The bend at your hips should make a 90° angle.

Adjustable armrests or none at all: Armrests should not keep you from getting close to your work surface.

OFFICE & DESKTOP LAYOUT

The next place you can tackle your work environment to maximize its comfort and convenience is in the layout and arrangement of your work space and desktop. Most office employees have at least some space that they can call their own. However, if you share your immediate work space with another or several other people, then you should do this analysis and arrangement of the work space with the other affected employees.

Several factors should be considered when determining how to arrange your immediate work area, including:

- most common tasks and their frequency;
- area lighting sources currently available to you; and
- available tools or techniques to improve comfort.

As much as possible, set up your immediate work area with consideration of your most common and frequent tasks. The tasks you perform most should define the design of or modifications to your work area that you wish to make.

Include in this task analysis how much you:

- use the telephone;
- do data entry or writing on the computer or a typewriter;
- read manuals, magazines, or other documents;
- draw, draft, paste-up, or do other detail work; or
- perform any other task frequently in your immediate work space.

After identifying these most frequent tasks, look around for all existing or potential light sources for the work space. These light sources may include:

- overhead lighting;
- natural light from windows or skylights;
- a desk or standing lamp; and/or
- under-cabinet/under-shelf lighting (the most frequently overlooked existing source).

With these two steps in your work space analysis complete, use that information and the following tips to rearrange your office most advantageously, and identify ways to improve your office and desktop arrangement. The placement of your telephone, computer, lights, and work areas should be influenced by tasks performed.

Tips for Office & Desktop Layout

The tools and techniques available to you to improve comfort in your immediate work space may be as simple as moving the wastebasket to a better spot or as complex as changing your computer or other office equipment.

Simple changes, such as rearrangement of items on the desktop or access to light sources, you may be able to do yourself. Be sure to request help for any furniture rearrangement, the rerouting of extension, phone, or computer equipment cords, or other more complex changes.

Some general tips to follow when setting up your work area for comfort and convenience include:

1. Place the phone on the same side as your dominant hand (i.e., right side if right-handed, left side if left-handed);
2. Have your computer placed at a right angle to windows (when you face the screen, the window is in your peripheral vision to the right or left, not behind your computer or behind your head);
3. Utilize all available lighting to suit the task at hand;
4. If the available lighting is inadequate, obtain additional lighting in the form of a desk lamp, a standing lamp, an under-shelf light, or another additional light source;

5. Keep items that you use most frequently easily accessible to you (e.g., heavy manuals that are frequently referenced should be kept between bookends on the desktop rather than stored in a bookshelf across the office);
6. Whatever you are doing, situate yourself in the best way for that given task (i.e., if reading, turn on a desk lamp or under-shelf light, if using the computer near a window with bright sunlight, pull the shades);
7. Utilize tools such as wrist rests, desk lamps, document holders, monitor stands, telephone headsets, or any other available tool to make your work space more comfortable.

REPETITIOUS OR STRENUOUS ACTIVITY

Another way to avoid cumulative trauma disorders is to minimize repetitious or strenuous office activity, and to use exercise and breaks in the repetitious activity you cannot avoid. Even if an activity is not difficult or apparently strenuous, it is still capable of causing a cumulative trauma disorder over a long period of time, if it is performed for long intervals during the day.

Common repetitious activities in offices that might fall into this category if performed unceasingly for several hours at a time include:

- filing;
- copying;
- keyboarding; and
- phone usage.

Obviously, many office jobs involve some or all of those activities. However, if any one of these is performed for a long period of time during the day, you should make a special effort to take a break from the activity at least once every hour. Choose a different task to do for five minutes each hour. Not only will it lessen your likelihood of developing a CTD, but it will probably perk you up and relieve the tedium of the task.

The need for short breaks cannot be emphasized too much. Especially when doing computer work, long sessions can affect not only your wrists, hands, and shoulders, but also your eyes. Five minutes of a different activity each hour should become a standard part of your routine, to keep your mind and body fresh.

Neck tension is an especially common problem caused by holding the telephone between the head and the neck. Use a headset or speakerphone if you use the telephone for extended periods of time.

Exercises

One of the best and easiest ways to make you stronger, relax tense or tired muscles, and become more able to resist cumulative trauma disorders is to exercise. At work, you can do specific exercises to combat the effects of prolonged office activities, while at home you can work on your overall general fitness and health.

See the Health & Wellness section in this handbook for more information on exercise, health, and fitness and their beneficial effects. Exercise for your whole body strengthens bones, muscles, and tendons, while spot-specific exercises that you can do at work or anywhere can relax and relieve potential ergonomic trouble spots.

Exercises to Do At Work

During the work day, perform a variety of stretches and exercises to help the shoulders, neck, wrists, hands, and fingers stay relaxed and comfortable.

Exercise	How To Do
overall body stretch	stand up, raise your arms over your head, hands close together, and reach for the ceiling
shoulder blade stretch	clasp hands behind your head and try to pinch shoulder blades together
shoulder shrugs	slowly shrug shoulders five times, raising shoulders as far as is comfortable
shoulder rolls	slowly roll your shoulders five times forward, then five times backward
head tilts	slowly tilt head to the right, stopping when you feel the stretch. Then slowly tilt head to the left. Repeat twice.

Wrist Exercises

Wrists are so vulnerable and prone to injury in the office environment, that it is especially important to do a variety of exercises for your wrists several times a day if your job involves heavy data entry or keyboarding.

Do the following wrist exercises to help avoid carpal tunnel syndrome:

Wrist Exercises
1. Rest forearm on edge of desk and gently bend back wrist by grasping fingers with the other hand, hold for five seconds.
2. Gently press hand flat against desktop, causing wrist to bend as arm is not parallel to desk, but is perpendicular to it. Stretch fingers and wrist for five seconds.
3. Clench hand into a tight fist, then slowly release until fingers are fanned out. Repeat five times.
4. Clench one hand, then cup it from above and apply gentle pressure, but make the wrist stay straight (resistance exercise). Do that with clenched hand palm away, then palm toward the cupping hand, then switch hands and do opposite.

WORK AT WORKING SAFELY

With proper exercise, a good diet, and the proper lifting techniques, your chances of being out of work with chronic or severe back pain are greatly reduced. Remember to:

1. Be aware of proper posture.
2. Follow a sensible diet and exercise program.
3. Get help to lift objects that are too heavy for you.
4. Plan ahead when lifting jobs are necessary.
5. Lift with the legs, not your back.
6. Make sure your path is clear and be careful of your footing.
7. Never twist or turn suddenly while carrying a heavy load.
8. Bend your knees to lower the load as you set it down.

In addition, you need to be aware of ergonomics and the causes of musculoskeletal disorders and CTDs.

1. Cooperate with your employer in making ergonomically designed changes in the workplace.
2. Be aware of the signs and symptoms of CTDs, and see a doctor about any CTD-related injuries.
3. Become aware of job-specific techniques you can use to alleviate ergonomic problems.