Ergonomics Program

Introduction

UNC Asheville is committed to providing a safe and healthful environment for its employees by developing an ergonomics program. Ergonomics is a multidisciplinary activity dealing with the interactions between a person and their work environment. Poor workplace designs can present ergonomic risk factors called stressors. These stressors include but are not limited to repetition, force, and extreme postures, static postures, contact pressure, vibration and cold temperatures.

- Repetition: Is the number of motions or movements that are performed per cycle or per shift.
- Force: Is the muscles used to produce force in order to perform necessary activities such as lifting, grasping, pinching, pushing, etc.
- Extreme Postures: Is when muscles are required to work at a level near or at their maximum capacity.
- Static Postures: A special type of awkward posture which occurs when a body part is not moving, but is still doing work. An example of this would be sitting in a chair holding an object.
- Contact Pressure: Is he pressure from resting part of the body against a sharp edge or corner. Resting the wrists or forearms on an edge of a desk while typing is an example.
- Vibration: Exposure to local vibration occurs when a specific part of the body comes in contact with a vibrating object, such as a power hand tool. Exposure to whole-body vibration can occur while standing or sitting in vibrating environments or objects, such as when operating heavy-duty vehicles or large machinery.
- Cold Temperatures: Reduce the natural elasticity of the body and reduce the sensation of touch. In order to get the same amount of tactile feedback, and employee may exert more force than is necessary.

Employee exposure to these stressors can cause injury or some type of Musculoskeletal Disorder.

Symptoms of Musculoskeletal Disorders (MSD)

Symptoms of MSD identify that an ergonomic hazard is present. There may be individual difference in susceptibility and symptoms among employees performing similar tasks. Any symptoms are to be taken seriously. The following list of symptoms can be but are not limited to:

- Numbness
- Tightness
- Tingling
- Swelling
- Pain
- Stiffness
- Redness
Work Strategy Controls

When an ergonomic hazard has been identified, the Environment, Health and Safety Office will work with the department in eliminating or minimizing the hazard. There are two general approaches to controlling ergonomic hazards: Engineering and Administrative.

- Engineering Controls: Are changes made to the workstations, tools, and/or machinery that alter the physical composition of area or process.
- Administrative Controls: Are changes made to regulate exposure without making physical changes to the area or process. An example would be to take frequent breaks and job rotations.

Responsibilities

Departments are responsible for providing sufficient resources to implement ergonomic recommendations in a timely manner as well as ensuring that employees are properly trained.

The Environmental Health and Safety Office is responsible for evaluating and monitoring the ergonomic program including assessing the nature and extent of ergonomic hazards, recommending ways of minimizing or controlling these hazards, and supporting the University in consultation and direction regarding ergonomics.

Medical Management

If an employee is experiencing any signs or symptoms of musculoskeletal disorders, the employee should report their symptoms to their supervisor and contact their personal physician for a medical evaluation. Environmental Health and Safety should be notified to investigate ways of mitigating work related ergonomic stressors.
Laboratory Ergonomics

Laboratories provide many opportunities for ergonomic stressors to manifest into injuries or repetitive stress disorders. Major ergonomic issues in the laboratory setting include static and/or awkward postures and repetitive motions.

General Tips

- If you stand at your workstation, wear comfortable shoes such as sneakers and consider using an anti-fatigue mat. If you are seated, a highly adjustable chair or stool is recommended. Sit against the back of your chair. If your feet come off the ground, lower the chair, adjust the foot ring, or get a footrest.
- Keep frequently used items within close reach. Most frequently used items should be at approximately a forearm's reach away, with lesser-used items up to arm's reach away. Items you are currently working with should be directly in front of the body.
- Adjust the position of your work, your work surface, or your chair or stool so that you can work effectively while maintaining an upright, supported position. Avoid hunching over your work. For precision work, the work surface can be adjusted higher to provide support and reduce bending and hunching. Regular light work generally places the work surface around elbow height or just below. Heavy work places the work surface approximately six inches below elbow height.
- Try to work at a bench cut out or a hood/BSC with adequate knee clearance. If you are seated, you need room for your legs. If you are standing, a foot rail or foot prop is recommended to encourage and aid shifting positions throughout the work day. Propping a foot up relieves pressure on the back.
- Keep shoulders, arms and hands relaxed and elbows close to the sides while working.
- Try to keep the wrists neutral and aligned while working. Sitting close to your work will help with this.
- Make sure all equipment is clean and in good working order to help minimize repetitive or forceful twisting, turning, and pinching. Equipment should be the right size for your hand. Use padding and/or tubing on equipment and work area edges to reduce pressure and force while working.
- Use the lightest pressure possible to use your equipment (e.g. pipettes). Use electronic, automated, or light touch model equipment when possible.
- Remember to take frequent rest breaks. Alternate your grip on items like forceps. Vary your tasks.
- Intensive tasks should be spread through the day or shared between employees when possible.
- Ensure proper lighting for your task.
- Store heavy items on lower shelves.
• Use bottle dispensers and bottom dispensing carboys for dispensing liquids.

Tips for Common Laboratory Tasks

Microscopes

• Ensure that you can view the eyepiece while sitting or standing in an upright position. This includes the shoulders, back and neck. Accomplish this by adjusting your chair (if applicable), the work surface, and/or the microscope eyepiece. An angle stand or extendable eye tube may be available to aid in adjustment.
• Bring the microscope as close to you as possible (this usually means it is pulled to the edge of the workbench).
• Arms should be supported and relaxed while using the microscope with the elbows close to the sides. Wrists should be in a neutral position while making adjustments.
• Keep scopes repaired and clean for easier use.

Pipetting

• Where possible, use electronic, light-touch, or latch mode pipettes for intensive pipetting. Multiple finger (as opposed to thumb-only) pipette designs are preferred. Use the lightest touch possible while pipetting and changing tips.
• Work supplies such as trays and beakers should be placed within easy reach and with no obstructions to their access. Keep work in front of the body to minimize twisting and awkward reaching.
• Strive for straight and neutral wrist position while working.
• Try alternating hands or using both hands to pipet.
• Use low profile tubes, containers, and receptacles to avoid bending and twisting of the wrists, neck, and rolled shoulders.
• Avoid working with winged elbows/arms. Keep arms relaxed and elbows close to the body. Ensure that your work surface is at the appropriate height (see general tips, above).
• Keep head and shoulders in an upright, neutral position.

Hoods and Biological Safety Cabinets

• Keep arms relaxed and by the sides. Back, shoulders and neck should be upright and neutral in position.
• Keep the sash clean and free of glare so that you can see without tilting your neck or assuming an awkward position. Use diffused lighting to limit glare.
• Use low profile tubes, containers, and receptacles to avoid bending and twisting of the wrists, neck, and rolled shoulders.
• Keep the work area clean and free of clutter. Keep what you are working on directly in front of you, with frequently accessed items within forearm length and lesser-used items at arm's length. Remove unnecessary supplies.
• Perform all work 6 inches inside the hood.
• Strive to keep wrists straight and neutral while working.
• Avoid contact pressure (forearm and wrists in contact with sharp edges). Foam padding may be used on the front sharp edge of the hood/BSC.

Microtomes

• Place the microtome at the appropriate height for work (see general tips, above).
• Avoid contact pressure (forearm and wrists in contact with sharp edges). Foam padding or padded arm supports may be used to reduce sharp edges.
• Use as little force as possible when turning the hand wheel. When possible, replace manual rotary microtomes with automatic ones, especially for high-intensity work.
• Operate the microtome with the hand in a pistol grip position (wrist aligned with forearm in handshake position).
• Ensure that the microtome can be operated in an upright position with back, shoulders, and neck in neutral positions.
• Keep arms close to the sides.
Lifting and Material Handling

Lifting heavy items is one of the leading causes of injury in the workplace. Overexertion and cumulative trauma are the biggest factors when lifting heavy items. Bending, twisting and turning are the more commonly cited movements when lifting that cause back injuries.

When employees use smart lifting practices, they are less likely to suffer from back sprains, muscle pulls, wrist injuries, elbow injuries, spinal injuries and other injuries caused by lifting heavy objects.

Lifting Principles

- Preparation
- Lifting
- Carrying
- Setting Down

Preparations:

Before lifting or carrying, plan out your lift.

- How heavy/awkward is the load? Should I use mechanical means (e.g. a hand truck) or another person to help me with this lift? Is it possible to break the load into smaller parts?
- Where am I going with the load? Is the path clear of obstructions, slippery areas, overhangs, stairs, and other uneven surfaces? Are there closed doors that need to be opened?
- Are there adequate handholds on the load? Do I need gloves or other personal protective equipment? Can I place the load in a container with better handholds?

Lifting:

Get as close to the load as possible. Try to keep your elbows and arms close to your body. Keep your back straight during the lift by tightening the stomach muscles, bending at the knees, keeping the load close and centered in front of you, and looking up and ahead. Get a good handhold and do not twist while lifting. Do not jerk; use a smooth motion while lifting. If the load is too heavy to allow this, find someone to help you with the lift.

Carrying:

Do not twist or turn the body; instead, move your feet to turn. Your hips, shoulders, toes, and knees should stay facing the same direction. Keep the load as close to your body as possible with your elbows close to your sides. If you feel fatigued, set the load down and rest for a few minutes. Don't let yourself get so fatigued that you cannot perform proper setting down and lifting technique for your rest.
Setting Down:

Set the load down in the same way you picked it up, but in the reverse order. Bend at the knees, not the hips. Keep your head up, your stomach muscles tight, and do not twist your body. Keep the load as close to the body as possible. Wait until the load is secure to release your handhold.

Weight of Objects

Heavier loads place greater stress on muscles, discs, and vertebrae.

Where possible, use mechanical means such as forklifts or hand trucks to transport heavy items. Ramps can be helpful in moving heavy items from one level to another. Materials that must be manually lifted should be placed at "power zone" height: about mid-thigh to mid-chest of the person doing the lifting. Ensure that proper lifting principles (see above) are used. Try to order supplies in smaller quantities and/or break loads up into smaller, lighter quantities where possible. Is the container itself heavy? Perhaps a smaller or lighter container is available. Limit weight you lift to no more than 50 pounds. Use two or more people when lifting loads heavier than 50 pounds.

Awkward Postures

Bending while lifting can cause several back problems. It adds the weight of the upper body to the weight of the object being lifted. Bending and/or reaching moves the load away from the body and allows leverage to significantly increase the effective load on the back, leading to stress on the lower spine and muscle fatigue. Carrying loads on one shoulder, under an arm, or in one hand creates uneven pressure on the spine.

Move items close to the body and use the legs when lifting from a low location to minimize bending and reaching. Ensure proper housekeeping is taking place so that you may get as close to your lifting load as possible. Store and place materials that need to be manually lifted at the "power zone": mid-thigh to mid-chest height. This can be accomplished by placing objects on shelves, tables, racks, or stacked pallets; or by using ladders or aerial lifts where necessary to elevate you and minimize overhead reaching. Ensure that proper lifting principles (see above) are used, including avoiding twisting and holding the load close to the body.

High Frequency and Long-Duration Lifting

Holding items for long periods, even if loads are light, increases the risk of back and shoulder injury since muscles can be starved of nutrients and waste products can build up. Repeatedly exerting, such as when pulling wire, can fatigue muscles by limiting recuperation times. Inadequate rest periods do not allow the body time to recover.

Plan ahead when beginning work that will require high-frequency and long-duration lifting. This way, the work can be organized in such a way so as to minimize the time workers spend holding loads. Adequate rest breaks can be planned in, as well as job rotation between employees. This includes both
rotating tasks (employees trade off on differing tasks) and team work (two or more employees work together doing different parts of the same activity to reduce strain). Planning can also include the pre-assembly of work items to minimize the time spent handling them during the actual work.

Inadequate Handholds

Inadequate handholds, such as boxes without handles or oddly-shaped loads, make lifting more difficult, move the load away from the body, lower lift heights, and increase the risk of contact stress and of dropping the load.

Where possible, utilize handholds such as handles, slots, or holes that provide enough room for gloved hands. Try to use materials that are packaged with proper handholds (your supplier may be able to provide different containers), or move materials into containers with good handholds. Wear protective equipment to avoid finger injuries and contact stress. Ensure that gloves fit properly and provide adequate grip. Suction devices are helpful in lifting junction boxes and other materials with smooth, flat surfaces. Other tools may be available that can create temporary handles.

Environmental Factors

Be aware of extreme temperatures that can affect lifting and material handling. For example, muscle flexibility decreases in cold temperatures, and hot temperatures can lead to heat stress. Low visibility or poor lighting increases the chance of trips and falls.

Do what you can to adjust work schedules to minimize exposure to extreme temperatures or low visibility. Wear appropriate clothing for the temperature in which you will be working. Drink lots of water to avoid dehydration in excessive heat. Provide proper lighting for areas with low light and try to perform work during daylight hours when possible.

Things to Remember When Lifting

- Use mechanical means (e.g. hand trucks, pushcarts, etc.) when possible for heavier or awkward loads. Remember to obtain training and authorization before using a forklift.
- It is easier and safer to push than to pull.
- Keep loads as close to the body as possible and do not twist while lifting, carrying, or setting down a load. Nose, shoulders, hips, and toes should all be facing the same direction.
- Minimize reaching.
- As a general rule, bend at the knees, not the hips.
- Get help when needed. Do not lift or carry things you don't feel comfortable with, no matter how light the load.
- Plan ahead for all parts of the lift: lifting, carrying, and setting down.
- Try to utilize proper handholds while lifting. If an item does not have a good handhold, think of ways to remedy this, such as placing the item in a container with good handholds, creating a safe and proper handhold with an appropriate tool, etc.
• Use personal protective equipment where needed, such as gloves with good grip and steel-toed boots where appropriate.

• Implement rest breaks and job rotation for frequent and/or heavy lifting.

• Place items to be lifted within the "power zone". The power zone is close to the body, between the mid-thigh and mid-chest of the person doing the lifting. This is the area where the arms and back can lift the most with the least amount of effort.
Office Ergonomics

Many people don't realize that a poorly designed computer workstation and/or bad work habits can result in serious health problems. Common symptoms associated with poor design or habits include discomfort in the back, neck and shoulders, hands and wrists, as well as headaches and eyestrain. Fortunately, the solution can be quite simple. Proper workstation setup and work practices can eliminate discomfort and even prevent it from occurring in the first place. Simple adjustments to office equipment can work wonders, making work more comfortable and more productive.

Chairs

What to look for in a chair
Starting from the bottom and moving upwards:

**Base**
The chair should have at least 5 castors at the base to ensure stability.

**Seat**
The seat should be able to adjust until your thighs are parallel to the ground. Shorter/taller users may need different height cylinders.

- The seat pan depth should be adjustable to provide a fist-width to three-finger gap between the back of the calf and the front edge of the seat pan.
- The seat pan should be able to tilt backwards and forwards.
- The seat pan should have a waterfall (rounded) front edge.

**Backrest**
The backrest height should be adjustable so the lumbar support can be fitted into the low back.

- The backrest should be able to recline independently of the seat pan and be set at a fixed reclined angle.

**Armrests**
Firstly, armrests are optional. Even with the range of adjustments found in many of today's armrests, there are some places where armrests will interfere with work.

- The armrests should be adjustable in height.
- They should be rounded on the edges.

Setting up my chair
Start out adjusting a chair from the ground up. Start with the height and move up from there. While adjusting the chair, worry first about getting the chair adjusted to fit you. Afterwards, look at things like the height of the desk, keyboard, etc. Too often, people adjust a chair too high so they can reach the keyboard rather than properly adjusting the chair and adding a keyboard tray to move the keyboard to the correct height.

**Seat Height**
Start by adjusting the height until your thighs are parallel to the floor. Stand in front of the chair and adjust the height until the top of the seat pan is at the height of the bottom of your kneecap. Then, sit
in the chair and make small height adjustments until your thighs are parallel to the ground. Sit in this position for a while before making any further changes in seat height. When you have become accustomed to this height, adjust the chair height up/down 1-3 inches until you find a location that is comfortable for you **while seated.**

**Seat Depth**
Adjust the seat pan until you have about three fingers to a fist's width of room between the back of your calf and the front edge of the chair when your back is touching the backrest. If the seat pan is not adjustable and the pan is too deep, add padding to the backrest (a towel over the backrest of the chair or a backrest cushion) to shift you forward in the seat while maintaining contact with the backrest. If the seat pan is too shallow, start looking for a new chair.

**Seat Angle**
There are three basic postures. The standard posture calls for a level seat pan so it is not necessary to adjust the tilt for this posture. Likewise, the reclined posture can have the seat flat as well. However, some people prefer to have a very slight backward tilt on the seat pan to help keep them in the seat. In the forward tilt posture, the seat pan is tilted forward 5-10°. Start by raising the overall height of the chair a few inches, and then tilt the seat pan forward.

**Backrest Height**
The lumbar curve on the backrest should fit into the small of your back. Start by raising the chair back as high as possible and then move the backrest downward in small steps until it feels most comfortable. If the chair doesn't have enough lumbar support, consider adding a lumbar pad to the chair. Make sure the extra pad doesn’t make the seat pan too short!

**Backrest Angle**
In the standard posture and forward tilt postures, the backrest should be straight up. If it feels as though the chair is pushing you forward, adjust the backrest back until you feel upright. In the reclined posture, the backrest should be reclined slightly. When seated, the angle between the thighs and back should be more than 90°.

**Armrests**
As previously mentioned, armrests can sometimes interfere with work. If they prevent you from pulling up to your desk or reaching for the mouse, either lower them until they are out of the way and don't use them, or have them removed. Armrests are "rests" not "supports". Typing with the arms constantly on the armrests is not recommended.

**Armrest Height**
Sit in the chair with your arm bent 90° and raise the armrest until it is directly under your elbow. Repeat the process with the other arm and then check that the armrests are the same height.

**Armrest Width/Pivot**
Some armrests pivot or slide inwards, allowing you to change the angle and width of the armrests. Adjust the armrest inwards until it is directly under your elbow while your upper arm/shoulder is relaxed. You should not have to reach your elbows outward to reach the armrests. If the armrests pivot, pivot them slightly inwards so they are underneath your forearms when you reach inwards to the keyboard.
Footrests

What to look for in a footrest

Use footrests as a last resort. Footrests are a way to shift postures or provide support for the feet if the chair cannot be lowered. Unfortunately, using a footrest when the chair is too high provides only one place for the feet to rest. The seated person only has the footrest and the castors under the chair as places for their feet and this limits the postures they can shift through throughout the day. The preferred solution is to add a shorter cylinder to the chair and lower the desk height until the desk surface is approximately 1 inch above seated elbow height.

Height

A footrest should be height adjustable. Adjust the footrest until the thighs are parallel to the floor +/- 1-3 inches.

Rocking

When using a footrest, be sure to shift postures frequently. Some footrests have a rocking feature that allows the user to rock the footrest, increasing circulation and helping avoid static postures. The rocking action on all-plastic footrests tends to wear out quickly, so look for durable models.

Keyboard Trays

What to look for in a keyboard tray

The purpose of a keyboard tray is to change the height and angle of the keyboard without interfering with how the user uses the keyboard and mouse. Therefore, the tray should be easy to adjust, have enough room for the keyboard and mouse and not prevent the user from typing with the keyboard at forearm length from the body.

Height

The tray should be height adjustable until the mouse and keyboard are at or slightly below elbow height. Avoid keyboard trays that require unscrewing a knob every time the height is adjusted. Knob-adjusted trays discourage users from making small adjustments in height and the knob, often located under the tray, may hit the user's knee and prevent them from sitting close enough to the keyboard and mouse to use them properly. Many newer trays have lever-less mechanisms, which allow users to adjust tray height by lifting the front edge and either pulling up on or pushing down on the back edge.

Angle

The tray should be angle adjustable to align the forearm with the keyboard. Often this will require a "negative tilt" where the front of the keyboard is higher than the back. For some users, it may be necessary to adjust the angle of the mouse surface as well to prevent the mouse from rolling off the tray.

Mouse

The tray should have space for the mouse beside the keyboard at about the same height.

Wrist Rest

If the tray comes with a wrist rest, it should be soft foam or gel and be removable. Not all keyboards will fit on a standard keyboard tray with the wrist rest attached.
Setting up my keyboard tray

**Height**
Sit upright in the chair and bend your elbow 90°. Hold your open palm down and raise the keyboard tray until the keyboard is just under your fingers. Keep the keyboard at this height or slightly lower as desired. Reach to the side and check to be sure the mouse is just under your hand as well. Some keyboard trays have mouse attachments that attach to the side and below the keyboard. If this places the mouse too low, put additional mouse pads under your mouse until it is at approximately the same height as the mouse.

**Angle**
Hold your hand, palm open, over the keyboard. Tilt the tray to align the angle of the keyboard with the angle of the forearm. If the keyboard is below elbow height, this will require a negative slope where the spacebar edge of the keyboard is higher than the back edge. In most cases, the keyboard will be either flat or tilted at a negative slope. Do not use the feet on the back of your keyboard or tilt the tray at a positive slope unless you are seated in a reclined position. Even when reclined, start with the keyboard flat before trying a positive tilt.

**Mouse**
Place the mouse beside the keyboard tray and at about the same height. On trays where there is room for the keyboard and mouse on the same tray, place the mouse beside the keyboard. On trays where there is a mouse attachment attached underneath the tray, check the mouse height in the same way as the keyboard height. Additional mouse pads are a good way to raise the mouse. Some trays have a mouse attachment above the keyboard. These attachments slide or pivot to cover the numeric keypad on the right hand side of the keyboard and reduce side reaching to use the mouse. Keep these trays pivoted over the numeric keypad when not using the keypad.

**Keyboards**

**What to look for in a keyboard**
There are many keyboard designs available. This page will cover the two most common keyboard designs, the standard flat keyboard and the split keyboard.

**Standard Flat Keyboard**
This is the standard rectangular keyboard with a numeric keypad on the right hand side.

**Split Keyboards**
These keyboards are split in the middle (between the g and h keys) and the halves are moved at an angle to each other. The theory is that angling the sides will keep the wrists straight. These keyboards are often tented upwards slightly in the middle.

**Wrist Rests**
Many keyboards have built-in or detachable wrist rests. These rests are usually hard plastic and, where possible, should be removed. If the wrist rest is not removable, keep in mind that these are wrist "rests," not wrist "supports". They should be used only during pauses while keying.
Setting up my keyboard

Location
The number pad creates an optical illusion when aligning the keyboard and monitor, particularly with standard keyboards. The monitor is usually lined up with the center of the entire keyboard (approximately the ';' key). The user, however, sits lined up with the center of the letters portion of the keyboard (approximately the 'g' and 'h' keys). This causes the user to either twist slightly to face the monitor or sit centered to the monitor and reach to the side to use the keyboard. When seated at the workstation, align the "gh" keys with the bellybutton and also check that the "gh" keys are centered with respect to the monitor.

Mouse

What to look for in a mouse
The first decision to make is what kind of input device to get. Users grip standard mice and move them to move the cursor on the screen. With a trackball, the user rolls a ball mounted on a stand to get the same effect. Touchpads require the user to move a finger on a small touch-sensitive square to move the cursor. Other input devices mount in front of the keyboard, use a pen on a large touch-sensitive square or even combine hand gestures to interpret commands.

After deciding on the input device, look for the features it offers and how well it fits the hand.

Standard Mouse
Common retail mice are manufactured in different "standard" sizes depending on the manufacturer. Most superstores have different mice on display in the store to try out. Try them out to see how well they fit the hand. A good mouse should partially "fill" the hand while gripping it. If you find yourself gripping the mouse with your fingertips or squeezing it between thumb and pinkie or thumb and ring finger, the mouse is probably too small.

Trackball
Trackballs are stationary devices, so they require less room to use than the standard mouse. They are normally larger than a mouse and may support the hand better. Look for trackballs with the ball located in the center (side-to-side) of the device. Avoid trackballs where the ball is manipulated using the thumb as this may place undue stress on the thumb.

Touchpads
Touch pads are compact input devices similar to those used in some notebook computers. Like trackballs, they are stationary. Touchpads are used by moving one finger along the pad.

"Ergonomic" Mice
So-called ergonomic mice have one or more design feature(s) intended to make the mouse more usable. Often these mice are curved along their length or raised on the thumb side to support the hand in a handshake posture. The drawback of these mice is they are usable only by one hand. Symmetric mice can be switched between the right and left hands without difficulty whereas the shaped mice require the user to assume an unusual grip if using the mouse with the hand the mouse was not designed for. Beyond that, check to be sure the mouse fills and supports the hand without requiring pinching with the fingertips.
Wrist Rests

About wrist rests
Wrist rests are intended to promote straight wrists and reduce pressure on the wrist by providing a soft surface to rest upon. However, research studies by Parsons (1991), Paul and Menon (1994) and Horie et al. (1993) indicate that foam wrist rests create similar pressures on the wrist as not having a wrist rest. Wrist rests that are higher than the keyboard or too narrow can actually be worse than no wrist rest at all.

Like chair armrests, wrist rests are "rests", not "supports". Too often, users support their wrists with the wrist rest continuously while keying and using the mouse. In addition to exposing the wrists to constant pressure, this static position forces the typist to stretch the fingers and bend the wrist to reach keys at the sides of the keyboard.

Wrist rests are best used when there is a sharp edge or hard surface the user is constantly coming into contact with. They should be used to rest the wrists during pauses while typing and not used as a continuous support.

What to look for in a wrist rest
Material
Look for a gel wrist rest that does not have a stiff plastic casing. Foam wrist rests do not distribute pressure as well as gel, and can create pressure points at the edges. Some gel wrist rests are designed like a wrist rest in a hard plastic box with an open top (where the wrists rest on the gel). Avoid this kind of wrist rest as the casing can come into contact with the wrists and create a pressure point.

Height
Choose a rest that is no higher than the front edge of the keyboard. Wrist rests that are higher than the keyboard force the user into awkward postures to properly use the keys.

Shape
Wide, slightly rounded wrist rests provide the best distribution of pressure. Wrist rests with a pronounced peak (such as many mouse wrist rests) concentrate the weight of the wrist over a small area and are unsuitable.

Monitors

What to look for in a monitor
Monitors now come in two types: CRT (the traditional "box" monitor) and LCD (the thin, "flat panel" monitor). CRTs are less expensive and take up more space.

Size
A 15" monitor is the minimum recommended size. CRT monitors are measured along their diagonal and include some space that is hidden by the monitor's casing. LCD monitor measurements only refer to viewable area.
Dot Pitch
Dot pitch affects how clear the monitor image is. The smaller the dot pitch, the better. A dot pitch of 0.27 is the lowest recommended quality. Monitors with better dot pitch are better able to support the high resolutions demanded by many of today's computer programs without flickering. Such flickering can create eye fatigue and discomfort.

Refresh Rate
This applies to CRT monitors. Refresh rate is the frequency with which the image on the screen is redrawn. 60Hz is the standard refresh rate, however many people are sensitive to refresh rates this low and are affected by the resulting screen flicker. 70 Hz and higher refresh rates are recommended.

Setting up my monitor
Side-to-Side Location
The monitor should sit directly in front of the user, and in line with the "gh" keys on the keyboard.

Tilt
The monitor should be tilted back, so the bottom of the screen is slightly closer to the viewer than the top.

Height
The top of the screen should be at or below eye level. If you notice that you tilt your head back while viewing the screen, think of ways you can lower the monitor. First, check to see if the CPU is underneath the monitor. If so, move the CPU from under the monitor and place it beside the monitor.

Distance
Start by placing it at arm's length. Adjust the monitor slightly closer or further away as your eyes dictate. If you find the monitor is only viewable extremely close or far away, consult your optometrist as you may require corrective lenses (or a change in prescription) to see the monitor properly.

Privacy Screens
If the job requires privacy while working, instead of rotating your monitor to one side, consider a privacy screen, which will allow you to keep the monitor directly in line with you and the keyboard.

Visibility
Keep the computer screen clean by wiping it very lightly when needed with a damp paper towel or monitor cleaning solution.

Glare Screens

What to look for in a glare screen
When shopping for a glare screen, consider what you need it for. Glare screens reduce light reflected into your eyes from the screen and reduce washing out of images on the screen. Privacy screens are used to prevent others from seeing the computer screen while standing to the side of the computer. Some screens combine both features.
Use a glare screen only when you cannot position the monitor away from glare-producing light sources or turn off lights that shine on the screen. Using a glare screen is similar to wearing a pair of sunglasses while looking at the monitor. Everything is darker, including images on the screen.

**Polarized vs. Non polarized**

Look for a glare screen that uses a polarized surface to reduce glare. This technique is used on some sunglasses to reduce bright lights while maximizing the visibility of other objects.

**Privacy Screens**

Match your monitor privacy needs to the situation. Some privacy screens require the user to be directly in front of the screen. Others prevent viewing from the side. If the information on your monitor is sensitive and people frequently pass behind your monitor, a more restrictive privacy screen is in order. Otherwise, consider one that allows a wider viewing angle so the person sitting at the computer can shift positions without the privacy screen blocking out their vision.

**Setting up my glare screen**

After putting the screen in front of the monitor, check to see if reflections on the screen are reduced. Next, look through the screen to the monitor. Is the monitor darker? Adjust the brightness and contrast controls on the monitor until you can comfortably view the monitor again.

**Document Holders**

**What to look for in a document holder**

The purpose of a document holder is to hold reference documents as close to the computer screen as possible, and at about the same angle. This will eliminate a twisted working posture, and also put the document at an easier-to-read angle. Constantly reading from a hard-to-read angle can be hard on the eyes.

Document holders usually clip to the side of the monitor, sit beside the monitor, or rest in front of the monitor.

**Clip to the Side Document Holders**

These document holders attach to the side of the monitor and usually are designed to hold only one or two sheets of paper. These document holders are useful for single, infrequently changed sheets of paper such as phone lists. However, for documents that are frequently changed, such as during data entry, or tasks that require making notes on the document, they are not well suited.

**Beside monitor Document Holders**

These document holders rest beside the monitor on the desk. Look for an easel style monitor to allow several documents to be placed on the document holder simultaneously. These document holders are also useful for writing notes on the document.

**Under-Monitor Document Holders**

These document holders usually rest between the keyboard and the monitor and directly in front of the user. These document holders allow the user to easily make notes on documents. Wider under-monitor document holders may be used as a way to increase desk space.
Lighting

Many offices have more light than is required to use a computer. Your work area should have moderate, indirect lighting free from sources of glare.

Glare

There are three types of glare: Direct Glare, Indirect Glare, and Contrast Glare.

Direct Glare
Direct glare comes from lights that shine directly into the eyes. Direct glare usually comes from sunlight shining through a window behind the monitor and directly into the eyes of the viewer. Sometimes poorly positioned desk lights will also shine directly into the viewer's eyes. Try to place the monitor perpendicular to windows and light sources. Point lamps at walls or the desk to diffuse the light source and keep the light from shining directly into the eyes. Be careful when shining lights onto a desktop. Some desks are highly reflective and can cause indirect glare.

Indirect Glare
Indirect glare results from light bouncing off an object and into the eyes. Indirect glare on monitors is seen as reflections in the monitor or as white spots. Desks, brass lamp bases and other reflective objects can be sources of indirect glare. Light can even bounce off a computer user wearing a light colored shirt, onto the screen and back into the user's eyes.

Contrast Glare
Contrast glare is frequently overlooked as a source of glare. Contrast glare results when a light colored object is next to a dark object. The retina is simultaneously trying to become larger and admit more light (to see the dark object) and become smaller to admit less light (to see the light object). To test for contrast glare on the monitor, take a neutral colored piece of paper (file folders work well) and tape a border of paper around the outside of your computer. If your eyes feel better with the border around the computer, it's a good bet the border was a source of contrast glare.

Rest Breaks

Short, frequent rest breaks are more beneficial than longer, more infrequent ones. Sitting for more than an hour without moving can put stress on the body due to the static posture that you are forced to sustain. Breaks can be as simple as standing up and walking around your desk three times, or even simply yawning. When you sit back down, you'll be in a completely new posture. It is recommended that a 30 second to 1 minute break is taken every 30 minutes. You should also break up your sitting period by walking to the water fountain, printer, etc.
Exercises
Here are some tension-relieving exercises that you can do throughout the day. You don't need to do all of them at once, but it would be beneficial to do them at the beginning of each day, and during each 15-minute break. Think of work as a sport, and that you are stretching out before the game. First, a good exercise would be to stretch muscles that are opposing the ones you normally use. This will allow you to achieve a balance within muscle groups. For example, if you regularly use your biceps muscle, along with stretching it, you can also stretch your triceps muscle.

Here are some other exercises:

• Clench your hand into a fist and release, fanning out the fingers.
• With elbows straight, bend your wrists down as far as they will go, hold for 3 seconds then extend your wrists back as far as they will go.
• Stand up straight, place your hands on your hips and bend backwards at the waist, gently.
• Touch the fingertips of your hands together just behind the top of your head without letting your hands touch your head, move your elbows in a backward direction, hold 5 seconds then relax.
• Tuck your chin in while keeping your eyes level; hold 3 seconds and then relax.
• Roll your head in circles, stretching more toward each shoulder.
• Eyestrain tip: Blink often, and take frequent rest pauses; close your eyes for a minute, refocus by looking away from your monitor at something in the distance, and roll your eyes up and down, left to right.