Introduction

*D*id you know that 90% of the workforce in the U.S. uses a computer? And did you know that the more you use a computer, the more likely it is that you will have a repetitive stress injury? In fact, the risk of a muscle-skeletal injury for someone who works on a computer four or more hours per day is nine times greater than it is for a person who spends just one hour per day on the computer. With so many people using computers and at high risk for injury, it is no wonder there are so many repetitive stress injuries!

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Because these types of injuries are so prevalent in our society, Letsdoyoga.com has asked Susan Orr,

M.A., a highly experienced expert in the field of office ergonomics, to share her extensive knowledge of preventing carpal tunnel syndrome and repetitive stress injuries. In the following pages Susan will address the causes of repetitive motion injuries, offer information on how to recognize if there is a problem, and then show you how these situations can be prevented, eliminated or exposure reduced.

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Publisher

Prevention

Getting the correct set-up is one of the most important things you can do, whether it be an office environment, an assembly area, or non-work related tasks such as hobbies. Let's take a look at the variables that influence the proper set-up.

Computer Workstation Set-Up and Posture

The best posture for using a computer is a neutral posture. If the chair and working surface are correctly adjusted and placed, you should be able to sit with your feet flat on the floor and your forearms level with the floor while keying. Your wrists should be in-line with your forearms and not dropped down while keying. Your arms should hang naturally at the sides, in-line with your torso without being propped up by chair arms.

There should be about a ninety-degree angle bend at your knees, hips and elbows. The chair should support your legs but not impinge on the back of the knees.

Your wrists should be in a neutral position as well, in-line with your forearms—not higher or lower than your forearms. There should be no side-to-side bending at your wrists while keying. Any posture, other than having your writs in-line and level with your forearms will impede circulation in the wrist area.

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Federal OSHA contends increasing the angle of bend in the wrist "increases the contact stress and irritation on tendons and tendon sheathes" (www.osha.gov/SLTC/etools/computerworkstatins/components_wrist_rests.htl), and they add: "This is especially true with high repetition or prolonged keying."

Most people don't need to use a wrist rest if they have the correct set-up and habits. In fact, most wrist rest users are wrist rest abusers! They tend to plant the wrists onto the wrist rest and then move the fingers back-and-forth from the wrist, creating a constriction in the wrist area. This isn't "resting" on the wrist rest—it is more like parking the wrists on the rest. In actuality, the wrists should float just a bit above the keyboard and the movement should come mostly from the

forearm and elbow. The caution is to avoid using the shoulders to lift the hands. The arms should be resting straight down from the shoulders and the shoulders should be relaxed. There should be no reaching forward with the upper arm.

> *. . . most wrist rest users are wrist rest abusers . . .*

Planting the wrists on the wrist rest is a bad habit, and one that is made worse if the wrist rest is hard or too thick. Wrist rests that are too thick sometimes cause users to sit with their shoulders lifted so they can get over the wrist rest, which in turn causes problems in the shoulder and neck areas.

Changing the habit of planting the wrists can be quite challenging. For some reason this habit seems to be especially difficult to break for those who also use a laptop or have used a laptop extensively in the past. I guess it is a bit more tempting to lay the wrists down on laptops as the keying area is sometimes more compact. If I cannot get someone to change this habit, I will put a soft, gel wrist rest, back into use. Having a soft wrist rest is better than laying your wrists all the way down onto the keying surface, which is most often a hard desk or keyboard tray.

Working Surface Height and Tilt

A workstation height should be designed so that the work is located in relation to the individual's elbow. Precise work that requires minimum strength but a clear view of the work to be done should be located approximately two to four inches above elbow height. Light assembly work requiring some strength and a normal viewing distance should be located two to four inches below elbow height. Heavy assembly type work requiring more strength and less visual clarity should be located four to eight inches below elbow height.

Placing items being worked on so that they are tilted back is a good idea for the same reason that copy holders are useful—it reduces the amount of bending at the neck to view the materials being worked with. It is easy to make what I call a production slant, which can be just a piece of wood propped up from behind. If there are concerns about the items being worked on falling to the bottom of the slant board, using even a small amount of slant can be helpful. For individuals doing a lot of reading, desktop lecterns are a good choice.

Centering

Workstations should be arranged to keep frequently used materials within an easy reach. This is especially true with heavier objects. Keep motions that are made frequently toward the center of the workstation. I can't tell you how important this is. I have seen programmers who use two monitors (for different programs running on different CPUs) develop very serious neck problems. They sit all day long and look back and forth from one computer monitor to the other. Attaching an A/B type switch, sometimes solve this. This is a switch, often

Case Study

Turning of the head seems like such a small movement, but too much of anything is well, just too much! I visited with one programmer who was facing surgery in the cervical area of her spinal column because she had worn out the discs in her neck. She related that there was talk of inserting a rod in her neck if other, less drastic, measures were not successful. As you can imagine, putting a rod in the neck would not allow for very much movement in the neck at all. ❖

Keyboards

In my seminars on office ergonomics, the subject of alternate keyboards often comes up. There haven't been many independent studies on the various types of keyboards and this subject gets everyone very confused. There are some very exotic forms of keyboards available and this makes it even harder to understand. I recommend three or four forms of keyboards which meet most needs.

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The seminal work on basic information for choosing a keyboard type is a PDF at the NIOSH (National Institute of Occupational Safety and Health) website- www.cdc.gov/niosh/97-148.html.

For most users the basic keyboard that comes with computers is fine, so long as it has a good, springy response in the keys. That being said, the design does have an interesting flaw as there are all these keys on the right-hand side that have to be cleared when reaching for the mouse. When you consider most users are right-handed, it makes you wonder what the designers were thinking. It may have been that initially, no mice were used and so everything was put on the right because of the fact most users are right-handed.

For those who are smaller in stature, or those who have extensive movement back-and-forth from mouse to keyboard, I sometimes recommend what is called a mini or compact keyboard. This works for those who do not utilize the right-hand 10-key. The other keys on the right side (for example the "page up" "page down" keys or the "home" or "end" keys) are usually integrated into the keyboard so that there is a much smaller footprint. Not only does this allow for a smaller keyboard, but also brings the mouse much closer to the keyboard and helps to center the work activities as discussed earlier.

Keyboard trays are useful in getting the right keying height.

Additionally, keyboards without the right side 10-key can be angled up at various heights in the center and allow for good adjustability. Many of the keyboards without the 10-keys also have separate 10-key pads that can be purchased and used when needed. When not in use, the 10-key can be moved out of the way so the mouse can be brought closer in, resulting in less opening up of the mousing shoulder.

For users who have to bend their wrist inward to get their hands on the keyboard (usually users who are wider at the shoulders) the so-called "natural"