Computer Mouse

Loss Control Bulletin

Douglas Englebart, of the Stanford Research Institute, invented the computer mouse in 1968. After reviewing a series of experiments conducted in the early 1960s by American geneticist Clarence Cook Little, he became intrigued by Little's examination of laboratory mice at the National Cancer Institute. As a result, Englebart set out to design a more efficient method for controlling computers based on small movements of the hand corresponding to a point on a screen. The term "mouse" is a play on this connection and was originally coined by Bill English, Englebart's friend and colleague at the institute.

Today's computer operating systems require the use of a pointing device and a keyboard, to quickly navigate documents and perform computer operations. The mouse has proven to be a very efficient, easy to use, and indispensable pointing device. It comes in various sizes and shapes and typically includes a wheel and two buttons. Moving the mouse across a surface with the hand translates into a motion of the pointer on the computer display that greatly reduces or eliminates the need of keystrokes to move the cursor within a spreadsheet or document. The mouse has proven to be an important labor-saving device.

The three-button scroll-wheel mouse has become the most common model available, but there are alternatives such as touch pads, trackballs, joysticks, pens, and vertical mice that use the handshake position. They can be mechanical, optical, laser, or inertial and be controlled by your hand, foot, finger, or head. A mouse can either be wired or wirelessly connected to a computer.

The widespread use of the computer for work and for internet access has produced evidence that suggests that computer mouse use is associated with upper extremity musculoskeletal disorders. Subjects reporting discomfort in the hand used to hold the mouse were found to have poor wrist posture (too much extension or pronation), shoulder abduction (turned outward) or excessive reaching. Discomfort can be caused by a combination of these factors.

The following user tips can help prevent the development of musculoskeletal disorders.

Equipment Options:

- For most persons, a mouse that fits the operating hand and is as flat as possible will reduce wrist extension.
- A symmetrical shaped mouse will reduce pronation and a larger, flatter mouse encourages arm movements rather than wrist movements.
- A trackball mouse may be useful when space is limited, but its shape can increase wrist extension.
- A keyboard designed with the mouse device or touchpad incorporated in the middle of the keyboard can reduce reaching and keep the mouse at the body's midline.
- A wireless mouse can enhance the placement of your mouse for multiple tasks. A combination of mice can be used if desired.
- A programmable mouse allows the user to customize the mouse for certain specific tasks. For example, a common change is to increase the pointer speed. This reduces the amount of mouse movement needed to move the pointer on the display.

Positioning for Comfort:

To avoid discomfort when using the mouse, there are some general guidelines to follow in positioning the mouse at a workstation. The location of the mouse during use in relation to the body's centerline affects the user's comfort level. The farther from the centerline, the more deviated shoulder and wrist postures may occur—usually turning outward to the right (if right dominant and the opposite if left dominant).

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- The mouse should be positioned next to the keyboard—right side for right dominant and left side for left dominant.
- Ideally, your hand should be just above elbow level when resting on the mouse to reduce extension of the wrist.
- For those persons who use the numeric pad infrequently, this position can be attained with the use of a mouse bridge or adjustable platform that sits above the numeric keypad. Both of these devices can be moved if the numeric pad is needed, or the top row number keys can be used.

When using the mouse, there is no need to grip the mouse tightly with your thumb and little finger to maneuver it.

- Relax your hand and lay it flat on the mouse.
- Avoid flicking the wrist to the left and right when moving the mouse.
- Your wrist should remain straight and controlled movements should be made from the elbow as the pivot point.
- Your elbow should be located at your side and should not be resting on the chair armrest.
- Do not use a wrist rest or rest your forearm on a chair armrest. Research has shown that a wrist rest can increase the pressure on the carpel tunnel. Using either or both resting surfaces while using the mouse can lead to mouse movements made by flicking the wrist rather than moving from the elbow because the forearm and wrist become locked into position.

You also need to assess how you use the mouse during your workday.

- Sharing the workload between your right and left hand is a perfectly good method to reduce duration, but you will need a keyboard or mouse platform that can be easily configured for the left or right hand.
- In some instances, alternative key movements can be used rather than the mouse in order to rest your hand, e.g., page down and arrow keys to move the pointer.
- For tasks with longer duration such as browsing the Internet, you may be able to shift the keyboard to the left (if right hand dominant) it to the right (if left hand dominant) and bring the mouse closer to the body's midline.

Many studies have looked at the different types of mice and the results of various postures with each mouse, but these studies have not determined a preferred size or shape. Position the mouse correctly and assess the tasks you do with the mouse to find the right one. With the many choices, it's always a good idea to first try out a mouse before buying. No one's preferences are the same, finding what works best for you will keep you comfortable when using the mouse.

Extension of the Wrist—Position of the risk when the arm is held horizontally, and the fingers of the hand are pointed toward the ceiling.

Pronation is a rotational movement of the forearm at the radioulnar joint. An inward rotation of the forearm so that the palm is facing posteriorly or inferiorly (e.g., backward or downward). During pronation, the distal end of the radius moves across the ulna towards the midline. Pronation is the natural position (but not the anatomical position) of the forearm when a person is standing in a relaxed position.