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# CLINICAL CARE UPDATE

## TECHNIQUE ADDRESSES COMPUTER-RELATED RSI

*This is the second part of a two-part article. Part I was published in the March 11 edition of the Clinical Care Update.*

**By Norman J. Kahan, M.D.**

Computer-related repetitive strain injury (RSI) is a medical, functional, and behavioral problem.

Seeing patients suffer from computer-related RSI compelled me to develop MouseKey Do™, an ergonomic training program in mouse and keyboard technique that addresses each aspect of the problem. Part I of this article discussed the causes of computer-related RSI, symptoms, and prevention guidelines. This second part addresses some specific techniques that can be used by keyboard and mouse users to help alleviate symptoms and prevent computer-related RSI.

**Home Row**

The traditional "home row" on the keyboard forms a straight line. By comparison, the natural contour of typing fingers is curved. For the middle and ring fingers to "fit" the home row, they have to curl, or flex, forcing the hand out of its neutral resting position into a "claw" position, which creates tension in the fingers, wrists, and elbows. To relieve this tension, typists often "drop," or extend, their wrists by resting them on a wrist rest or computer edge, which can lead to other complaints.

To encourage natural alignment of the fingers and reduce tension, the typing technique featured in our training program replaces the traditional home row keys of “A S D F” “J K L;” with this key configuration:

| Left Hand | Right Hand |
|---|---|
| W E | I O |
| A F | J ; |

In this position, the fingers are naturally curved, allowing the wrists and hands to balance comfortably over the pads of one’s fingers.

**The Drop - Arms Do the Walking**

With a healthier hand position established, the next training step involves a new way to navigate around the keyboard. Touch typists typically use the traditional home row as a fixed reference point from which the fingers depart and return. Although this system allows letters to be "found" by a sense of feel, it also invites stressful movements because the forearms are static. Fingers and wrists do the work by flexing, extending, twisting, and reaching.

Rather than rely on fingers and wrists, the MouseKeyDo™ technique encourages the user to recruit help from the forearms, elbows, upper arms, and shoulders to minimize finger and wrist movements. For example, when typing, fingers typically perform three distinct movements: 1) moving up and down; 2) moving forward and backward, and 3) moving from side to side.

Rather than use these motions to get around the keyboard, one can reduce injury risk by learning how to "drop" onto the keys using fingers, hands, and forearms together in a synchronized motion. One can accomplish this movement by lifting and dropping onto the keys from the elbow "hinge," much like a hammer tapping a nail. This allows the fingers to drop onto the keys with minimal effort, especially if one uses the weight of the hand and arm.

With the drop technique, motions are never initiated from the fingers, wrists or arms alone. The whole upper limb moves together, sharing the workload. Another way to encourage this movement is to think of the hand as a paw; when one finger moves, the others follow, carried by the arm.

Once one gets the hang of "pawing" as a substitute for "clawing," the whole hand may be moved forward and backward by gently swinging from the shoulders and elbows, thus allowing the arms to carry the fingers and hands back and forth without disturbing the natural contour of the wrists and fingers.

To avoid ulnar deviation at the wrist or twisting the hand to the side of the little finger when typing, the typist is instructed to swing his or her arms from side to side through internal and external rotation at the shoulders, similar to the movement of a windshield wiper. Lastly, in moving up and down at the keyboard rather than flexing and extending at the fingers and wrists, the typist is instructed to drop his or her arms from the elbows, or flex and extend at the elbows. By using gravity and recognizing that the arms weigh more than the keys, there is no need to press, push or pound on the keys.

**The Beat - Rhythm and Speed**

When a drummer plays a drum roll, rhythm and speed are created by striking the drum with alternating hand and arm strokes. When typing letters with alternating hands, one can begin to create speed and momentum by applying a beat to the movements. The goal is to type letters in groups with a sense of rhythm rather than as individual keystrokes.

To illustrate a two beat-three beat-two beat rhythm sequence in words, the typist is instructed to type the

words "go for it," using their forearms, wrists, and middle fingers like drumsticks to compensate for directional changes the fingers alone are accustomed to making.

As the words are typed, the typist speaks aloud the word “pa-dum” for the word “g-o,” “pa-da-pum” for the word “f-o-r,” and “pa-dum” for the word “i-t.” When the arm movement is correctly timed, hitting multiple letters can be made to feel as one gesture. The fingers can afford to be lazy, while the arms create speed by dropping in rapid succession.

**The Roll - Efficiency and Comfort**

The "roll" permits one to rapidly type several letters with minimal effort by simply rolling over adjacent keys or letters that typically fall under the fingers, similar to how one would play a piano chord, but hitting the keys successively rather than simultaneously.

To illustrate, the typist is instructed to type the word “power,” using the right hand and arm to roll over the letters “p” and “o,” moving from the right side of the keyboard to the left side of the keyboard, and using the left hand to hit the remaining keys “w” “e” “r” by rolling from the left to the right side of the keyboard. The roll technique increases comfort and efficiency because the typist hits multiple keys with a single arm gesture.

By using the drop, beat, and roll™ as choreographed techniques, typing becomes more comfortable and efficient – even fun.

**Using the Mouse**

Most computer programs are designed to incorporate the use of a mouse input device. "Mice" can come in the form of a traditional mechanical mouse, optical mouse, trackball, mouse pen or touch pad. There are even foot and head mice. Risk factors commonly associated with the mouse include:

- Poor placement.
- Gripping with excessive force.
- Initiating motions at the wrist, such as ulnar or radial deviation.
- Initiating motions at the fingers, particularly the thumb.
- High "clicking" fingers.
- Clicking and dragging, again with excessive force, on both the mouse and the "clicking" finger.

Computer users may be given the following instructions to encourage comfortable handling of the mouse: Gently rest the palm on top of the mouse and relax the fingers. Give the hand and arm a place to rest. Let the upper arm hang freely from the shoulder joint and allow it to move like a clock pendulum. The forearm should feel light and easy. Making small circular motions, the mouse should feel as though it is skimming on ice. When making larger circles with the effort generated by the shoulder, elbow, and wrist, the arm can move the mouse with subtle twisting at the wrist. Fight the urge to squeeze the mouse or jerk the wrist while the arm is planted on the table. Make figure eights with a supple wrist. When clicking the mouse button, try not to use just the fingertip. The goal is to create a fluid, snake-like movement using the entire upper arm and torso rather than isolating the fingers and wrists.

**Laptop Use**

Just as desktop computers have specific guidelines and recommendations for safe and healthy use, so do laptops. The following recommendations are included in our training program:

1) The laptop computer should be positioned so the user’s elbows are level with, or slightly higher than, the keyboard (i.e., elbows slightly less than 90 degrees using full elbow extension as a zero reference). Wrists should be level or slightly extended. Upper arms should hang as vertically as possible.

2) Use an armless chair to promote arm movement.

3) Avoid resting on the wrist rest while typing.

4) Use whole hand and arm movements to navigate around the keys.

5) Avoid pounding the keys.

6) If the glide point is difficult to move, substitute it with an external mouse, and/or key commands.

7) Avoid bending at the neck; tuck the chin and keep the head balanced over the spine.

8) Sit with knees and hips level.

**Summary**

The MouseKeyDo™ training program provides computer users with ergonomic guidelines and techniques to help them establish a safe workstation and good work habits. Our bodies are designed to move. Ergonomic keyboards and mice can help facilitate healthier body alignment, but if one continues to type with static arms and busy finger movements, problems will persist. These suggestions are just the beginning of training in mouse and keyboard technique. Training takes time, understanding, and commitment to change. It all begins with awareness.

*Norman J. Kahan, M.D., director of Sports and Occupation Medical Associates, Cupertino, CA, is board certified by the American Academy of Physical Medicine and Rehabilitation. He will speak on mouse and keyboard training techniques at the American Occupational Health Conference, April 17 in Chicago. For more information, contact Dr. Kahan at njkahan@yahoo.com, or call 408-725-7277.*

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