Alternative vs. "Ergonomic" Keyboards

Loss Control TIPS

Introduction

What is an "ergonomic keyboard"? The term "ergonomic keyboard" is generally used in reference to a computer keyboard designed to incorporate ergonomic principles with the intention of maximizing comfort and minimizing risk factors, such as awkward postures and force, associated with musculoskeletal disorders (MSD).

Journals, newspapers, and sales brochures are marketing keyboards conforming to a variety of shapes and sizes. Some of the new keyboards assimilate what has come to be considered the "standard" keyboard layout. Others feature a contoured design and vary significantly from the conventional design. Some are even configured in sections which separate and move to allow individual adjustment. Another approach incorporates programmability into standard and ergonomic keyboards. Each design meets a different combination of ergonomic criteria, and each one presents its own set of pros and cons. The "perfect keyboard" does not exist. No one keyboard design will meet the needs of all individuals or all keyboard related job tasks.

Use of the term "ergonomic", as it relates to keyboards (as well as other products) seems to have become a common marketing strategy. Since ergonomic features offered by each keyboard vary and no single keyboard is designed to meet all of the ergonomic needs of the population, **the more appropriate terminology is "alternative keyboards",** rather than "ergonomic keyboards." The questions to be answered in evaluating an alternative keyboard is what ergonomic features are offered and how well do these features match the needs of the user and the job task.

Alternative keyboard designs

The rapid increase in computer use and the proliferation of MSDs associated with computer use has led to the development of a variety of "non-standard" keyboard designs. The following list provides a brief description of some of the more common designs":

- **Sculpted or contoured keyboards** place the keys in contours or curves that are intended to match the natural movement of the fingers, reduce finger travel to the keys, and transfer some of the work from the weaker fingers to thumbs.
- **Fixed split keyboards** offer a single board with keys separated into two or three groups. The key layout mimics that of the standard keyboard but two main sections (one for the right hand, one for the left hand) are angled to encourage a straight, not deviated, wrist position. These fixed

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split keyboards offer various combinations of features such as a curved base with a wrist rest, a hinged rail for height adjustability, "ports" on both the right and left sides of the keyboard offering a choice of numeric keypad location, trackball located centrally in the wrist rest portion of the product, and detached optional numeric keypad. One model offers an optional foot pedal for keystroke assignment.

- **Adjustable split keyboards** are divided in two or more independent pieces to allow horizontal and vertical angling of sections. Some of the features offered include detachable and/or adjustable palm rests and adjustable numeric keypad.
- **Vertical keyboards** place sections of the keyboard in vertical, "hand-shake", position.
- **Chord keyboards** are smaller and have fewer keys, typically one for each finger and possibly the thumbs. Simultaneous compression of various combinations of keys, similar to playing a musical chord on a piano keyboard, is required for each character typed.
- The **Dvorak keyboard** layout offers an alternative to the more standard QWERTY arrangement of alphanumeric keys. The Dvorak keyboard is designed to more evenly distribute typing among the fingers of both hands by positioning the most frequently types characters on a keyboard in more accessible locations.
- **Other keyboard designs** offer various combinations of the features described above. For example, one design features two molded hand pods with magnetic switches clustered in three-dimensional "wells" around each finger. Typing is performed by moving the fingers very slightly in one of five directions (north, south, east, west, or straight down).

It should be noted that there is a learning curve associated with the introduction of these alternative devices. It takes some time for most users to adjust to the new design.

How Valid Are Manufacturers' Claims?

Only a portion of the alternative keyboards currently in production are referenced above. As you can see, there is a range of similarity and differences. The cost of these products ranges widely as well from prices comparable to the standard keyboard to prices 2-3 times that of the standard keyboard. What is common to all of these new products is that they have been designed with the intention of improving the comfort of users. We can all readily accept and, in fact, we welcome design changes to improve comfort. However, some manufacturers profess that their keyboards provide relief to the many who "suffer through grueling keyboard aerobics" day after day. Some even go so far as to say that their keyboards will prevent keyboard related injuries. There is no doubt that, given the opportunity and choice, an individual operator may be more comfortable using a specific type of keyboard. But this will happen only when the design meets that user's particular need(s). We must use caution and avoid considering keyboard design, or any product design, as an easy, perhaps generic, solution to a very complex problem.

The Role of the Keyboard in MSDs

Discomfort or symptoms of musculoskeletal disorders (MSDs) related to keyboard use are very likely caused by a combination of factors, including posture, workstation design, work practices, and how the workstation is used. The keyboard itself is only one component of a complex series of factors that may be responsible for exposure. Nevertheless, the potential role of the keyboard in the development of cumulative trauma disorders has been singled out in the many lawsuits that have been brought by injured users against manufacturers of keyboards and other computer equipment. The plaintiffs intend to show that the companies that manufacture conventional keyboards have known for many years that these keyboards are responsible for exposures that can lead to such disorders, that the manufacturers deliberately did not warn users of the danger, and that alternative keyboard designs existed that could have prevented users' injuries.

Are Alternative Keyboards a Solution for MSDs?

The implication of both the plaintiff's position and of some manufacturers is that alternative keyboard designs, specifically those referred to as "ergonomics keyboards", will resolve the MSD-related problems caused by traditional keyboards. This implication is misleading and inaccurate. Little data exists to support the use of alternative keyboards alone as a means to correct physiological problems. In fact, keyboard risk factors are not clearly understood, and even the experts cannot, with certainty and specificity, make a direct and indisputable connection between keyboard and injury. These keyboards can introduce new ergonomic risk factors if not carefully selected. For example, the increased

width or height of some of these keyboards may cause users to reach excessively to access the keys or pointing device. In an attempt to ward off product liability lawsuits, some manufacturers have decided to put warning labels on keyboards, directing users to read a safety guide with tips on avoiding hand and wrist injuries. There continues to be much controversy on the subject and other manufacturers have no plans for warning labels.

Keyboards Are Only One Part of the Computer System

It is clear that the computer workstation must be considered as a system. In order to prevent and to eliminate exposures known to cause cumulative trauma disorders, many job related factors must be studied, including furniture, equipment (keyboards included), workstation design, the general work environment, work organization and practices, and performance pressures. More definitive research is necessary to determine the true effect of the new keyboard designs.

Full Workstation Assessments Needed

In the meantime, a full workstation assessment is the best tool to identify risk factors and exposures. Alternative keyboards may be an effective solution in select situations and can be considered in the problem solving process. As with all "ergonomic accessories," the need must be determined through the individual workstation assessment process. Subsequently, the implementation of the solution must be carefully monitored for effectiveness.

Other Considerations

While keyboards have been implicated in playing a role in the development of cumulative disorders, they cannot be held exclusively responsible for another reason. Other devices are gaining ground as primary input tools. The mouse is perhaps our biggest concern right now, however, trackballs, pens, and voice activation are also in the picture. It is encouraging to know that we have a variety of tools that can be employed as alternatives when needed. But further study on how these tools are used and their potential impact on the health and safety of users is necessary.

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