

Potential problems with the use of laptop computers

Introduction

The rapid spread of laptop computers ran ahead of the scientific research into the health and safety aspects of their use. However, Leon Straker at Curtin University in Australia cites a recent study which found that 60% of laptop users reported musculoskeletal discomfort.

The problems

The following features of laptop computers differ from those of desktop computers in respect of key human / machine interaction issues.

- the screen
- the input device
- the connection of screen to the keyboard
- the environments in which they are used.

Screen

Laptop screens are flat screens, which until very recently had poorer clarity and a restricted lateral angle of viewing. The results of these are common complaints of difficulty in viewing

laptop screens. This can lead to visual discomfort and, as the visual and musculoskeletal systems are closely linked, it can also lead to musculoskeletal discomfort.



Keyboard and input devices

Most laptops currently available, use a reduced size keyboard on a flat base, which raises it relatively high above the worksurface yet with no slope or difference in height between keys in each row.

This often requires users to raise their wrists and hands to reach keys in the back row as shown in the following picture. This puts strains on wrist, hand and shoulder muscles.

Laptops use a track pad or mini joystick as pointing devices. Pointing devices in laptops require more accurate but smaller and finer control movements than those in desktop computers. These



in turn can put greater strain on hand muscles for movement control and forearm muscles for stabilising hands.

Fixed connection of screen to keyboard

Most current laptops have the screen attached to the main body of the keyboard of the computer. This presents a severe restriction to the user in choosing a comfortable position for the keyboard (laterally) and the screen (laterally and height wise).

Both the visual system and hand movements have their own comfortable 'reach' zones, which vary from one user to another. With desktop computers, where the keyboard and other input devices are separate from the screen, it is possible for the user to place these three components in comfortable reach zones. However, as the laptop screens are permanently attached to keyboards and input devices, users who prefer longer eye to monitor distance have to key with extended arms or compromise the visual distance in order to achieve a more comfortable arm posture.

The height of the screen is also fixed in relation to the work-surface. The low screen can cause a neck strain even though it results in less visual strain. This may create some musculoskeletal problems for some people. However the key problem is that users have no choice in selecting a screen height, which is comfortable for them.

It is generally agreed that people using laptops adopt a hunched posture where their neck is bent (flexed), head is lowered and protrudes forward, shoulders roll in and chest appears sunken. Consequently, the spine loses its normal S-shape and is arched forward. Such postures are considered to give rise to musculoskeletal discomfort and disorders. It must be noted that screens positioned above eye level can cause greater problems such as neck and shoulder pain or disorder.

Environment

Often, if the laptops are truly used as portable equipment, they will be used away from more controlled environments such as offices. In such environments the users may have to use the



laptops on work surfaces that are too high or too low, with too little lighting or with reflections and glare present.

All such factors may force the user to adopt non-conventional postures to minimise the effects of these factors. For example in order to avoid glare, the user may rotate the laptop, which in turn can force the user to adopt a twisted back posture in order to use the keyboard.

Additional problems with laptops are that they have to be transported / carried by the users.

Even though an average laptop weighs about 4kg, by the time the user has to carry power adapters and other accessories, the weight soon builds up. If they are carried in inappropriate bags, they can create other musculoskeletal problems such as back pain.

An unexpected risk

There is another, unexpected risk associated with laptop computers. HSE states that there is a risk of theft, possibly involving assault. Hence employers have to inform their employees how to minimise such risks.

Conclusions

In conclusion, the design and use of laptop computers can result in increased visual and musculoskeletal disorders compared with desktop computers.

The main problems are likely to be visual discomfort and neck and upper limb complaints, all due to possible poorer clarity of display, restricted viewing angles, lack of keyboard and lack of independent adjustment of position and height of keyboard and screen.

All of these problems are likely to be exacerbated when laptop computers are used away from controlled office environments.

The Solution:



By simply adding a Laptop Stand, an External Keyboard and Mouse (The Laptop Pack) users can position the keyboard at the proper height while adjusting the screen to the preferred viewing distance and height.