

Regulatory Matters

SECTION EDITORS



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Editorial

The computer is the medical writer's best friend. As such, occupational hazards associated with this line of trade include back,

neck, shoulder, and hand pain as a result of constrained postures from computer-based tasks. In line with the topic of the virtual workforce, we are pleased to have Ri Xu take us through her

journey to understanding various muscle pains and her creative ways of working ergonomically to counter them.

Clare Chang and Zuo Yen Lee

Hand and back muscle pain and how to avoid them: A regulatory writer's story

Introduction

I am 33 years old and am prone to different kinds of muscle pain, not only while at work, but also while eating, driving, walking, and sleeping. As a regulatory writer, I experienced different muscle pain and tension and therefore set out to investigate pain management with multiple devices and creative ways to use them. This article is an anecdotal journey to discovering the causes of pain from medical writing and how they can be avoided. The recommended devices and principles of working can be useful for different medical writers.

Why medical writing causes muscle aches

I was a Clinical Evaluation Reports (CERs) writer supporting the regulatory compliance of medical devices for a year. CERs summarise clinical data from various data sources to assess the benefits vs. risks of a medical device. More than 70% of the work involves finding and placing relevant information into a template or a table. Sources of information include labelling documents, post-market surveillance reports, risk management documents, etc. Therefore, the physical work on the computer involves moving and clicking the mouse, and using a lot of hotkeys, such as Ctrl + F (search), Ctrl + C (copy), and Ctrl + V (pasting). At a fast pace, these activities may result in muscle pain in the hand.

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Muscle pain analysis and discussions

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General reasons for body aches

Generally, regardless of where the pain is (lower back, neck, hand, etc.), the reasons behind the pain (which may potentially become arthritis), are simple – overuse of muscles:

- Holding a posture or position for too long or moving incorrectly.¹ Human bodies are made to move and the movement has to be ergonomic.² Repetitive mouse movements and clicking can be painful for the hand, elbow, and shoulder. In my case, the pain was only relieved when I rested my right arm completely (e.g. when one is walking).² Even a partially relaxed position (e.g. resting hands on the table) caused a lot of pain. The problems of prolonging certain postures and moving incorrectly may be underrated and require further scientific studies since the current literature is limited.¹
- Weight overloading, uneven weight loading, or uneven distribution of weight.³ Bad postures can occur unintentionally when sitting on an uneven surface or walking on an uneven floor: the floor or seat is the cause of uneven weight distribution. Notably, weight overloading, uneven weight loading, or uneven distribution of weight are common causes of arthritis during later stages of life.^{4,5}

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For example, in my kung-fu class, my teacher asked me to hold the split stance: one foot forward and one foot back while moving a stick in one hand. While performing this movement, I felt pain in my hand and lower back. I could not even open and close my hand while holding the stick. My legs were uneven when I performed the split stance, which caused the lower back pain.

Hand pain

(including finger, wrist, and elbow pain)

While the use of the mouse and keyboard is straightforward, the causes of hand pain can be complex.

Operating the mouse

Based on my own observations, mouse movements can be categorised into three types: moving the cursor, clicking, and scrolling (see Creative office set-ups below.)

Weight bearing of the upper body

If one's upper body is leaning forward, then their wrist or arm is likely supporting part of their weight. I tried well-designed moveable elbow support but ended up transferring the pain into both my elbow and shoulder. Thus, leaning forward may contribute to wrist, elbow, and shoulder pain.



Holding the mouse

One of the main causes of pain can be holding the mouse for an extended period of time.

Moving the cursor

The cursor's movement is composed of two parts: long-distance movement and small adjustments. With long-distance cursor movement, the mouse/trackball only needs momentum to reach the destination area. After that, the cursor's movement is fine-tuned within that area. The most painful part is the small adjustment movement, where multiple muscles have to work together to ensure that the cursor is placed precisely. I've tried different types of mice: ergonomic left- and right-hand mice, trackball mice, trackpads, pen-shaped mice, etc. Regardless of the mouse type used, moving the cursor can be painful for very small adjustments. Consequently, I would not recommend a single mouse.

Additionally, I tried working with multiple mice, where I switched to another mouse when my hand pain became unbearable. However, the pain merely transferred from one muscle to another after the switch. Therefore, my sug-

gestion for alleviating hand pain is to minimise moving the cursor using a mouse.

Clicks

Mouse clicking is not painful but having to hover one's fingers to be always ready for the clicks is painful (see suggestions in the Hand or finger hovering problem section below.)

Scrolling

Most devices on the market allow only up-and-down scrolling. However, there is a need for left and right scrolling as well.

Horizontal scrolling mice are very difficult to find because there are so few on the market. I also tried to add this function to my macro keyboards but was unsuccessful. Hence, there can be a potential market need for this function. Left and right scrolling devices, if available, may alleviate the pain stemming from the current click and drag function to scroll the horizontal bar.

Overall, from my pain analyses, I recommended limiting the usage of any mouse (including different shapes, types of mice, and trackpads) and especially avoid moving the cursor.

Operating the keyboard

A quick CER writer probably uses hotkeys quite frequently. Performing such movements frequently for eight hours a day may be painful, especially when hovering one's hands above the keyboard while anticipating the next hotkeys (See Hand or finger hovering problems). For this matter, I suggest using small macro keyboards (see the section below, Trial and error – Recommended devices).

Hand or finger hovering problem

How often does a writer need to click the mouse? Let's estimate one click every two to three seconds. Imagine that the left-click button was on a wall that is easily accessed by raising a hand. This movement would not be painful if the hand returned to a relaxed position after every click. However, if the hand were to hover near the button until the next click, the hand (or arm rather) would become very fatigued. Hand hovering is often subconscious and difficult to change. Hence, one may resolve hand pain by returning the hand to a comfortable resting position more frequently – after each action.⁶ By doing so, the muscles get to relax for up to 50%



Figure 1. Creative office set-up: a mouse on both left and right sides of the chair

Creative office set-ups

After months of trial and error, I established my current office set-up, in an attempt to resolve the pain mentioned above. This setup is based on devices currently on the market.

To work while sitting in a chair with a slight backwards incline, I have two trackball mice, one to the left and one to the right of my chair (Figure 1). Trackball mice allow for moving the cursor by rolling the trackball. In front, I have small macro keypads and trackpads placed at comfortable positions (Figure 2). Trackpads require moving fingers on the pad.

While a touchscreen and macro keyboards avoid more than 70% of painful cursor movement, there are still situations when the mouse cannot be avoided.

To increase comfort, I try to relax my hands as frequently as possible by switching hands while operating the computer.

Here is how I operate the mice: I separate long-distance cursor movement, small cursor adjustments, and clicks. I perform the long-distance movement with my right hand on the trackpad and small adjustments with my left hand on the trackball mouse (Figure 1 and Figure 2). For clicks, I either use the trackball mice or the trackpad.

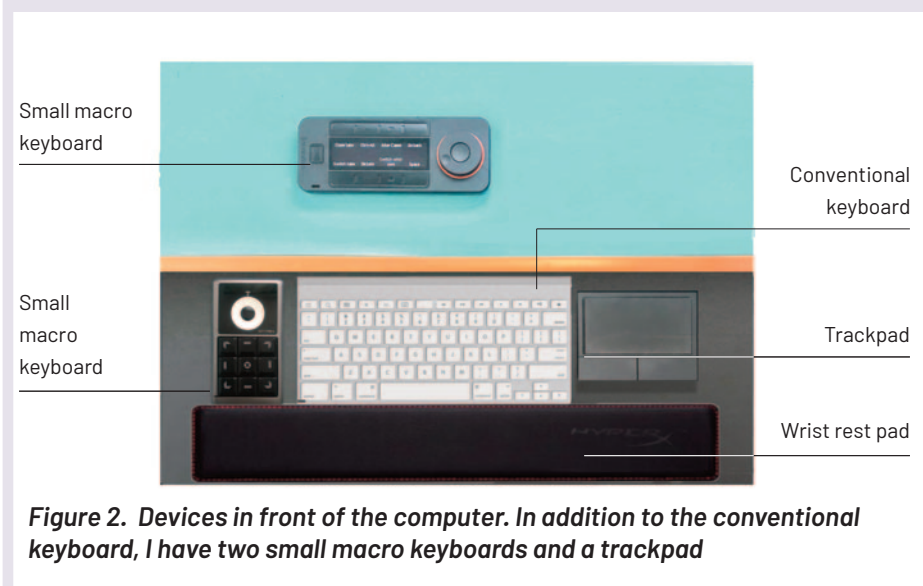


Figure 2. Devices in front of the computer. In addition to the conventional keyboard, I have two small macro keyboards and a trackpad

of the working time. Changing hands frequently can make this possible (see Creative office set-ups below.) This recommendation applies to all devices being operated, including touchscreens.

Neck pain, shoulder pain, and lower extremity pain

The positions that can cause neck pain are listed below:

- Bending neck downwards. This often occurs when one is reading something below eye level.
- Facing forward with a hunched back and rounded shoulders. This often occurs when one needs to work in front of a computer but wants to relax the neck and shoulders. The posture may be assumed unintentionally and subconsciously.
- Tilting or turning the head to one side. This often occurs when the writer looks only at one side of the screen.

The ideal alignment of the neck assumes a slight lordotic curvature, which can be achieved by leaning backwards on a chair and staying centred.⁷

Lumbar (lower back) pain

One reason for lower back pain is an uneven weight load. Sometimes a chair is not flat and is lower in the middle and higher on the edges. In this case one needs to ensure that the chair is centred. It may be hard to notice when sitting a little bit off-centre and pain may occur.

Back support is also a necessity and most chairs do not have this. Immediately trying a commercial gaming chair or back support for office use can be costly and may not necessarily help. Every individual has a preference for the height and thickness of the cushion for back support,^{2,8} so it is important to try out back support and make sure it is centered.

Trial and error - Recommended devices for pain relief

Based on trial and error and analyses above, the following equipment or settings can be helpful:

- Touchscreen. A touchscreen can minimise cursor movement.
- Small macro keyboards. Each hotkey (i.e., a combination of keys) can be easily programmed into one single key on a macro keyboard. Small macro keyboards can be easily placed anywhere and are very comfortable to use. As a result, the hand pain caused by hovering over keyboards can be avoided. Macro keyboards are very popular in the gaming and digital art industry. It was a lot



of fun to create my own “gaming keypads” for regulatory writing work.

- **Voice recognition** in Microsoft Word and Windows Operating System. In Word, voice recognition is very useful for drafting text. However, when it comes to copy-pasting work, macro keyboards are still faster.
- **Automation software**, such as Macros in Word and Excel. (Automation software can repeat certain sequences of keystrokes and mouse-clicks conducted on a computer.) So far, I have found Word Macros very efficient in cross-referencing and fixing broken links.
- **Monitor risers** that raise your computer screen to eye level, reducing neck strain.
- **“Lazy-man glasses”** for reading files on the table without bending the head. (These glasses have prisms that allow one to read files below without looking down.)
- **Customised lumbar support pillows** centred in the chair.

Conclusions and suggestions

Through trial and error, I performed pain analyses and proposed principles for pain management. Currently, there is limited literature supporting the point of view discussed in this article, which potentiates further research in office set-up design.^{9,10}

Principles for pain management

The principles of pain management from my analyses are below:

- Relax the hand and arm more frequently regardless of which devices are being used. The muscles get to relax 50% of the time by changing hands frequently.
- Limit the usage of any mouse (including different shapes, types of mice, and touchpads), especially in terms of moving the cursor.
- Limit neck bending.
- Lean back and centre oneself in the chair.

A contradiction of good posture vs. conventional office settings

- The preferred and more ergonomic posture for the human body while sitting is to lean backwards. However, conventional office settings typically involve forward-facing work. This might be the major reason why many people suffer from back pain and hand pain.⁷ Non-conventional office settings can be created, where devices such as mice are not operated in front of the user, but to the side, which may be more comfortable and create less stress on arms, wrists, and hands. (See Figure 1).
- Prolonging certain postures, even the most relaxed postures, may also cause pain. A new device or set-up may relieve pain temporarily but not permanently.

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The author declares no conflicts of interest.

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