

Ergonomic considerations for a patient presenting with a work-related musculoskeletal disorder: a case report

Luke A Boudreau, BSc, DC*
Geoff Wright, P Eng, PhD, CCPE**

Primary contact health care practitioners can play an important role in work-related musculoskeletal disorders (WRMSDs) by recognizing and addressing occupational health issues. It is important to recognize ergonomics as a possible factor in patient health and recovery. A case is presented of a 36-year-old male suffering from neck and trapezius pain. Ergonomic factors at his workstation were identified as a possible contributor to his musculoskeletal disorder. Conservative care and ergonomic changes to his workstation produced positive results leading to a full recovery. Practitioners should not ignore the possibility that the workplace may be a contributing factor in patients presenting with musculoskeletal complaints. A thorough patient history is the key to determining if musculoskeletal disorders are work-related.
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KEY WORDS : Work-related musculoskeletal disorders, ergonomics, repetitive strain injury.

Les praticiens de soins de santé de premier contact peuvent jouer un rôle important dans les troubles musculo-squelettiques liés au travail en dépistant et soignant les problèmes de santé professionnels. Il est important de considérer l'ergonomie comme éventuel facteur de santé et de rétablissement du patient. Prenons le cas d'un homme de 36 ans souffrant de cervicalgie et de douleur au trapèze. Des facteurs ergonomiques à son poste de travail ont été identifiés comme pouvant contribuer à son trouble musculo-squelettique. Des soins conservateurs et des modifications ergonomiques ont donné des résultats positifs aboutissant à son rétablissement complet. Les praticiens ne doivent pas ignorer le lieu de travail comme facteur potentiel chez les patients se plaignant de troubles musculo-squelettiques. Les antécédents complets du patient jouent un rôle crucial pour déterminer si les troubles musculo-squelettiques sont liés au travail.
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MOTS CLÉS : troubles musculo-squelettiques liés au travail, ergonomie, microtraumatismes répétés

* Advanced Rehabilitation Inc., Toronto, Ontario, Canada.

** Employee Health & Safety, Human Resource Services, City of Vancouver, British Columbia, Canada.
School of Occupational and Public Health, Department of Environmental Health, Ryerson University, Toronto, Ontario, Canada.

Department/ Institutions where the work was done:

Luke Boudreau: Department of Graduate Studies and Research, Canadian Memorial Chiropractic College, Toronto, Canada.

Geoff Wright: School of Occupational and Public Health, Department of Environmental Health, Ryerson University, Toronto, Canada.

Address correspondence to: Luke Boudreau, BSc, DC, 1635 Lawrence Avenue West, Suite 201A, Toronto, Ontario M6L 3C9.

E-mail: drlboudreau@yahoo.com

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Introduction

Work-related musculoskeletal disorders (WRMSDs) describe a wide range of inflammatory and degenerative disease conditions. These disorders can result in pain and functional impairment affecting the neck, shoulders, elbows, wrists, and hands.¹ Epidemiologic literature has grouped these disorders as clinically well-defined (such as tendonitis and carpal tunnel syndrome), less clinically well-defined (such as tension neck syndrome) and non-specific (such as repetitive strain injury, cumulative trauma disorder and overuse syndrome).² Nonspecific disorders are not considered a diagnosis, but rather an umbrella term for a disorder developing from various risk factors.³

The World Health Organization recognize that musculoskeletal disorders are work-related when the work environment and performance of work are significant contributors to their development or exacerbation but are not the sole determinant of causation.⁴ These work-related musculoskeletal disorders are not a new phenomenon. For example, incessant “driving of pen over paper” and “movement of the hand and always in the same direction” causing “almost tonic strain on the muscles and tendons, which in course of time results in failure of power in the right hand” was described in clerks and scribes by Bernardino Ramazzini over two centuries ago.⁵

There has been a notable increase in WRMSDs within the past few decades leading to increased attention by government and industry in the United States⁶ and most other industrialized countries. In North America, WRMSDs have been considered a problem reaching epidemic proportions in some industries. Prevalence in the United States has increased in the previous decade and now accounts for more than 65% of occupational illness.⁷

Ascertaining the financial costs associated with neck and upper limb disorders is a difficult task. Conservative estimates by the National Institute for Occupational Safety and Health (NIOSH) indicate that work-related musculoskeletal disorders cost industry in the United States more than 13 billion dollars per year.⁸ Canada has similar costs proportionally; 1997 data from the Ontario Workplace Safety and Insurance Board (WSIB) on upper extremity repetitive body motion injuries carried an average cumulative cost of \$9630.00 per case with an average of 69 work days lost. Average cumulative costs included payments for temporary loss of employment, future economic

loss (up to age 65), non-economic loss entitlement and health care expenses, including all medical/rehabilitation costs.⁹ The direct costs from compensation are appreciated far more than the indirect costs associated with absenteeism, disruption in productivity and quality, training and worker replacement costs.¹

Case

A 36-year-old male production controller of an industrial manufacturing plant presented to the on-site multidisciplinary clinic with right trapezius and neck pain. The patient reported that the onset of pain was three weeks earlier and apparently insidious in nature. Over the past year he had noticed transient, minor pain and discomfort (once every month or two) while working at the video display terminal (VDT) workstation in his current job position.

The current episode of pain was noted to be much worse with increasing frequency (one or two times per week as opposed to once every few months). The pain was characterized as dull and throbbing at rest and sharp upon movements of the cervical spine, especially rotation. Intensity of the pain was noted as progressive throughout the day while at work, reaching 7/10 on the pain severity scale (a rating of 0 being no pain and 10 being the worst pain in his life). Pain reduced to near 0/10 at night after work. Relieving factors were noted as rest, Tylenol and self-massage.

Systems review and family health history were unremarkable. His personal health history revealed that he smokes (½ pack per day), is active in martial arts approximately 1–3 times per week and does home stretches in 15 minute sessions a few times per week. Secondary complaints were reported to be low back pain when driving long distances and occasional headache. The patient indicated that these secondary complaints were relatively rare and that he was not currently experiencing back pain or headache. Discussion of his occupational habits revealed that the patient works at a VDT workstation for a significant portion of the day (up to five hours).

After reviewing the set-up of the patient’s VDT workstation, it was determined that an ergonomics consultation was warranted. The on-site occupational health nurse was notified and an ergonomics evaluation of the VDT workstation was carried out seven days later. Figure 1 demonstrates the configuration of the workstation before the ergonomics assessment.

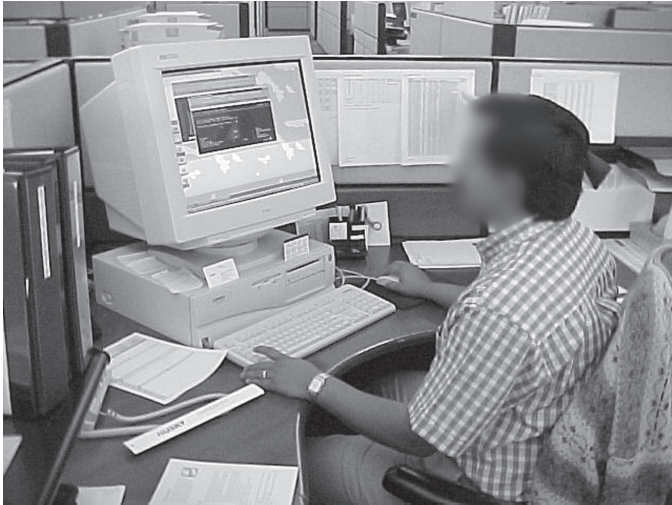


Figure 1 The VDT workstation before the ergonomics assessment and recommendations. Note that the monitor is approximately 5 inches too high. Chair position does not allow for arm support at the elbow and mouse position is too far away causing protraction of the right shoulder.

Examination and treatment

The physical examination of the patient revealed mechanical joint dysfunction at the T1–T4 spinal segments and mild tenderness of the right rhomboids. Active cervical ROM was full in all ranges, but pain of moderate nature was experienced in the right upper trapezius upon left lateral flexion. The right upper trapezius muscle was tender on palpation with multiple trigger points (an area of hypersensitivity in a muscle from which impulses travel to the central nervous system, giving rise to referred pain¹⁰) that caused pain to radiate to the neck and head. Cervical Kemp's test, and axial compression was unremarkable. Spurling's test produced right posterior muscle pain only in the C3–C7 region. Neurological examination consisting of upper extremity deep tendon reflexes, strength testing and light touch sensation were unremarkable. A working diagnosis of cervico-thoracic postural strain with associated thoracic facet joint dysfunction was given and the patient was placed on a treatment plan of two visits per week for two weeks. Treatments lasted 10–15 minutes and consisted of trigger point therapy and low amplitude, high velocity joint manipulation (diversified technique) to vari-

ous thoracic spinal segments in the T1–T4 region. The patient was referred to one of the massage therapists in the clinic for concurrent treatments at a frequency of twice per week as well. After the initial visit, the patient reported a reduction in pain and discomfort from 7/10 to 3/10. The patient was discharged pain-free within two weeks of the initial presentation (four treatments).

Ergonomics assessment of the VDT workstation

An ergonomics assessment was conducted to determine discrepancies between the set-up of the employee's office workstation and the recommendations contained in Step 7 of the Canadian Standards Association's Guidelines on Office Ergonomics (CSA-Z412-00).¹¹

The ergonomics assessment revealed the following issues:

- 1 The top of the computer screen was 5 inches above eye level
- 2 The task chair was not adjusted properly to provide adequate postural support for the lumbar and thoracic spine
- 3 Mouse position produced slight torso flexion and right shoulder protraction
- 4 Arm supports on the chair were too low and did not give support to the elbow or forearm.

The recommended interventions were implemented immediately after the assessment. Monitor height was lowered to prevent extension of the neck. Chair position was difficult to alter due to the corner position of the workstation. When the chair arms were raised to the height recommended in the CSA Z412-00 to create an approximate 90-degree angle at the elbow, the desk would prevent forward chair movement causing the worker to be too far away from the keyboard and mouse. Since the VDT workstation could not be moved out of the corner, a compromise was necessary. The arm supports were raised to a level close to the recommended height allowing some support of the elbows. The worker was then instructed to use the surface of the desk for supporting the forearms (Figure 2A). The mouse position was then adjusted to prevent forward arm position and protraction of the shoulder (Figure 2B). Mini breaks and stretches were also discussed and implemented as part of the treatment plan.



Figure 2A



Figure 2B

The VDT workstation after the ergonomics assessment was completed. Note that the elbows and forearms are supported by the chair and top surface of the workstation. The monitor height is corrected to prevent extension of the neck and mouse position is now closer to the body to prevent right shoulder protraction and back flexion.

Follow up

Upon follow up four weeks after initial presentation, the patient reported that he had been spending more time at the VDT workstation, but had only mild pain or discomfort on one or two occasions per week. These symptoms never persisted for more than a few minutes at a time and he claimed to be very satisfied with the outcome. Two weeks later a second follow up was undertaken in which the patient reported no pain but did note that he was feeling some occasional discomfort as experienced in the previous year.

Discussion

The role of the primary contact clinician in occupational health is important. Patients may not understand the mechanism of injury or the significance of occupational health issues as it relates to their overall health. It is imperative that clinicians recognize occupational hazards that may be causal or contributory to the patient's complaints. Given the fact that patients may present with numerous areas of complaint from work-related activities, it is quite challenging for clinicians to determine exact cause

and effect of injury. Knowing the risk factors and asking the right questions are paramount to accomplishing this.

Clinicians typically can relate to the "clinically well-defined" disorders, but most are not as familiar with some WRMSDs. For example, the typical diagnosis for WRMSDs fails to incorporate sound diagnostic criteria in defining and identifying conditions.¹² Typically, clinicians do not use the more inclusive "surveillance" case definitions used by epidemiologists to identify risk factors and to institute preventative measures.² These case definitions are the result of expert consensus in defining a disorder along with criteria such as signs, symptoms and tests results used for reporting.¹³ The use of these case definitions are to help ensure that future studies are comparable and that data can be combined across industries, even countries.³ Unfortunately, there are several important causes of upper limb pain that have no case definition for surveillance purposes. Foremost among these is pain referred from the neck.¹³

Identification of occupational risk factors through a thorough patient history is a key strategy to narrowing the diagnosis. Although cause and effect is not always clear,

in our case, the patient history revealed clues suggesting his complaints were work related. The fact that pain was progressive when at work, and relieved at night when at home was important information. Failure to address the patient's workstation as a possible contributor to his musculoskeletal complaints may have lead to slower resolution of symptoms and the possibility of the discomfort developing into a chronic condition.

Specific risk factors to look for in patients suffering from WRMSDs are repetitive or sustained exertions, forceful exertions, awkward postures and local mechanical stress.^{4,14-16} Understanding the physical job demands of the work will lead to a better comprehension of the risk factors involved. Psychosocial risk factors are also important to consider since non-meaningful work content, low social support, perceived stress, low job control, high perceived work load, time pressure and job demands that require sustained concentration have been related to disorders of the neck and shoulder.¹⁷⁻²⁰

Musculoskeletal disorders have been more extensively characterized by specific occupational groups and industries, than for the general public.²¹ For example, from 1992-1997 the same five occupations (product fabrication, clerical, machining, service, and materials handling) consistently lead the number of claims reported to Ontario's WSIB. These five occupations also lead percent of claims, average days lost per claim and average cost per claim.⁹ The practitioner can use these occupational listings as a starting point for determining if the injury is work-related, or if there may be increased risk, even if the etiology remains hypothetical.²²

The role of ergonomics in the management of WRMSDs is one of prevention and intervention. This is accomplished by matching workers and workplaces in a manner that improves worker productivity while decreasing the worker's risk of injury and discomfort.²³⁻²⁵ Controlling WRMSDs by using ergonomics begins with identifying exposure to the known risk factors through an on-site assessment of the work being performed. It is important to consider that many WRMSDs are the result of multiple exposures to a combination of risk factors. Therefore, in practice, studying the tasks that make up the essential duties of the job is the correct approach. This is achieved through a combination of employee and supervisor interviews, onsite observation, video taping and when possible, personal experience performing the task.²¹ Components

of the job that involve identified risk factors should be evaluated and quantified wherever possible. The information should then be analyzed and modifications of the tasks developed.

Although the outcome was positive, it cannot definitively be said that chiropractic care, massage therapy or the ergonomics interventions were responsible in whole or in part for recovery of the patient featured. This is, after all, only one case report. There has been some investigation into the clinical course and prognosis of work-related musculoskeletal disorders.²⁶ However, to date, there appears to be no randomized control trials comparing chiropractic treatment, massage therapy and ergonomics interventions or any combination of these on recovery rates of individuals suffering from work-related musculoskeletal disorders. This is an area of study that needs to be investigated.

A possible weakness of this case report is the CSA-Z412-00 Guidelines used for the ergonomics assessment. The Z412-00 document was formally approved by the Technical Committee on Office Ergonomics, which is under the jurisdiction of the Strategic Steering Committee on Occupational Health and Safety. The composition of the Technical Committee uses the CSA's well-established formula for participants. It includes representatives from government, unions, manufacturers and the public. As such, the standard is a consensus document, implying that there may be some disagreement on specific ergonomics issues. However, recommendations made to the patient in this case report are consistent with commonly established ergonomics principles and practices.

As health care professionals, it is important to use information and tools to aid patients based on the best available evidence. This is not to say that clinicians should become experts in ergonomics and occupational health issues. Professional certified ergonomists have the appropriate qualifications for conducting an ergonomic evaluation. Health care practitioners should be able to give basic advice on ergonomics to patients who require it. There is also a benefit in clinicians understanding the process of an ergonomics assessment and evaluation so that the health care practitioner can explain to patients how the workplace interventions identified by the ergonomist are an integral part of the overall treatment plan.

Occupational health can be a complex issue. Employees may be uneasy about confronting their employer about

issues in the workplace for fear of being labeled as a “complainer” or “problem worker”. For this reason, health care practitioners must be aware of the proper channels required to deal with occupational illness. The employer may have an occupational physician, nurse, or health and safety specialist on staff. These are the personnel who should be contacted to address concerns about possible causes of WRMSDs in the workplace.

Conclusion

Health care practitioners should be aware of occupational issues affecting patient health. External influences may play an important role in patient response to treatment and recovery as was suggested in the case presented. Consequently, it is important that ergonomics issues be considered, as they are often a significant contributor to certain musculoskeletal complaints. A thorough patient history is the key to determining if musculoskeletal disorders are work-related. Personnel properly trained should carry out the detailed ergonomics assessment and recommendations.

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