

# Musculoskeletal Injuries: An Occupational Health and Safety issue in Sonography

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Many sonographers are suffering musculoskeletal injuries as a result of their employment. An ergonomic study into this subject conducted by Workcover Authority NSW reported 77.8% of sonographers surveyed suffered work related musculoskeletal injuries. All sonographers have the right to be employed in a safe workplace. To achieve this preventative measures need to be introduced to reduce the incidence and severity of musculoskeletal injuries. In this paper I will discuss the types and causes of musculoskeletal injuries suffered, some preventative measures that can be introduced, the Workcover Authority NSW survey and advise on what to do if you are suffering a work related injury.

## Introduction

Musculoskeletal disorders among sonographers are a serious health problem for our profession and I believe the incidence is increasing. There are a number of sonographers who have had to seek alternative employment as they can no longer perform ultrasound. Others have had to reduce their hours of work or change work practices to continue to work.

Last year two staff members in the Radiology Department at Royal Prince Alfred Hospital (RPAH) began to suffer musculoskeletal disorders. They worked full time in ultrasound and medical opinion was that their problems were related to the work tasks they performed. This prompted me to conduct a literature review on musculoskeletal disorders in Sonography. In the literature reviewed there were three overseas surveys that reported the incidence of musculoskeletal disorders among sonographers to range between 82 - 88%. (Necas M, 1996, Vanderpool H, 1993; Wihlidal L, Shrawan K, 1997)

These musculoskeletal disorders are also described by the terms repetitive strain injury (RSI), repetitive motion disorder, cumulative trauma disorder (CTD) and occupational overuse syndrome (OOS).

In October 1997 Workcover Authority NSW performed an invited inspection of the ultrasound sections at RPAH. The general, obstetrics and gynecology, vascular and cardiac ultrasound sections were inspected. A questionnaire on the type of tasks performed, the degree of difficulty and the length of examinations and the type and severity of musculoskeletal disorders suffered was completed by the sonographers. The questionnaire results revealed that 77.8% of sonographers suffered symptoms of work related musculoskeletal injuries. This was consistent with the published findings from the overseas surveys. (The number of respondents were low but so are the number of sonographers). The Workcover Authority NSW report is discussed later. (Mc Farlane D, 1997)

## Symptoms of musculoskeletal disorders in sonographers

Symptoms suffered in the sonographer usually occur in the upper limb and torso. Back, hip and leg problems have also been reported. Involved is damage to the tendons, tendon sheaths, muscles, joints, blood vessels and peripheral nerves. (Hales T et al 1992)

The symptoms include:

- .. pain - localized and/or general mainly in the neck, shoulder and arms.
- .. numbness - mainly in the hand, wrist and elbow.
- .. clumsiness
- .. tingling, itchy and burning sensations
- .. weakness in the arms
- .. swelling - particularly in the wrist and hand
- .. loss of function
- .. overdevelopment of muscle groups (Vanderpool H, 1993; Wihlidal L et al 1997)

The classification of these symptoms and some examples are:

- .. nerve entrapment syndromes - cubital, radial and carpal tunnel syndromes,
- .. tendon related disorders - tendinitis, tenosynovitis, De Quervain's syndrome, ganglion cyst formation,
- .. muscular disorders - fibromyositis, tension neck syndrome,
- .. neurovascular disorders - thoracic outlet syndrome,
- .. joint capsular disorders - bursitis, osteoarthritis, synovitis (Necas M, 1996)

Most sonographers suffer a combination of these symptoms. These injuries are caused or aggravated by the repetitive movement, forceful exertions and the unnatural posture adopted by sonographers during their jobs. (Keyserling W, Stetson B, Silverstein B, Brouwer M, 1993))

There are two main processes that cause musculoskeletal injuries in Sonographers.

1. Overuse or strain of the muscles may cause microtears at the tendon insertions, resulting in ischaemia and soft tissue breakdown. If the microtears continue, further abrasions and tears occur. An acute injury may result in a tear at the already damaged tendon insertion.
2. Venous return can also be obstructed causing enlargement of tendon sheaths resulting in scarring and compression of the nerves. With prolonged nerve compression, demyelination, slowing of nerve conduction and loss of function occur.

It is reported that the incidence of the injuries described can be reduced by changing activities to allow time for the tissue to repair. (Winzler S et al 1996)

### Causes of musculoskeletal disorders

The main factors that contribute to musculoskeletal injuries in sonographers are:

**Poor equipment design:** keyboard/screen height and position, equipment manoeuvrability, poor transducer grip, ill adjusted or non adjustable chairs and examination couches.

**Poor posture** due to the type of work performed especially with the shoulder in sustained abduction and the spine in an unnatural alignment.

**Sustained pressure and force** often used to optimise imaging.

**Repetitive movements** particularly when performing sessions of similar examinations.

**Awkward scanning techniques** especially when performing endocavity, cardiac, musculoskeletal and vascular examinations.

**Assisting with patient movement.**

**Body habitus and gender** - the overseas surveys reported that taller, heavier sonographers and males have fewer problems.

**Inadequate work breaks** with insufficient recovery time.

**Overall job stress.** (Necas M, 1996, Vanderpool H, 1993; Wihlidal L et al 1997)

### Why are these symptoms now more prevalent?

From my own research the incidence of musculoskeletal injuries among sonographers is increasing. As there is little published as to why these injuries are now more prevalent, the following are some causes that may be responsible:

- .. Increased time spent by sonographers performing sonography only.
- .. More specialisation within sonography.
- .. Longer, repetitive and more physically difficult examinations.
- .. Increased number of ultrasound examinations being performed (as shown in Medicare statistics.)
- .. Fewer changes of activities. For example most practices use recording devices so there is no need to change cassettes. This task represented a significant change in activity.
- .. Smaller transducers grips.

### What can we do?

Preventative measures need to be introduced. Investigating prevention of injuries in the workplace is a specialised field and I suggest sonography practices contract the services of an ergonomist to inspect and report on the work place and work practises. Musculoskeletal injuries are an emerging issue in Sonography and have until recently largely gone unreported.

### My suggestions on how to improve work conditions are:

- .. Be proactive in equipment design and selection - adjustable ultrasound units, adjustable chairs and couches, improved transducer grips, use of arm supports to improve comfort.

“ Vary workload - performing block sessions of similar examinations can result in damaged tissues not having sufficient time to recover.

“ Take frequent work breaks - we need to stop and take a break or perform a completely different task to avoid symptoms. This is necessary for data entry staff, so why not sonographers!

“ Introduce exercise routines such as gentle passive stretching and fitness programs. These must be performed regularly and consistently. In discussion with a sonographer practising in Canada, I was told that in her department there are exercise stations to encourage regular exercise. At RPAH we have introduced passive stretching exercises in consultation with a physiotherapist. Several sonographers have taken up fitness programs such as weight training to increase strength in their upper extremities.

“ Become multiskilled and vary work practices.

The long term effect of the injuries suffered by sonographers may be extremely serious (Hales T et al 1992). It is reported that musculoskeletal disorders such as those suffered by sonographers is a precursor to long term disability with the severity of injuries increasing with the number of years spent practicing ultrasound. (Necas M, 1996)

### **Workcover Authority NSW survey summary.**

As a supervising Radiographer performing ultrasound I was concerned about the incidence of musculoskeletal injuries amongst my colleagues. I sought help from the Health and Research Employees Association of NSW (HAREA), the industrial body covering Radiographers (Medical Radiation Scientist) in NSW. HAREA asked Workcover Authority NSW for assistance in investigating this occupational health and safety issue. After reviewing the literature, Workcover Authority NSW agreed to perform an invited inspection of the ultrasound facilities at RPAH. The summary of the report of this inspection is as follow: (McFarlane D, 1997)

#### **Findings:**

1. The walk-through survey revealed three of the risk factors included in the Risk Identification Checklist in the National Code of Practice for the Prevention of Occupational Overuse Syndrome (1994). The ultrasound tasks were all characterised by prolonged extended reach, a prolonged grip and maintenance of awkward positions of the arms.

An example of the National Code of Practice for the Prevention of Occupational Overuse Syndrome is that the arm should not be abducted more than 20 degrees and ideally no more than 8 degrees. Sonographers nearly always exceed this angle of abduction.

2. In all cases both the scanning site (the probe and the couch) and the keyboard were too high in relation to the worker (considerably higher than elbow height)

3. The majority (77.8%) of the respondents to a pilot questionnaire reported work-related symptoms. These were mainly in the shoulder, arm and neck. These results were similar to the published findings of overseas surveys. This suggests that despite the small size of this pilot, it almost certainly reflects the existence of a more widespread problem.

#### **Recommendations:**

1. These findings indicate that the examination couches and keyboards should be lower or should be capable of being lowered. The chair used by the sonographer should have a height adjustment range of 380 to 510mm. The keyboard should have a height adjustment range of 580 to 730mm. The couch should have a height adjustment range of say 250 to 760mm.

2. HAREA should request the Electromedical Division of State Projects to include adjustability as a criterion for selection of ultrasound machines in the next tender. Through State Projects equipment can be purchased under period contract by the NSW public sector.

3. Ultrasound equipment should be fitted with a high resolution screen that has a high refresh rate (85 Herz or higher), a non-interlaced monitor and an easily adjustable brightness control.

### **What should sonographers do if they are suffering any problems?**

The employee should report the injury to the employer and if medical treatment is required and/or time is lost, the employee should lodge a claim through their employer's workers compensation policy to cover any expenses incurred. Worker's compensation is compulsory for all employers and it is a 'no fault' system in NSW. When employees experience a work related injury or illness they are entitled to worker's compensation. This is both for acute injury and aggravation of previous injuries.

In 1983 the Occupational Health and Safety (OH&S) Act NSW was introduced. The moral and legal requirements of the Act put obligations on the employer to ensure a safe workplace without risk to the employee's health, safety and welfare. Employer's can be found negligent if they do not do something that should be done to prevent someone becoming injured while at the workplace. Manufacturers, suppliers and others can also be found negligent. Employees are obliged by law to report all work related injury to their employers. There is similar legislation in other states.

The general 'duty of care' on employers by the Act is that employers must ensure the health, safety and welfare of their employees while their employees are at work. The employer has absolute responsibility to prevent health and safety problems that cause injury and illness to workers. The OH&S Act also covers rehabilitation of an injured worker.

### **Improvements reported to date**

I have received feedback from several sonographers who have suffered musculoskeletal injuries and who have introduced changes in work practises and lifestyle to overcome these. The feedback has been very positive with the severity of the injuries suffered being reduced and in some cases 'cured'.

The most common change has been the introduction of height adjustable couches used in conjunction with height adjustable chairs (on casters). This allows the angle of arm abduction to be reduced. The heights can also be adjusted to better suit both the sonographers' and patients' body habitus. Other work places have improved the sonographers' seating. Some have purchased 'saddle' type ergonomic chairs. One practice which specialises in obstetric examinations has installed monitors for the patient to view. This has allowed the sonographer to improve her posture as the ultrasound unit is in better alignment for work. Another sonographer has changed her work pattern and now works four days without reducing the total hours worked. Many practices have altered their booking schedules to vary the type of examinations performed. Several sonographers with musculoskeletal injuries have undertaken fitness programs such as weight training to increase their upper limbs strength and overall fitness. This has resulted in significant improvement in their symptoms.

Recently, some manufacturers have started to address these ergonomic issues by introducing improved design into their ultrasound units. Some examples are height and directional adjustable keyboards with userfriendly layout, monitors that are more adjustable and units with 'leg room'. However, most transducers still have poor grip for extended use and the units are very heavy to move. There is still need for further improvement in equipment design.

### **Conclusion**

Musculoskeletal injuries affect about 80% of sonographers. This represents a serious health hazard for our profession.

As professionals, we must recognise these problems and become involved in improving and changing our work practices and work conditions. The best way to do this is in consultation with specialists in workplace injury prevention and by introducing changes in work practices and work routines to reduce, and if possible, eliminate musculoskeletal injuries in our profession.

The incidence and severity of musculoskeletal disorders will also be reduced if sonographers become fit for work by introducing appropriate physical exercises into their daily routine.

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### ***A Response from Federal Council***

*Recent correspondence with Joan Baker, President of SDMS in the USA, has raised the issue of the ASA collaborating with the SDMS regarding their workplace injury survey and therefore to have an international research project that would lend a lot more weight since it would be supported internationally.*

*This will be raised at the next Federal Council Meeting on 23<sup>rd</sup> August 1998.*

## **The Sonographer Musculo-skeletal Injury**

### **Checklist:**

- 1. Is the patient close enough to me? Is my arm and elbow tucked in closely to my body in a comfortable position?**
- 2. Did I adjust my chair or examining table according to the body habitus of my patient in relationship to my height?**
- 3. Is my posture a comfortable and correct one so as not to cause undue stress on my body?**
- 4. Am I working with my wrist and neck in a straight and supported position?**
- 5. Is the monitor and keyboard positioned so that I can easily see and reach them?**
- 6. Am I supporting my limbs properly throughout the entire examination?**
- 7. When I stand, am I carrying my body weight equally on both feet?**
- 8. Did I take a micro-break? i.e. consciously releasing the tension on the scanning hand for a few seconds.**
- 9. Did I take a mini-break? i.e. removing the probe from the scanning hand, stretching the hand, arm and shoulders and glancing periodically away from the monitor to release eye tension.**
- 10. Am I aware of any unusual symptoms, such as numbness, swelling or pain?**

(Supplied by ASA Federal Council)