



**PREVENTION OF  
WORK-RELATED  
MUSCULOSKELETAL  
DISORDERS IN SONOGRAPHY**





# **PREVENTION OF WORK-RELATED MUSCULOSKELETAL DISORDERS IN SONOGRAPHY**

---

**Society of Radiographers' Responsible Officer:**

Kim Sunley

March 2007

First edition

ISBN 0-9503597-8-5

© Society of Radiographers

£15 to SCoR members

£25 non-members

**The Society of Radiographers**

207 Providence Square

Mill Street

London SE1 2EW

Telephone: 020 7740 7200

Facsimile: 020 7740 7233

E-mail: [info@sor.org](mailto:info@sor.org)

Website: [www.sor.org](http://www.sor.org)



## ACKNOWLEDGEMENTS

---

**The Society of Radiographers would like to thank the following members for their input into this document:**

**Julie Burnage DCR, DMU, FETC**

Director, Ultrasound Now Ltd  
Ultrasound Now Ltd  
Suites 2-3, Hanover House  
The Roe, St. Asaph  
Denbighshire LL17 0LT

**Gillian Cattell DCR, MSc**

Advanced Ultrasound Practitioner  
Radiology Department  
Birmingham Women's Hospital  
Birmingham B15 2TG

**Anne-Marie Dixon**

Division of Radiography  
University of Bradford  
Unity Building, 25 Trinity Road  
Bradford BD5 0BB

**Pauline Kilbourn**

Sonographer / H & S Representative SCoR  
Ultrasound Dept, City Hospitals  
Kayll Road, Sunderland SR4 7TP

**Mr Crispian Oates**

Head of Regional Vascular Ultrasound  
Regional Medical Physics Department  
Newcastle General Hospital

**Dawn Palmer**

Senior Sonographer  
Ultrasound Department  
Radiology  
Peterborough Hospitals NHS Trust  
Thorpe Road, Peterborough, Cambs. PE36DA

## Table of Contents

---

	Page No.
1. INTRODUCTION	7
2. SCALE OF THE PROBLEM	8
3. THE LEGAL PERSPECTIVE	10
4. HEALTH AND SAFETY MANAGEMENT FRAMEWORK FOR MSDs	14
Understand the issues and commit to action	15
Create the right organisational environment	15
Assess the risk of MSDs in your workplace	17
Reduce the risk of MSDs	19
Educate and inform	23
Manage any episodes of MSDs	25
Carry out regular checks on programme effectiveness	26
5. RESOURCES	27
Model Risk Assessment	
Exercises	
Model Policy	
6. FURTHER INFORMATION	34
7. REFERENCES	35

## 1. INTRODUCTION

---

Musculoskeletal disorders are the most common work-related illness in Britain<sup>1</sup> and represent a significant potential risk to employers and employees. This guidance focuses on preventing and controlling musculoskeletal disorders in radiographers and other health care professionals engaged in sonography. This includes diffuse conditions affecting the back, shoulders, neck and arms and localised conditions collectively referred to as work related upper limb disorders affecting a specific area (such as tendonitis, carpal tunnel syndrome and tenosynovitis).

Advice is given to all parties involved in the management and operation of sonography facilities including senior managers who have responsibility for setting policies and ensuring that risks are eliminated or controlled; departmental managers who can influence policies and good practice; specialist advisors such as risk managers, occupational health advisors and back care advisors; safety representatives and employees who work in sonography.

The guidance is relevant to both centralised facilities and satellite units located at the point of care. It is also applicable to the use of ultrasound in other environments such as on the ward using mobile units, and during physiotherapy interventions. It is recommended that this guidance is read in conjunction with the Society of Radiographers '*Industry Standards for the Prevention of Work Related Musculoskeletal Disorders in Sonography*'<sup>2</sup> which details standards and control measures to be taken to reduce the risk of injury.

Other hazards that may be present in sonography suites, such as chemicals and electricity, are not addressed here. These should also be managed through risk assessment and implementation of control measures in compliance with the relevant statutory requirements e.g. the *Management of Health and Safety at Work Regulations 1999*, *Control of Substances Hazardous to Health Regulations 2002* and the *Electricity at Work Regulations 1989*. Manual handling is not explored in detail although there is reference to the relevance of the regulations in relation to musculoskeletal disorders in sonographers.

The guidance emphasises the need for managers, safety representatives and employees to work together to create an environment and culture in which safe practices and policies are planned, implemented, reviewed and maintained.

## 2. SCALE OF THE PROBLEM

---

The Society of Radiographers (SoR) has conducted a number of studies into the risks of musculoskeletal disorders (MSDs) in radiographers and sonographers. A survey in 2000 showed that 70% of all radiographers and 79% of sonographers reported symptoms of pain and discomfort they believed to be work-related (Arrowsmith 2000)<sup>3</sup>.

A further study of 300 UK sonographers found a point prevalence of MSDs amongst sonographers to be 89% (Feather 2001)<sup>4</sup>. This compares with a lifetime prevalence of neck and arm pains in the general population of 70% and a point prevalence of between 13 and 22%<sup>5</sup>.

Musculoskeletal problems can have a negative impact on both employees affected and the organisation as a whole. MSDs can be debilitating and painful and can impact on daily living. They can lead to loss of morale and possible financial hardship if a person has to take time off sick or, in a worse case scenario, has to leave their job as a result of the MSD. Furthermore, where a colleague is off sick, this can have a negative impact on the morale of a department in terms of staff having to cope with an increased work load, which in turn has the potential to increase the risk of further MSDs in staff.

One sonographer, who has been medically retired for two years after one year's sick leave says: "I don't lead a normal life. I can't do the housework properly and 15 minutes of gardening causes dreadful problems. I can't sit comfortably for periods of time; I haven't been to the theatre for years and I can't even sit and read a book."

Data from the 1995 Self reported work related illness survey<sup>6</sup> on the working population of Britain, estimates that a person takes 13 days off work per year as a result of a work related upper limb disorder or neck disorder. In terms of the costs to an organisation of arranging temporary agency cover for a sonographer this could range from £2,700 to £3,700 (based on average 2006 rates for sonographer agency staff working a 7 hour day for 13 days ) on top of sick pay for the affected individual.

Employees returning from sickness absence may also be advised to do reduced hours or have a phased return to work which could impact on service delivery and patient waiting times.

If the MSD is not recognised or treated in time or the causes are not addressed, this could result in the medical retirement of a trained and experienced sonographer and the subsequent costs which come with recruitment and training a new member of staff.

One case of MSD in the department may just be the 'tip of the iceberg', if one person is suffering from MSDs, there may be the potential for others to be exposed to the risks.

There is also the potential for the healthcare organisation to be prosecuted under health and safety law and for the injured person to take out a claim for compensation under civil law. In August 2006 a SoR member who developed an injury to her right arm, shoulder and right side of her neck in May 2002

following an increase in her workload was awarded a £243,000 out of court settlement for an industrial injury claim against her trust.

The Health and Safety Executive have taken a keen interest in the management of musculoskeletal disorders in sonography and have issued improvement notices to targetted trusts that have failed to meet legislative requirements<sup>7</sup>.

Increasing volumes of work and demanding work schedules within some organisations, exacerbated by staff shortages and the pressures of working in a target driven environment may have an impact on the prevalence of musculoskeletal disorders in sonographers. To date, the impact of and association between workload and symptoms has not been fully researched. However current studies have indicated that factors such as workload, lack of rest breaks and reduced recovery time have an impact on musculoskeletal symptoms<sup>8, 9, 10, 11, 12, 13</sup>.

### 3. THE LEGAL PERSPECTIVE

---

There are general duties placed on employers under the *Health and Safety at Work etc Act 1974*<sup>14</sup> and specific duties to carry out risk assessments under the *Management of Health and Safety at Work Regulations 1999*<sup>15</sup>. Other pieces of legislation give some reference to the legal standards required to prevent MSDs and to create an environment that is ergonomically sound and these are mentioned below.

#### ***The Health and Safety at Work etc Act 1974***

##### **Key duties:**

This places general duties upon employers, employees and others:

Employers must:

- protect the health and safety of their employees [Section 2(1)]
- protect the health and safety of others who might be affected by the way they go about their work (for example, cleaners, visitors or contractors working in the hospital) [Section 3(1)]
- prepare a statement of safety policy and the organisation and arrangements for carrying it out (if 5 or more people are employed, this statement must be written down) [Section 2(3)]

Employees must:

- take care of their own health and safety and that of others [Section 7(a)]
- co-operate with their employer [Section 7(b)]

The general duties in the Health and Safety at Work Act are developed in the *Management of Health and Safety at Work Regulations 1999* (the Management Regulations) and other more specific pieces of law. The Approved Code of Practice on the *Management of Health and Safety at Work Regulations*<sup>15</sup> provides further guidance.

#### ***The Management of Health and Safety at Work Regulations 1999***

##### **Key duties:**

Employers must:

- assess risks to staff and others, including visitors, young persons and new and expectant mothers. [Regulation 3(1)]
- make appropriate health and safety arrangements, which must be written down if 5 or more people are employed [Regulation 5]
- appoint competent persons to help them comply with health and safety law [Regulation 7(1)]

- establish procedures to deal with imminent danger [Regulation 8]
- co-operate and co-ordinate with other employers and self-employed persons who share the workplace (for example primary care trust staff working at an acute trust site or vice versa) [Regulation 11]

Employees must:

- work in accordance with training and instruction given by their employer [Regulation 14(1)]
- report situations which they believe to be unsafe [Regulation 14 (2)]

The legal framework lays down a hierarchy of measures [Regulation 4 and Schedule 1]:

- (a) Avoid hazardous operations so far as is reasonably practicable. This may be done by redesigning the task to avoid the hazard e.g. through automation.
- (b) Make a suitable and sufficient risk assessment of any work activities where the risk cannot be avoided.
- (c) Reduce the risk of injury from those operations so far as is reasonably practicable by changes to the, equipment, working practices and the working environment.

### ***Health and Safety (Display Screen Equipment) Regulations 1992***

In a survey of 55 sonographers in 2002 (SoR)<sup>16</sup>, 84% reported spending over 6 hours per day scanning patients. Additionally 35.3% of respondents typed patient reports on a computer. This figure is likely to increase significantly as further IT systems are installed.

Many sonographers will, therefore, be “users” or “operators” and subject to the provisions of the Display Screen Equipment Regulations. This is supported by the Health and Safety Executive in their guidance to inspectors<sup>7</sup>.

The Display Screen Equipment Regulations require employers to:

- assess and reduce risks from display screen work;
- ensure workstations meet minimum requirements, as laid out in the schedule to the regulations;
- plan breaks or changes of activity;
- provide health and safety training and information and provide eye tests on request and glasses if required for display screen work.

More detailed guidance on Display Screen Equipment can be found in the SoR’s guide *VDUser Friendly*<sup>17</sup> and the HSE’s Guidance on the *Health and Safety (Display Screen Equipment) Regulations 1992*<sup>18</sup>.

## Consulting employees

Two pieces of health and safety law cover consultation with employees. The *Safety Representatives and Safety Committees Regulations 1977* deal with consulting recognised trade unions through their safety representatives and the *Health and Safety (Consultation with Employees) Regulations 1996* cover employees who do not have a trade union safety representative or where the employer does not recognise a union. More detailed guidance is provided in other HSE publications<sup>19, 20</sup> and on the TUC website<sup>21</sup>.

### **Employers must consult employees and their representatives about aspects of their health and safety at work, including:**

- any change which may substantially affect their health and safety;
- their employer's arrangements for getting competent health and safety advice;
- the information provided on reducing and dealing with risks;
- the planning of health and safety training;
- the health and safety consequences of introducing new technology.

Arrangements for dealing with risks of MSDs in sonography suites are only fully effective if employers closely involve employees and their representatives.

In addition, recognised trade union safety representatives have the right to:

- carry out regular workplace inspections (every 3 months or more often in the event of a safety concern or accident);
- receive information from the employer on a health and safety issue (there are certain exceptions to this e.g. information relating specifically to an individual, unless the individual has given their consent);
- investigate accidents and cases of ill health;
- to be consulted in good time on matters relating to health and safety;
- to request the establishment of a safety committee (where two or more safety representatives put this in writing).

### ***The Reporting of Injuries, Diseases and Dangerous Occurrences 1995***

The *Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995* (RIDDOR) require employers to report specified accidents and dangerous occurrences and cases of ill health to the HSE.

Occupational diseases include cramp of the hand or forearm due to repetitive movements. The cramp must be a chronic condition linked to repetitive work movements and usually characterised by the inability to carry out a sequence of what were previously well co-ordinated movements. Further information and guidance is available from the HSE's guide to the *Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995*<sup>22</sup>.

### ***Workplace (Health, Safety and Welfare) Regulations 1992***

The *Workplace (Health, Safety and Welfare) Regulations 1992* require workplaces to meet certain standards with regards to the environment and facilities.

With regards to the prevention of MSDs, two sections of the regulations are relevant. They require that:

- lighting is sufficient to enable people to work and use facilities safely;
- temperatures in indoor workplaces are reasonable.

Further information on the regulations can be found in the HSE's guidance and approved code of practice<sup>23</sup>.

### ***Provision and Use of Work Equipment Regulations 1998***

The *Provision and Use of Work Equipment Regulations 1998* apply to different types of work equipment from hand tools to machinery. Ultrasound equipment is covered by these regulations. Under the regulations employers are required to take into account the ergonomic risks when selecting work equipment [Regulation 4] (i.e. to ensure that equipment and operating positions; working heights; reach distances are compatible with the intended operator). The approved code of practice and guidance on the regulations is available from the HSE<sup>24</sup>.

### ***The Manual Handling Operations Regulations 1992***

These regulations are primarily aimed at lifting and moving operations, however they are also relevant to MSDs and strain injuries. The Approved Code of Practice accompanying these Regulations<sup>25</sup> states:

*"Sprains and strains arise from incorrect application and/or prolongation of bodily force. Poor posture and excessive repetitive movement can be important factors in their onset. Many manual handling injuries are cumulative rather than being truly attributable to any single handling incident."*

## 4. HEALTH AND SAFETY MANAGEMENT FRAMEWORK

---

The Health and Safety Executive (HSE) have developed a seven stage cycle to assist with the management of work related upper limb disorders<sup>26</sup>. The cycle takes an ergonomic approach which includes the participation and involvement of the workforce.

The cycle is detailed in Table 1. The cycle provides a robust framework for employers to follow when implementing a risk management programme for MSDs in sonography departments. The next section of this guide details each step of the cycle and practical action that can be taken.

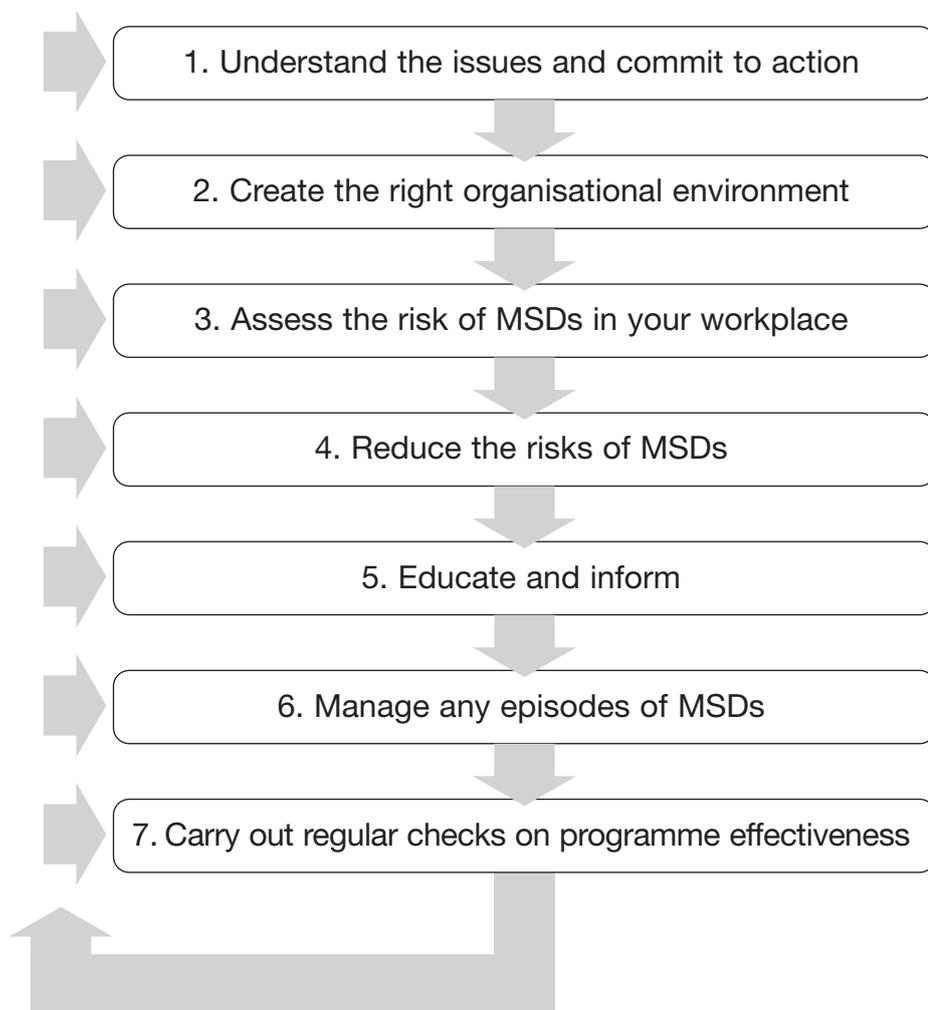


Table 1. Risk Management Programme for MSD's.

## Step 1. UNDERSTAND THE ISSUES AND COMMIT TO ACTION

The HSE recommend that management and workers should have an understanding of the issues and be committed to action on prevention. This commitment may be expressed through strong leadership, by generating an effective health and safety policy and by having appropriate systems in place. These actions will help to promote a positive health and safety culture in the workplace. The HSE also emphasise that effective management of occupational health risks is characterised by “*an appropriate balance between health and safety and production goals*”.

Joint commitment from managers and safety representatives and sign up to a local action plan is an excellent way of moving forward.

### **Case Study: Committing to action and creating the right organisational environment through participation and involvement**

As a result of recommendations made by the Health and Safety Executive, following a visit to the ultrasound department at City Hospitals Sunderland in January 2002, an action plan was developed. One of the first actions was to set up an assessment team to investigate the issues and undertake a detailed risk assessment. The assessment team consisted of the radiology business manager, the ultrasound superintendent, a sonographer/health and safety representative, an occupational health nurse and a back care physiotherapist.

(Source: “*Reducing the health risks to sonographers*” by Pauline Kilbourn Synergy March 2004)

### **Suggested Action:**

- ***Sign up to a joint action plan on implementing a risk management programme***

## Step 2. CREATE THE RIGHT ORGANISATIONAL ENVIRONMENT

The HSE identify four ways of creating the right organisational environment:

- Participation and involvement
- Communication
- Competence
- Allocation of responsibilities

### **Participation and involvement**

Participation is well documented as a factor necessary for the success of any workplace ergonomic programme.

Participation and involvement of safety representatives and employees is key to the prevention of MSDs. Safety representatives can give managers a 'reality check' as to what conditions are like. Safety representatives can also provide an effective channel for employees to report concerns and equally to act as a conduit for managers in communicating important safety messages to employees.

### **Communication**

Communication within the department and the wider organisation is also key, including communication with those involved in the purchase of equipment and design of new builds or refurbishments which could impact on MSDs e.g. space and layout of scanning facilities.

### **Competence**

Managers, safety representatives, employees and specialist staff such as risk managers need to be competent in order to prevent MSDs. The HSE recommend that some groups of staff may require specialised training e.g. in the application of ergonomic principles, evaluation of workplace changes and the recognition of MSDs. The HSE also recommends that prevention of MSDs is an integral part of health and safety training, paying particular attention to risk factors and how these may be avoided.

Access to specialist ergonomic advice will not always be necessary and many problems can be solved with a multi-disciplinary approach, which includes safety representatives and back care advisors. However, where complex issues cannot be solved locally, the advice of an ergonomist may need to be sought.

### **Allocation of responsibilities**

Legal responsibility for health and safety in the sonography suite cannot be delegated and rests primarily with the employer. This involves assessment of the risks, development of policies, putting arrangements in place to implement those policies and monitoring the way those arrangements work. Effective management can only be achieved through involvement of the line management chain. Action to ensure that adequate precautions are in place is generally delegated down to line managers.

### **Suggested Action:**

- *Introduce the draft action plan at a staff meeting and ask for feedback*
- *Communicate your action plan and risk management programme with internal stakeholders including estates and facilities and procurement*
- *Assess the competencies and training needs of those involved in implementing the programme and provide training where gaps have been identified*
- *Develop a local policy on prevention and management of MSDs*
- *Ensure that everyone is clear about their responsibilities*

### Step 3. ASSESSING THE RISKS OF MSDs IN THE WORKPLACE

Risk assessment is not simply a paper exercise. Its purpose is to ensure that there are appropriate precautions in place. Risk assessment involves systematically looking at the work to identify the significant risks and determine the precautions needed to eliminate or control these risks. It can be simplified into a five step process:

Step one: look for hazards

Step two: identify who might be harmed and how

Step three: evaluate the risks - consider the existing controls and assess the extent of the risks which remain

Step four: record the findings of the assessment including the controls necessary and any further action needed to reduce risk sufficiently

Step five: review, revise and modify the assessment particularly if the nature of the work changes or if developments suggest that it may no longer be valid

Assessments should be carried out by people trained to do so and with knowledge of the work of the unit. Safety representatives are crucial to the process. In some instances ergonomic expertise may also be required.

#### Risk factors

When assessing musculoskeletal hazards from sonography, the following risk factors should be taken into account:

**Working postures** adopting during scanning

**Design features of ultrasound equipment** such as:

- o Adjustability of equipment including monitor, in terms of height and tilt
- o Keyboard design for comfort
- o Software dictates the number of movements needed by the operator
- o Probe/transducer size, weight, slip resistance, ease of handling to reduce pinch grip
- o Cable weight and support
- o Mobility, stability and ease of manoeuvring the machine
- o Fitness for purpose

**Furniture** such as adjustable chairs and tables/examination couches for

- Support
- Mobility

**Accessory equipment** such as

- Printers
- Image storage devices
- Transducer cleaning facilities
- Patient support pads
- Accessibility of gel and paper roll
- Additional external/slave monitors

**Job design**

- Scheduling of breaks and are they actually taken?
- Length of patient lists/workload
- Mixed case load or repetition of same procedure
- Overtime working
- Staff rotation
- Mini and microbreaks
- Is there control over workflow?

**Environmental factors**

- Heating
- Lighting
- Space constraints
- Provision for wheelchair and trolley access

**Education and training**

- Staff training in risks and control measures
- Understanding of reporting mechanisms

**Psychological Stressors**

- Introduction and familiarisation with new technology
- Impact of carrying out scans which show fetal demise or abnormality

**Suggested Action:**

- ***Identify the risks in your department***
- ***Ensure that all parties including managers, safety representatives, specialist staff and employees are involved in identifying risks***

## Step 4. REDUCE THE RISK OF MSDs

### RISK CONTROL MEASURES

The risk of MSDs can be managed by a package of measures which must be designed and implemented in collaboration with relevant parties. This may include departmental managers, sonographers, safety representatives, back care advisory service, occupational health service, health and safety department, estates, purchasing department and equipment suppliers.

The SoR document entitled '*Industry Standards for the Prevention of Work Related Musculoskeletal Disorders in Sonography*'<sup>2</sup> should be referred to when implementing control measures.

The measures to be considered should include:

- A clear policy for the reduction of musculoskeletal hazards which is endorsed at Board level and with a commitment to identify and control risks. The policy should include the arrangements in place to conduct risk assessments, record the significant findings and means of identifying when re-assessment is needed.
- Evaluation of the ergonomic design of ultrasound equipment which should be given a high priority in the decision to purchase/lease.
- The use of voice activated software which eliminates much keyboard work.
- Ergonomic assessment of existing equipment and modifications to reduce risk e.g. placing equipment on a height adjustable table.
- Provision of adjustable chairs that support the back, legs and feet and promote an upright posture.
- Examination tables that are height adjustable, and allow staff to get as close as possible to the patient. Special features may be available for particular procedures e.g. a drop away or cut out section for ease of access to the apical region for cardiac imaging and an adjustable footplate for trans-vaginal examinations.
- Accessories such as a transducer cable support, operator forearm support, and placing of items such as gel bottles, recording devices within easy reach.
- Remote monitors to prevent unnecessary twisting, bending and turning to view monitor as is especially common in vascular scanning.
- Maintenance regimes in place to ensure that equipment and the working environment are kept in good working order. A system for reporting faults should be in place.
- Management of patient lists to enable task rotation.

- Protocols for examination of high BMI patients and to inform referrers and patients of the limitations of examinations.
- Staffing levels and skill mix.
- Work scheduling, including scheduling of breaks or changes in activity. Short frequent breaks e.g. 5 – 10 minutes after 50 – 60 minutes continuous screen/keyboard work are considered better than a 15 minute break every 2 hours. For further information see section on work scheduling.
- Ensuring the working environment is suitable e.g. lighting, flooring, housekeeping, temperature and noise.
- Exercise to reduce and relieve muscle stress (examples of exercises can be found on page 28).

### Case Study: Equipment Purchase

As part of a medical equipment replacement programme, three new machines were purchased.

Within the procurement process, manufacturers were informed of the need for the equipment to be ergonomically suitable. The machines were assessed using specific criteria. Several machines failed to obtain a good ergonomic rating. The two machines, that did perform well, were the most expensive of those assessed. The Directorate put together a business case to purchase this more expensive equipment, justified on the basis of cost benefit. The benefit of the ergonomic design, with reduced risk of injury, far outweighed the additional added cost to purchase the equipment.

(Source: *“Reducing the health risks to sonographers”* by Pauline Kilbourn, Synergy March 2004)

### Health and Safety Executive Case Study

A Health and Safety Executive research report published in October 2006 on the cost benefits of tackling musculoskeletal disorders details two case studies carried out in sonography. The ergonomists carrying out the research on behalf of the HSE found that interventions including the use of a saddle seat, reduction in number of scans from 30 to 20 per day, training on good posture, exercises and giving sonographers more control of the booking system significantly reduced complaints of upper limb discomfort over a 6 month period. The study also highlighted the cost benefits of such an intervention.

Source: *Cost Benefit studies that support tackling musculoskeletal disorders* (HSE Research Report 491)<sup>27</sup>, contains several other case studies, including one on medical film examination workstations used by radiologists.

## Case Study

### Risk Assessment

- Individual work place assessments for sonographers
- Saddle seat available on all sites
- Arm braces available
- Specific tailor made manual handling assessments for ultrasound
- Assistants to work with sonographers in most areas to take away non-essential computer work/organising to reduce stress levels

Source: *Peterborough Hospital NHS Trust*

### Work Scheduling

Work scheduling and hands on transducer time are key factors to consider when implementing a risk management programme. There are two interrelated levels where workload needs to be controlled and where absence of control is likely to produce both psychological stress and MSD injury. The first of these is the number of scans and the scan-type mix booked into a session. The second is having the ability to control the rate of booking and throughput. The potential of too many scans with a lack of control of throughput, producing unsafe workloads, is exacerbated by the increasing demand on a service with limited staff and equipment resources, and the use of external booking arrangements, for example outpatient services booking patients on a patient-choice basis, with no regard to scan type or what is asked for on the request card. Whilst external pressures mean that government targets have to be achieved, they should not be pursued at all costs, particularly at the cost to a sonographer's health and well-being.

When scheduling work, many factors must be taken into consideration including the experience of the sonographer; standards of equipment in use; type of scan being carried out; BMI of patient; need to plan for micro breaks and lunch breaks; the availability of an assistant; the use of new technology and psychological factors including scans indicating foetal demise and abnormalities.

Departmental managers, safety representatives and sonographer's should work together to agree a safe work schedule over which the sonographer has a considerable degree of control. Having agreed a reasonable booking/request acceptance protocol, with regard to demand, resources available and safe working practices, it should be rigorously adhered to and kept under review. This will need to take into account the expected workload resulting from planned outpatient appointments and the less predictable inpatient and urgent workload. Whilst the manager, within the exigencies of the whole service, has a duty of care to ensure that staff are not put at risk, each sonographer has a duty of care to themselves and their colleagues not to jeopardise their ability to continue their practice through MSDs. The onus to agree or to refuse to do extra scans over and above the agreed schedule should be the responsibility of the individual sonographer who will perform the scan, without prejudice. In some cases it may be necessary to advise a sonographer not to do more than is a sensible or reasonable amount.

## Case study

The inpatient workload runs at an average of 34% of the total number of scans performed each month. The number of slots kept free for inpatients in a full session is 34%, with the time of slots equal to the average scan time. This results in some busy days and some less busy days that averages out over a month. If a doctor phones to have an extra patient seen from the clinic, the person who will perform the scan has the right to accept the decline the scan or agree with a colleague that they will do it, or suggested to the doctor that an early outpatient appointment will be made for the patient. They are supported in their decision by the departmental manager. The rate of inpatient requests and agreed booking rates are kept under regular review. Booking rates are adjusted for scan type, training sessions, inexperienced sonographers and availability of HCA assistance.

Source: Crispian Oates, Head of Regional Vascular Ultrasound, Regional Medical Physics Department, Newcastle General Hospital

## NIOSH Recommendations on Work Scheduling

The United States regulatory body for health and safety at work, the national institute for occupational safety and health (NIOSH), have made recommendations on scheduling. These are as follows:

Schedule different types of examinations for each sonographer in a workday to decrease strain on musculoskeletal tissues specific to one type of examination.

Limit the number of portable examinations to help minimise those tasks with higher number of pinch grips and increased static or awkward postures.

Consider a maximum number of scheduled examinations for sonographers. Take into account existing ergonomic conditions and equipment, the type of exams performed, experience of the sonographer, and the duration of the individual examinations. Because of the complexity of each diagnostic situation, it is difficult to specify an allowable limit to the number of examinations per day. Until better information is obtained, take into account the total examination time per day (more examinations of shorter duration or fewer examinations of longer duration).

Source: *CDC Workplace Safety and Health Preventing work-related musculoskeletal disorders in sonography. September 2006. Available from <http://www.soundergonomics.com/info-pubs.php>*<sup>28</sup>

For outpatients, pregnancy dating scans are carried out at a rate of 15 minutes per scan with a maximum of 10 dating scans per session. Anomaly scans are allocated 30 minutes.

General medical outpatient scans are done at a maximum of 9 per session. 20 minutes is allocated for an abdomen. For general medical inpatients, one sonographer (unassisted) would accept only 5 – 6 scans, depending on the types of scan, with 30 minutes per patient.

Source: *Pauline Kilbourn, Sonographer/H&S Representatives SCoR, Ultrasound Dept, City Hospitals, Kayll Road, Sunderland.*

The Service Manager incorporates rest periods in working schedule when discussing capacity and demand figures to make managers aware that we need breaks and setting up and clearing up time. The use of flexitime in ultrasound with the emphasis on rest days to assess working patterns. Travel time is allocated when working between sites.

Source: *Peterborough Hospital NHS Trust*

### **Suggested Actions:**

- ***Identify and implement risk control measures using this guidance and the SoR's 'Industry Standards for the Prevention of Work Related Musculoskeletal Disorders in Sonography'<sup>2</sup>***
- ***Ensure that all parties including managers, safety representatives, specialist staff and employees are involved in identifying solutions, including work scheduling***
- ***Ensure that everyone is clear about their responsibilities and role in implementing risk control measures***

### **Step 5. EDUCATE AND INFORM**

Education and training should not be relied on as a primary control measure. Training should be an integral part of any risk reduction programme but not a stand alone measure.

The HSE recommend that all workers, supervisors and managers should receive education in MSDs to assist in identification of the early warning signs. Education should also extend to those involved in making equipment purchasing decisions.

The HSE recommend that training should aim to:

- Increase awareness and knowledge of the issues
- Reduce the likelihood of problems by providing information on risk factors present in the workplace, safe working methods, correct operation of equipment and the importance of reporting early symptoms of MSDs

Safety representatives should be consulted on the structure and content of any health and safety related training programmes. Safety representatives should also be given a slot on a training programme to emphasise the importance of reporting incidents of pain associated with work activity.

Participating in the following types of exercises may be beneficial in the prevention of musculoskeletal disorders<sup>29</sup>:

- Aerobic/cardiovascular
- Body conditioning: *Pilates; Yoga; Tai Chi*
- Relaxation skills

Examples of exercises can be found on page 28 of the this guidance.

### **Case Study: Education**

At City Hospital, Sunderland, education of sonographers has been addressed during weekly staff meetings where there has been presentation of findings and education/awareness of safer techniques. The back care physiotherapist has carried out training sessions with sonographers. These have included posture positioning and exercises which can be performed between scanning examinations to aid muscle recovery. These sessions will be included in departmental induction for new staff and annual updates are planned for all staff. Posters with pictures and exercise plans have been provided and are displayed in all scan rooms.

(Source: "Reducing the health risks to sonographers" by Pauline Kilbourn Synergy March 2004)

### **Case Study: Information and Training**

- Annual lecture delivered on positioning and best scanning practices
- Annual talk from physiotherapist on good scanning techniques and exercise regimes
- Outside lectures on Alexander technique arranged for staff
- Health and safety notice boards in most areas

Source: *Peterborough Hospital NHS Trust*

### **Suggested Actions:**

- ***Develop and implement a training programme in liaison with safety representatives and specialist staff e.g. back care advisors***
- ***Include an element of training and awareness in local induction training for new staff***

## Step 6. MANAGE ANY EPISODES OF MSDs

It is of utmost importance that employees feel confident enough to report early symptoms of MSDs and it is important to maintain an open climate where employees can report problems without fear of repercussions. Reports of pain or discomfort should be entered into the department's incident book.

Early recognition is important for two reasons; firstly early intervention could prevent the problem becoming worse and secondly it alerts the manager to potential problems in the work environment.

Following confirmation of a musculoskeletal disorder by either the individual's GP, consultant or the organisation's Occupational Health Doctor, prompt action should be taken to review any risk assessments carried out and to check that existing control measures are effective.

Safety representatives and managers should work together to investigate the causes of MSDs following any reports from employees.

It is important that the organisation has an effective rehabilitation policy so that an injured sonographer can return to work safely. Fast track access to physiotherapy services will speed up recovery and return to work. Rehabilitation may include adaptations to the working environment, reduced working hours, reduced case load and refresher training.

Where a sonographer has a chronic disability i.e. one which is substantial and long term, employers will need to comply with the requirements of Disability Discrimination Act 1995 and make reasonable adjustments to the working environment or working conditions to avoid putting the disabled employee at a substantial disadvantage<sup>30</sup>.

### Case Study: Occupational Health Involvement

- Annual talk from occupational health on assertiveness and stress management
- Case management with occupational health doctor
- Sonography health screening forms contain questions on work related upper limb disorders

Source: *Peterborough Hospital NHS Trust*

### Suggested Actions:

- ***Encourage all staff to report pain and injury promptly to either their manager and/or safety representative***
- ***Work with occupational health staff to ensure a safe return to work for staff who have been off sick***

## Step 7. CARRY OUT REGULAR CHECKS ON PROGRAMME EFFECTIVENESS

### Monitoring

Monitoring the effectiveness of the risk management programme is an important function of line management.

Monitoring can be active or passive and involves monitoring the numbers of incidents reported and risk factors in order to assess the effectiveness of control measures. A combination of active and passive monitoring can be used. It is important that both managers and safety representatives are involved in monitoring performance.

Active monitoring may include:

- Workplace inspections/walkthroughs
- Confidential questionnaires of staff
- Health Surveillance

Passive monitoring may include:

- Reviewing accident data
- Reviewing sickness absence records
- Looking at staff turnover
- Gauging opinion at local health and safety/staff meetings

### Review of Performance

Where monitoring has uncovered deficiencies with the risk management programme, a formal review of performance should be carried out. A review is also recommended when technical developments or organisational changes are planned which may alter the level of risk. Reviews can take the form of an audit and can be built into existing quality programmes.

Managers should ensure that safety representatives are consulted on the structure and findings of any planned reviews.

### Audit of performance

This is the structured systematic process of collecting independent information on the efficiency, effectiveness and reliability of the total health and safety management system and drawing up plans for corrective action. The aims of the auditing process should be to establish whether:

- Appropriate management arrangements are in place including training and supervision
- Adequate risk control systems are implemented
- Appropriate precautions are in place and properly used
- Improved control measures need to be introduced

Where relevant, the findings and any lessons learnt from the review should be shared with other departments within the organisation.

### Suggested Actions:

- *Implement a programme which combines both active and passive monitoring*
- *Review performance following results of monitoring programmes*

## 5. RESOURCES

### SAMPLE MUSCULOSKELETAL DISORDERS RISK ASSESSMENT FOR SONOGRAPHY

Location: Ultrasound Work Activity: Sonography

Hazard	Who might be harmed	Current control measures	Further action required
Musculoskeletal disorders from:	All staff undertaking ultrasound examinations		Undertake detailed ergonomic assessment of ultrasound procedures (may require outside assessor)
Poor job design	As above	Limit repetition of examination types in sessions Protocols for examination of high BMI patients	Vary types of examinations on lists Inform referrers and patients of limitations of examinations
		Rest breaks to reduce muscle fatigue Limit overtime	Build in rest breaks at a minimum of 10 minutes per hour
Ultrasound equipment (new)	As above	Assess for ergonomic suitability prior to trial and purchase	Ensure ergonomics given highest priority in selection process prior to accepting machines on trial Get written agreement from other directorates that ultrasound dept will assess any equipment for use by sonographers prior to purchase
Ultrasound equipment (current)	As above	Reporting mechanisms for faults	Investigate accessory equipment purchase as necessary
		Assess whether accessory equipment can improve ergonomics Chairs (multi-adjustable)	Assess individuals' needs, purchase multiple types as required; Check need for separate footrests Purchase general/specialist couches as appropriate
Furniture	As above	Couches (multi-adjustable, mobile, electronic controls) Reporting mechanism for faults	Reinforce staff awareness to report faults as a health and safety hazard
Education	As above	Education of staff and managers on: <ul style="list-style-type: none"> <li>Risk factors</li> <li>Prevention including correct use and adjustment of equipment</li> <li>Exercise plan</li> </ul>	Specialist support e.g. physiotherapist evaluation of individual scanning methods/postures and train sonographers in safer techniques. Induction plan to include education, induction to include advice from physiotherapist. Annual updates Initial education from back care advisor Posters in rooms
Treatment	As above	Fast track referral to occupational health Fast track physiotherapy available for staff with lower back pain	Require fast track physiotherapy for all work related musculoskeletal disorders

Date of Assessment:

Date of Review:

## WORK RELATED UPPER LIMB DISORDER – EXERCISES FOR PREVENTION AND CURE

---

Julie Burnage DCR, DMU, FETC  
Director, Ultrasound Now Ltd  
Ultrasound Now Ltd  
Suites 2-3 Hanover House  
The Roe  
St. Asaph  
Denbighshire  
LL17 0LT  
Email: [jburnage@ultrasoundnow.co.uk](mailto:jburnage@ultrasoundnow.co.uk)  
Website: [www.ultrasoundnow.co.uk](http://www.ultrasoundnow.co.uk)

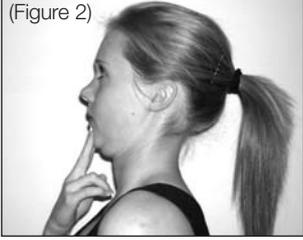
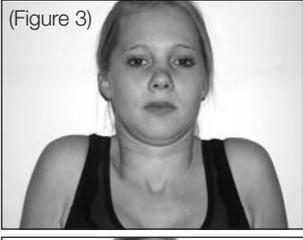
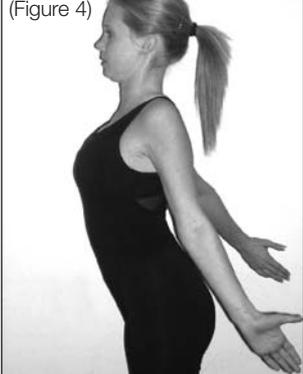
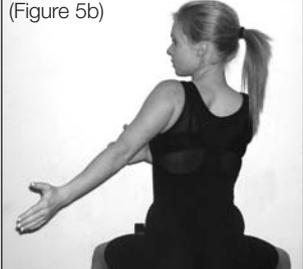
### Acknowledgements

This paper is based around an exercise programme devised for use at Ultrasound Now Ltd, and first shared with the radiography / sonography community at a College of Radiographers' WRMSD study day in Birmingham, UK in May 2006. The exercises are included in the article: ***Work Related Upper Limb Disorder: A Sonographer's Survival Guide*** in the **BMUS Ultrasound Journal. Ultrasound Volume 15 Number 1 February 2007 pp 38-42 (5)**

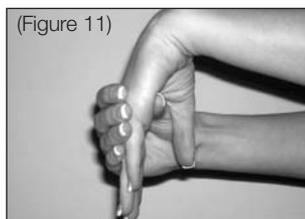
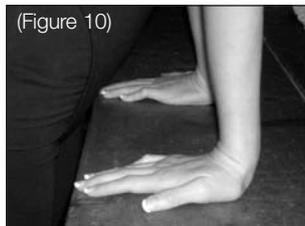
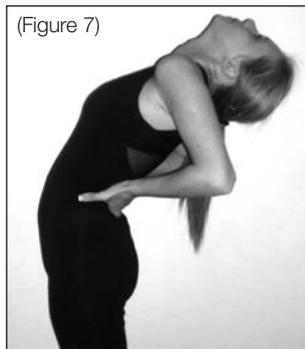
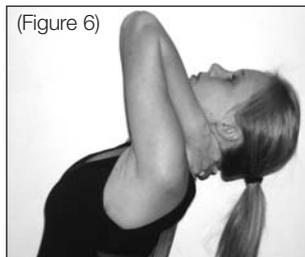
The author would like to thank her daughter Lydia for posing for the exercise pictures, Dafydd and Bernie at Dyffryn Physio for their patience whilst treating her and Maggie, her Pilates teacher for making her body do the things it should after years of neglect.

The Society of Radiographers would like to thank the British Medical Ultrasound Society for allowing us to reproduce this article.

## Prevention and recovery exercise routine

	<b>Problem</b>	<b>Remedy</b>	<b>Example exercise</b>
<p>(Figure 1)</p> 	<p>Turning the head constantly to one side</p>	<p>Restore symmetry to cancel out the repetitive movement</p>	<p>Turn your head to one side until you feel a stretch (Figure 1). Return to centre. Repeat 4 times each side. Keep your torso facing forwards.</p>
<p>(Figure 2)</p> 	<p>Head and neck leaning forward</p>	<p>A counteractive retraction exercise.</p>	<p>Pull your chin in. Put your fingers on your chin and push it a little further (Figure 2). Hold for a count of 3, feeling the pull at the nape of your neck. Repeat 6 times.</p> <p>You are not flexing or extending the neck - imagine pushing the occiput away from the cervico-thoracic junction, lengthening the back of the neck and feeling the pull at the nape of the neck.</p>
<p>(Figure 3)</p> 	<p>Sustained abduction - causes tension in trapezius which leads to headaches</p>	<p>Release tension in trapezius - you will know if you have tension in your trapezius if you find it easier to carry a shoulder bag on one shoulder rather than the other - do not carry a shoulder bag on your scanning arm!</p>	<p>Lift the shoulders until you can feel contraction in your trapezius (Figure 3). Hold for 5 seconds then relax completely. Repeat 3 times</p>
<p>(Figure 4)</p> 	<p>Abduction of the arm and hunching of the shoulders.</p>	<p>Retract and depress the scapulae. This redresses the balance of overworking the upper trapezius by priming and strengthening the lower trapezius.</p>	<p>Pinch the scapulae together whilst holding the thumbs and palms outwards (Figure 4). Push shoulders away from ears. Hold for 5 seconds. Repeat 3 times.</p>
<p>(Figure 5a)</p> 	<p>Twisting to one side repeatedly</p>	<p>Redress the balance. Best done in a seated position</p>	<p>Sitting on a chair, cross your arms over your chest clasping the opposite shoulder (Figure 5a).</p>
<p>(Figure 5b)</p> 			<p>Hold your hands as if passing a parcel (Figure 5b). Let your eyes follow the movement. Keep hips facing forward. Repeat 4 times to each side.</p>

## Prevention and recovery exercise routine



Problem	Remedy	Example exercise
Hunching over	Reverse the action.	Sit on a chair with hands clasped behind your neck. Lean your spine back against the chair so that the chair supports the vertebra to be mobilised. Inhale as you lean back and exhale as you lean your shoulders over the chair (Figure 6). Vary the level of the spine being 'treated' by shuffling your bottom forwards or sitting on a pillow.
Leaning to one side	Redress the balance	Stand in a neutral position. Bend sideways at the waist sliding hand down side of leg (Figure 7). Let the hips glide away to the opposite side. Repeat 4 times each side.
Hunching over - poor posture	Redress the balance	Stand straight with your feet apart. Support your back with your hands as you bend backwards (Figure 8). Push pelvis forwards. Back to neutral. Repeat 4 times.
Gripping / sustained and fixed wrist positions	Various ways of stretching wrists to counter the awkward and unnatural positions	<p>Sit or stand with forearms horizontal and palms together. Push palms together and lower towards the naval keeping the heels of your hands together (Figure 9). Hold for 10 seconds feeling the stretch in front of the wrists. Repeat 3 times.</p> <p>Stand leaning on a table with straight arms, palms on the table and fingers towards your body (Figure 10). Move the weight of your body backwards until you can feel the stretching on the inside of your forearms. Hold for 20 seconds. Repeat 3 times.</p> <p>Keeping your elbows straight, hold your arms out in front of you. Bend your wrist downwards; stretch the wrist into flexion with the other hand (Figure 11). Hold for 10 seconds, repeat each hand 3 times.</p>

# MODEL POLICY FOR PREVENTION OF MUSCULOSKELETAL DISORDERS IN ULTRASOUND DEPARTMENTS

---

## 1. Policy Statement

(INSERT HEALTHCARE ORGANISATION'S NAME) is committed to ensuring a safe working environment for staff.

(INSERT HEALTHCARE ORGANISATION'S NAME) recognises the potential for MSDs to develop in sonographers and is committed to preventing MSDs.

(INSERT HEALTHCARE ORGANISATION'S NAME) will work with safety representatives and employees to identify the causes of MSDs and, so far as is reasonably practicable, implement measures to prevent MSDs.

## 2. Responsibilities

### 2.1 Chief Executive

The Chief Executive is ultimately responsible for health and safety at (INSERT HEALTHCARE ORGANISATION'S NAME).

The implementation of this local policy is delegated to (INSERT TITLE OF SENIOR MANAGER FOR SONOGRAPHY/ULTRASOUND).

### 2.2 Managers

- (INSERT TITLE OF SENIOR MANAGER FOR SONOGRAPHY/ULTRASOUND) is responsible for the allocation of resources for the implementation of this policy
- (INSERT TITLE OF SENIOR MANAGER FOR SONOGRAPHY/ULTRASOUND) is responsible for ensuring that risk assessments are carried out and recommendations are acted on.
- Departmental managers are responsible for carrying out risk assessments and consulting with safety representatives on the findings of risk assessments.
- Departmental managers are responsible for implementing risk control measures identified in the risk assessment.

### **2.3 Head of Procurement** *(or insert similar title as appropriate to your organisation)*

The Head of Procurement must ensure that sonography staff are consulted prior to purchasing any equipment.

### **2.4 Estates and Facilities** *(or insert similar title as appropriate to your organisation)*

The Head of Estates and Facilities must ensure that sonography staff are consulted prior to any refurbishment or new build affecting the sonography department.

### **2.5 Risk Manager** *(or insert similar title as appropriate to your organisation)*

The risk manager will give advice and support to the department on matters relating to risk assessment.

### **2.6 Back Care Advisor** *(or insert similar title as appropriate to your organisation)*

The back care advisor will give advice and support to the department on matters relating to ergonomics and patient/equipment handling.

The back care advisor will support and participate in local awareness and education sessions.

### **2.7 Occupational Health**

The occupational health department will give advice and support to individuals and their managers on the safe rehabilitation and return to work of staff who have developed a musculoskeletal injury.

### **2.8 Employees**

Employees should attend training or awareness sessions as required by their manager.

Employees should report any signs of injury as soon as they develop.

Employees should report any faults with equipment.

## **3. Implementation**

### **3.1 Risk Assessments**

Risk assessments will be carried out on sonography activities to identify any risk factors and control measures.

Risk assessments will be carried out by departmental managers with the support of specialist staff as required (e.g. back care advisors or risk management).

Employees will be involved in the risk assessment process to ensure that all risks are being identified and given an opportunity to suggest practical solutions.

Safety representatives will be consulted on the findings of the risk assessment.

### **3.2 Training and Awareness**

All staff who operate ultrasound equipment will receive training on the safe operation of the equipment, how to adjust furniture and safe systems of work (e.g the importance of taking rest breaks).

All staff will be made aware of warming up exercises.

All staff will be made aware of the importance of reporting symptoms of MSDs

All staff will be made aware of the importance of reporting faults with equipment

Training and awareness will take place during local induction of new staff, during team meetings and on the job.

### **3.3 Management of Individuals with MSDs**

Once an individual reports an MSD they will be referred to occupational health for advice. They will also be advised to see their own doctor if they haven't already. An incident form should be completed.

Occupational health will give advice to department managers including advice on rehabilitation and safe return to work.

The member of staff will be fast tracked for physiotherapy treatment, if treatment is recommended by their doctor or occupational health.

The department manager will review the risk assessments to ensure that control measures are effective and are being implemented

### **3.4 Monitoring and Review**

Incident reports and sickness absence data will be reviewed at three monthly intervals.

The safety representative and the department manager will carry out 3 monthly inspections of the department to ensure that risk assessments have been implemented and safe systems of work are followed.

Health and safety will be a regular agenda item at staff meetings where staff and safety representatives can raise concerns regarding MSDs.

A performance audit and review of this policy will take place annually or earlier if monitoring indicates a problem or if there are major technological or organisational changes.

## 6. FURTHER INFORMATION

---

### Society of Radiographers

Details of 'It's a Pain' campaign and industry standards for sonography can be found on the members health and safety pages at [www.sor.org](http://www.sor.org)

### Health and Safety Executive

Free leaflets with summaries of key health and safety laws can be found at <http://www.hse.gov.uk/pubns/index.htm>

The Health and Safety Executive has a website area dedicated to MSDs this can be accessed at <http://www.hse.gov.uk/msd/index.htm>

The web page also details links to free and priced publications on MSDs and HSE contract research on MSDs.

### The Ergonomics Society

Useful news and resources on ergonomics including a list of registered ergonomic consultancies and information how to choose an ergonomist. <http://www.ergonomics.org.uk/>

### Sound Ergonomics

The website of an American Occupational Health Consultancy who are recognised as experts in the study and application of ergonomics to the ultrasound profession. The website contains links to academic articles on MSDs in sonography. <http://www.soundergonomics.com/>

## 7. REFERENCES

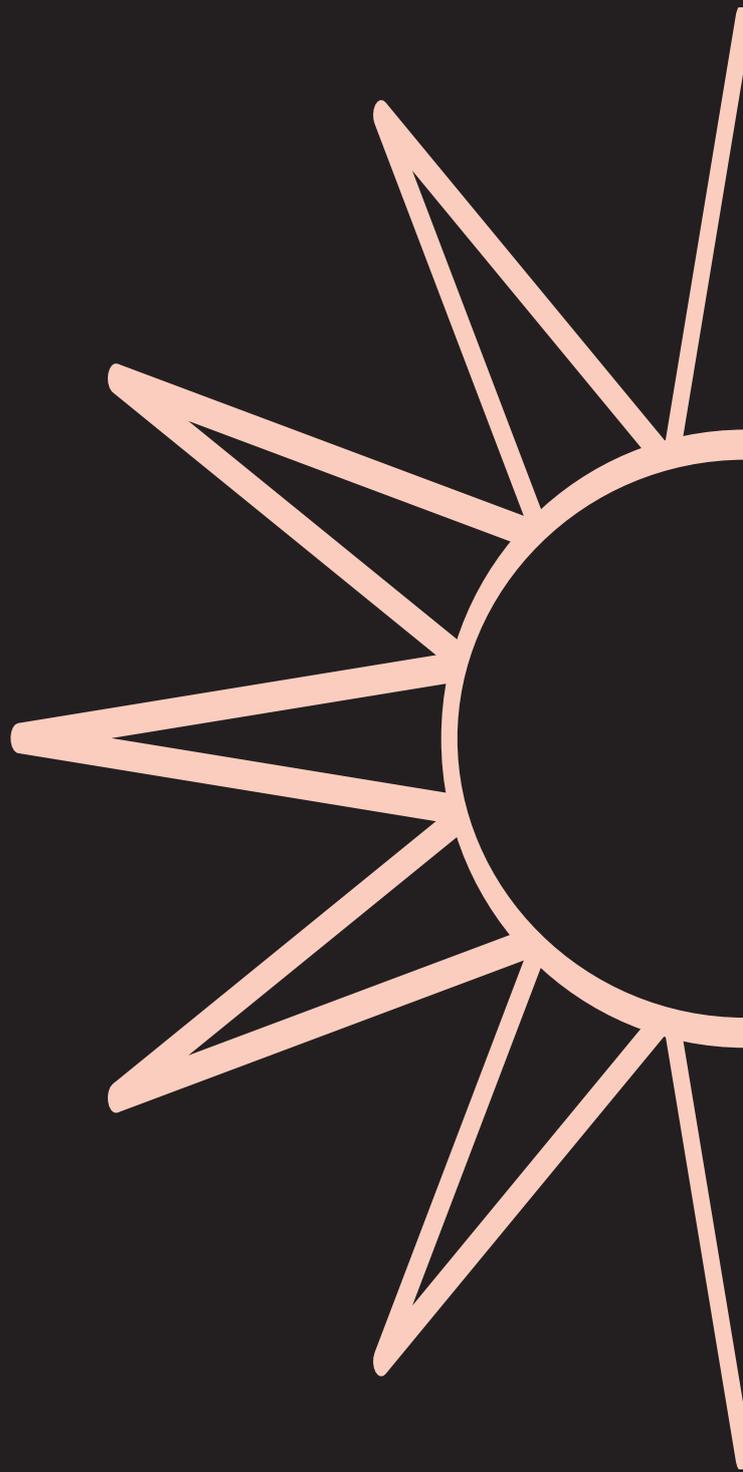
---

- <sup>1</sup> Health and Safety Executive (2006) [www.hse.gov.uk/msd/index.htm](http://www.hse.gov.uk/msd/index.htm)
- <sup>2</sup> Society of Radiographers (2006) *Industry Standards for the Prevention of Work Related Musculoskeletal Disorders in Sonography*. ISBN 0-9503597-7-7  
(available to download on the members area of the website [www.sor.org](http://www.sor.org))
- <sup>3</sup> Arrowsmith I M (2000) *The Prevalence of Work-Related Upper Limb Disorders Amongst Radiographers*. Synergy, September 2000
- <sup>4</sup> Feather C (2001) *WRMSD: An occupational hazard for sonographers'* Synergy, October 2001
- <sup>5</sup> Cited in a presentation by Dr Grahame Brown, Musculoskeletal, Sport & Exercise physician and specialist in Occupational Health to a SCoR conference on Musculoskeletal Disorders in Sonographers, May 2006
- <sup>6</sup> *Information sheet 2/99/EMSU Economic Impact: Revised data from Self Reported Work Related Illness survey in 1995 (SWI95)* available from <http://www.hse.gov.uk/statistics/books.htm#swi>
- <sup>7</sup> Health and Safety Executive Sector Information Minute SIM 07/2006/05 Public Sector Programme 2006/07: Musculoskeletal Disorders (MSD) in the health Services  
[http://www.hse.gov.uk/foi/internalops/sectors/public/7\\_06\\_05.pdf](http://www.hse.gov.uk/foi/internalops/sectors/public/7_06_05.pdf)
- <sup>8</sup> Russo A, Murphys C, Lessoway V, Berkowitz J (2002). *The prevalence of musculoskeletal symptoms among British Columbia Sonographers*. *Applied Ergonomics* 2002; 33:385-93
- <sup>9</sup> Magnavita N, Bevilacqua L, Mirk P, Fileni A, Castellino N. (1999). *Work-related musculoskeletal complaints in Sonologists*. *The Journal of Occupational and Environmental Medicine* 41(1999) 981-988.
- <sup>10</sup> Glover W, McGregor A, Sullivan C, Hague J. (2005) *Work-related musculoskeletal disorders affecting members of the Chartered Society of Physiotherapy*. *Physiotherapy* 91 (2005) 138-147
- <sup>11</sup> Wihlidial L M, Kumar S. (1997) *An injury profile of practicing diagnostic medical sonographers in Alberta*. *International Journal of Industrial Ergonomics* 19 (1997) 205-216
- <sup>12</sup> Cook t, Rosecrance J, Zimmermann C, Gerleman D, Ludewig P. *Electromyographic Analysis of a Repetitive Hand Gripping Task* (1998). *International Journal of Occupational safety and Ergonomics* 1998 4 (2):185-200
- <sup>13</sup> Blatter B M, Bongers P M (2002). *Duration of computer use and mouse use in relation to musculoskeletal disorders of neck or upper limb*. *International Journal of Industrial Ergonomics* (2002) 30 295:306
- <sup>14</sup> *Health and Safety at Work etc Act 1974*. The Stationary Office ISBN 92 828 81741
- <sup>15</sup> *Management of health and safety at work, Management of health and Safety at Work regulations 1999*. Approved Code of Practice and Guidance L21 (second edition) HSE Books 2000 ISBN 0 7176 2488 9

- <sup>16</sup> The Society of Radiographers (2002) *The causes of musculoskeletal injury amongst sonographers in the UK*. June 2002
- <sup>17</sup> *VDUser Friendly – a guide to dealing with health and safety issues arising from their use*. The Society of Radiographers.
- <sup>18</sup> *Display screen equipment work, Health and Safety (Display Screen Equipment) 1992 Guidance on the Regulations* HSE Books L 26 1992 ISBN 0 11 886331 2
- <sup>19</sup> *A guide to the Health and Safety (Consultation with Employees) Regulations 1996 L95 HSE Books 1996* ISBN 0 7176 1234 1
- <sup>20</sup> *Safety representatives and safety committees. Approved Code of Practice and guidance on the Regulations* 3rd edition L87 HSE Books 1996 ISBN 0 7176 1220 1 (known as The Brown Book)
- <sup>21</sup> TUC Safety Reps webpage [http://www.tuc.org.uk/h\\_and\\_s/index.cfm?mins=395&minors=395](http://www.tuc.org.uk/h_and_s/index.cfm?mins=395&minors=395)
- <sup>22</sup> *A guide to the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995* L73 HSE Books 1996 ISBN 0 7176 1012 8
- <sup>23</sup> *Workplace health, safety and welfare. Workplace (Health, Safety and Welfare) Regulations 1992. Approved Code of Practice* L24 HSE Books 1992 ISBN 0 7176 0413 6
- <sup>24</sup> *Safe use of work equipment. Provision and use of work equipment regulations 1998. Approved Code of Practice and guidance (second edition)* HSE Books 2001 ISBN 07176 1626 6
- <sup>25</sup> *Manual Handling. Manual Handling Operations Regulations 1992. Guidance on Regulations* L23 (second edition) HSE Books 1998 ISBN 07176 2415 3
- <sup>26</sup> *Upper limb disorders in the workplace* HSG60 HSE Books ISBN 0 7176 1978 8
- <sup>27</sup> *Cost Benefit studies that support tackling musculoskeletal disorders* HSE Research Report 491. September 2006, HSE Books.
- <sup>28</sup> CDC Workplace Safety and Health, Workplace Solutions from the National Institute for Occupational Safety and health, Preventing Work-Related Musculoskeletal Disorders in Sonography. September 2006 (available from <http://www.soundergonomics.com/info-pubs.php>)
- <sup>29</sup> Presentation by Dr Grahame Brown, Musculoskeletal, Sport & Exercise physician and specialist in Occupational Health to a SCoR conference on Musculoskeletal Disorders in Sonographers, May 2006
- <sup>30</sup> *Disability Discrimination Act 1995: Code of Practice Employment and Occupation*. Disability Rights Commission 2004 [www.drc-gb.org](http://www.drc-gb.org) ISBN 0 11 703419 3







**March 2007**  
**First edition**  
**ISBN 0-9503597-8-5**

**£15 to SCoR members**  
**£25 non-members**

**The Society of Radiographers**

207 Providence Square  
Mill Street  
London SE1 2EW  
Telephone 020 7740 7200  
Facsimile 020 7740 7233  
E-mail [info@sor.org](mailto:info@sor.org)  
Website [www.sor.org](http://www.sor.org)