VDU Regulations:

Health and Safety (Display Screen Equipment) Regulations 1992 (amended 2002), updated 2010: A Guide to dealing with Health and Safety Issues arising from their use

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Chapter 1: Introduction

Introduction

Since the transition to digital equipment SoR, members are increasingly using computers while at work. This has caused a marked increase in the number of members complaining of a range of upper limb disorders (commonly known as repetitive strain injury) including pains in the neck, arms, elbows, wrists, hands and fingers; back ache (from inappropriate seating), fatigue and eye strain.

According to the Health and Safety Executive (HSE), extensive research has found no evidence that Visual Display Units (VDUs) can cause disease or permanent damage to eyes.

However extended or prolonged periods of VDU work can lead to tired eyes and discomfort. As the eyes now perform more demanding tasks, it may make VDU workers more aware of an eyesight problem. It may also make those with pre-existing vision defects more aware of them if these are not corrected.

SoR members can be susceptible to a whole range of other health problems while carrying out their daily tasks. The causes may not always be obvious and can be due to a combination of factors should the employer not ensure the workstation and staff are in compliance with the regulations.

The importance of adequate health and safety training provision cannot be emphasised too highly especially regarding safety aspects of operating VDUs. The SoR cannot stress how important it is for the employer's interest to be proactive and educate employees in how to avoid problems rather than be reactive and deal with possible claims for damages once employees have been injured.

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Chapter 2: Health and Safety (Display Screen Equipment) Regulations 1992 (amended 2002

What does the law state?

- The employer has a duty to carry out a suitable analysis of the workstation to assess the health and safety risks of people using them and to make changes to any risks that are identified

- The employer should comply with guidance laid down by the Health and Safety Executive on workstation minimum requirements

- The employer has to plan work activities of VDU users to incorporate frequent breaks

- Employers must provide health and safety training and re-training when modifications, changes in the equipment, software, workstation, environment and the tasks are changed

  Training should be focused on:
  - reducing or minimising the risk of musculoskeletal disorders
  - visual issues
  - stress

- Employers have to provide information on health and safety risks which should include reminders and measures taken to reduce risks and how to make use of them.

- *Regulation 5*: requires employers to provide users, on request, with an appropriate eye and eyesight test (including a vision test and eye examination by a registered ophthalmic optician or a registered medical practitioner) before commencing regular VDU work and at regular intervals or if they experience visual difficulties attributable to the work. The provision of tests and of any corrective appliances prescribed specifically for VDU work must be paid for by the employer.

The Regulations do not contain detailed technical specifications or lists of approved equipment. Instead, they set more general objectives. Employers must assess workstations to ensure they meet the minimum requirements and take responsibility for remedying the risks identified.

Employees and safety representatives should be encouraged to take part in risk assessments (e.g. by reporting health problems). Where risks are identified, the employer must take steps to reduce them.

Who is affected?

The Regulations apply where staff habitually use VDUs as a significant part of their normal work. Others who use VDUs only occasionally are not covered by the requirements in the Regulations (apart from the workstation requirements). However, their employers still have general duties to protect them under other health and safety at work legislation. The regulations require employers to minimise the risk in VDU work by ensuring that workplaces and jobs are well designed and they apply where staff habitually use VDUs as a significant part of their normal work.

Who is a 'user'?

Regulation 1:

Display Screen Equipment (DSE) regulations state that a 'user' is "an employee who habitually uses DSE as a significant part of his [or her] normal work. A 'user' may work from home. The term 'users' will be more obvious at times than others. The regulations require employers to minimise the risks on VDU work by ensuring that workplaces and jobs are well designed. If most, or all, of the following criteria are met, the employee is a 'user':

- DSE is necessary for the job, as alternative means are not readily available
- there is no choice over the use of DSE
- significant training and/or specific skills in the use of the DSE are required
- the employee normally uses DSE for continuous spells of an hour or more at a time
- DSE is used more or less daily
- the fast transfer of information between the employee and screen is an important requirement of the job; and
- the performance requirements of the system demand high levels of attention and concentration by the user, for example, where the consequence of error may be critical.

In practice, if a number of employees use the same DSE, or if use of the equipment is vital for the job, employers will find it easier to designate all employees who use DSE as 'users'.

Examples of 'users' given in the Guidance to the regulations include: secretaries, data input operators, community care workers, librarians, scientists, secretaries, telephone operators and receptionists.

Based on the criteria above, the Society of Radiographers definitely considers the following to be users:

Any **radiography** staff using computerized patient record schemes

- **Sonographers: av**erage in the region of twenty patients a day, at around 15

minutes per patient; there is no doubt that they could not manage their job without constant reference to the display screen equipment

- **Mammographers**: see patients every 7-8 minutes, constantly using VDU's since the transition to digital imaging

- **MRI**: radiographers carry out a scan with constant use of a VDU screen

- **CT:** radiographers similarly carry out the scan with constant use of a VDU screen

- **Angiography:** radiographers are expected to operate several machines that incorporate VDUs enabling them to carry out their duties.

What is Display Screen Equipment?

Regulation 1 defines DSE as visual display units (VDUs), display screen equipment (DSE) and monitors – all the terms mean the same a display screen, usually forming part of a computer system and showing text, numbers or graphics.
It does not include: screens whose main use is to show television or film pictures, screens onboard a means of transport or mainly intended for public use, window typewriters with a few lines of text, equipment with a small measurement display such as calculators or cash registers, or portable systems **unless** they are in prolonged use.

THE SCHEDULE: **Regulation 3**
(WHICH SETS OUT THE **MINIMUM REQUIREMENTS FOR WORK STATIONS** WHICH ARE CONTAINED IN THE ANNEX TO COUNCIL DIRECTIVE 90/270/EEC ON THE MINIMUM SAFETY AND HEALTH REQUIREMENTS FOR WORK WITH DISPLAY SCREEN EQUIPMENT)

1. **Extent to which employers must ensure that workstations meet the requirements laid down in this schedule**
   An employer shall ensure that a workstation meets the requirements laid down in this Schedule to the extent that-
   (a) those requirements relate to a component which is present in the Workstation concerned;
   (b) those requirements have effect with a view to securing the health, safety and welfare of persons at work; and
   (c) the inherent characteristics of a given task make compliance with those requirements appropriate as respects the workstation concerned.

2. **Equipment**
   (a) General comment
   The use of the equipment must not be a source of risk for operators or users.

   (b) Display screen
   The characters on the screen shall be well-defined and clearly formed, of adequate size and with adequate spacing between the characters and lines.
   The image on the screen should be stable, with no flickering or other forms of instability.
   The brightness and the contrast between the characters and the background shall be easily adjustable by the operator or user, and also be easily adjustable to ambient conditions.
   The screen must swivel and tilt easily and freely to suit the needs of the operator or user.
   It shall be possible to use a separate base for the screen or an adjustable table.
   The screen shall be free of reflective glare and reflections liable to cause discomfort to the operator or user.

   (c) Keyboard
   The keyboard shall be tiltable and separate from the screen so as to allow the operator or user to find a comfortable working position avoiding fatigue in the arms or hands.
   The space in front of the keyboard shall be sufficient to provide support for the hands and arms of the operator or user.
   The keyboard shall have a matt surface to avoid reflective glare.
   The arrangement of the keyboard and the characteristics of the keys shall be such as to facilitate the use of the keyboard.
   The symbols on the keys shall be adequately contrasted and legible from the design working position.

   (d) Work desk or work surface
   The work desk or work surface shall have a sufficiently large, low-reflectance surface and allow a flexible arrangement of the screen, keyboard, documents and related equipment.
   The document holder shall be stable and adjustable and shall be positioned so as to minimise the need for uncomfortable head and eye movements.
   There shall be adequate space for operators or users to find a comfortable position.

(e) Work chair
The work chair shall be stable and allow the operator or user easy freedom of movement and a comfortable position.
The seat shall be adjustable in height.
The seat back shall be adjustable in both height and tilt.
A footrest shall be made available to any operator or user who wishes one.

3. Environment

(a) **Space requirements**
The workstation shall be dimensioned and designed so as to provide sufficient space for the operator or user to change position and vary movements.

(b) **Lighting**
Any room lighting or task lighting provided shall ensure satisfactory lighting conditions and an appropriate contrast between the screen and the background environment, taking into account the type of work and the vision requirements of the operator or user.
Possible disturbing glare and reflections on the screen or other equipment shall be prevented by co-coordinating workplace and workstation layout with the positioning and technical characteristics of the artificial light sources.

(c) Reflections and glare
Workstations shall be so designed that sources of light, such as windows and other openings, transparent or translucent walls and brightly coloured fixtures or walls cause no direct glare and no distracting reflections on the screen.
Windows shall be fitted with a suitable system of adjustable covering to attenuate the daylight that falls on the workstation.

(d) **Noise**
Noise emitted by equipment belonging to any workstation shall be taken into account when a workstation is being equipped, with a view, in particular, to ensuring that attention is not distracted and speech is not disturbed.

(e) **Heat**
Equipment belonging to any workstation shall not produce excess heat which could cause discomfort to operators or users.

(f) **Radiation –(see note page 12)**
All radiation with the exception of the visible part of the electromagnetic spectrum shall be reduced to negligible levels from the point of view of the protection of operators' or users' health and safety.

(g) **Humidity**
An adequate level of humidity shall be established and maintained.

4. Interface between computer and operator/user

In designing, selecting, commissioning and modifying software, and in designing tasks using display screen equipment, the employer shall take into account the following principles:
(a) software must be suitable for the task
(b) software must be easy to use and, where appropriate, adaptable to the level of knowledge or experience of the operator or user; no quantitative or qualitative checking facility may be used without the knowledge of the operators or users
(c) systems must provide feedback to operators or users on the performance of those systems
(d) systems must display information in a format and at a pace which are adapted to operators or users
(e) the principles of software ergonomics must be applied, in particular, to human data processing.

Radiation

The Schedule requires radiation, with the exception of the visible part of the electromagnetic spectrum (i.e. visible light), to be reduced to negligible levels from the point of view of the protection of users' health and safety. In fact, so little radiation is emitted from conventional cathode-ray tube (CRT) designs of DSE that no special action is necessary to meet this requirement. LCD flat-panel screens do not emit any electromagnetic radiation, except visible light.

Taking CRT displays as an example, ionising radiation is emitted only in exceedingly small quantities, so small as to be generally much less than the natural background level to which everyone is exposed. Emissions of ultraviolet, visible and infrared radiation are also very small, and workers will receive much less than the maximum exposures generally recommended by national and international advisory bodies.

For radio frequencies, the exposures will also be well below the maximum values generally recommended by national and international advisory bodies for health protection purposes. The levels of electric and magnetic fields are similar to those from common domestic electrical devices. Although much research has been carried out on possible health effects from exposure to electromagnetic radiation, no adverse health effects have been shown to result from the emissions from display screen equipment.

Thus it is not necessary, from the standpoint of limiting risk to human health, for employers or workers to take any action to reduce radiation levels or to attempt to measure emissions; in fact the latter is not recommended, as meaningful interpretation of the data is very difficult. There is no need for users to be given protective devices such as anti-radiation screens.

Providing health and safety training and information

Employers have to provide training, to make sure employees can use their VDU and workstation safely, and know how to make best use of it to avoid health problems, for example by adjusting the chair.

Information should also be provided about VDU health and safety. This should include general background information - this could be done by giving out copies of this booklet. It should also cover more specific details of the steps taken by the employer to comply with the Regulations, such as the action taken to reduce risks and the arrangements for breaks.

What the law says:

The employer has a number of responsibilities under health and safety legislation.
They include:

- a requirement to carry out a suitable analysis of workstations to assess the health and safety of people using them and to make changes if risks are identified
- guidance on and compliance with workstations' minimum requirements, as laid down by the Health and Safety Executive
- planning work activities of VDU users to incorporate frequent breaks

- Regulation 5, which requires employers to provide users, on request, with an eye examination (See chapter 6),
- providing health and safety training and re-training when any modifications or new equipment is introduced such as changes to hardware, software, workstations, environment or the job. Training should be aimed at reducing or minimising musculoskeletal problems, visual fatigue and mental stress
- providing information on health and safety risks which should include reminders and measures taken to reduce risks and how to make use of them.

How can we effectively deal with issues?

As with all health and safety issues, the most effective way to avoid possible issues arising in the first place is by engaging SoR health and safety reps and the radiographer(s) who are expected to operate the equipment.

The role of the SoR rep

The SoR health and safety reps have a right under the Safety Representative and Safety Committee Regulations to:

- make inspections of the workplace at least every three months, which should include talking to members about any health and safety problems they may have, related to VDUs
- investigate members complaints: make sure your members know that they can talk to you if they have a complaint regarding VDU work
- investigate potential hazards; this gives you the right to look into situations or practices you believe could become a health and safety risk
- investigate when there is any change in working conditions (e.g. a transition to digital imaging), which can include the introduction of new technology
- be consulted on all aspects of health and safety, including:
    - risk assessments
    - introduction of new equipment
    - training course content
    - the appointment of competent persons to assist management in risk assessments, training etc.

Remember that it is management's responsibility to provide a safe working environment and safe systems of work and that if you do miss a potential hazard, SoR Health and Safety Reps cannot be held responsible.

Workstations

The watchword for workstations is adjustability. As many features as possible should be under the direct control of the operator who should also have the opportunity to make frequent changes of posture. Where workstations are to be used by more than one person, this adjustability becomes even more crucial - it must not just cater for all the varieties of movement which one operator may

wish to adopt, but must also allow for those of other workers who will be of different shapes, sizes, ages and abilities.

Example:

What workstation suits a 20-year-old, 6-foot, shortsighted man at 5pm in the winter ***will be very different*** from the adjustments appropriate for a 40-year-old 5-foot woman with long sight on a sunny morning.

Key requirements of the legislation are:

The work desk or work surface shall have a sufficiently large, low-reflectance surface and allow a flexible arrangement of the screen, keyboard, documents and related equipment.

The document holder shall be stable and adjustable and shall be positioned so as to minimise the need for uncomfortable head and eye movements.

There shall be adequate space for operators or users to find a comfortable position. ***Schedule 2 (d)***

The workstation shall be dimensioned and designed so as to provide sufficient space for the operator or user to change position and vary movements. ***Schedule 3 (a)***

The symbols on the keys shall be adequately contrasted and legible from the design working position. ***Schedule 2 (c)***

The Association of Optometrists' advice is that the source documents and other work materials should not necessarily be at the same distance as the screen as the size of hard copy text is usually smaller than the characters on the screen. 'The shorter the working distance, the greater the risk of developing shortsightedness' (Grundy, Rosenthal and Seymour 1991).

Again the critical factor is ***adjustability to suit the individual operator.*** All VDU operators should be able, without moving from their workstation or twisting uncomfortably, to look periodically into a distance of at least 20 feet to rest tensed eye muscles. Adjustable document holders should be available.

Screen

Some key factors which affect character and symbol legibility and which in turn impact on vision include:

Character size, the dot matrix density (the number of dots per inch making up the characters), brightness, contrast, resolution, stability, design, colour and polarity (whether there are dark characters on a light background (negative polarity) or light characters on a dark background (positive polarity) and the viewing angle.

Legibility may also be affected by the age of the VDU and the effectiveness of maintenance including cleaning. A 1989 study found that blood pressure and stress levels of VDU users were increased when viewing small characters (of 4.8 x 2.6 mm) compared to viewing larger characters (5.6 x 4.8 mm) and this effect increased with the age of the user (Tanaka et al 1989). Another study found that poor screen legibility caused increased rates of eye discomfort (Collins et al 1990).

The characters on the screen shall be well-defined and clearly formed, of adequate size and with adequate spacing between the characters and lines. ***Schedule 2 (b)***

Lighting

Lighting requirements vary enormously depending on the task and person performing the task. VDU work is rarely the only visual activity going on in any particular area. Most VDU workers must also refer to documents, use the telephone, check print-outs and carry out a variety of other tasks, all of which require different types and levels of lighting. Most solutions are therefore likely to be a compromise of some sort.

The two key principles to remember are that lighting should be as individually adjustable as possible *without* interfering with the lighting of neighboring workers.

Many VDUs, especially older ones, produce low levels of character brightness, forcing the user to reduce the background lighting level in order to see the screen characters. Also, to avoid the discomfort caused by moving the eyes continuously between areas of very different brightness, the difference in brightness between the screen characters and the screen background should be kept low. This may mean reducing the overall level of background lighting. A low level of background lighting may make the screen easier to read, but makes it harder to read printed material - so a level of lighting must be chosen which least affects the reading of screen characters and the reading of hard copy source documents.

The brightness and the contrast between the characters and the background shall be easily adjustable by the operator or user, and also be easily adjustable to ambient conditions. ***Schedule 2 (b)***

The objective when selecting lighting for environments where VDUs are in use is to provide adequate levels of background illumination and contrast with the screen, while at the same time avoiding glare and reflection on the screen.

Any room lighting or task lighting provided shall ensure satisfactory lighting conditions and an appropriate contrast between the screen and the background environment, taking into account the type of work and the vision requirements of the operator or user. ***Schedule 3 (b)***

Down lighters or direct lighting should always be fitted with diffusers to control the light distribution and to provide even brightness. As fluorescent lights (without diffusers) have large exposed areas they may dazzle your eyes and affect your capacity to see clearly - so it is particularly important that they are fitted with adequate, preferably opaque, diffusers (London Hazards Centre 1987).

Possible disturbing glare and reflections on the screen or other equipment shall be prevented by co-coordinating workplace and workstation layout with the positioning and technical characteristics of the artificial light sources.- ***Schedule 3 (b)***

Well planned uplighting is particularly suitable for VDU work as it provides indirect lighting reflected back from the ceiling which minimises reflections on the screen. However, use of uplighter is not recommended if the floor to ceiling height is less than 2.5 metres (Grundy, Rosenthal and Seymour 1991).

Glare

Glare can be caused by direct light or reflections and may lead to eyestrain, headaches and tiredness. As well as glare from artificial lighting, light from windows is a frequent cause of glare. The following can help to reduce glare:

- fitting adjustable shades or blinds to windows
- arranging VDUs so that neither operators nor screens are facing an unscreened window
- where fluorescent lights are used, ensuring that the tubes are viewed end on when operators are sitting at their workstation and covering direct light sources with a diffuser
- Using low reflecting furnishing and decorating materials.

Workstations shall be so designed that sources of light, such as windows and other openings, transparent or translucent walls, and brightly coloured fixtures or walls cause no direct glare and no distracting reflections on the screen.

Windows shall be fitted with a suitable system of adjustable covering to attenuate the daylight that falls on the workstation. ***Schedule 3 (c)***

The keyboard shall have a matt surface to avoid reflective glare. ***Schedule 2 (c)***

Job design factors affecting vision

The structure, duration, demands, pace, breaks and task variation of the job all influence visual stress. Frequently, the introduction of VDUs to a workplace can create a high demand, low control situation for the workers required to use them.

A consistent finding from studies of VDU users is that vision-related problems are higher among operators doing repetitive keyboard and screen work than among those doing more creative question and answer work suggesting that the intensity and repetitiveness of the work are important factors.

Full-time workers suffer noticeably more than part-timers. Studies have also shown that eyestrain becomes worse in direct proportion to the amount of time spent each day at a VDU.

Work which requires operators to stay in the same position working on a repetitive task for long periods without rest invariably causes visual strain and tiredness.

REGULAR REST BREAKS AWAY FROM THE SCREEN ARE ESSENTIAL

Wherever possible the frequency, timing and duration of rest breaks away from the screen should be under the control of the individual worker. Studies have shown that to be effective, rest breaks should be taken *before* the onset of fatigue. The Association of Optometrists recommends that *in addition to hourly breaks of several minutes,* every 15 minutes or so the eyes should be relaxed by looking away from the screen to objects at a greater distance.

Research commissioned by the HSE from the University of Nottingham supports this advice - they found that to be effective in reducing fatigue and stress, breaks should be taken away from the VDU, and should not involve transfer to an equally repetitive task (Cox, cited in *NALGO Safety Representative* June 1991).

During the drafting of the EC's directive on VDU work - implemented in the UK as the *Health and Safety (Display Screen Equipment) Regulations 1992* - many unions and hazards-campaigning organisations attempted to have daily time limits for VDU work included (London Hazards Centre 1992). However, resistance by the Health and Safety Executive (HSE) and the Confederation of British Industry (CBI) has meant that the DSE Regulations do not specify time limits and the most that is required is periodical interruptions of work at the screen.

Every employer shall so plan the activities of users at work in his undertaking that their daily work on display screen equipment is periodically interrupted by such breaks or changes of activity as reduce their workload at that equipment. ***Regulation 4***

Key points from the guidance to the regulations include the following:

Whenever possible, jobs at display screen should be designed to consist of a mix of screen-based and non screen-based work to prevent fatigue and to vary visual and mental demands. Where the job unavoidably contains spells of intensive display screen work these should be broken up by periods of non-intensive, non-display screen work. Where work cannot be so organised, e.g. in jobs requiring only data or text entry requiring sustained attention and concentration, deliberate breaks or pauses must be introduced. ***Regulation 4 Guidance note 62***

Breaks or changes of activity should be included in working time. They should reduce the workload at the screen, i.e. they should not result in a higher pace or intensity of work on account of their introduction. ***Regulation 4 Guidance note 62 (a)***

Breaks should be taken before the onset of fatigue, not in order to recuperate. ***Regulation 4 Guidance note 62 (b)***

Short, frequent breaks are more satisfactory than occasional, longer breaks: e.g. a 5-10 minute break after 50-60 minutes continuous screen and/or keyboard work is likely to be better than a 15 minute break every two hours. ***Regulation 4 Guidance note 62 (c)***

Wherever practicable, users should be allowed some discretion as to how they carry out tasks; individual control over the nature and pace of work allows optimal distribution of effort over the working day. ***Regulation 4 Guidance note 62 (d)***

Changes of activity (time spent doing other tasks not using the DSE) appear from study evidence to be more effective than formal rest breaks in relieving fatigue. ***Regulation 4 Guidance note 62 (e)***

If possible breaks should be taken away from the DSE workstation and allow the user to stand up, move about and/or change position. ***Regulation 4 Guidance note 62 (f)***

Chapter 3: Potential health and safety hazards

The principle health risks associated with DSE work are physical (musculoskeletal) problems, visual fatigue and mental stress. These problems often reflect bodily fatigue. But none of them are unique to DSE work, nor are they an inevitable consequence of it. The risks associated should be low if the employer complies with the regulations and the ergonomic principles are taken into account in the design, selection and installation of the equipment, the design of the workplace and the organisation of the task.

It is important not be become complacent about this as the number of SoR members who use DSE equipment continues to rise, while for some, this risk may be relatively low if control measures are adhered to, but sadly for some members the regulations are deemed “not applicable”, which is incorrect.

Musculoskeletal Disorders

The musculoskeletal (MSK) system consists of muscles, bones, tendons and ligaments, and can also be considered to include the nerves connecting these structures to the brain. Bones are held together by ligaments, muscles are attached to bones by tendons. Body movements are produced by the contraction and relaxation of muscles. Tendons do not stretch or contract but transfer force from the muscles to the bones. When a muscle contracts it becomes shorter, pulling on the tendons and allowing the joints and limbs to move. Tendons are smooth and slippery, so that they can glide easily inside a joint’s surrounding synovial sheath. Synovial sheaths contain a lubricating fluid, synovial fluid, which enables the tendon to move within its sheath and without friction. Where a ligament may be subject to particular frictional forces, for example at the shoulder, elbow or knee, a small, fluid-filled sac called a bursa helps reduce the friction.

Although the musculoskeletal system can withstand many of the stresses and strains placed upon it, it is not invulnerable. Damage can occur to any part of the system and cause pain. Although our bodies can repair themselves, they need time to do this. When people suffer sports injuries, they usually rest the injured part and allow time to recover. However if an injury is work-related, people often feel under pressure to carry on. Not only do they not give the injured part the chance to recover, but they often continue to perform the work activities which cause the injury in the first place.

Musculoskeletal disorder (MSD) is a term covering a wide range of phenomena and experiences (discomfort, disorders and pain). MSDs are not ‘accidents’, but injuries (diminished range of movement, swelling, numbness or tingling, loss of sensitivity) to joints, muscles, ligaments, tendons, peripheral vessels or nerves.

MSD injuries are mainly associated with effort, movement, posture and vibration, but are also influenced by work organisation and psychosocial factors. MSDs bear different names according to parts of the body affected or the presumed pathomechanics of the injury mechanism. A wide range of acronyms and terms are used to give a unified name to syndromes that are work-related, and appear at different sites of the human MSK system. This terminology relates either to the

presumed cause of the syndrome (repetition, build up) or the location of the injury, and so has a shifting content unsuited to preventative measures.

Repetitive strain injury (RSI) is an umbrella term used to describe a range of painful conditions which affect the MSK system. To add confusion, there are a number of alternative umbrella terms in common usage, such as work-related upper limb disorder (WRULD), occupational overuse syndrome (OOS), cumulative trauma disorder (CTD) and occupational cerviobrachial disorder (OCD). None describes the disorder fully or perfectly and the proliferation of terminology reflects the difficulty our members experience in finding a satisfactory explanation of the condition. WRULD and RSI are the terms that are most popularly used within the United Kingdom; even though they imply only one risk factor, the terms are more generally recognized.

To add further confusion however, RSI and WRULD are both umbrella terms used to describe a range of painful conditions which affect the MSK system,(i.e. tendons, synovial sheaths, joints and muscles), that are associated with repetitive movements and other forms of overuse.

There are two broad types of musculoskeletal injury: localized and diffuse.

A localised injury is confined to one particular part of the body such as the wrist, and the site of injury is usually apparent, (e.g. a tendon). The sufferer will experience symptoms usually in that area only. Examples of localised conditions include inflammation of a specific tendon (tendonitis) or at a tendon insertion (e.g. lateral epicondylitis or 'tennis elbow'), nerve entrapment syndromes (e.g. carpal tunnel syndrome) and inflammation of a specific tendon sheath (tenosynovitis).

Diffuse conditions are much less well understood and are characterised by muscle discomfort, pain, burning and/or tingling. Although identifiable areas of tenderness are usually present in the muscles, it may not be apparent exactly where the injury has occurred due to the diffuse nature of the symptoms.

Diffuse injuries are more common than localized ones, and, whereas localized conditions can be treated using methods such as steroid injection, ultrasound, acupuncture or carpal tunnel release surgery, diffuse conditions may need a multifactorial approach to treatment including looking at work processes, the social environment, ergonomics and relaxation and stress reduction techniques.

The two categories of injury often overlap and diffuse conditions can often mimic localized ones. For example, diffuse muscle discomfort in the shoulder area may present itself as discomfort in the arms due to the way nerves and muscles in the shoulder, neck and upper arms are organized

It is important to realize that symptoms do not necessarily follow a specific pattern or take the same length of time to become severe. The development of musculoskeletal injury usually involves a variety of factors, rather than just one.

This leads to some confusion when trying to diagnose an individual's condition in the early stages as there are several symptoms and factors common to musculoskeletal injury and to muscle fatigue, as both:

- are related to work intensity and duration
- increase with the intensity and duration of work
- result in pain and impair work performance
- are often unreported
- involve mechanical and physiological processes, and possibly stress at work
- may be caused by several factors**.**

However, there are also significant differences between musculoskeletal injury and muscle fatigue which enable the conditions to be correctly diagnosed.

Musculoskeletal injury takes much longer to recover from, while muscle fatigue should cease within minutes of stopping the activity that has caused it or, in extreme cases, after a night's rest. When symptoms continue through to the next day, it may be a sign that the condition is not merely muscle fatigue, but something more serious.

The posture adopted by SoR members while working causes significant stress on the joints, the upper limbs and surrounding soft tissues. Members may adopt a number of uncomfortable postures / positions during the working day including:

- stooping
- bending
- extending and flexing the neck
- holding arms stretched away from the body (while weight bearing)
- deviation and hypertension of the joints.

The frequency, speed and acceleration of movements, external forces (clients / patients) and extreme postures are risk factors classically associated with MSD; the terms RSI (repetitive strain injury) and WRULD (work related upper limb disorders) aptly describing their causative aetiology.

RSI classically has the following symptoms:

- pain
- tenderness
- burning sensation
- pins and needles
- crepitus
- loss of sensation (numbness)
- sensation of cold
- swelling
- ganglion - classically a sign rather than a symptom
- muscle weakness
- muscle spasm
- joint restriction / loss of movement
- loss of grip.

Not all sufferers experience all symptoms and symptoms do not necessarily appear in any particular order. The symptoms can occur at any stage in development of RSI, and there may be a delay between doing an activity and experiencing the symptoms. Often there are no visible signs at all.

RSI is a progressive condition which can be divided into three broad stages, although the symptoms experienced by sufferers do not always fit into this tidy scheme.

Stage 1 (Mild):
The first symptoms are a dull pain or a tingling sensation in the affected area, which gets better when rested. At this stage, the condition is reversible and is known as 'threatened over-use injury'.

Stage 2 (Moderate):
If the condition is left unchecked at the mild stage, recurrent pain, aching and tiredness will occur earlier in the working day and will persist at night, possibly disturbing sleep. There may be a visible swelling. The condition may be reversible at this stage, but only by complete rest from the task that has brought on the injury in the first place.

Stage 3 (Severe):
The pain, along with weakness and fatigue, can be felt even when resting completely. Sleep can be disturbed and it may not be possible to carry out even the most mundane tasks at home or work. This stage may result in permanent disability.

A detailed list below describes the nature of the conditions, and its symptoms more fully. Localized conditions have a specific medical name, are better understood and can be diagnosed relatively easily on examination, they are usually confined to one part of the body and the symptoms are experienced in that area only.

Conditions	Symptoms	Typical Causes
Bursitis: Inflammation of soft tissue between skin and bone, or bone and tendon at knee elbow and shoulder	Pain and swelling at site of injury	Kneeling, pressure at elbow, forceful movement, repetitive movement
Carpal tunnel syndrome Pressure on the nerves passing though wrist	Tingling, pain, numbness in fingers and thumb, especially at night, weakness in hand	Repetitive work with a bent wrist, use of vibrating tools
Cellulitis Inflammation of palm of hand following repeated bruising	Pain and swelling of palm	Use of hand tools
Cervical Spondylitis Inflammation of discs and synovial joints in neck and shoulder	Extreme pain in neck, possible referred pain in other parts of body if nerve trapped	Awkward postures, repetitive twisting of neck and shoulder
Dupuytren's Contracture Thickening of tissue under palm of hand causing fingers to curl up	Occasional burning pain and development of palmar nodules, gradual inability to extend fourth and fifth fingers	Vibration and manual handling – may also be hereditary
Epicondylitis Inflammation of area where bone and tendon join, may be called tennis elbow' when it occurs at elbow	Pain and swelling at site of injury	Repetitive, often forceful work

Ganglion A cyst at a joint or in tendon sheath, usually on back of hand or wrist	Hard, small swelling, usually painless	Repetitive hand movement
Osteoarthritis Damage to joints, resulting in scarring at joint and the growth of excess bone	Stiffness and aching in the spine, neck and other related joints	Long term overloading of spine and other joints

Peritendonitis Inflammation of muscle tendon junction and surrounding tissue	Swelling, pain in wrist and forearm	Repetitive movement plus force to move heavy weights
Rotator Cuff syndrome Inflammation of muscles and tendons in shoulder	Pain, loss of mobility in shoulder, with referred pain further down arm if nerves trapped	Repetitive use of shoulder
Tendonitis Inflammation of tendon, may lead to tendons locking in the sheaths so that fingers, hands or arms cannot move easily	Pain, swelling, tenderness and redness of hand, wrist or forearm, difficulty in using hand	Repetitive movements
Tension neck or shoulder Inflammation of muscles	Localized pain in neck or shoulder	Maintaining rigid, awkward posture
Tenosynovitis Inflammation of tendon sheath	Aching, tenderness, sometimes with a crackling sound in wrist (crepitus), developing into extreme pain spreading in neck or shoulder	Repetitive movement of wrist may be associated with sudden increase in workload
Trigger finger or thumb Inflammation of tendons and/or tendon sheaths or fingers or thumb	inability to move fingers or thumb smoothly, locking of affected digit, with or without pain	Repetitive movements with repeated or prolonged gripping or pinching

The role of the SoR rep

As a SoR rep, you may want to assess the extent of the problem within your department by issuing a questionnaire, whether it is anonymous or not.

If you have any cases of MSDs or WRULDs within your workplace which you think may be attributable to VDU use, it is important that these are identified as soon as possible to prevent the member from suffering further damage. Severe cases should be reported to SoR headquarters, where a decision can be obtained as to whether it is appropriate to pursue a claim for compensation.

Negotiating checklist:

Prevention is better than cure. If you are an SoR health and safety rep, make sure that you carry out workplace inspections and are involved with risk assessments with management, including deciding whether specialists in ergonomics are brought in to assist in assessing workstations. (guidance is available on HSE website) The factors which need to be assessed, under law, in deciding whether a work process prevents a risk to the operators health and safety are:

- is the workstation ergonomically suitable? Poor ergonomic design can often lead to awkward posture, which in turn can lead to an upper limb injury;
- are there frequent breaks away from the keyboard? The HSE recommends breaks are taken before the onset of fatigue, not to recuperate from it. This is especially important with pressure to increase number of patients at the expense of breaks.
- does the work involve fast, repetitive or awkward movements of the fingers, hand or arm? One of the simplest remedies sometimes is to slow down

Model workplace questionnaire

This questionnaire will help you; the SoR representative to discover the extent of work related upper limb disorders at your workplace.

1. Do you suffer from swellings, numbness, tingling, “pins and needles”, stiffness, aches or pains in any of the following places? (please tick relevant boxes)

	SWELLING	NUMBNESS	TINGLING	STIFFNESS	ACHES	PAINS
BACK						
NECK						
SHOULDERS						
ARMS						
WRISTS						
FINGERS						
LEG						
OTHER						

2. Have you visited the doctor about any of these complaints? Yes/No

3. What diagnosis or treatment did the doctor suggest?

   - Diagnosis
   - Treatment

4. Do you have any of the following types of movement in your job?

   - Repetitive movement of the wrist or hands? Yes/No
   - Repetitive movements of the arms or shoulders? Yes/No

- Frequent use of awkward wrist positions or bending of wrists? Yes/No
- A twisting 'clothes-wringing' motion of the hands and wrists? Yes/No
- Keeping parts of your body positioned, with your muscles? (E.g. holding your arms above your shoulders and elbows out) Yes/No
- Repeated stretching or reaching movements? Yes/No
- Repeated squeezing, screwing or twisting movements? Yes No

5. Is your workstation well designed for the job that you do? For example

- Can you 'sit square' to do your job? Yes/No
- Does your chair have good back support? Yes/No
- Is the chair easily adjustable? Yes/No
- Is your bench or desk too high or too low? Yes/No
- Do you have difficulty reaching anything on your desk? Yes/No
- Do you have difficulty reaching the controls, levers etc? Yes/No
- Do you have to repeatedly stretch or reach in a particular direction to carry out your work? Yes/No

6. What or who determines the speed of your work? Is it

- Machinery Yes/No
- Work Processes Yes/No
- Line Manager Yes/No
- Patient waiting lists Yes/No
- Staff shortages/sickness/holidays Yes/No

7. Is your output measured/is there a monitoring system in operation? Yes/No

8. What work rate/number of patients do you have to achieve?

9. How often do you take a rest break?

10. Can you think of any obvious or immediate improvements that can be made to your job?

11. Have you raised any other of these problems with your line manager?

12. Have any of your work colleagues complained of painful hands, wrists, arms, shoulders, neck or back?

13. Do you take pain relief frequently in order to keep working?

14. Are there any other comments you would like to make?

Fatigue and stress

Stress is the most common cause of occupational ill health particularly when periods of stress can lead to physical and/or mental illness as well as behavioral changes such as smoking or drinking which are known to damage health.

Stress arising from work is often caused by "poor job design or work organisation''. Stress can be caused both by physical and psychological factors and can lead to physical and psychological problems including muscular strains to parts of the body involved in DSE work. Mental stress can be caused by a poor and monotonous job design, with little or no task rotation for members.

Negotiating checklist

In considering the design of jobs to reduce psychosocial risks in DSE work, the following factors are undesirable and should be tackled if possible:

- Workers having little control over their work and shift patterns
- Tasks requiring high attention and concentration in conditions where the worker has little control over their allocation of effort
- Workers being unable to make full use of their skills
- Workers not being involved in decisions that affect them;
- Workers expected to carry out repetitive, monotonous tasks all the time
- Work being system-paced (patient waiting lists) especially if these rates are monitored inappropriately
- Demands of work being perceived as excessive
- Payment systems that encourage working too quickly or with insufficient breaks
- Opportunities for social interaction being limited by work systems
- High level of effort not being balanced by sufficient reward (pay, resources, self-esteem, status).

Chapter 4: Understanding the principles of workplace ergonomics

Ergonomics (also known as human factors) is essentially concerned with all those factors that can influence people and their behaviour. In a work context the Health and Safety Executive has defined ergonomics as the environmental, organisational and job factors, and human and individual characteristics which influence behaviour at work. Careful consideration of human factors can improve health and safety by reducing the number of accidents and cases of ill-health at work. It also provides considerable benefits for business by reducing the costs associated with such incidents and increasing efficiency.

People are involved in all aspects of work, which is why the SoR and HSE recognise the importance human factors can play in helping avoid accidents and ill-health at work. For example, up to 80% of accidents is often attributed to human error which suggests a great deal more can be done to prevent them.

Why do accidents happen?

If we define anything that goes wrong at work which results in some kind of harm as an accident, then it is possible that many things could contribute to its cause. It is often easy to blame the individual who was most directly involved. However, this is too simplistic and a 'human factors' approach makes it clear that there are often a number of factors which have contributed to the accident. These can include poor design, poor maintenance, attitudes to health and safety in the organisation, inadequate training or supervision and poor work planning and organisation.

Anthropometrics

Anthropometrics is the branch of ergonomics which deals with the physical shape and size of people. Applying anthropometric data to the design of products and workplaces can go a long way towards ensuring that they will be suited to the physical needs of the users.

These characteristics are presented as frequency distributions and provide designers and ergonomists with statistical averages of the population, some commonly used dimensions are provided for British adults aged from 19 – 65 years.

Reach

Reach is "…a sphere around the worker that can be touched by the worker at all points without moving the body from the starting point" (Jacobs et al 1999).

Kroemer and Grandjean (1997) state ''An understanding of how much room the hands and arms need to take hold of things and to move them about is an important factor in the planning of

controls, tools, accessories of various kinds and workspaces on which to put these down, such as in assembly or inspection. Reaching too far to pick things up leads to excessive movements of the trunk, making the operation itself less accurate and more energy consuming, and increasing the risks of pains in the back and shoulders.''

''The grasp or reach envelope is determined by the sweep radius of the arms, with the hands in a grasping or reaching attitude. Decisive factors are the location of the person's shoulder joint and the distance from this joint to the hand. This is a case in which we need to consider persons with short arms.''

Zone of convenient reach

Pheasant (1996) also writes about the 'zone of convenient reach':

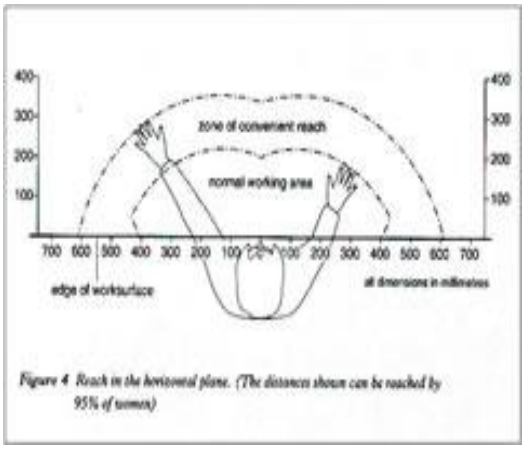


Figure 4 Reach in the horizontal plane. (The distances shown can be reached by 95% of women)

''At this point it is appropriate to develop the concept of a zone or space in which an object may be reached conveniently, that is, without undue exertion. Consider what it means for a control to be 'within arms length'. The upper limb, measured from the shoulder to the fingertip (or to the centre grip), sweeps out a series of arcs centered upon the joint. These define the zone of convenient reach for one hand, which extends sideways to the coronal plane of the body.''

Normal working area

''The intersection of a horizontal plane, such as a table or bench, with the zones of convenient reach defines what work study writers would call the maximum working area. Within this is a much smaller 'normal working area' – described by a comfortable sweeping movement of the upper limb, about the shoulder with the elbow flexed to 90° or a little less.'' (Pheasant 1996)

Principles of rational workspace layout

Importance - the most important items should be in the most accessible locations

Frequency of use principle - the most frequently used items should be in the most accessible locations

Function principle – items with similar functions should be grouped together

Sequence of use principle – items that are commonly used in sequence should be laid out in the same sequence

Working Posture

Pheasant (1996) explains some of the problems associated with poor posture while people work and provides useful guidelines in designing and organising workspace and work tasks to avoid injury.

‘‘The posture that a person adopts when performing a particular task is determined by the relationship between the dimensions of the person’s body and the dimensions of the various items in his or her workspace (a tall person using a standard kitchen will stoop more than a short one etc.). The extent to which posture is constrained is dependent upon the number and nature of the connections between the person and the workspace. These connections may be physical (seat, worktop, etc.) or visual (location of displays, etc.).’’

‘‘Posture may be defined as the relative orientation of the parts of the body in space. To maintain such an orientation over a period of time, muscles must be used to counteract any external forces acting upon the body. The most ubiquitous of these external forces is gravity. Consider a standing person who leans forward from the waist. The postural loadings in the hip extensor or the back extensor muscles are proportional to the horizontal distance between the hip and lumbosacral joints, respectively, and the centre of gravity of the upper part of the body (i.e. the head, arms and trunk). The further the trunk is inclined the greater this distance becomes. Physiologists call the muscular activity that results from this loading ‘static work’.’’ (Pheasant 1996)

‘‘Muscle as a tissue, responds badly to prolonged static mechanical loading. Static effort restricts the flow of blood to the muscle. The chemical balance within the muscle is disturbed, metabolic waste products accumulate and the condition of ‘muscular fatigue’ supervenes. The person experiences a discomfort which is at first vague but which subsequently develops into a nagging pain until it becomes a matter of some urgency that relief is sought by a change in position. Should you require evidence of this course of events, you should raise one of your arms and hold it out in front of you as you continue to read. Provided our workspace and/or work schedule allows us to make frequent shifts of posture which are subjectively desirable, all will be well – since the physiological processes of muscular fatigue are relatively rapidly reversible by rest or change of activity (particularly if the activity involves stretching the fatigued muscles).’’ (Pheasant 1996)

‘‘Back pain, neck pain and the class of conditions affecting the hand, wrist and arm which we refer to as work-related upper limb disorders or repetitive strain injuries are all conditions that characteristically result from over-use of the muscles and other soft tissues in question. This over-use may be due to prolonged static loading, repetitive motions, acute over–exertion or some

combination of these. Psychological factors may also be involved (probably because psychological stress leads to increased muscle tension).''

''In general, a varied working posture is better than a fixed working posture; but if circumstances demand that you work in a fixed position (as in practice will very often be the case), then the deleterious effects that ensue will increase the degree of static work required to maintain the position concerned.'' (Pheasant 1996)

Guidelines for working posture (Pheasant 1996)

1. Encourage frequent changes of posture.
2. Avoid forward inclination of the head and trunk.
3. Avoid causing the upper limbs to be held in a raised position.
4. Avoid twisted and asymmetric positions.
5. Avoid postures that require a joint to be used for long periods at the limit of its range of motion.
6. Provide adequate back support in all seats.
7. Where muscular force must be exerted the limbs should be in a position of greatest strength.

Vision and head posture.

Pheasant (1996) discusses in this next section the importance of vision and how this affects the position of the head and neck when carrying out tasks.

''The visual demands of a task and the location of visual displays are important not only in themselves, but also because they largely determine the posture of the head and neck. Look carefully at the printed text on this page – fix your eyes on one particular word near the centre of the page. You will find that other words become less distinct with increasing distance from the central point of fixation and the margins of the page are no more than an indistinct blur. Only the central part of the visual field is sufficiently sensitive for demanding visual tasks such as reading text or recognising a face. The area of foveal vision, as this central region is called, is limited to a solid angle of some 5° about the line of central fixation. Visual work demands that the foveal regions of both eyes be directed convergently upon the task.''

''If we sit or stand with our head up, and look ahead, our eyes will naturally assume a slight downward gaze of some 10 or 15° from the vertical – this we shall call the relaxed line of sight. The direction of gaze is altered, first, by movements of the eyeballs in their sockets by means of the orbital muscles, and, second, by movements of the head and neck. Taylor (1973) states that the eyes may be raised by 48° and lowered by 66° without head movements. In practice, only a part of this range of movement is used. Weston (1953), in his classic study of visual fatigue, suggests that, in practice, downward eye movements were limited to 24°-27°; beyond that point the head and neck are inclined forwards and the neck muscles come under tension to support the weight of the head.…On the basis of the above findings we may conclude that the preferred zone for the location of visual displays extends from the horizontal line of sight downwards to an angle of 30° and that

the optimal line of sight is somewhere in the middle of this zone. Given that some modest degree of neck flexion is acceptable, this could be extended a further 15°.''

''Visual comfort and satisfactory posture are also dependent upon displays being located a suitable distance from the eyes. When focused on infinity, or any object more than around 6m distant, the lens of the eye is completely relaxed. To look at closer objects than this requires effort, both of the orbital muscles for convergence and of the muscles within the eye itself for accommodation. In young people the processes of convergence and accommodation reach their limits or 'near points' at around 80 – 120mm, respectively. Visual work performed excessively close to the eyes is fatiguing and leads to 'eyestrain' – a poorly defined condition involving blurring of vision, headache and burning or 'gravelly' sensations around the eyes. …for most practical purposes a minimum viewing distance of about 500mm is probably desirable; and 750mm or more may well be preferable.''

''It is interesting to note that pain and spasm in the neck muscles (trapezius, sterno-mastoid, splenius capitis, etc.) can lead to 'mechanical headache' – experienced in various parts of the head and face and not uncommonly around or behind the eyes. The symptoms of mechanical headache and eyestrain are exceedingly similar.''

Vision and head posture - bad practice

The illustration below demonstrates an example of work which encourages forward/side flexion of the neck for prolonged periods:

Clearance

"...the space needed to allow free passage of a person or a body segment" (Jacobs et al 1999).

Good practice ensures that:

- There is room for legs under a desk. There should be a space at least 68cm wide by 69cm high
- for desk work, space between knee and underside of desk should be between 24-30 cm
- There should be room for elbow clearance on the desk.

Working Height

Pheasant (1996) discuss the importance of correct working height for manual tasks.

- Delicate manipulative tasks (e.g. writing): wrist support will generally be necessary - good working height: 50-100mm above elbow height (when sitting)
- Manipulative tasks involving a moderate degree of both force and precision - good working height: 50 – 100mm below elbow height
- Heavy manipulative tasks (particularly if they involve downward pressure on the workpiece) - good working height: 100 – 250mm below elbow height
- Hand operated controls e.g. switches, levers etc. - good working height: between elbow height and shoulder height. Pheasant (1996)

Ergonomic principles

1. All important surfaces within the visual field should of the same order of brightness.
2. The general level of illumination should not fluctuate rapidly because a reaction as well as retinal adaptation is a relatively slow process.

'Glare' in physiological terms

Glare is physiologically a gross overloading of the adaptation processes of the eye, brought about by over exposure of the retina to light. Three types of glare may be distinguished:

1. Relative glare: caused by excessive brightness contrasts between different parts of the visual field
2. Absolute glare: when a source of light is so bright that the eye cannot possible adapt to it
3. Adaptive glare: a temporary effect during the period of light adaptation, e.g. coming out of a dark room into bright daylight outside. This phenomenon is also called transient adaptation.

Practical hints

In this context the following hints are important in the layout of work spaces.

1. The effect of relative glare is greater the nearer the source is to the optical axis and the larger area
2. A bright light above the line of sight is less disturbing than one below or to either side.
3. The disturbance is greater in a dim room than a bright one since the retina is then at its most sensitive.

Appropriate arrangement of lights

1. The light source should not appear in line of vision while completing the task
2. Lights should be provided with shades/glare shields
3. The line from eye to light source must increase at an angle of >30 degrees above horizon
4. Fluorescent tubes should be aligned at right angles to the line of sight
5. It is better to use more lamps of lower power than fewer high powered ones
6. Reflective colours on machines, tables, equipment etc. in the work field should be avoided
7. For very fine work, light should be from the front, rather from the side; light below the eye level

Seating and Low Back Injury

- Disc pressure is higher sitting than standing.
- Disc pressure drops when backrest is tilted from vertical to 110 degrees.
- Disc pressure is lower whilst leaning back on a 50mm lumbar pad (110º-120º of tilt) than of a person standing in normal lumbar lordosis.
- Myoelectric activity of the back muscles decreases when the back support is located in the lumbar region rather than thoracic.

The 'Yuppie Hump'

VDU user showing the "Yuppie Hump"

Ref: Kroemer K, Grandjean E (1997) Fitting the task to the Human. London :Taylor & Francis

- Without sacral support to produce anterior tilt to the pelvis, the sacrum rotates posteriorly, bringing the lumbar spine into a flattened or kyphotic position.
- Flexion of the neck and upper body occurs to compensate increasing stress to these areas.

People who sit for prolonged periods are at risk of back injury because:

- Strained ligaments and stretching of muscles occur over time
- Flattening of lumbar spine occurs during sitting causing disc herniation Jacobs (1999)

Good Posture

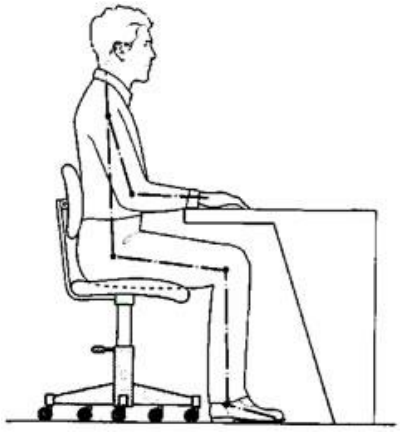
- decreases ligamentous strain
- decreases muscular imbalance and strain
- decreases intradiscal pressure
- maintains healthy spine angles
- creates efficient muscular working
- provides greater range of motion of upper limbs when reaching
- assists in efficient diaphragmatic breathing
- Improves the flow of oxygenated blood to the vital organs, increasing productivity and reducing fatigue
- improves lower limb circulation
- promotes a positive self image.

Jacobs (1999)

Design features of an office chair which should be considered

- Seat height should be adjustable
- Armrest height should be adjustable
- Backrest height should be adjustable
- Backrest angle and depth from seat
- Seat angle (horizontal / tilting slightly forwards or back)
- Seat edge should be curved
- 5 point base on castors
- Upholstery fabric

Recommended sitting position in an office chair



Chapter 5: Making adjustments to suit your needs

What can you do to help yourself?

Make full use of the equipment provided and adjust it to get the best from it and to avoid potential health problems. If the Regulations apply to you, your employer should cover these things in training. If the Regulations don't apply, it is still worth setting up your workstation properly, to be as comfortable as possible.

Getting comfortable

- Adjust your chair and VDU to find the most comfortable position for your work. As a broad guide, your forearms should be approximately horizontal and your eyes the same height as the top of the VDU.
- Make sure you have enough work space to take whatever documents or other equipment you need.
- Try different arrangements of keyboard, screen, mouse and documents to find the best arrangement for you. A document holder may help you avoid awkward neck and eye movements.
- Arrange your desk and VDU to avoid glare or bright reflections on the screen. This will be easiest if neither you nor the screen is directly facing windows or bright lights. Adjust curtains or blinds to prevent unwanted light.
- Make sure there is space under your desk to move your legs freely. Move any obstacles such as boxes or equipment.
- Avoid excess pressure from the edge of your seat on the backs of your legs and knees. A footrest may be helpful, particularly for smaller users.
- There are a number of "saddle" seats (see p.62) currently on the market, which do aide the user and their posture.

Reading the screen

- Adjust the brightness and contrast controls on the screen to suit lighting conditions in the room.
- Make sure the screen surface is clean.

- In setting up software, choose options giving text that is large enough to read easily on your screen, when you are sitting in a normal, comfortable working position. Select colours that are easy on the eye (avoid red text on a blue background, or light blue on grey)
- Individual characters on the screen should be sharply focused and should not flicker or move. If they do, the VDU may need servicing, adjusted or replaced.

Keyboards

Keyboard ergonomics have changed considerably over the years from the bulky, rigid, non-moveable type, although the QWERTY design of keyboard still remains. Keyboards are now more ergonomically friendly for the user (see p62). They can be used freely by both hands, are height adjustable and benefit the user greatly.

- Adjust your keyboard to get a good keying position. A space in front of the keyboard is sometimes helpful for resting the hands and wrists when not keying.
- Try to keep your wrists straight when keying. Keep a soft touch on the keys and don't overstretch your fingers. Good keyboard technique is important.
- Do not have your desk cluttered with paperwork and other objects that you are not using, this greatly reduces your work space, and hence the user adopts awkward positions to reach the materials they really need.

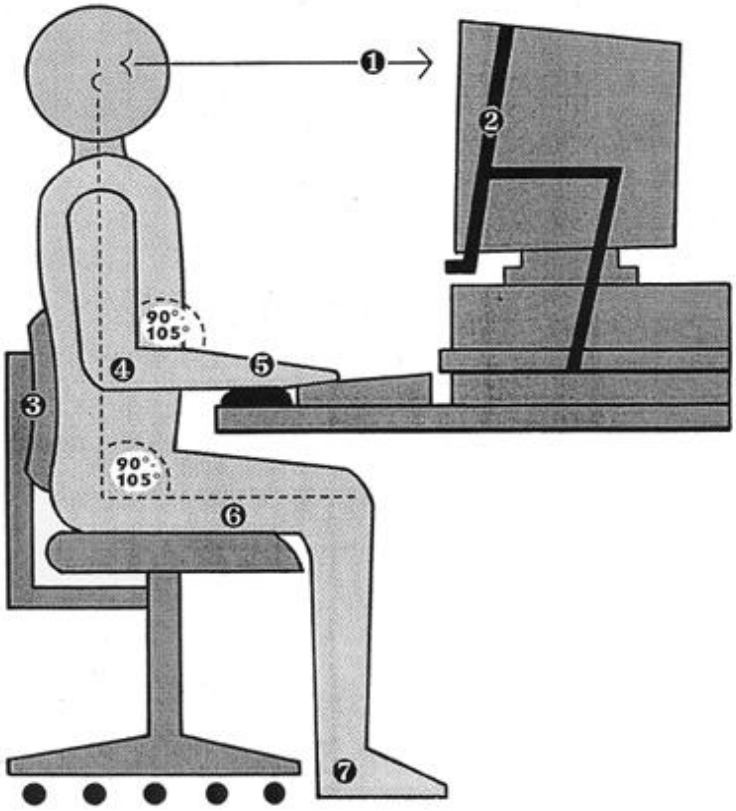
Using a mouse

- Position the mouse within easy reach, so it can be used with the wrist straight. Sit upright and close to the desk so you don't have to work with your mouse arm stretched. Move the keyboard out of the way if it is not being used.
- Support your forearm on the desk, and don't grip the mouse too tightly.
- Rest your fingers lightly on the buttons and do not press them hard.

Postures and breaks

- Don't sit in the same position for long periods of time,
- Make sure you change you position as often as is practical,
- Some movements are desirable but avoid repeated stretching to things you need. (If this happens a lot, rearrange your workstation).

Recommended seating position



✓ ✓	1	Top of screen at eye level; lower for bifocal and varifocal wearers. Screen distance at arms' length (38-40cm)
✓	2	Document holder adjustable to screen height.
✓ ✓	3	Chair backrest provides firm lower back support. Chair back and seat easily adjustable for height and tilt by user.

✓	❹	Keyboard height promotes relaxed arms with forearms parallel to the floor.
✓	❺	Wrists straight (neutral). Padded, movable, wrist rest; same height as nearest keyboard row, if needed.
✓	❻	Thighs parallel to floor. Ample legroom under work surface.
✓	❼	Feet rest firmly on floor or foot rest.

Chapter 6: Eye tests

Eye and eyesight testing

It is estimated that as many as one in three of the workforce has uncorrected or insufficiently corrected vision defects. Many of those with vision defects will only become aware of them once they start to do visually demanding work such as VDU work.

To ensure that VDU workers do not suffer from the pain, headaches and blurred vision which may result from working at a VDU with an uncorrected vision defect, all workers should, if they have free eye and eyesight testing.

UK trade unions have campaigned for many years for eye testing for VDU workers and now, despite resistance from industry and the statutory authorities, the new DSE Regulations, which include specific requirements for testing, have come into force. The Regulations cover both *eye examinations* and *sight tests*.

The regulations state that employers of both existing VDU users and new users:

Shall ensure that he (sic) is provided at his request with an appropriate eye and eyesight test, any such test to be carried out by a competent person. ***Regulation 5 (1)***

Health and safety campaigners have long been wary of any form of employment or pre-employment screening which is used to exclude or discriminate against particular groups of workers. However, in this case, the regulations make clear that the purpose of the tests is to identify vision defects in order to correct or remedy them and *not* to exclude workers on the grounds of those vision defects.

When should the tests be carried out?

The regulations state that for existing users the test should be *carried out as soon as practicable after being requested by the user concerned.* ***Regulation 5 (2) (a)***

And for new users or employees about to become users the test should be *carried out before the employee concerned becomes a user****. Regulation 5 (2) (b)***

What type of tests?

The regulations are intended to implement the European Directive *Minimum safety and health requirements for work with display screen equipment,* which makes specific the right to eye and eyesight tests.

Although the DSE Regulations also specify this right, in its guidance to the regulations, the Health and Safety Executive suggests a convenient watering down of the provision for employers - that in

the first instance, vision screening tests, (which are far more superficial than full sight tests) may be offered as a means of identifying those who need a full sight test (although those users who request a full sight test will be entitled to one).

Since it is unlikely that the majority of VDU users will have in-depth knowledge of the distinction between eye examinations, vision screening and full sight tests, this 'guidance' may lead to many VDU workers being deprived of their rights.

How often should the test be carried out?

In its original Consultative document on the Directive, the HSE proposed restricting the right to repeat tests to once every ten years. Fortunately the outcry that this provoked led to a reinstatement, as intended in the original directive, of the right to re-testing at regular intervals.

The regulations now specify:

At regular intervals after an employee has been provided with an eye and eyesight test his employer shall, subject to paragraph (6), ensure that he is provided with a further eye and eyesight test of an appropriate nature, any such test to be carried out by a competent person. ***Regulation 5 (3)***

Where a user experiences visual difficulties which may reasonably be considered to be caused by work on display screen equipment, his employer shall ensure that he is provided at his request with an appropriate eye and eyesight test, any such test to be carried out by a competent person as soon as practicable after being requested. ***Regulation 5 (4)***

Nothing in paragraph (3) shall require an employer to provide any employee with an eye and eyesight text against that employee's will. ***Regulation 5 (6)***

The British College of Optometrists' *Statement of Good Practice for work with Display Screen* Equipment advises that reports on eye examinations and sight tests should include recommendations on the frequency of re-examination.

The report should also state whether or not corrective appliances (i.e. glasses or contact lenses) are needed for VDU work and as well as making the report to the employer, the optometrist should provide the employee with a copy. Details of the *prescription* should only be included in the employer's report if the employee gives permission.

The *Statement of Good Practice* reminds practitioners:

Confidentiality of clinical information about the employee must be maintained at all times and clinical information should only be divulged to an employer if it is relevant to the employee's work at the VDU and **only with the patient's consent (British College of Optometrists 1992).**

What is a 'competent' person?

The guidance to the regulations makes it quite clear that employers must offer employees testing by registered ophthalmic opticians (optometrists) or registered medical practitioners with suitable ophthalmic qualifications.

Unfortunately, this guidance is somewhat undermined by the section on vision screening tests which suggests that those conducting these tests need only have a basic knowledge of the eye and be competent in the operation of the instrument or test. This is the type of eye testing offered by many companies with occupational health facilities. However the Association of Optometrists recommends that eye and eyesight testing should be done by the employee's own optometrist, thereby ensuring that eye care is provided by the practitioner of the employee's choice.

The Association goes on to point out that this arrangement:

"…offers the employee a professional opinion independent of the management or any management nominee and has proved valuable in increasing employee confidence". [Sic] (Grundy, Rosenthal and Seymour 1991).

Our advice is that workers should take up their entitlement to a full eye and sight test and not to be fobbed off with on-site vision screening by unqualified persons.

Corrective appliances

If the eye and sight tests show that an employee needs glasses (corrective appliances) specifically to correct vision defects at the viewing distance of the VDU then the employer must provide them (Regulation 5 (5)).

Unfortunately, the regulations limit the employer's responsibility to providing glasses only when: *normal corrective appliances cannot be used.* **Regulation 5 (5) (a)**

The British College of Optometrists interprets the Regulation to mean that free glasses should only be provided to those with special needs related to their use of a VDU as part of their employment.

Clearly, there is scope in the regulations for different interpretations of what vision defects will affect employee's ability to do VDU work, and therefore qualify for 'special corrective appliances'. This is likely to lead to inconsistent provision to those who really need glasses to do the work, and who otherwise would not have had to buy them, and the meanness of the regulations in this respect is one of their major flaws.

Who pays for eye tests and glasses?

The guidance to the regulations is clear about the employer's responsibility for paying for eye tests and special glasses:

*The provision of eye and eyesight tests and of special corrective appliances under the Regulations is at the expense of the user's employer**. Guidance to Regulation 5 (85)***

Where special glasses for VDU work have been prescribed, the employer only has to pay for the basic cost (i.e. lenses and frames) which adequately do the job of correcting the vision defect which affects VDU work. If the employee wants special frames or glasses which perform other functions, then the employer must still pay the basic cost, but the employee would have to make up the difference.

On request, arrange eye tests and provide spectacles if special ones are needed

Employees covered by the Regulations can ask their employer to provide and pay for an eye and eyesight test. This is a test by an optometrist or doctor. There is also an entitlement to further tests at regular intervals; the optometrist doing the first test can recommend when the next should be. Employers only have to pay for spectacles if special ones (e.g. prescribed for the distance at which the screen is viewed) are needed and normal ones cannot be used.

Negotiating checklist:

- Eye tests should be carried out by a registered ophthalmic optician :
  - before commencing work on a VDU
  - at regular intervals thereafter
  - during work time and at no expense to the user
  - if corrective lenses are needed for VDU work – these should be provided by the employer
  - workers should be encouraged to take up their entitlement to full eyesight tests rather than be satisfied with on-site vision screening by unqualified persons.
- Activities should be planned to include changes in activity and breaks
- Jobs should be a mix of screen based and non screen-based work
- Breaks should be taken before the onset of fatigue
- Short frequent breaks are more satisfactory than occasional longer ones
- Care should be taken about the positioning of a VDU in relation to light sources, particularly in respect of the amount of glare on the screen
- VDUs should not be positioned directly next to a wall in order to allow the operator to re-focus on more distant objects.

Chapter 7: Breaks

As the need for breaks depends on the nature and intensity of the work, the Regulations require breaks or changes of activity but do not specify their timing or strength. However the guidance on the regulations explains general principles, for example short, frequent breaks are better than longer, less frequent ones. In an ideal world the radiographer should have some discretion over when to take breaks.

Most jobs provide opportunities to take a break from the screen (e.g. to do filing or photocopying). Make use of them. If there are no such natural breaks in your job, your employer should plan for you to have rest breaks, again, frequent short breaks being better than fewer long ones.

Should VDU users be given breaks?

The relevant regulations are the Health and Safety (Display Screen Equipment) Regulations 1992. Regulation 4 is concerned with the daily activities of users and states:

'Every employer shall so plan the activities of users at work in his undertaking that their daily work on display screen equipment is periodically interrupted by such breaks or changes of activity as reduce their workload at that equipment.'

The guidance states:

In most tasks, natural breaks or pauses occur as a consequence of the inherent organisation of the work. Whenever possible, jobs at display screens should be designed to consist of a mix of screen-based and non screen-based work to prevent fatigue and to vary visual and mental demands. Where the job unavoidably contains spells of intensive display screen work (whether using the keyboard or input device, reading the screen, or a mixture of the two), these should be broken up by periods of non-intensive, non-display screen work. Where work cannot be so organised, e.g. in jobs requiring only data or text entry requiring sustained attention and concentration, deliberate breaks or pauses must be introduced.

Where the display screen work involves intensive use of the keyboard, any activity that would demand broadly similar use of the arms or hands should be avoided during breaks. Similarly, if the display screen work is visually demanding, any activities during breaks should be of a different visual character. Breaks must also allow users to vary their posture. Exercise routines which

include blinking, stretching and focusing eyes on distant objects can be helpful and could be covered in training programmes.

It is not appropriate to lay down requirements for breaks which apply to all types of work; it is the nature and mix of demands made by the job which determine the length of break necessary to prevent fatigue. But some general guidance can be given:

- Breaks should be taken before the onset of fatigue, not in order to recuperate and when performance is at a maximum, before productivity reduces. The timing of the break is more important than its length
- Breaks or changes of activity should be included in working time. They should reduce the workload at the screen, i.e. should not result in a higher pace or intensity of work on account of their introduction
- Short, frequent breaks are more satisfactory than occasional, longer breaks, for example a 5-10 minute break after 50-60 minutes continuous screen and/or keyboard work is likely to be better than a 15 minute break every 2 hours
- If possible, breaks should be taken away from the screen
- Informal breaks, that is time spent not viewing the screen (e.g. on other tasks), appear from study evidence to be more effective in relieving visual fatigue than formal rest breaks
- Wherever practicable, users should be allowed some discretion as to how they carry out tasks; individual control over the nature and pace of work allows optimal distribution of effort over the working day.

PLAN CHANGES OF ACTIVITY OR BREAKS FOR USERS

Breaking up long spells of VDU work helps prevent fatigue, eye strain, upper limb problems and backache. Where possible, include spells of other work, (e.g. telephone calls, filing, photocopying etc). If such changes of activity are not possible, the law requires you to plan for users to take rest breaks.

When organising users' work, the following points may help:

- vary the tasks such as encouraging users to walk across to a colleague to get information, rather than e-mailing or using the phone
- remind users to stretch and change position
- encourage users to look into the distance from time to time, and to blink often
- breaks should be taken before users get tired, rather than to recover
- short frequent breaks are better than longer, infrequent ones

- individual control over work patterns is the ideal but make sure users don't: get carried away and work intensely for too long, save breaks to take a few longer ones or go home early or use breaks for other computer activities, like surfing the Internet.

Chapter 8: Seating at work

The Health and Safety at Work etc Act 1974 (HSWA) places a duty on employers to ensure the health and safety of employees and others who may be affected by their work activities. In practice this means that seating should not endanger the health and safety of people at work. The HSWA also places a general duty on seating manufacturers and suppliers to make sure that their seating is safe and does not present a risk to health and safety. This responsibility includes providing instructions on using and maintaining seating.

The Management of Health and Safety at Work Regulations 1999 place a duty on employers and self-employed people to assess risks to health and safety from their undertaking. This will include risks from seating. The duty holder must also identify what measures are needed to comply with health and safety requirements and make arrangements to manage these measures effectively.

The Workplace (Health, Safety and Welfare) Regulations 1992: regulation 11 requires a suitable seat to be provided for each person in the workplace whose work includes operations of a kind that the work (or a substantial part of it) can or must be done sitting. The seat should be suitable to meet the needs of the individual and the task at hand. A suitable footrest must also be provided where necessary.

The Health and Safety (Display Screen Equipment) Regulations 1992 seek to reduce the health and safety risks from using visual display units (VDUs) in the workplace. These set out minimum requirements for workstations, including seating. VDUs

The Manual Handling Operations Regulations 1992 seek to reduce the health and safety risks to employees from handling and lifting loads. They give advice on how to handle and move loads to prevent poor posture or injury, including handling whilst seated.

The Provision and Use of Work Equipment Regulations 1998 require employers to ensure that work equipment provided is maintained in an efficient state, in efficient working order and in good repair. The Regulations regard seating as work equipment.

The Health and Safety (Consultation with Employees) Regulations 1996 require employers to consult their employees, or elected representatives, on matters that affect their health and safety. These Regulations apply even when employees are not represented by recognised trade unions.

Chapter 9: Risk assessments

Risk Assessment – the proactive way to a safer environment

Risk assessment is a legally required system for managing workplace health and safety. The law also requires prompt consultation with union health and safety representatives.

In risk assessment, hazard is defined as the potential to cause harm, and risk as the likelihood of that harm occurring. Risk assessment involves deciding whether harm is so likely to occur that preventive action must be taken.

The problem with risk assessment is that judging risk has an element of subjectivity. A bad judgment of a risk will result in inappropriate preventive action, or none.

Another key criticism is that risk assessment does not insist on elimination of hazards, but only on controls.

Basic legal obligation

The Management of Health and Safety at Work Regulations (Management Regulations) 1999 require employers to identify all hazards at their workplace, to quantify the risk to employees and others and to systematically eliminate or control hazards. Employers with five or more employees must record significant findings. The assessment must take everyone into account, not forgetting cleaners, security staff, contractors and the public, and must be reviewed periodically, or if an incident or illness occurs, or the job or worker changes.

Preventing accidents from occurring in the first place is obviously the best way to protect the workforce. The following action points will help all SoR health and safety reps achieve this:

1. Identify the hazards in your workplace that present a significant risk to your employees

2. Identify who might be harmed by the hazard i.e. those groups at risk such as employees who work in the vicinity, patients, (some of who may be able bodied, disabled, children), cleaners etc. Remember, each hazard is quite likely to have a different list of 'at risk' groups

3. Look for physical or psychological conditions that make employees less aware of the risks around them or that make them less able to concentrate on the job in hand

4. Find out whether employees are motivated to carry out their work in a safe manner. What factors, if any, lead to unsafe behaviour?

5. Define the actual work situations that would give rise to the risk for each of the groups of individuals that we have already identified in bullet point 2

6. Where a significant risk of injury exists, identify risk control measures that must be taken to minimise the risk(s)

7. Implement these control measures

8. Monitor the situation to ensure the risk control measures remain in place and continue to be effective in protecting the workforce.

Understanding the hazards and risks: the need for appropriate training

It is crucial that employees are thinking about safety at all times. You must therefore ensure that every member of your workplace:

- Is aware of, and fully appreciates, the risks inherent in the jobs they do – i.e. they are sufficiently trained to know how to carry out their work tasks in a safe manner. They should know who to contact in the event of a problem – egg machinery breakdown and be aware that they should not attempt to sort out such problems themselves

- has access to the written safe procedures, necessary tools, technical aids

- Has the motivation to do the job in a safe and responsible manner. Where any doubts exist, employees should always be given duties that do not put them at risk and are comfortably within their range of competence.

It is particularly important that those persons made responsible for dealing with health and safety matters (including risk assessments and investigations) are themselves competent and have adequate resources to carry out their duties effectively.

An example of a risk assessment checklist (taken from the HSE) can be found on the following pages:

RISK FACTORS	Tick answer YES	Tick answer NO	THINGS TO CONSIDER	ACTION TO TAKE

1 Display screens

Are the characters clear and readable? Health and safety ✔ Health and safety ✘			Make sure the screen is clean and cleaning materials are made available. Check that text and background colours work well together.	
Is the text size comfortable to read?			Software settings may need adjusting to change text size.	
Is the image stable, ie free of flicker and jitter?			Try using different screen colours to reduce flicker, eg darker background and lighter text. If problems still exist, get the set-up checked, eg by the equipment supplier.	
Is the screen's specification suitable for its intended use?			For example, intensive graphic work or work requiring fine attention to small details may require large display screens.	
Are the brightness and/or contrast adjustable?			Separate adjustment controls are not essential, provided the user can read the screen easily at all times.	
Does the screen swivel and tilt? 			Swivel and tilt need not be built in; you can add a swivel and tilt mechanism. However, you may need to replace the screen if: ■ swivel/tilt is absent or unsatisfactory; ■ work is intensive; and/or ■ the user has problems getting the screen to a comfortable position.	
Is the screen free from glare and reflections?   Are adjustable window coverings provided and in adequate condition?			Use a mirror placed in front of the screen to check where reflections are coming from. You might need to move the screen or even the desk and/or shield the screen from the source of reflections. Screens that use dark characters on a light background are less prone to glare and reflections. Check that blinds work. Blinds with vertical slatscan be more suitable than horizontal ones. If these measures do not work, consider anti-glare screen filters as a last resort and seek specialist help.	

RISK FACTORS	Tick answer		THINGS TO CONSIDER	ACTION TO TAKE
	YES	NO		

2 Keyboards

Is the keyboard separate from the screen?			This is a requirement, unless the task makes it impracticable (eg where there is a need to use a portable).	
Does the keyboard tilt?			Tilt need not be built in.	
Is it possible to find a comfortable keying position?  ✔  ✘  ✘  ✘			Try pushing the display screen further back to create more room for the keyboard, hands and wrists. Users of thick, raised keyboards may need a wrist rest.	
Does the user have good keyboard technique?			Training can be used to prevent: ■ hands bent up at wrist; ■ hitting the keys too hard; ■ overstretching the fingers.	
Are the characters on the keys easily readable?			Keyboards should be kept clean. If characters still can't be read, the keyboard may need modifying or replacing. Use a keyboard with a matt finish to reduce glare and/or reflection.	

RISK FACTORS	Tick answer		THINGS TO CONSIDER	ACTION TO TAKE
	YES	NO		

3 Mouse, trackball etc

Is the device suitable for the tasks it is used for?			If the user is having problems, try a different device. The mouse and trackball are general-purpose devices suitable for many tasks, and available in a variety of shapes and sizes. Alternative devices such as touchscreens may be better for some tasks (but can be worse for others).	
Is the device positioned close to the user?  ✔  ✘			Most devices are best placed as close as possible, eg right beside the keyboard. Training may be needed to: ■ prevent arm overreaching; ■ tell users not to leave their hand on the device when it is not being used; ■ encourage a relaxed arm and straight wrist.	
Is there support for the device user's wrist and forearm?			Support can be gained from, for example, the desk surface or arm of a chair. If not, a separate supporting device may help. The user should be able to find a comfortable working position with the device.	
Does the device work smoothly at a speed that suits the user?			See if cleaning is required (eg of mouse ball and rollers). Check the work surface is suitable. A mouse mat may be needed.	
Can the user easily adjust software settings for speed and accuracy of pointer?			Users may need training in how to adjust device settings.	

4 Software

Is the software suitable for the task?			Software should help the user carry out the task , minimise stress and be user-friendly. Check users have had appropriate training in using the software. Software should respond quickly and clearly to user input, with adequate feedback, such as clear help messages.	

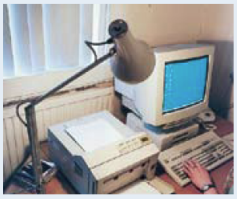
RISK FACTORS	Tick answer		THINGS TO CONSIDER	ACTION TO TAKE
	YES	NO		

5 Furniture

Is the work surface large enough for all the necessary equipment, papers etc?  ✔ ✘			Create more room by moving printers, reference materials etc elsewhere. If necessary, consider providing new power and telecoms sockets, so equipment can be moved. There should be some scope for flexible rearrangement.	
Can the user comfortably reach all the equipment and papers they need to use?			Rearrange equipment, papers etc to bring frequently used things within easy reach. A document holder may be needed, positioned to minimise uncomfortable head and eye movements.	
Are surfaces free from glare and reflection?			Consider mats or blotters to reduce reflections and glare.	
Is the chair suitable? Is the chair stable? Does the chair have a working: ■ seat back height and tilt adjustment? ■ seat height adjustment? ■ swivel mechanism? ■ castors or glides?			The chair may need repairing or replacing if the user is uncomfortable, or cannot use the adjustment mechanisms.	
Is the chair adjusted correctly?  ✔  ✘  ✘			The user should be able to carry out their work sitting comfortably. Consider training the user in how to adopt suitable postures while working. The arms of chairs can stop the user getting close enough to use the equipment comfortably. Move any obstructions from under the desk.	
Is the small of the back supported by the chair's backrest?			The user should have a straight back, supported by the chair, with relaxed shoulders.	
Are forearms horizontal and eyes at roughly the same height as the top of the VDU?			Adjust the chair height to get the user's arms in the right position, then adjust the VDU height, if necessary.	
Are feet flat on the floor, without too much pressure from the seat on the backs of the legs?			If not, a foot rest may be needed.	

RISK FACTORS	Tick answer		THINGS TO CONSIDER	ACTION TO TAKE
	YES	NO		

6 Environment

Is there enough room to change position and vary movement?			Space is needed to move, stretch and fidget. Consider reorganising the office layout and check for obstructions. Cables should be tidy and not a trip or snag hazard.	
Is the lighting suitable, eg not too bright or too dim to work comfortably? 			Users should be able to control light levels, eg by adjusting window blinds or light switches. Consider shading or repositioning light sources or providing local lighting, eg desk lamps (but make sure lights don't cause glare by reflecting off walls or other surfaces).	
Does the air feel comfortable?			VDUs and other equipment may dry the air. Circulate fresh air if possible. Plants may help. Consider a humidifier if discomfort is severe.	
Are levels of heat comfortable?			Can heating be better controlled? More ventilation or air-conditioning may be required if there is a lot of electronic equipment in the room. Or, can users be moved away from the heat source?	
Are levels of noise comfortable?			Consider moving sources of noise, eg printers, away from the user. If not, consider soundproofing.	

7 Final questions to users...

- Ask if the checklist has covered all the problems they may have working with their VDU.
- Ask if they have experienced any discomfort or other symptoms which they attribute to working with their VDU.
- Ask if the user has been advised of their entitlement to eye and eyesight testing.
- Ask if the user takes regular breaks working away from VDUs.

Write the details of any problems here:

Chapter 10: References and resources

References:

Collins M. (1990) Workstation variables and visual discomfort associated with VDT's, in applied ergonomics (1990), 21 (2) June 1990, 157 - 161

Cox cited in NALGO Safety Representative (June 1991), Health and Safety aspects of VDU work. New legislation. Breaks and changes of Activity

Grundy J W, Rosenthal S G and Seymour H (1991) Visual aspects of VDU usage, Association of Optometrists

Health and Safety (Display Screen Equipment) Regulations 1992 as amended by the Health and Safety (Miscellaneous Amendments) Regulations 2002

Health and Safety Executive: Understanding ergonomics at work.
www.hse.gov.uk

Kroemer K, Grandjean E (1997) *Fitting the Task to the Human (5th Ed) A textbook of occupational ergonomics.* London: Taylor & Francis Ltd.

London Hazards Centre: VDU Work and hazards to the health.
www.lhc.org.uk/members/pubs/books/vdu/vd01.ht

McKeown C, Twiss M (2004) Workplace ergonomics: A practical guide. Institute of Occupational Safety and Health (IOSH) England: Lavenham Press

Pheasant S (1996) Bodyspace – anthropometry, ergonomics and the design of *work.* 2nd Ed. London: Taylor & Francis Ltd.

Tanaka T et al (1989) the effects of VDT work on the regulations of hemodynamics compares with aging, Ergonomics 32, (12), 1595 – 1605.

The Health and Safety at Work etc Act 1974
http://www.opsi.gov.uk/RevisedStatutes/Acts/ukpga/1974/cukpga_19740037_en_1

The Health and Safety (Consultation with Employees) Regulations 1996
http://www.legislation.gov.uk/uksi/1996/1513/contents/made

Leaflet: 5 steps to risk assessment. HSE. INDG163. Management of health and safety at work: Management of Health and Safety at Work Regulations 1999: Approved Code of Practice and guidance.
http://www.legislation.gov.uk/uksi/1999/3242/contents/made

The Manual Handling Operations Regulations 1992
http://www.legislation.gov.uk/uksi/1992/2793/contents/made

The Provision and Use of Work Equipment Regulations 1998
http://www.legislation.gov.uk/uksi/1998/2306/contents/made

The Workplace (Health, Safety and Welfare) Regulations 1992
http://www.legislation.gov.uk/uksi/1992/3004/contents/made

Alternative products

Saddle seat:

http://www.bambach.co.uk/

Maltron keyboard

http://www.maltron.com/

Are you keying comfortably?

Advice and exercises for VDU users

Occupational Health Unit, Drummond Street Annexe
http://www.safety.ed.ac.uk/ohu/

Try to do 3-4 exercises at least once in every hour of continuous VDU work, breaking for 5-10 minutes. Try to do exercise number 1 more frequently. Adopt a good posture with shoulders and arms relaxed. Perform each stretch smoothly and SLOWLY, avoid jerky and bouncy movements. Hold each stretch for a count of 6. Repeat each stretch 6 times.

1. **NECK STRETCH**
Sit tall. Keeping face forward, try to touch your left shoulder with your left ear. Hold. Return head upright. Repeat on the right. Do not tense or hunch shoulders.

2. **SHOULDER ROLL**
Sit (or stand) with good posture. Raise your shoulders and rotate 2 or 3 times in a forward direction. Do the same in a backward direction.

3. **ARM STRETCH 1**
Grasp your left elbow with your other hand as shown. Pull the elbow behind and towards your head. Feel a stretch. Relax. Repeat on the right.

4. **ARM STRETCH 2**
Straighten your arms out. Stretch your wrists back. Touch your shoulders and repeat.

5. **WAITER'S TIP**
Put shoulders back and down. Flex your wrist. Make a fist. Rotate your wrist outwards. Keep your arm close to your body.

6. **FINGERS**
With palms face down, spread your fingers as wide as possible. Hold for a few seconds then relax your fingers.

7. **SIDE TWIST**
Stand up, feet hip width apart, hands on hips. Gently twist around as far as comfortable to the right. Relax. Repeat on the left.

8. **EXECUTIVE STRETCH**
Stand (or sit) with good posture. Place your hands in your lower back. Push your hips forward and your shoulders back to arch your spine. Relax.

9. **GET UP AND WALK ABOUT**

Correct Sitting Position

- Good lower back support
- Sit with back supported at all times
- Feet flat on the ground or on footrest
- Knees levelled with hips
- Adjust your chair correctly by adjusting:
  The height of the backrest
  The angle of the backrest
  The height of the chair
- Sit almost straight, shoulders relaxed
- Pull shoulder blades together and down
- Sit in front of your monitor, avoid twisting

INCORRECT

CORRECT

KEEP SHOULDERS RELAXED

Do's and Don'ts

- Do ensure a risk assessment of your VDU workstation has been carried out
- Do take breaks regularly and stretch
- Do adjust the contrast and brightness of your monitor
- Do learn some shortcut keys instead of using your mouse
- Do use your mouse correctly as shown below

- Don't extend your arms - keep your elbows close to your body at all times when keying or using the mouse
- Don't hammer your keyboard
- Don't overstretch your fingers, move the whole hand
- Do look in the distance regularly - at least every hour
- Do learn how to touch type
- Do change position regularly
- Do use a wristrest if you flex your wrists when keying

Remember the ABC for VDU users

A Adjust the chair
B Break up your tasks
C Change your position and stretch

THE SOCIETY OF RADIOGRAPHERS

Safety Awareness: VDU's

VDU's are not dangerous in themselves, but you <u>must</u> adjust your chair and desk layout to prevent aches and pains from prolonged use.

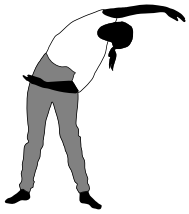
CHAIR

- Sit upright.
- Adjust the chair's seat height, back rest and tilt.
- Support your lower back - an 'S' not a 'C' shape for spine.
- Position chair **<u>close</u>** to the desk

× NOT like this!

SCREEN POSITION

- Avoid glare and reflections.
- Have sufficient space in front of the screen for the keyboard to be a comfortable distance from your body.
- Make adequate space for other papers / work.



OTHER POINTS

- Look away from the screen and blink every 10 minutes.
- Exercise your limbs hourly.
- Consider a full-size screen and/or keyboard if you regularly use a portable PC at a desk for long

Display Screen Work

Actions: Your Responsibilities

1 Adjust your chair so that:
- your **back** is supported and vertical
- you are **close** to the edge of the desk
- your arms are **horizontal** when your hands are on the keyboard

Your **feet** should rest flat on the floor - if they don't, then use a footrest.

2 Position the **screen** and **document** at the same distance (arm's length) from you with the top just below eye-level.

3 Arrange adequate **lighting** without glare or reflections.

4 Keep the screen **clean** and the work area **clear**.

5 Sit up ***STRAIGHT!*** Don't slouch - keep an 'S' shaped spine.

6 Exercise at least **hourly**: Stand, stretch, flex all muscles.
Have your eyesight checked periodically and when a problem is suspected.

7 **Report** problems and malfunctions immediately.

VDUs do NOT directly cause health problems

- ***Incorrect*** *set-up of the workstation or your* ***posture*** *can cause pain in your eyes, neck, back and hands. Avoid these by ensuring that your work area is set up ergonomically*

… think ***safety***