

## **Better musculoskeletal health for anaesthetists: guidance from the Association of Anaesthetists & Society of Occupational Medicine**

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This is a consensus document produced by members of a Working Party established by the Association of Anaesthetists and the Society of Occupational Medicine. It has been seen and approved by the Board of Directors of the Association of Anaesthetists and the Council of the Society of Occupational Medicine.

## **Summary**

Work-related musculoskeletal disorders are very common amongst healthcare workers, and there is evidence that anaesthetists are at greater risk of upper limb disorders than other groups. This guidance aims to bring together advice and recommendations from a variety of sources in order to inform and support anaesthetists at work, in an attempt to reduce the prevalence and severity of work-related musculoskeletal disorders and the exacerbation of pre-existing disorders. Mechanical and psychosocial risk factors for work-associated musculoskeletal disorders are summarised, along with general principles for achieving better musculoskeletal health and practices specific to areas of the body most at risk. These include recommended exercises and stretches during sedentary work.

## **Recommendations**

Attention must be paid by both employers and anaesthetists to the physical and psychological risk factors that may lead to development and/or exacerbation of musculoskeletal disorders. This requires ongoing risk assessments and adherence to published standards of health and safety at work, including training.

### ***What other guidelines are available on this topic?***

There are many sources of guidance on health and safety in the workplace, across many sectors, much of which is of relevance to anaesthetists. There is no readily accessible guidance specifically aimed at the anaesthetic workplace.

### ***Why was this guideline developed?***

This guidance was developed as part of a wider piece of work by the Association of Anaesthetists based around ergonomics of the anaesthetic workplace, as a result of the increased reported incidence of musculoskeletal disorders amongst anaesthetists. It aims to draw on existing guidance and present a summary of advice relevant to anaesthetists and their practice.

### ***How and why does this publication differ from existing guidelines?***

This guidance summarises other advice and recommendations, and focuses on factors relevant to the anaesthetic workplace.

## 1. Introduction

Musculoskeletal disorders (MSDs) are very common. They range from localised, non-specific painful conditions (e.g. back/neck pain), regional specific disorders (e.g. carpal tunnel syndrome, trochanteric bursitis) through to widespread pain (e.g. fibromyalgia syndrome), generalised arthritis and rarer rheumatological diseases (e.g. rheumatoid arthritis, systemic lupus erythematosus).

It has long been recognised that some types of work, or activities performed at work, can cause MSDs or worsen existing MSDs. Two areas of importance for employers and employees are first, how to identify and minimise causal or aggravating work-related risk factors, and second, how to evaluate the impact of MSDs on employees' ability to work effectively.

In the healthcare sector, MSDs are the biggest single ill-health concern in the workplace, and work-related MSDs account for ~40% of sickness absences amongst NHS staff [1]. Work-related risk factors for MSDs include several mechanical and psychosocial factors (Table 1). Healthcare staff therefore have a relatively high level of exposure to many of the important risk factors for MSDs. Much of the research in this area has focused on nursing or surgical specialties, concluding that staff within these groups are at increased risk of MSDs [3-7]. More recently, a high incidence of work-related MSDs has been reported in anaesthetists, albeit in a small international survey [8]. A much larger survey of Association of Anaesthetists members found a high incidence of upper limb disorders, with three factors identified as independent risk factors: years of anaesthetic practice; parenthood (for both men and women, and irrespective of the number of children); and right-handedness [9]. The last is very unusual for work-related MSDs, for which most advice refers to the increased risk posed to left-handed workers in environments designed by, and for, the right-handed majority [10-12]. The identification of right-handedness as a risk factor may be related to the traditional practice of tracheal intubation in which the laryngoscope is held in the (non-dominant) left hand whilst attempting to pass the tracheal tube with the right. Especially in inexperienced intubators, this may be accompanied by a stooped and bent back, with the head extended on a flexed neck [13, 14]. Other procedures performed by anaesthetists that may involve an unnatural posture include certain nerve blocks and central venous cannulation. Repeated transfer of anaesthetised patients to/from operating tables and trolleys may also be a factor. Poor workstation/anaesthetic machine design and inadequate attention to other ergonomic factors (e.g. chairs, computer/monitor screens and keyboards) are further stressors.

## 2. Aims of this guidance

This guidance is directed primarily at anaesthetists and their employers, but also at those responsible for designing and manufacturing/supplying anaesthetic equipment, and occupational medicine departments. The aim is to bring together existing advice and guidance to inform and support anaesthetists, in an attempt to reduce the development and/or exacerbation of MSDs amongst this at-risk group. It forms part of a wider piece of work by the Association of Anaesthetists, looking at the general ergonomics of the anaesthetic workplace [15, 16]. (Ergonomics is the branch of human science that seeks to identify and evaluate the interactions between humans and other elements of a system; in the hospital setting, this extends beyond the issue of MSDs alone).

## 3. Prevention of musculoskeletal disorders

### *General principles*

The Health and Safety at Work etc Act (HSWA) 1974 sets out health and safety law in Great Britain, and the Management of Health and Safety at Work Regulations 1999 (Management Regulations) make more explicit what

employers are required to do, to manage health and safety under the HSWA [17].<sup>1</sup> Employers have a legal duty under the Management Regulations to put in place suitable arrangements to manage health and safety and protect employees (Regulation 5) and to assess risks (Regulation 3) [17]. Although described in very broad terms, this includes arrangements for managing and assessing work activities that expose employees to the risks of MSDs. In addition, employees have an obligation to follow local health and safety guidance and mandatory training as they relate to MSDs, e.g. manual handling or safe use of specific equipment. This is intended to remove or mitigate the exposure to physical risk factors. Specific problems/issues (e.g. low ceiling pendants, broken doors) must be brought to the attention of employers, who are unable to fulfil their responsibility to provide a safe working environment if unaware of an issue. Individuals with existing MSDs or those who experience musculoskeletal symptoms must consult an appropriate professional, whether at work (e.g. physiotherapist/occupational physician) or outside (e.g. general practitioner); not to do so can make the problem worse and potentially place patients at risk. Actions that employees can take to help achieve better musculoskeletal health are summarised in Table 2. Several of these may also have a role in management of existing MSDs (see below). (See also <https://www.hse.gov.uk/msd/msds.htm>).

#### *Specific areas of the body*

Aside from general fitness and stretching/exercise etc, particular areas of the body may be protected against MSDs to a degree by adopting certain practices and avoiding others, both at work and outside of work. These are summarised in Table 3.

## **4. Management of musculoskeletal disorders**

### *General principles*

Management of MSDs in general would follow standard medical (e.g. analgesics, anti-inflammatories) and physical (e.g. physiotherapy, splinting) treatments, with referral as appropriate. It is also important to consider psychological factors and job satisfaction in the workplace. Precipitating and/or aggravating factors, both related and unrelated to work, need exploring, e.g. taking up new hobbies/sports, undertaking demanding physical activities, changes in the nature and/or frequency of clinical work, and any associated stress. Certain principles of management apply to all MSDs, and are also key components of preventative strategies (Table 4, plus see Table 2). It may be difficult for the anaesthetist to adhere to these on a day-to-day basis, e.g. when clinical priorities demand urgent action/intervention, or when they are unable to control their environment. Some activities may require modifying or avoiding, depending on the particular MSD and its severity. Good communication is required between occupational medicine, the general practitioner and any other specialist service involved. At all times, risks to the anaesthetist (e.g. from the MSD itself and from any treatment side effects) and to his/her patients (i.e. the ability of the anaesthetist to practise safely) must be considered and a risk assessment performed.

### *Specific areas of the body*

The practices outlined in Table 3 are particularly important if a MSD is already present or develops during work. If an anaesthetist is diagnosed with a specific MSD, e.g. rheumatoid arthritis or osteoarthritis, specialist advice should

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<sup>1</sup>The main legislation covering health and safety in the workplace in Ireland is the Safety, Health and Welfare at Work Act 2005 (<http://revisedacts.lawreform.ie/eli/2005/act/10/front/revised/en/html>), which sets out employers' and employees' rights and obligations. The Safety, Health and Welfare at Work (General Application) Regulations 2007 (<http://www.irishstatutebook.ie/eli/2007/si/299/made/en/print>) and specific regulations may be found at <https://www.hsa.ie/eng/Legislation/Acts/Safety Health and Welfare at Work/Safety Health and Welfare at Work Act.html#regulations>.

be taken from his/her clinicians as to any workplace adjustments that are required. Employers are obliged, under the Equality Act 2010, to accommodate 'reasonable adjustments' for anyone living with a disability (and the terms of a disability are defined very loosely within the Act) [36]. Occupational health departments may need to be involved to give specific advice.

### Competing interests

No competing interests and no external funding declared.

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**Table 1** Mechanical and psychosocial risk factors for work-associated MSDs.

<i>Mechanical</i>	<p>Heavy lifting</p> <p>Pushing and pulling heavy loads</p> <p>Working in awkward postures or positions (e.g. working with arms raised above shoulder height)</p> <p>Prolonged static postures</p> <p>Repetitive movements of the limbs and/or joints</p> <p>Environmental e.g. poorly designed/constructed equipment including: clinical devices; anaesthesia workstations and chairs; badly placed monitors, keyboards and other IT equipment; poor theatre layout</p>
<i>Psychosocial</i>	<p>Working under pressure and/or to tight deadlines</p> <p>Lacking control of workload and work tasks</p> <p>Having poor support from colleagues and/or managers</p> <p>Depression</p> <p>Poor job satisfaction</p> <p>Perceived lack of reward for effort expended</p> <p>Low self-efficacy*</p>

\*Self-efficacy: an individual's belief in having the required capabilities to achieve a goal [2]

**Table 2** Potential actions for achieving better musculoskeletal health. (See also: Health and Safety Executive. Manual Handling at Work: a Brief Guide, 2020. <https://www.hse.gov.uk/pubns/indg143.htm>).

<i>Improving general fitness</i>	Regular exercise strengthens muscles and increases resilience against physical and psychological strain, particularly when aerobic fitness is combined with activities that promote stretching and relaxation e.g. yoga, Pilates, resistance exercises [18]. A little exercise repeated regularly is thought to be better than very high-intensity irregular participation [19]
<i>Improving lifestyle</i>	Musculoskeletal disorders are aggravated by poor diet, impaired/non-restorative sleep and cigarette smoking [20]
<i>Altering work patterns</i>	These are often seen as outside one's control but there may be scope to identify and address exposure to the mechanical risk factors listed above. This may include changing shifts, new or modified equipment and/or rearranging the work environment to account for patterns of work [21-24]
<i>Undertaking specific exercises etc at work</i>	Although the evidence suggesting a health benefit from work-based exercises is generally weak, a resistance training exercise programme can help prevent and manage upper limb disorders [18]. It is generally recommended that it is important to avoid prolonged immobility, especially combined with poor positioning/posture [25, 26] (see Fig. 1)
<i>Regular review of mental health status</i>	Members of a busy department are often (or usually) working under high pressure, in which it may be difficult to take the time and effort required to assess one's own mental health, let alone act on any concerns. Sharing stress with colleagues, ensuring adequate breaks and emphasising the need for mutual support within a department may require a commitment to support wellbeing at department level or above (see <a href="https://anaesthetists.org/Home/Wellbeing-support">https://anaesthetists.org/Home/Wellbeing-support</a> )



**Table 3** Area-specific practices to help protect against development of MSDs (see also Fig. 1).

<i>Neck [21, 27]</i>	<p>Avoid sustained abnormal postures such as lateral rotation or extension of the neck, and move equipment and chairs to avoid this as much as possible</p> <p>Avoid using a computer keyboard too close to the body and holding a telephone between one ear and the shoulder</p> <p>Break up repetitive tasks as much as possible</p>
<i>Shoulder [28, 29]</i>	<p>Keep the elbows close to the body and change the angle of shoulder motion when possible</p> <p>Avoid working with the hands above shoulder level or at 45° degrees of shoulder flexion</p> <p>Avoid excessive workloads e.g. &gt; 10% maximal voluntary contraction, especially repeated</p> <p>Avoid twisting and awkward positions</p> <p>Consider a swivel/wheeled chair when seated tasks are in multiple nearby locations</p> <p>Sleep with the arms below the level of the chest</p> <p>Keep the hands below the '3 o'clock' and '9 o'clock' positions on the steering wheel when driving</p>
<i>Elbow and forearm [28, 30, 31]</i>	<p>Use minimal force and avoid pressure/impact on the elbow</p> <p>Avoid pushing against hard surfaces when sitting, driving or changing positions</p> <p>Avoid prolonged and/or excessive handling of heavy loads</p>
<i>Hand and wrist [32]</i>	<p>Use the stronger larger joints where possible, e.g.: use the palms and forearms to carry heavy objects; grasp objects with the hand and all fingers; use both hands as much as possible when lifting heavy objects</p> <p>Avoid unnatural/stressful positions, e.g.: rest the hands flat and open rather than with a tight fist; be aware of hand clenching; avoid excessive hand and wrist flexion for work activities; adapt tools if required to maintain the wrist in a neutral position; use a wrist rest while working on a keyboard</p> <p>Use minimum force, e.g.: use a relaxed grip whenever possible; push, slide, or roll objects instead of lifting them; use tools when available (e.g. pliers or forceps for unscrewing tight caps/bungs etc)</p>
<i>Back [25, 33-35]</i>	<p>Avoid sitting for long periods in front of a computer – no matter how good the positioning. Try to break up sedentary time every 30 min for at least 1-2 min (see Fig. 1)</p> <p>Workstation chairs should be stable (most office chairs have five legs in a star shape). The seat height must be adjustable, and the back rest adjustable in height and tilt. Ideally, the back rest should move independently of the seat to allow a comfortable position</p> <p>When sitting, the thighs should be at right angles to the body or sloping slightly down. If the chair is properly adjusted, the feet should be firmly on the floor, but a footrest should be used if it is more comfortable (i.e. the feet should be planted on the floor and support the back)</p> <p>Key points for lifting safely:</p> <ul style="list-style-type: none"><li>• plan your lift</li><li>• start in a stable position</li><li>• keep the load close to your waist</li><li>• keep your back as straight as possible</li><li>• avoid twisting your back or leaning sideways</li><li>• avoid lifting heavy loads</li><li>• push heavy objects rather than pull them</li><li>• distribute the weight evenly</li></ul>
<i>Hips and knees [23, 24]</i>	<p>Lifting heavy weights and kneeling/squatting at work are associated with an increased risk of osteoarthritis of the hips and knees, respectively. Try to minimise the weights lifted by using aids or getting help from others</p> <p>Wear supportive, well-fitting shoes</p> <p>Maintain leg muscle strength by doing regular leisure-time physical activity</p> <p>Maintain a healthy weight</p>

**Table 4** General principles for managing MSDs at work.

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Respect pain

Balance rest and activity

Recognise and acknowledge stress

Participate in exercise or leisure-time physical activity to maintain strength and range of motion (see also Fig. 1)

Use the minimum amount of force necessary to complete the task and distribute the load over stronger joints and/or larger surface areas

Simplify work where possible

Use good posture and body mechanics and avoid positions that induce deformity/strain in other areas, whilst protecting affected areas

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**Figure 1 COLOUR VERSION** Exercises/stretches recommended for improving or maintaining musculoskeletal wellbeing during sedentary work. All the exercises should be repeated three times, every ~30 min. All figures ©PhysioTools Ltd. All rights reserved. Used with permission of PhysioTools Ltd, <https://www.physiotools.com/>.



Turn your head to one side until you feel a stretch. Hold ~3 s then repeat to the other side.



Tilt your head toward one shoulder until you feel the stretch on the opposite side. Hold ~3 s then repeat to the other side.



Sit straight-backed. Bend your head forward until you feel a stretch behind your neck. Hold ~3 s.



Sit straight-backed. Pull your chin in as far as you can. When you reach the limit bend your head back as far as possible. Do the exercise slowly and carefully.



Push shoulders forward, stretch the arms diagonally forwards and down, keeping your chin tucked in. Hold ~20 s.



Place your hands behind your neck, elbows pointing forward. Move your elbows out to the side. Hold ~20 s.



Hold your hands and lift your arms over your head. Breathe in and stretch your hands towards the ceiling. Breathe out and return to the starting position.



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Stretch one arm over to the opposite shoulder by pushing it at the elbow with your other arm. Hold the stretching ~20 s then relax.



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Make a fist and bend your wrist forward with your other hand, then straighten your elbow. Hold ~20 s then repeat to the other side.



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Hold your forearms horizontally in front of you and push your palms together. Hold ~20 s then repeat to the other side.



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Stand straight with one hand on your hip and the other straight up. Bend to the side with the opposite arm reaching overhead, and keeping your pelvis in mid-position. Hold ~5 s then repeat to the other side.



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Stand and place your palms above your buttocks on your lower back. Open your chest, straighten your hips and bend your body backwards, then return to the starting position.

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Stand with your legs astride and straight. Bend one leg and put your hands on the knee. Bend your leg even more and put more weight on the leg. You will feel stretching on the inside of the thigh on the straight leg. Hold ~20 s then repeat to the other side.



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Stand with one on a footstool. Flex your ankle and push the heel towards the footstool keeping your knee straight. Hold ~20 s then relax. Then bend your upper body forwards from your hips keeping your back straight. You should feel the stretching behind your knee and thigh. Hold ~20 s then repeat to the other side.



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Stand holding on to a support. Bend one knee and take hold of the ankle (do not lock the knee of the leg you are standing on). Draw your heel towards your buttock. Tilt your hip forwards so that your knee points towards the floor. Feel the stretch in the front of your thigh. Hold ~20 s then repeat to the other side.



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Stand in a walking position with one leg straight behind you and the other leg bent in front of you. Take support from a wall or chair. Lean your body forwards and down until you feel the stretching in the calf of the straight leg. Hold ~20 s then repeat to the other side.

**Figure 1 B&W VERSION** Exercises/stretchers recommended for improving or maintaining musculoskeletal wellbeing during sedentary work. All the exercises should be repeated three times, every ~30 min. All figures ©PhysioTools Ltd. All rights reserved. Used with permission of PhysioTools Ltd, <https://www.physiotools.com/>. Colour changed to greyscale with the permission of PhysioTools Ltd.



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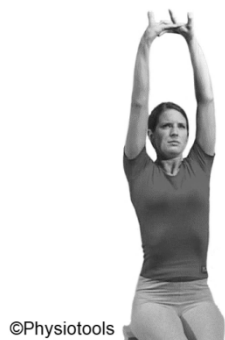
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Place your hands behind your neck, elbows pointing forward. Move your elbows out to the side. Hold ~20 s.



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Stand with your legs astride and straight. Bend one leg and put your hands on the knee. Bend your leg even more and put more weight on the leg. You will feel stretching on the inside of the thigh on the straight leg. Hold ~20 s then repeat to the other side.



Stand with one on a footstool. Flex your ankle and push the heel towards the footstool keeping your knee straight. Hold ~20 s then relax. Then bend your upper body forwards from your hips keeping your back straight. You should feel the stretching behind your knee and thigh. Hold ~20 s then repeat to the other side.



Stand holding on to a support. Bend one knee and take hold of the ankle (do not lock the knee of the leg you are standing on). Draw your heel towards your buttock. Tilt your hip forwards so that your knee points towards the floor. Feel the stretch in the front of your thigh. Hold ~20 s then repeat to the other side.



Stand in a walking position with one leg straight behind you and the other leg bent in front of you. Take support from a wall or chair. Lean your body forwards and down until you feel the stretching in the calf of the straight leg. Hold ~20 s then repeat to the other side.