Mobile Working
Risk Management System

Guidance on managing the musculoskeletal risks from mobile working

Chartered Institute of Ergonomics & Human Factors

www.ergonomics.org.uk

INTRODUCTION

How we work has changed a great deal over the last decade, or even the last 5 years. Mobile device developments have left many businesses uncertain about the best way to manage the risks that they bring with them.

The main types of question raised are:

- What are the risks in using mobile devices?
- What can and should we, the employer, do about the risks?
- What are employers' legal duties?
- What should employees be doing about the risks?

WHO IS THIS GUIDANCE DESIGNED FOR?

This guidance is aimed at employers and employees who want to answer those questions and to proactively and effectively manage the ergonomic health risks associated with mobile working. Mobile working is the use of mobile devices (smartphones, phablets, tablets, laptops and notebooks etc.) for work purposes, in whatever type of location that occurs. The key ergonomic health risks, which this guidance addresses, are musculoskeletal injury and digital eye strain.

There are three key areas to consider when managing the ergonomic health risks of mobile working: Equipment, Expectations and Education.

If an employer provides equipment (mobile devices) for mobile working, and expects employees to use them during their work, they have legal duties to educate their employees on any associated health risks, to assess those risks, and to provide additional equipment to help control the risks. Employees also have a legal duty to follow instructions and training, and to use equipment provided to them for the purpose of managing and reducing risks. This guidance has been written to help you with the following:

- Health and Safety law; how it applies to mobile working and what you should be doing to manage the health risks.
- How to assess the risks and identify risk factors in employees' mobile work.
- Identifying reasonably practicable ways to control and reduce the ergonomic risks.

Table of Contents

Section 1

Section 2

Section 3

www.ergonomics.org.uk

Version number: 6.5

Mobile devices, how we work, and the ergonomic risks

1

MOBILE WORKING: ERGONOMICS AND MUSCULOSKELETAL RISK

How and where we work is rapidly changing. For many it has already changed. Networked mobile devices, cloud-based data management, fast-data phone networks etc. mean we can work now almost anywhere we need or want to.

Companies are increasingly looking to move to more flexible working as a way of saving costs and improving work-life balance of employees[1]. Globalisation, fast transportation systems and modern business practice also means large numbers of people now work while travelling and away from their office.

Naturally this means an increasing use of mobile devices (laptops, tablets, phablets, smartphones). These devices benefit employers and employees greatly in some ways – improved workflow, faster communication, easier and safer data storage and access. These all have substantial business

advantages. But mobile working has also come at a cost; it has introduced ergonomic risks, which only as few as 5 years ago employees may not have been exposed to. The primary ergonomic risks, which this guidance addresses, are musculoskeletal strain (for example 'text thumb and text neck') and digital eye strain. These issues were highlighted in the extensive *Mobile Generations* report, produced by J Taylour / Orangebox, which played a key role in highlighting the need for this guidance.

One of the key challenges with mobile working is that we can find ourselves working in physically 'un-ergonomic' ways – e.g. working for long periods using a laptop on our knees. Working in awkward or unsupported postures increases the risk of us developing musculoskeletal pain.

This checklist and guidance provides employers and employees with a resource, which they can use to:

- Identify possible musculoskeletal risks from mobile working on mobile devices.
- Identify ways to manage and reduce the risks.

94% of organisations now offer staff some form of flexible working

(UK Figures - ILM Report 2013[1])

What sort of work does this guidance apply to?

This document provides guidance to help with assessing musculoskeletal risk during sustained mobile working for example:

• On trains / planes / boats / coaches

• In hotels / cafés / waiting areas etc.

• When visiting offices or workplaces other than your own

• In co-working spaces

• During vehicle-based work (e.g. car, van etc.)

• During ad-hoc work at home (see below)

• During mobile working at your designated workplace, (e.g. if you are agile working)

A range of terms are used for different flexible working practices, or different aspects of flexible working. To help clarify what we mean by mobile working, these other terms are outlined below:

Agile working – Using the physical workplace and technology to support people in working how, where and when they work best. Agile work may be in the office (or other designated workplace such as a school, university or hospital), at home or while travelling etc. Work may be in teams or solo, online or offline. Agile working is about the overall approach taken to achieving results.

Remote working – Working away from your office or other designated place of work. This may include being embedded in client organisations / offices, or working from home.

Nomadic working – Sometimes called 'extreme' remote working. Using the digital workspace to work and earn from wherever you want to be in the world. Work may be carried out in a wide range of environments from the beach to offices.

Work while traveling This is work carried out when actually using transport/ in transit rather than working between journeys in a hotel room, cafe etc

Mobile working occurs during all these types of work, it is about the following:

1) How we physically interact with mobile devices whilst working (our actions, postures, work duration etc.).

2) How our work tasks and environment affect the way we interact with our mobile devices.

3) How we carry and transport our mobile devices when we are not actually using them.
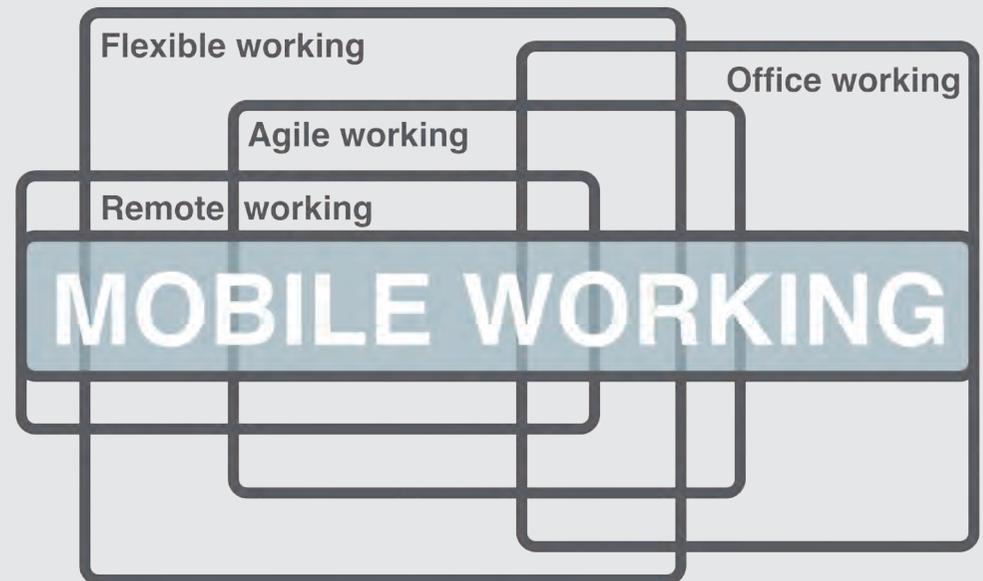
WHY IS MOBILE WORKING AN IMPORTANT ISSUE?

Laptops are increasingly being used as people's main work computers. The main driver for this is the move to more flexible working[1]:

- Enabling people who travel as part of their work to continue or keep up with work away from the office.
- Companies who implement hot-desking giving employees laptops allow for secure homeworking and movement throughout the office.
- To allow for flexible working patterns, which don't fit in with typical office hours.

However, the basic design of a laptop is not ergonomic from a musculoskeletal point of view. Having the keyboard at a useable height means the screen will be too low, causing poor neck posture [2, 3, 4]. On the other hand if the screen is raised to a suitable height, the attached keyboard essentially becomes unusable.

We can improve the ergonomics of our work arrangements when we are using laptops in the office (e.g. by using laptop stands, separate monitors etc.), but when we are mobile working we often do not have the equipment, or if we are

Avoid informal working postures - they might seem relaxed at first, but they can quickly lead to discomfort

issued with it do not feel it is practical to use, which may be due to lack of understanding of the musculoskeletal risks associated with mobile working.

It's not just about laptops, there's smartphones and tablets as well

Smartphones are now standard work equipment for many people. More recently tablets have increased mobile working flexibility. Their use as primary work equipment is on the rise [5,6,7,8].

However, smartphones and tablets, like laptops, introduce ergonomic risks. Their use can lead to particularly poor neck and back posture and repetitive thumb actions, leading to musculoskeletal strain. Extended use may also lead to digital eye strain.

WHAT ARE THE RISKS?

The devices that we use and our approach to work has led to changes in working postures and the physical actions we use. For example one study identified a range of 'new' common postures linked to use of mobile devices involving leaning forward over our screens and angling our necks downwards[9]. Research has identified that our postures and movements when we use our devices can present an increased risk of musculoskeletal problems – the sections below explain this in more detail.

Hand, wrist and arm pain

It is widely understood that long periods of smartphone use (typing, selecting, scrolling) are associated with thumb and wrist problems [10,11].

So-called 'text thumb' first brought this into everyday public awareness. Text thumb is a musculoskeletal disorder which is not clearly defined. It is sometimes clinically diagnosed as De Quervain's syndrome – where the sheaths around the tendons controlling thumb movements become thickened and irritated by repetitive thumb use. Alternatively it can be classified as Trigger Thumb or Thumb Arthritis – depending on symptoms and response to clinical tests [12,13,14]. 'Text claw' and 'Smartphone pinky' are two other commonly used terms describing pain and restricted function in the hands, linked to use of mobile devices.

In a recent survey 75% of smartphone users were observed to use one thumb for scrolling and text entry etc. with two thirds of those people holding the phone in the same hand as they type / select with [15].

Interestingly although this single thumb style is the most frequently used, it is relatively slow and places a high loading on thumb and shoulder muscles. This means the single thumb style potentially leads to more musculoskeletal strain and discomfort than other methods such as typing with both thumbs or forefinger typing using your free hand [10, 16]. The only real advantage seems to be that it leaves one hand free.
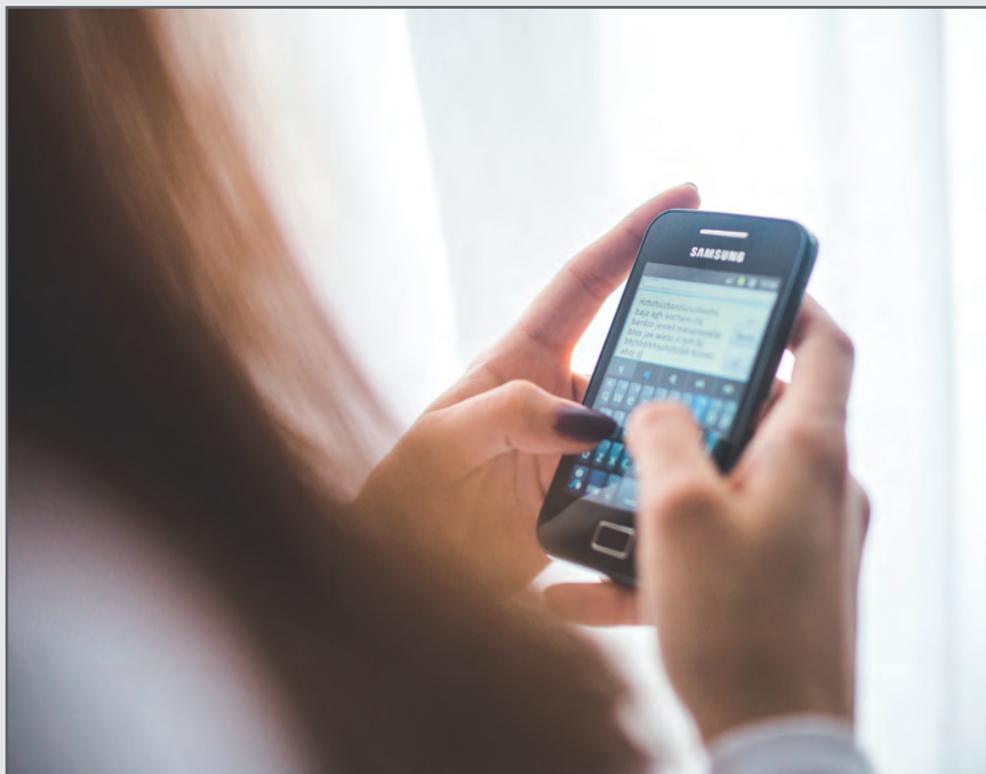
Repetitive thumb movements - as used in text entry and scrolling - are associated with musculoskeletal pain

Only 10% of observed phone users who were selecting and entering information on the screen held their phone in one hand and typed with the index / forefinger of their other hand [15]. Despite this style of use putting significantly less strain on the thumbs and wrists, most people naturally use other styles of use which put higher strain on the thumbs [10,16, 17].

A pain in the neck

As use of tablets and smartphones continues to increase there is a focus on neck posture [18]. We have a natural tendency to hold mobile devices around chest height or even lower, possibly because of the effort involved holding them up, and also because we tend to want to maintain screen privacy. This tends to result in poor neck posture (neck flexion).

Added to this is the effects of extremely high screen resolution of many newer mobile devices. Although high-resolution screens have some benefits, it can lead to people reading and focusing for long periods on extremely small text – resulting in poor neck posture – as well as eye-strain[19].

Forward head posture is seen when people push their head forward in a 'turtle' posture.

As the head moves forward in a 'turtle' posture, strain on the neck increases substantially [20]. Sustained poor neck posture puts a substantial strain on the neck and can lead to long-term neck and shoulder pain, and loss of posture.

Head/Neck flexion is seen when people tilt their head down (chin onto chest).

Increased neck flexion also leads to strain on the neck and shoulders due to the weight of the head [21,22].

Research indicates that a 15° tilt angle places an additional 12kg load on the neck – rising to an additional 27kg load on the neck at a 60° tilt angle (figures are based on a 6kg average adult head) [23].

In the short term this additional strain on the neck and shoulders causes muscle tension leading to fatigue and headaches. In the longer term poor neck posture can result in chronic pain and a more permanent loss of posture.

Why do we put strain on ourselves?

Research shows that we naturally tend to use our devices in ways that put us at greater musculoskeletal risk [10,15,16,17,18]. It is not entirely clear why we do this, maybe it's for convenience, or appearances sake, or maybe because we get distracted by devices themselves and 'lose track' of our postures and how we are working. Or in the case of tablets, when we are holding them, their size, weight and how we interact with them will tend to result in us holding them lower and adopting poor neck posture.

Whatever the reasons, this characteristic of how many of us use our devices underscores the need to guide and train people in how to improve the way they use them, i.e. how to work in postures and use actions which put the least strain on the body.

A key element of musculoskeletal risk management is training and making sure that a) people understand the risks they are exposed to, and b) what they should do about them. Without properly understanding the risks, people are less likely to work in ways that are safer, but initially seem less convenient.

Why do we not get the same problem with books / magazines?

This is an area of debate. It may be that we naturally relieve our neck posture when we turn pages. We may also hold books and magazines higher –

Bending the neck is a typical posture when using mobile devices. If this posture is sustained it can lead to neck pain and long-term musculoskeletal problems.

because they tend to be lighter compared with tablets – reducing severity of neck posture. It may be that we use more 'micro-movements' when reading compared with using a tablet – e.g. scanning pages side to side, and adjusting the view as the reading material is moved [24]. The way we use tablets is also more interactive; whereas traditional reading is more passive and done with our eyes, interaction with tablets uses our eyes and hands, which will tend to result in us holding tablets lower to allow us to interact with them more easily using our hands.

OUR DEVICES ARE ESSENTIAL – BUT WE SHOULD USE THEM SAFELY

Mobile devices can give us significant benefits in terms of work flexibility, but they also present us with musculoskeletal risks that previous generations did not experience to the same extent.
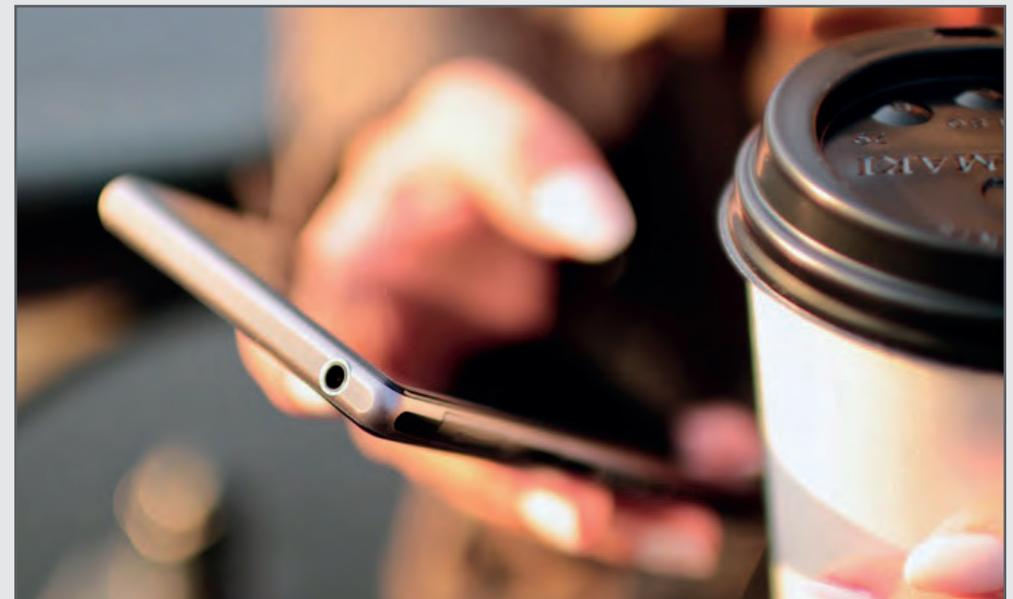
Work takes place everywhere now, thanks to mobile devices, but it can be associated with physical discomfort and long-term musculoskeletal problems.

We need to focus on managing and reducing the physical strain and discomfort which mobile devices can place on us, so that we can benefit from them without risking long-term pain and injury.

WHAT DOES 'SUSTAINED' WORK MEAN?

Sustained work in this guidance means a period of mobile work which is long enough to trigger a need for risk control (e.g. use of laptop stand and external keyboard).

In this guidance a 'sustained' period of mobile work means 15 minutes or longer without a rest break.

WHY 15 MINUTES?

Health & Safety Executive guidance states that to tackle the risks inherent in mobile devices you should, *'avoid prolonged use and take more frequent breaks'* and that *'breaks or changes of activity are particularly important for portable users not working at a docking station'*. [25]

The same HSE guidance states that a 5 to 10 minute break after an hour of work is preferable to working for longer before a break. We have to bear in mind this 1 hour figure assumes a properly set up ergonomic workstation arrangement.

In the UK, employees with **26** or more weeks service have a legal right to ask their employer for flexible working

The sustained mobile work threshold should logically be the point at which a rest break is necessary to prevent development of fatigue and pain. Effectively it is the point where further work could be detrimental, unless a break is taken and/or unless improvements are made to the working arrangements. Based on the HSE guidance, for mobile work in a non-optimal arrangement this period should be shorter than 1 hour.

There is limited information available on how long it is safe to work on mobile devices (which are not set up ergonomically) before taking a break. In reality it will vary depending on the exact circumstances and type of device. However, based on research and guidance we recommend that 15 minutes should be considered as a sustained period of mobile work [26,27,28].

This 15-minute figure should be viewed as cumulative, e.g. it applies even if a break occurs after 15 minutes and work continues again after a break. This is on that basis that in reality taking a significant break every 15 minutes is likely to be disruptive and unfeasible, and so it is unlikely it will actually be done. The cumulative aspect is intended to make it is less disruptive overall to make changes to the way you are working and set yourself up more ergonomically – e.g. using an external keyboard, or voice dictation.

15 MINUTES IS NOT LONG – WON'T THAT BE DISRUPTIVE?

We agree - taking a break every 15 minutes is likely to be disruptive and that makes it unrealistic over the longer term. This leads to a key point of this guidance.

To reduce rest break frequency to a more realistic level for longer periods of mobile work, risk controls should be applied, such as laptop / tablet stands, external keyboards, input devices and user techniques such as shortcuts / hotkeys and voice input.

More advice on risk controls later in the guidance.

You can use these risk controls to improve the ergonomics of how you work. This should mean you are able to do mobile work for useful and realistic periods before becoming uncomfortable or needing to take a break.

However, with any mobile working rest breaks will still be important, and in many mobile working arrangements they should still be more frequent than when you are using a properly set up and assessed desk-workstation. The hierarchy of risk flow chart in this guidance sets out our recommendations for rest break frequency and duration for mobile work – depending on the physical working arrangements.

What if mobile work only happens occasionally?

Occasional mobile working e.g. once or twice a week, could still create musculoskeletal strain if working arrangements are poor and the work takes place for a lengthy period each time. Where occasional sustained working is expected this guidance can still be applied.

Note on designated homeworkers

For designated homeworkers, employers should apply the same approach and standards to DSE risk management at home as required in the office.

85% of people say that mobile devices are a central part of their everyday lives

(Salesforce Mobile Behaviour Report 2014)

• What should employees be doing about the risks?

Although there is a growing body of research into musculoskeletal risks from use of mobile devices, the speed of change in how we work, and the devices we use means that the scale and health implications of longer-term effects are still to be seen.

Our view is that we should acknowledge the potential risks now, and do what we can to pre-empt them, rather than wait for longer term problems to develop. The principles of musculoskeletal risk are the same for mobile working as for any other type of work that has gone before.

This guidance is intended to get managers and employees thinking and talking about mobile working, the musculoskeletal risks and what they can do about it.

LEGAL DUTIES OF EMPLOYERS AND EMPLOYEES

Employers have a legal duty under The Health and Safety at Work etc. Act 1974 [29], to manage and reduce the risks which employees are exposed to when they carry out their work. Employees also have a duty to comply with the instructions and systems that their employers put in place to manage the risks

Whichever devices you use, there are risks and benefits, depending on how you work. Choose mobile devices which are suited to your tasks and environment, then focus on using them as ergonomically as possible.

Musculoskeletal risks are an important consideration when using DSE; they need to be controlled and managed so far is reasonably practicable.

Employers have a general duty, under the Management of Health and Safety at Work Regulations 1999 [30] to carry out a suitable and sufficient risk assessment. If, as part of that assessment, a risk is identified that has more specific regulations allocated to it, then the assessment should be continued under those specific regulations. The risks associated with working with DSE are well defined and therefore risk assessments carried out should be done using the DSE Regulations (the Health and Safety (Display Screen Equipment) Regulations 1992 as amended by the Health and Safety (Miscellaneous Amendments) Regulations 2002 [25]

There is currently still some debate about whether or not the DSE Regulations are suitable, given the changes in types of equipment / devices being used.

The DSE Regulations themselves (the Statutory Instrument) we see as being goal-setting and can broadly speaking be considered still fit for purpose.

The regulations define DSE as any alphanumeric or graphic screens and users as those employees using that equipment as a significant part of their normal work. Mobile equipment clearly meets those criteria and employees using it as a significant part of their normal will be defined as users.

Employers and commentators can sometimes become confused between the Regulations themselves and the Guidance to the Regulations. It is acknowledged that the guidance document L26 [25] is dated now with old fashioned pictures and limited reference to new and mobile technology.

However, The DSE Regulations themselves are still fit for purpose and applicable to mobile working as follows:
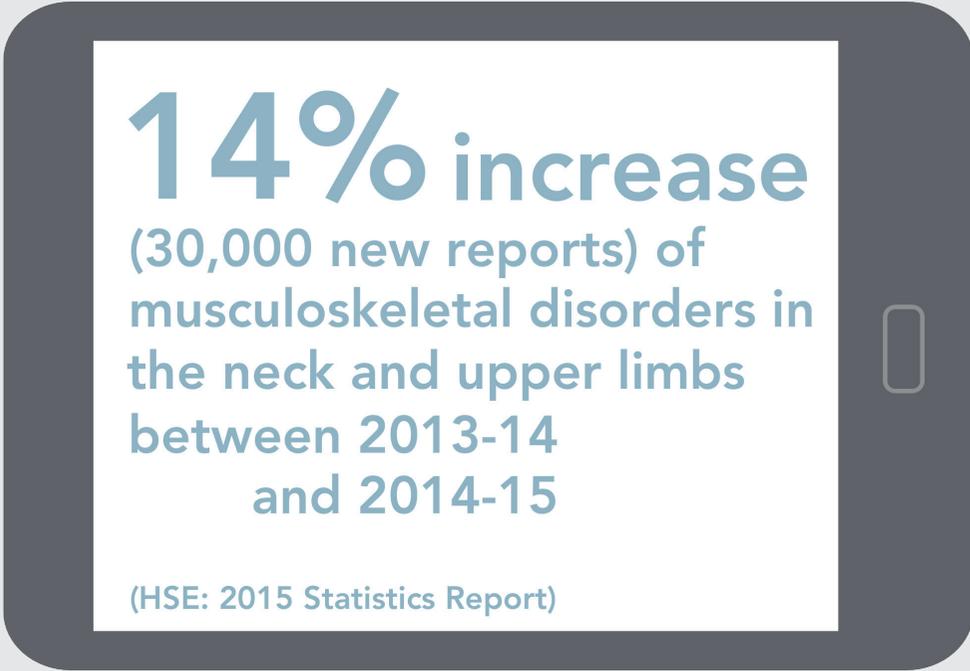
14% increase

(30,000 new reports) of musculoskeletal disorders in the neck and upper limbs between 2013-14 and 2014-15

(HSE: 2015 Statistics Report)

Regulation 1. Identify who your users are
- Know and understand which staff are using mobile technology.

Regulation 2. Assess the risks, i.e. the workstation
- Identify and understand how those staff are using that equipment.

Regulation 3. Provide a suitable workstation
- Provide equipment to allow staff to set up a suitable workstation and adopt good posture wherever they are.

Regulation 4. Work routine
- Ensure staff understand the need for breaks and ensure work routine allows them to take those breaks.

Regulation 5. Eye-sight testing and glasses
- Provide eye-sight testing and corrective appliances if required.

Regulation 6. Provide training
- Training about how to use (mobile) technology safely.

Regulation 7. Provide information
- Information about the risks and how to mitigate them. Advice on setting up mobile workspaces.

What is reasonably practicable?

Reasonably practicable simply means that what can be done (to manage and reduce the risks) should be done, up to the point that the cost (financial, time, effort) of doing any more is "grossly disproportionate" to any additional reductions in risk that would be achieved [31].

In the case of mobile working, we take the view that reasonably practicable includes the following:

- Carrying out a risk assessment identifying concerns and possible solutions.

- Providing equipment to reduce the risks such as laptop or table stands or risers, portable external keyboards and input devices.

- Training employees in how to use equipment safely and what the musculoskeletal risks are.

- Monitoring how employees work when mobile. Ensuring that equipment provided to make their work safer is actually used, and used correctly.

STAFF BRIEFING

Staff information and instruction is an essential part of managing the risks associated with mobile working. The guidance in this document and from any other suitable sources can be used to inform staff who use mobile devices for work, about the ways that they can help to manage the risks.

HOW DO I RECOGNISE EARLY SIGNS OF UPPER-LIMB MUSCULOSKELETAL PROBLEMS?

There are a range musculoskeletal disorders affecting different areas of the body. A key challenge employers and employees face is how to tell the difference between transitory aches and pains which may disappear naturally, versus the early stages of a musculoskeletal problem which requires intervention.

Some important indicators of a significant problem are:

• Dull aches in joints.

• Recurrent pain (same type of pain in the same area) during work and outside work which make normal work or home activities difficult – possibly leading to avoiding certain tasks.

• Sleep disturbance – being kept awake by discomfort or numbness.

• Loss of strength in the effected limb.

• Stiff joints, swelling, burning sensation and, pins and needles – these all indicate a more significant problem than typical muscle fatigue.

• Pain lasting for more than 24 hours after the associated activity has finished.

If you have any of these symptoms or any others that you are concerned about you are advised to follow your company procedure for reporting ill health issues. This may include informing your line manager, HR, and seeking professional health advice from your GP or a qualified physiotherapist.

Discuss with your manager the task(s) associated with pain and any ways that the tasks could be changed or adapted. Medical treatments for musculoskeletal disorders may include rest from aggravating task(s), using a brace to limit movement, non-steroidal anti-inflammatory medication and / or a course of physiotherapy and osteopathy. The sooner that early signs of musculoskeletal problems are recognised, and steps taken to address them, the lower the risk of them developing into a more severe or 'chronic' problems.
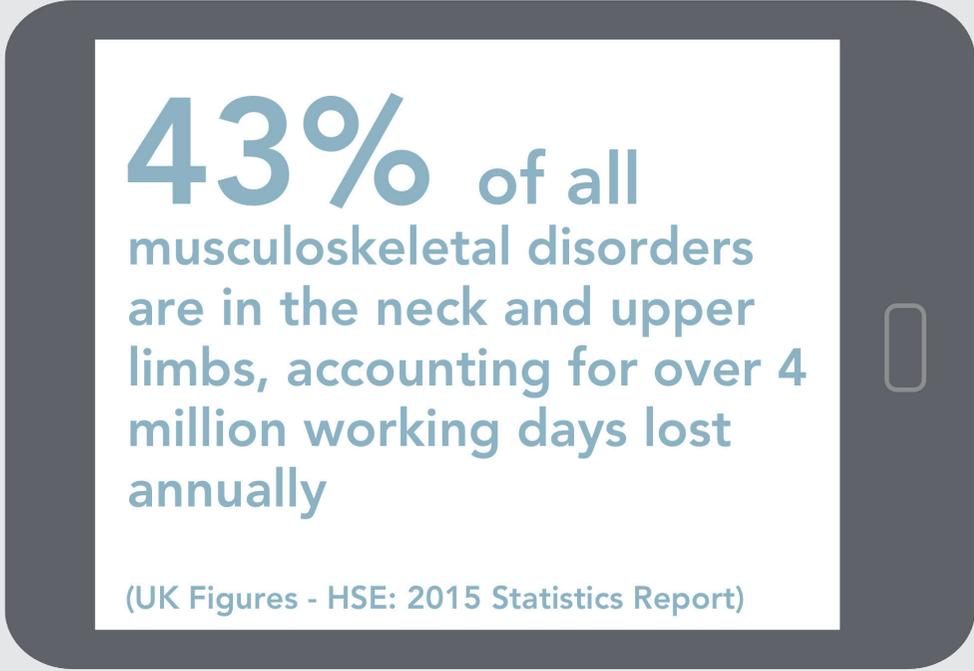
43% of all musculoskeletal disorders are in the neck and upper limbs, accounting for over 4 million working days lost annually

(UK Figures - HSE: 2015 Statistics Report)

PRECAUTIONARY NOTE

As with all musculoskeletal risks, unless the task is eliminated, there is always likely to be some residual risk. Taking the steps outlined in this guidance will help you reduce the risk but not remove it altogether – and the more changes and improvements you implement, the greater the risk reduction is likely to be.

However, residual risks are why it is vital that employers have suitable arrangements for employees to report early signs of musculoskeletal problems, and management systems for addressing any injuries which may occur.

WHAT IS THE CIEHF?

The Chartered Institute of Ergonomics & Human Factors is the UK's professional body for the scientific discipline of ergonomics and human factors. We have a vibrant membership base helping us to raise awareness of the discipline and to set standards of professional practice and accreditation.

We recognise that the use of mobile DSE equipment and the current revolution in the way we work is a major cause of occupational ill health and we are pleased to support and issue this guidance. It will help employers to identify the risks associated with the dynamic nature of mobile work, and provides clear guidance to help reduce the risks, improve employee health and wellbeing, and achieve legal compliance.

ASSESSING THE RISK

This document includes a 2-part risk assessment tool. Section 1 is an overview assessment form that employees and line managers can complete together. Section 2 is a more detailed assessment form for completion by employees.
Employers are unlikely to be able to assess employees while they are 'on the road', which many mobile device users are, so musculoskeletal risk control measures will come down to:

• Informing employees about the risks, and how to make effective use of any equipment / control measures that are provided.

• Employees assessing the mobile working risks

• Employers providing the necessary equipment and support to manage the risks

Mobile working situations are inherently variable. In our view it is unrealistic to expect line managers to personally assess the range of mobile work situations that employees might find themselves in. So we recommend the risk assessment process goes as follows:

1. Risk Assessment form - Section 1. Employee and Line Manager to complete together

The first stage of the checklist should be completed by the employee and line manager together to identify issues such as:

• Typical mobile work situations for the employee

• Equipment which is currently used or may be needed

• Expectations – a realistic review of what level of mobile work is expected of the employee

• Setting a time frame for the employee to complete the assessment and report back

2. Risk Assessment form - Section 2. Employee completes

The second stage of the checklist is to be completed by the employee only. This is to:

• Look at the mobile work situations in more detail and if necessary prompt a return to stage 1 to discuss specific issues in more detail with line manager

• Identify risk factors, and possible solutions

• It is also a 'reality check' on Section 1 of the risk assessment, looking at how useful or realistic in practice any existing or proposed control measures are

3. Final review with Line Manager

The final part of Section 2 asks for details to be filled out of any proposed changes and improvements to manage the musculoskeletal risks.
This is a key part of the risk assessment and it is important that the following details are recorded:

• What changes are proposed (e.g. new equipment or agreed ways of working)?

• Who is responsible for implementing changes?

• Target date for implementing changes.

• Date changes actually implemented.

Further reviews of risk assessment

The mobile working risk assessment should also be reviewed if there are any significant changes in:

- Equipment used,
- Levels of work expectations (e.g. amount of travel, work pressures and deadlines),
- Tasks carried out when mobile,
- Personal mobility and health,
- Places / modes of transport where mobile work,
- Any other factors which affect ease of mobile working.

It is vital that managers and staff discuss mobile work. Worker participation in solutions is key to effective risk assessment

In the UK **31 Million** working days were lost in 2013 due to musculoskeletal disorders, with the greatest proportion being back, neck and muscle pain

(ONS Sickness Absence Report 2014)

On average people estimate that they spend between **1.5 and 4.5 hours** per day using their smartphones

71% of **people** check their phone within 15 minutes of waking up

(Deloitte: Mobile Consumer Report 2015[6])

76% of UK Adults now own or have access to a smartphone **60%** own or have access to a tablet
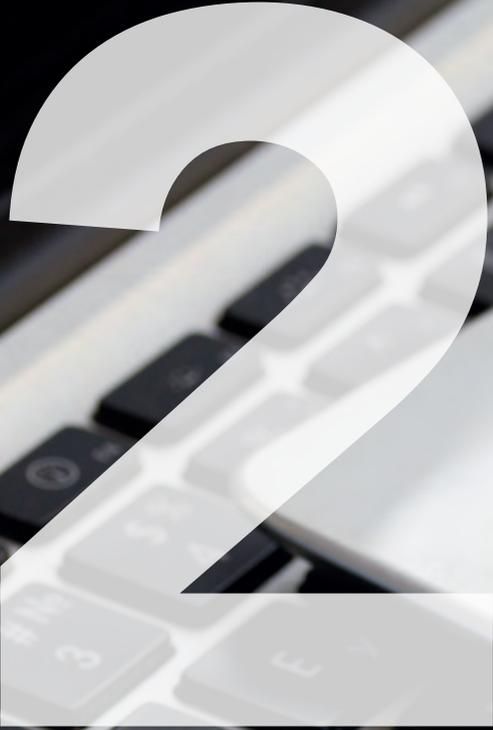
(Deloitte: Mobile Consumer Report 2015[6])

How and where we work is increasingly diverse thanks to cloud-based working, availability of data networks, and highly portable networked devices. This makes it increasingly important to take control of our physical working arrangements and make sure we are not at increased and unnecessary risk of injury.

HIERARCHY OF RISK CONTROL FOR MOBILE WORKING

The flow chart below shows the overall hierarchy of risk controls proposed by this guidance.

1. AVOID
Plan to minimise work on laptops and mobile devices while travelling, unless equipment is setup optimally.

2. ASSESS
Apply guidance and checklist if mobile working is necessary

3. REDUCE
Use risk control (RC) measures to reduce the risk.
RC1. Provide employee training.
RC2. Implement training and use physical risk controls.
RC3. Proactively monitor RC2.
RC4. Review assessment periodically and if work or work equipment changes significantly.

RISK CONTROL: TRAINING
Employees to understand the risks and when/how to use control measures

4. REVIEW
If work equipment, work practices, mobility, type and amount of travelling change significantly, review the assessment with line manager

GOOD
Laptop or tablet with external keyboard, raised using stand/ riser device if possible

✓ Can be set up ergonomically
✖ Have to carry additional kit
Takes time to set up
Only possible if table available

Suitable for:
Daily/long term use

Rest breaks:
2-5 mins / 30 mins
5-10 mins / hr

MODERATE
Laptop or tablet on table – no ext. keyboard, screen angled but not raised on stand/riser, no ext. input device

✓ Screen size/resolution
✖ Poor neck posture

MODERATE
Smartphone with external keyboard, stand/riser and input device

✓ Neck bending reduced
✖ Forward neck posture to view detail on screen

Suitable for:
Short term use and no longer than 30 minutes without rest break

Rest breaks:
2-5 mins / 30 mins

MODERATE
Laptop on knees but raised up e.g. on briefcase/books

✓ Minor reduction in neck bending
✖ Body movements restricted
Still some neck bending

POOR
Laptop on knees

✓ Keyboard can be used
✖ Body movements restricted
Severe neck bending

POOR
Tablet – no external devices

✓ Can be elevated for short periods, reducing neck strain
✖ Severe neck bending

Suitable for:
Very short term use and no longer than 15 minutes without rest break

Rest breaks:
2-5 mins / 15 mins

POOR
Smartphone – no external devices

✓ Can be elevated for short periods, reducing neck strain
✖ Severe neck bending & thumb use

13

Risk Assessment Checklist

PART 1. MOBILE WORKING CHECKLIST – EMPLOYEE AND LINE MANAGER

Mobile working issues	Detail and any proposed changes / actions	Guidance
Is employee required or expected to do work activities using mobile devices (laptops, tablets, phablets, smartphones – excluding laptops at employees normal desk)	*Record what the current situation is and what you propose to do to improve your mobile working practices.* *Is mobile working required and / or expected?*	**Does mobile working take place?** This assessment should be used if your employee uses mobile devices in the course of their work activities. Employers have a legal duty to manage the musculoskeletal risks which mobile working may present to employees. Mobile work activity includes sending texts and emails to communicate with colleagues or clients however in the context of this assessment it does not include use of smartphones for phone calls.
Is mobile working occasional or routine? If work is routine - how often per week? If occasional - how often per month?	*How often and for how long does employee do mobile work?*	**Benchmark the level of mobile working** Occasional working can still create musculoskeletal strain if it is for a sustained period each time. **Why is this important?** This question is asked as a way of benchmarking the amount of mobile working carried out. When this assessment is reviewed, this information will help you recognise increases in the amount, and changes in the type, of mobile working carried out.
Where does mobile working take place?	*Include details of any situations where a significant amount of work is undertaken (e.g. >15mins per session).*	**Locations of mobile working** Discuss employees' typical mobile working situations e.g. locations, durations, type of work being done, and possible ways of working in more comfortable or ergonomic ways (see hierarchy of control flow diagram).

Mobile working issues	Detail and any proposed changes / actions	Guidance
Has employee received training in: 1. Recognising musculoskeletal risks specifically to mobile working? 2. Setting up physical arrangements as optimally as possible during mobile working? 3. Using software (e.g. rest break software, shortcuts and dictation software) to help reduce risks?	*E.g. Training received (date) or training to be provided on certain date.*	**The importance of training** Mobile working presents musculoskeletal risks that can be hard to identify and manage. In reality it will be up to employees to deal with the risks from day-to-day, so it is vital that employees understand the musculoskeletal risks they face and how to recognize and control them. Employers have a legal duty to inform employees about risks they are exposed to, and how to deal with them.
Has employee been assessed for competence on training they have received on mobile working risks and – including use of Section 2 of this assessment?	*E.g. Training included an assessment of competency to apply checklist.*	Remember that just delivering and receiving training is not a guarantee of competence or legal compliance. **Competence: Check that training is understood and remembered** Employers should take steps to make sure that safe work messages have been understood and remembered by the employees.
Does employer / line manager have a system for monitoring whether employees are complying with their company policy on mobile work? E.g. Checking how and when employees use any external equipment that has been provided to reduce risk.	*Examples of monitoring methods include spot checks such as calls, text messages, and emails with an expectation of a photo sent back of work set up.*	**Monitoring how employees work** Policies and equipment for risk control are only effective if they are followed and used. Mobile work practices will be particularly vulnerable to 'slippage' into 'bad habits', so companies should establish a system for checking so far as is reasonably practicable that policy is being followed. **How to monitor mobile working** Reasonably practicable measures may include spot-check calls or text messages or for example asking employee to send a picture of working arrangements.

Mobile working issues	Detail and any proposed changes / actions	Guidance
Has employee been provided with any devices for mobile working? Has employee been provided with any equipment to make mobile working easier (e.g. laptop stand and external keyboard)	*If yes tick box to indicate which:* ☐ *Laptop* ☐ *Tablet* ☐ *Smartphone* ☐ *External keyboard* ☐ *External input device* ☐ *Laptop stand* ☐ *Tablet stand* ☐ *Tablet riser* ☐ *Smartphone stand* ☐ *Smartphone riser* ☐ *Tablet / phone stylus* ☐ *Tablet or smartphone input device* ☐ *Anti-glare screen protectors* ☐ *Blue-light filters or filter apps* ☐ *Bag or rucksack etc.* *List any other equipment employee has been provided which is related to mobile working.*	When tablets and smartphones are provided, if they are intended for sustained mobile work, external equipment (i.e. keyboard, input device or stylus and stand/riser) should also be provided. **What does sustained mean?** Any longer than 15 minutes of mobile work (this figure is cumulative; if a break is taken at 15 minutes but work continues afterwards, this indicates a significant volume of work is being done, and a need for control measures).

Mobile working issues	Detail and any proposed changes / actions	Guidance
Is size and weight of equipment taken into account when specifying and ordering IT equipment? Is size and weight of external equipment such as Bluetooth keyboards, stands and risers etc. taken into account when ordering?	*In larger companies these issues are likely to be for IT departments to confirm. You should aim to get this confirmed centrally to save duplication of effort.*	**Choosing the right equipment** If someone's role involves mobile working with laptop, a lighter laptop should be chosen (or a lighter tablet / keyboard combination), providing they are still suitable for the work being carried out on them. **Weight of device versus usability** Weight needs to be balanced against screen size. If saving weight means that the screen is too small, that may compromise neck posture and may be stressful / frustrating when trying to carry out some tasks. A balance needs to be stuck between usability and portability. **Weight of external equipment versus usability** Weight and size of external keyboards, input devices and stands should also be taken into consideration, with an aim to keep weight to a minimum. Again there is a usability / portability compromise to consider - for example a keyboard provided for long periods of mobile work should be of a reasonable size, but as light as that size will allow. There are portable keyboards available which offer a split keyboard option. This can help offset the ergonomic drawback of the overall smaller size – which tends to be poor wrist posture, particularly for users with broader chests.

Mobile working issues	Detail and any proposed changes / actions	Guidance
Discuss employee's awareness of the following: • The company's mobile working policy. • Legal duty of employer to provide employee with an eyesight test, and provide any special corrective appliances (glasses or contact lenses) if required for expected and sustained mobile working. • What equipment is available and how to obtain it, such as laptop stands or external keyboard etc. • How and when to report problems with equipment, workplaces, work activities or musculoskeletal pain.	*E.g. Reiterate the key policy areas. Remind employee to book an eye test if one is due or if they have not had one. List here anything of note which comes up during discussion. For example employee may report getting sore eyes and it may be that they have never had an eye test. Or employee may be unaware of how to request equipment for mobile working.*	These are key areas to discuss, in order to ensure compliance with health and safety regulations. In the UK it is recommended that adults have their eyes tested every 2 years – or sooner if advised by a medical professional. Employees who are already classed as DSE users can request an eye test, paid for by their employer. If they need glasses specifically for DSE work and their normal corrective lenses are not appropriate, the employer must provide a basic appliance (normally glasses) adequate for the work. Or the employer can opt to pay for a portion of a more expensive appliance depending on user choice.

Risk Assessment Section 1. Administrative details

Date of Section 1 completion.		

Names and signatures of employee and line manager / safety manager etc.:	**Employee:**	**Employer / Line manager / Supervisor:**

Date set for discussion of employee's completed Risk Assessment Section 2	*Set a target date for discussion and finalising of the risk assessment.* *This is an opportunity to discuss any concerns the employee notes in Part 2 of the checklist.*

2.1 Transporting your equipment	Detail and any proposed changes / actions	Guidance
Do you have a suitable case or bag for carrying mobile devices, risk control equipment and other work items in?	*Record what the current situation is and what you propose to do to improve your mobile working practices.*	See guidance below:

Selecting bags and tips for safe use

Research on bag weights has tended to focus on children and their school-bag weights. However general findings can be applied to adults as well. Maximum recommended weight of a carried bag is 10 to 15% of bodyweight [32,33].

In the UK this equates to the following:

- *Average UK Male: 8.4kg to 12.5kg.*
- *Average UK Female: 7kg to 10.5kg.*

Rucksacks are preferable to single strap bags because they allow the load to be more evenly distributed on the shoulders and through the spine [32,34].

Single strap bags should only be used for lighter loads. Single strap bags put an uneven load on the spine, increase strain on the back muscles, lead to changes of gait and can result in shoulder and neck pain [32, 34, 35, 36]. Carrying a single strap bag with the loads given above would more quickly lead to fatigue and discomfort – particularly on the shoulder bearing the full load.

There are no hard and fast rules on when to switch from a single strap bag to a rucksack. However, our recommendation is to use a rucksack for loads over 5% of body weight (although below this weight a rucksack is still preferable).

.

2.1 Transporting your equipment - guidance continued.

Tips for safe rucksack use

- *Shoulder strap separation should not be too wide or narrow: the straps shouldn't pinch your neck, or slope off the outsides of your shoulders.*
- *Length – check that the back or length of the rucksack is not too long (bouncing off your bottom) or short (hanging against your upper back only).*
- *Make sure that shoulder straps are adjustable and wide enough to not put uncomfortable pressure on your shoulders. Ideally straps should be cushioned although wider straps can adequately compensate for a lack of cushioning if you are carrying a light load.*
- *Avoid rucksacks that are already relatively heavy before you put anything in them.*
- *Compartments are important for business rucksacks, they will save time and reduce scope for equipment damage. You don't want to spend valuable time bent over searching for things in the bottom of your bag.*
- *Rucksack straps should be adjusted so that your bag fit snugly against your back and doesn't hang away at the top.*
- *Heavier items should be placed at the bottom and closer to your back.*

Tips for safe single strap bag use:

- *Only use a single strap bags for lighter loads.*
- *Use a bag with a wide strap and ideally a cushioning section which can be moved along the strap.*
- *Wear the strap across your body rather than on one side – this helps to reduce the asymmetric loading on spine and reduces poor shoulder posture.*
- *Alternate the bag frequently between shoulders.*
- *Keep the strap short to avoid the bag dangling and swaying when you walk.*
- *Avoid carrying your bag in your hands whenever possible.*

When to use a wheeled bag

Aim to use a wheeled bag if your load is over 10 to 15% of bodyweight [36]. There are combination bags which allow you to alternate– between wearing as a rucksack and wheeling them – to suit different travel environments and situations. Remember – don't be tempted to put too much into a wheeled bag – at some point you will probably still have to carry it.

Click here for a range of examples of business rucksacks, wheeled bags and wheeled/rucksack combination bags.

2.1 Transporting your equipment

Do you / can you take unnecessary items out of your bag before travelling?

Detail and any proposed changes / actions

e.g. – how often you check, types of things to remove for different trips etc.

Guidance

Why carry unnecessary weight?

Check through your bag periodically e.g. weekly or before significant trips and take out any items you won't be needing.

2.2 Type of mobile work carried out

What does your mobile work involve?

- Emails – writing, sending, receiving, reading
- Texting
- Internet usage
- Document writing
- Spreadsheet work
- Working on presentations
- Other

Detail and any proposed changes / actions

Think about and record approximate percentage of time you spend doing different types of mobile work. Make a record for a typical week to get a good picture of how you are working

Guidance

Option to work on hardcopy

Consider the type of mobile work you do. Can you arrange to work on hardcopy when travelling, instead of electronic documents?

Consider weight and security of hardcopy

There will be a trade off in that carrying documents will add to bag weight. There may also be security restrictions on what you can travel with in terms of hardcopy.

Why is this important?

This question is asked as a way of benchmarking the type of mobile working you do. When this assessment is reviewed, this information will help you recognise changes in the type of mobile working carried out. This information could then influence decisions on suitability of devices or working practices.

2.2 Type of mobile work carried out	Detail and any proposed changes / actions	Guidance
What is your typical mobile work intensity? • High intensity – high concentration, working to tight deadlines • Low intensity – non-essential work, 'gap-filling', no imminent deadlines 	*Think about and record approximate percentage of time you spend doing different types of mobile work.*	**Try to avoid high-intensity / high-concentration tasks when travelling** High intensity and high concentration tasks will tend to keep you fixed in one position for longer unless you are careful about taking breaks [40]. High concentration tasks also take our attention away from maintaining good posture – this applies wherever we work [41]. **Stress and distractions** High-intensity tasks can also be more stressful while travelling because of increased difficulty concentrating due to noise, distractions and other environmental issues such as heat / cold [40,41]. Try to put these tasks off to a time when you are at a desk / workstation. **Focus on low intensity work when travelling** If you working while travelling is unavoidable, try to make sure it is low-intensity. If the work is not essential, try to eliminate it altogether.

2.3 Mobile working on laptops	Detail and any proposed changes / actions	Guidance
Can tasks on your laptop when it is directly on a table - be minimised by effective work planning?	*e.g. possible ideas for minimising laptop use away from desk and/ or outline of how laptop can be set up ergonomically when mobile working.*	Are the tasks you do away from a properly set-up desk essential? **Avoid using a laptop directly on a table / desk** Avoid working on a laptop placed directly on a table or desk. It will lead to poor neck posture[2,3], potentially leading to pain and headaches. **Which Laptop Stand should I use?** Laptop Wedge Stands can be useful in situations where it is not feasible to set up a Laptop Stand and use external keyboard and input device. Aim for a wedge stand which is sloped at approximately 12°. This has been shown to benefit neck posture without having a significant effect on wrist posture on the angled keyboard[42]. A useful benefit of Wedge Stands is that the laptop screen remains closer for viewing, compared with a Laptop Stand. When choosing a Laptop Stand (as opposed to a wedge stand), look for one which allows for a steep keyboard angle. This should provide a higher maximum screen height and will bring the screen closer, both useful characteristics. You should also use an external keyboard which is not too deep front-to-back as this will also allow the screen to be kept closer. **Eyes, Elbows and Legs – setting up ergonomically** Table height and seating should be considered when mobile working – see below. A basic ergonomic arrangement with a laptop (or tablet) can be remembered by EEL: • Eyes: Laptop on stand, bringing screen up to a height where the top of the screen is approximately at eye-height. • Elbows: Sitting or standing at a height that means the external keyboard is at approximately elbow height. • Legs: Ensuring that the underside of your thighs are supported if sitting, and that your feet are supported either by a footrest or on the floor. We have to be realistic that when mobile working, it is unlikely that we will be able to use a chair with the kinds of adjustments we use in offices. For this reason we have recommended just these three basic easy-to-remember ergonomic principles.

2.3 Mobile working on laptops	Detail and any proposed changes / actions	Guidance
Do you work with your laptop directly on your knees?		**Aim to minimise the amount of time you spend working in non-optimal conditions** Can planning and time management help you to reduce or minimise the time you spend working in non-optimal conditions? In the hierarchy of risk control, the top level control is to eliminate the hazard / avoid the risk. In the case of mobile work, this would mean avoiding sustained work in non-optimal conditions. **Avoid working with your laptop directly on your knees** Working with your laptop on your knees leads to poor neck posture and should be avoided where possible [3]. **If the work is unavoidable, raise the laptop** Consider if work done this way is essential. If the work is essential and there is no table to use, place something on your knees underneath the laptop to raise the screen height and reduce neck strain (e.g. a briefcase or some books / magazines). Make sure the arrangement is stable and that the laptop cooling vents are not obstructed. **Take frequent breaks if you can't raise the laptop** If it is not possible to raise the laptop off your knees, you should minimise the amount of time you work with the laptop on your knees, and take very frequent breaks (e.g. 2 to 5 minutes rest at least every 15 minutes).
Can you (and do you) adjust the screen brightness to fit the environment?		**Adjust screen brightness to match conditions** Have you been given instructions in how to adjust screen brightness, and when to recognize the need to do it – i.e. when sunlight is directly on the screen or in bright environments? Check whether your laptop adjusts screen brightness automatically. Newer laptops have this function but older ones may not. **Avoid working with sunlight directly on your screen.** **Keep a clean screen** Keep your screens clean and free from dust and smears, to reduce veiling reflections (glare) which can make screens more difficult to read.

2.4 Tablets and Smartphones	Detail and any proposed changes / actions	Guidance
Are you required or expected to do sustained work on a tablet or smartphone? (i.e. longer than an occasional email / text.) 	*When and where does this work take place, type of work and for how long.*	**Aim to do longer text entry on a laptop, shorter text entry on smartphones and tablets** Are lengthy text entry or search tasks on tablet or smartphone essential? If so could they be done more effectively and safely on a laptop? Are there other tasks you can do which are more appropriate for tablet and smartphones such as shorter messaging? **Use written notes and voice memos – to avoid typing into devices** If you don't have or can't use a laptop in the circumstances, could you write down the information / message and transcribe it later once you are at a computer / laptop? Or leave yourself voice memos? Bluetooth pens offer a fusion of mobile device and traditional writing – **click here** for more some examples. **Make use of dictation and voice control facilities** If you are using tablet or phone intensively while in private, consider using the voice dictation functions to reduce typing, or use an external keyboard. **Use voice texting to keep typing to a minimum** Instead of typing out a long text, you could simply record your message in a short clip and send it via text messenger app. Just hold your finger on the microphone key on the messenger app keyboard and start recording. Release your finger when you have finished recording and slide up – your clip will be sent via text message which keeps it in your message exchange timeline. You can use the same quick and simple method to enter text across a wide range of apps, for example in browser search bars or to write emails. Consider the data security implications of speech recognition however. Some IT policies will not allow it as it can breach data security requirements - if necessary discuss this with your IT support.

2.4 Tablets and Smartphones	Detail and any proposed changes / actions	Guidance
If you use a tablet for your work, is an external keyboard, case/stand and (where applicable) an external input device provided? Do you use a stylus? 	*State which equipment you have and any problems or difficulties you have using it.*	**Set up your tablet as ergonomically as you can** **Use a stand / case, keyboard and input device** For any sustained work you should at least use a case which raises the screen away from horizontal, and an external keyboard. Some tablets also support a cursor and external input device. **Standing a tablet up can help, but it will still lead to poor neck posture** Cases which double as stands can make the tablet screen easier to see but they effectively mean the physical arrangement is approximately the same ergonomically as a laptop directly on a table/desk, and neck posture may still be poor [2,21,22]. **Ideally use a tablet riser, or use books etc to raise the screen height** There are portable tablet risers available. As a temporary alternative to a riser, you can just raise your tablet on a stack of books or magazines etc. Bluetooth keyboards can also be linked to smartphones if you are using them to send long emails or text messages etc. **Use a stylus to vary (and improve) wrist posture** Using a stylus is a useful way of varying wrist posture if you are having to do a lot of tapping on a tablet or smartphone screen. Using a stylus can help you maintain a more neutral wrist posture if your screen is not horizontal.

2.4 Tablets and Smartphones	Detail and any proposed changes / actions	Guidance
Are you required / expected to do sustained work on a smartphone? (i.e. for longer than a few short emails or occasional texts). 		Sustained work on mobile phones can present injury risks for the upper limbs (thumb / wrist injury), neck injury, and potential eyestrain [10,19]. If you have to do sustained work on a smartphone, link it to an external keyboard, raise the screen and / or use voice command and dictation. Avoid sustained work on a smartphone whenever possible unless you have it linked with an external keyboard, you are able to raise the screen and/ or you are using voice command / dictation functions. Bear in mind that a stand which does not raise the screen off a working surface (e.g. table top) will not be optimal because it will still lead to poor neck posture – posture will be similar to using a laptop (or tablet) directly on a table. Take more frequent rest breaks if you can't use external keyboard / dictation etc. If work on a mobile phone is unavoidable (and you cannot set it up with a keyboard or use voice control), make sure you take a rest between emails or texts etc. Use rest breaks to put the phone down, relax your shoulders and arms and straighten your neck. Follow our tips below, to reduce thumb and neck strain.

Tips on using your smartphone ergonomically

Avoid using a single-thumb style

Single-thumb is the most commonly used inputting style on smartphones – it is also the highest risk for your thumb and wrist.

- Hold your phone in one hand and input with the forefinger of the other hand (or alternatively you could use a stylus).

- For longer text entry use an external keyboard (preferable if feasible) or hold you phone in both hands and type using both thumbs (sharing the load).

Pinky at side not at base

Avoid holding your phone with your little finger or pinky at the base.
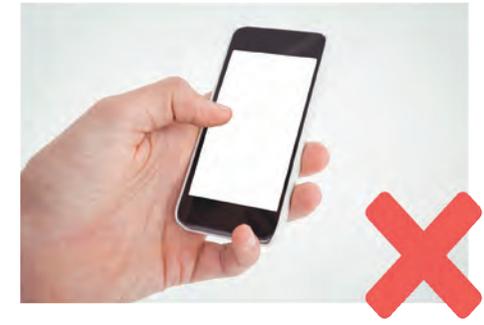
Hold your phone up!!

Your neutral neck posture is the one you would adopt if you were standing or sitting straight and looking at a target which is between eye height and 15° below the horizontal line at your eyes.

- Lift your phone up to keep your neck close to your neutral posture and reduce strain on your neck muscles.
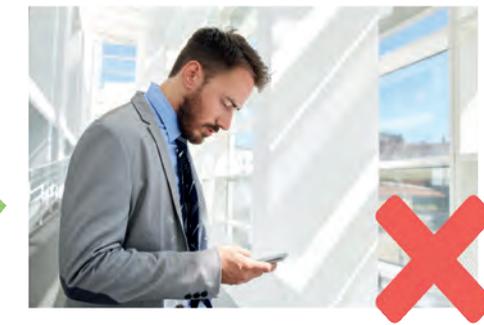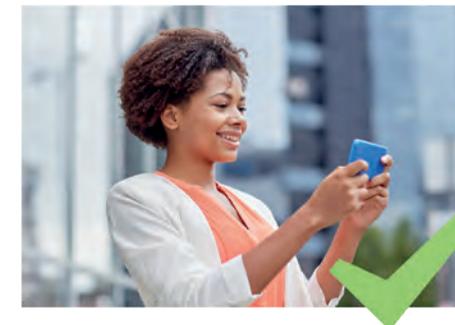
Tips on using your smartphone ergonomically

Rest your arms

- If possible find a way to rest your arms while holding your screen higher. This will help to reduce the strain on your shoulder muscles.

- If you aren't able to find or use arm support, hold your phone up but try to minimise the time you spend on task.

- Take frequent breaks to rest your neck and shoulders.

- Alternatively, if it is a sustained text entry activity, consider whether you could either put the task off until later and/or use an external keyboard.

Speak don't type

Dictate emails and send voice texts to save time and reduce strain on your thumbs, shoulders and neck. This won't always be feasible or appropriate but when you can do this, it is a useful way of reducing musculoskeletal risk.

2.4 Tablets and Smartphones	Detail and any proposed changes / actions	Guidance
Do you have to hold your tablet or smartphone while you do significant amounts of screen selecting etc. (i.e. while not at a table or seated where you can rest your arms or put the tablet in a stand)?	*This question is aimed at people who move about / stand while holding a tablet or smartphone as part of their work, for example:* • *teachers and lecturers (e.g. interacting with / controlling smartboards),* • *health care staff (e.g accessing patient records electronically),* • *retailers (e.g. stock checking items off an electronic inventory, taking orders),*	**Use handles or grips if holding your tablet for long periods is not avoidable** Detachable Grips or 'Handles' may help to reduce strain in the wrist and arm from extended periods of holding a tablet or smartphone [37].

2.4 Tablets and Smartphones	Detail and any proposed changes / actions	Guidance
Do your screen protectors filter blue light wavelengths?		**Reduce glare and eyestrain using screen filters** Anti-glare screen filters / screen protectors can help reduce eye-strain by reducing the amount of light reflected from your screen, making it easier to read. **Consider using blue-light filters or filter apps** Recently there has been a focus on the intensity of blue-light wavelengths emitted by modern device screens. Studies have shown links between increased levels of blue-light and melatonin suppression which leads to reduced sleep quality [45,46]. Other studies have indicated that there may be potential for retinal damage by blue light emitted by modern device screens [44], however this link has not yet been fully confirmed. The technology industry may move towards screens which filter blue light, but many devices currently do not have this. Our recommendation is (given the low costs involved) to err on the side of caution and fit your devices with blue light filtering screen protectors / filters. *There are also apps* - for example f.lux, Bluelight Filter for Eye Care, Twilight, and CF.Lumen which alter the blue light intensity emitted from your mobile device or computer.

2.5 Rest breaks	Detail and any proposed changes / actions	Guidance
Has rest break software been installed and activated on your laptop?	*List any rest break apps or software installed on your devices, and whether they are activated.*	**Use rest break software** If you are working in less than optimal arrangements, it is vital that you take regular breaks. Rest break software can help with this by reminding you to take a break.
Is the rest break software on your laptop adjustable by the user – e.g. to reduce duration of work periods when mobile and in less optimal working arrangement? 		**Adjust your rest break frequency to match your working conditions** If working in less than optimal working arrangements is unavoidable, it is important to take more frequent rest breaks. See our Hierarchy of Controls page for more details. Rest break software will often allow adjustment of reminder / break periods.
Do your other devices (tablets and smartphones) have rest break software installed? Are you familiar with how to use them and are they activated? 		**Use rest break reminder apps on tablets and smartphones** Taking rest breaks from sustained use of Tablets and Smartphones is essential. Often we forget to do this because we are concentrating on tasks. We often think an activity will only take a short time but it ends up taking us much longer. There are a number of rest break reminder apps available for Tablets and Smartphones. Search for rest break reminder in app stores. If you have been provided with Tablets and Smartphones for work, make sure that they have rest break apps installed and activated.

2.6 Travel planning	Detail and any proposed changes / actions	Guidance
Can you book your train seats at a table if you are planning to work?	*How is travel booking done, are changes needed to make sure you can book table seats?*	**Book a table seat if you plan to work on a train** Trains are a fairly common workplace for many people – for several hours at a time in some cases. If you know that you are going to be working during a journey, try to ensure you book a seat at a table (or if you are not booking in advance, try to arrive early enough to secure an unreserved table seat).
Are there cafes / lounges where you are travelling, where you can work at a table?	*Briefly list the main places mobile work occurs, and whether tables or other work areas are available*	**Plan ahead where you intend to work, aim to avoid working with your laptop on your lap** One of the least ideal working arrangements is laptop on lap. If you have to do sustained work, you should always aim to work at a table. If you are able to do this, you should also aim to set up using external keyboard and a laptop stand. Many travel hubs now have 'landing zones' where you can set yourself up to work and get into a good working posture.

2.6 Travel planning	Detail and any proposed changes / actions	Guidance
Do you work in your car for sustained periods?		**If you can't avoid working in your car, make sure you only do it for short periods** Space to work in cars is restricted and it is unlikely you will be able to set up an ergonomic working arrangement. It is likely you will be working with your laptop on your lap, neck bent forward and down, possibly twisted to the side. Wrist posture may also be compromised. **Move away from drivers seat** If you do have to work in your car, consider moving to a passenger seat, where you will have more room to work and adjust your posture. **Plan ahead – where can you get out and work?** If you know you may have to work whilst 'on the road', plan ahead and check whether there are cafés etc. where you can sit and work at a table. **If work is unavoidable consider using a vehicle desk or lap desk** There are vehicle desks available. These come in a range of designs. Most will allow you to work in better postures than if your laptop or device is directly on your knees. **Click here** for some examples of in-vehicle desks.

2.6 Travel planning	Detail and any proposed changes / actions	Guidance
Do you work on your devices while travelling on planes or on coaches?	*Do you travel standard class and have to work during your flights? Have you asked about upgrading your seat? Is your work avoidable or could you work on hardcopy?*	**Avoid working in planes on a laptop or tablet for sustained periods if you are seated in a standard zone** Space in standard seating on many airlines is quite restricted and trying to use a laptop or tablet with keyboard will result in poor neck and wrist posture. If you are expected to do sustained work on a plane, check your company's travel policy and if possible book upgraded seats with space to set up a more ergonomic working arrangement.
If you visit other offices are you able to use a desk / docking station for any sustained work you may need to do? Is there a facility to connect your laptop with an external monitor, keyboard and input device? Is suitable and adjustable office seating provided?		**Check what facilities there will be to work at destination offices or client sites** Make sure if you are visiting other offices either within your company or clients etc. that you know whether there are facilities for hot-desking / landing zones where you can do sustained work at an ergonomically set up workstation. **Remember to book a desk if you need to** Some offices and companies need desks to be booked in advance. Make sure you know the system and who to book with. Reserve your desk early. **Would couriering you equipment such as external keyboard ahead of your arrival help reduce the load you have to carry and is it feasible?** If you are doing sustained work without an external monitor you should set up a laptop stand or tablet stand or riser, external keyboard and input device at the desk available (or use voice command and dictation).

2.6 Travel planning	Detail and any proposed changes / actions	Guidance
If you work at hotels do you use the desk in your room or business centre / landing zone?		**Set up your equipment ergonomically in your hotel room** If you are doing sustained work in your room you should set up a laptop/tablet riser, external keyboard and input device at the desk available (or use voice command and dictation). **Use business centres at hotels / travel hubs if they allow you to work more ergonomically** Alternatively many hotels now have business centres / 'landing zones'. If these are available you should be able to set up a good working arrangement – again using a laptop stand or tablet stand or riser and external keyboard.

Summary – to be completed by Employer and Employee

List any proposed changes and improvements.	Who is responsible for implementing changes?	Target dates for implementation of changes.	Actual dates that changes were implemented.

Note any additional details

3

How to reduce
the risks of injury

PUTTING SAFER MOBILE WORKING METHODS INTO PRACTICE

This section brings together recommendations and information on mobile working. We have grouped our advice into 5 key areas to take into account when you are mobile working.

Avoiding – minimise unnecessary tasks where you are working in non-ergonomic arrangements

Plan your travel – think about where you can work most comfortably and the equipment you will need

Control – take control of where you work and how you work, make an effort to set up as ergonomically as possible

Rest – if you are mobile working in less than ideal arrangements you will need to rest more frequently than you would in the office

Technology – use voice dictation and commands to reduce typing, and/or use an external keyboard and/or input device / stylus / Bluetooth pen.

These 5 areas are explained in more detail below.

AVOID

Are the tasks you do away from an optimal working arrangement really essential? Avoid lengthy periods of work on mobile devices when actually travelling, whenever possible. For example work on hardcopy or notebooks etc. as long as the additional weight is not excessive.

Consider using the time for thinking, planning making notes etc. rather than typing. If you are travelling with colleagues, encourage each other to take rest breaks.

PLAN

If your mobile device use involves travelling, plan ahead to try and optimise how and where you work, also try to match the tasks you do to your situation. This section gives some tips on how to achieve this.

Trains

Book a table seat if you are going to be doing sustained work

Trains are a fairly common mobile workplace for many people – for several hours at a time sometimes. If you know that you are going to be working during a journey, try to book your seat at a table (or if you are not booking in advance, try to arrive early enough to secure an unreserved table seat).

Avoid working on a laptop on airline seats

Avoid working on a laptop when you are on an airline (non-table) seat on a train. Space is restricted and you will inevitably have to adopt poor neck and wrist postures while working.

Advantages of aisle seats when working

Also consider booking aisle seats as a preference. This helps in three main ways:

- Taking standing breaks will be easier and less disruptive to others (so you may be more inclined to take them)

- Glare from the sun will be less of a problem when you are trying to work

- Arm / elbow space is less restricted, which can help you maintain better wrist posture if typing

Cars

Avoid working in your car other than for short periods. If you know you may have to work while 'on the road', plan ahead and check for cafés etc. where you can sit and work at a table.

If working in your car is unavoidable, either move into a seat other than the driving seat, and use a lap desk or similar. Click here for examples of in-vehicle desks. Alternatively use a tray which fits to the steering wheel and raises your laptop or tablet off your lap.

For tips on car ergonomics and driver comfort click here.

Transport hubs

At transport hubs e.g. airports or stations, find out in advance where there are business lounges or which the best cafés are for working and internet access.

Planes

Avoid sustained work on mobile devices on a plane, unless you are in an upgraded zone which provides adequate workspace, table etc. In a standard aircraft seat the layout / passenger envelope is likely to result in poor neck and wrist posture.

Plane travel, long haul travel overseas etc. can lead to stresses and strains which go beyond the issue of mobile working. Click here for advice on staying comfortable and safe.

Visiting other offices

Plan ahead and book a desk if possible (and if necessary).

Check what facilities will be available e.g. docking stations with external monitors, laptop stands, external keyboards and input devices etc. If you have to visit this area regularly speak to the area manager and ask for a correctly equipped hot desk area to be set up.

Take equipment such as laptop stand, external keyboard, input device with you if none will be available at the office you are visiting.

Consider sending equipment such as a laptop stand and external keyboard ahead of you if you are not travelling by car (and if there are none at the office you are travelling to). This will mean you are not having to carry it long distances. This approach won't suit all situations but may be worth considering.

Use an adjustable seat if one is available. Try to avoid using un-adjustable conference/meeting seating for long periods of time. If you have to use un-adjustable seating make sure you take more frequent rest breaks.

Co-working spaces

Using co-working space is an increasingly popular way of working. As more people work flexibly from home, this can be a good way of avoiding isolation and many people enjoy and benefit from the creative buzz of a good co-working space.

Co-working has many positives and even some large companies are viewing it as a potential way of saving real estate costs. However, if you are using a co-working space you should set up an optimal working arrangement as far possible – here's a reminder:

- Raise your screen height using a laptop stand or tablet riser depending on which device you are using) – don't just work with your laptop or tablet at desk height.

- Adjust your seating – good co-working spaces should provide adjustable office-style seating. If you are not sure how to adjust your seat, ask someone to demonstrate it.

- If you need a foot-rest, ask for one.

- Use an external keyboard and input device.

- If the co-working space provides lockers, consider leaving your external devices and stand / riser, to avoid having to carry it to and from work.

Ad-hoc work at home

If you are not a designated homeworker, but you choose to work at home for significant periods with your employers agreement, you should set up your mobile device (laptop or tablet) with a suitable stand or riser, external key-board and input device.

If your employer provides you with mobile devices and expects you to use them away from your office you should also be provided with reasonably practicable risk controls. This is likely to include a stand or riser for your laptop or tablet, an external keyboard and an input device.

Who pays for equipment?

If your employer provides you with mobile devices and expects, as a significant part of your work, that you use them away from the office then the employer should provide you with risk controlling equipment such as laptop stands, external keyboards, etc. if they are practical for the work they do and if they will be used effectively.

CONTROL

Take control of where and how you work.

Take a moment to think about whether you may be working in a certain way or in a particular place mostly out of habit. There may be simple changes you can make to work more comfortably and safely – such as working at a table in your favourite café instead of working on a sofa with your laptop on your lap.

Avoid working in ways that put you at risk of pain and discomfort. Find ways to step up how you look after yourself – café tables, although they are not ideal, are better than knees

Select your working environment proactively

Choose your working environment carefully – and set it up as ergonomically as you can. Consider how long you are likely to be working and whether the arrangement will be suitable and comfortable.

One of the least ergonomic working arrangements is laptop-on-lap. If you have to do sustained work, you should always aim to work at a table.

If you are able to work at a table, you should also aim to set up using external keyboard and stand or riser. Many airports and hotels now have 'landing zones' for short-term work, where you can set up your equipment optimally.

Thinking, planning and discussing versus typing

Sometimes we can use our time just as effectively by thinking about our tasks rather than always typing, searching etc. For example with a notebook and pen we can sometimes think more freely and creatively. Sometimes a few minutes really thinking deeply about a challenge is worth hours of 'habit working' where we tap away thinking along the same lines over and over again.

Working smarter like this can be more productive than continuing with everyday work in a less than ideal environment. If you are travelling with a colleague time could be best spent talking things over rather than spending hours each with heads down into laptops, you can also encourage each other to take rest breaks etc.

Control over eye strain

Remember to control your screen brightness – often when mobile working we are in brighter environments than we are used to which means our screens will probably need to be set brighter for us to read them properly. Many phones and tablets automatically adjust but older laptops are less likely to.

Remember: Make adjustments! Don't assume things have to be a certain way, focus on your neck posture, wrist and arm posture, and back support.

Could your journey be best spent thinking and talking rather than typing into a miniature keyboard?
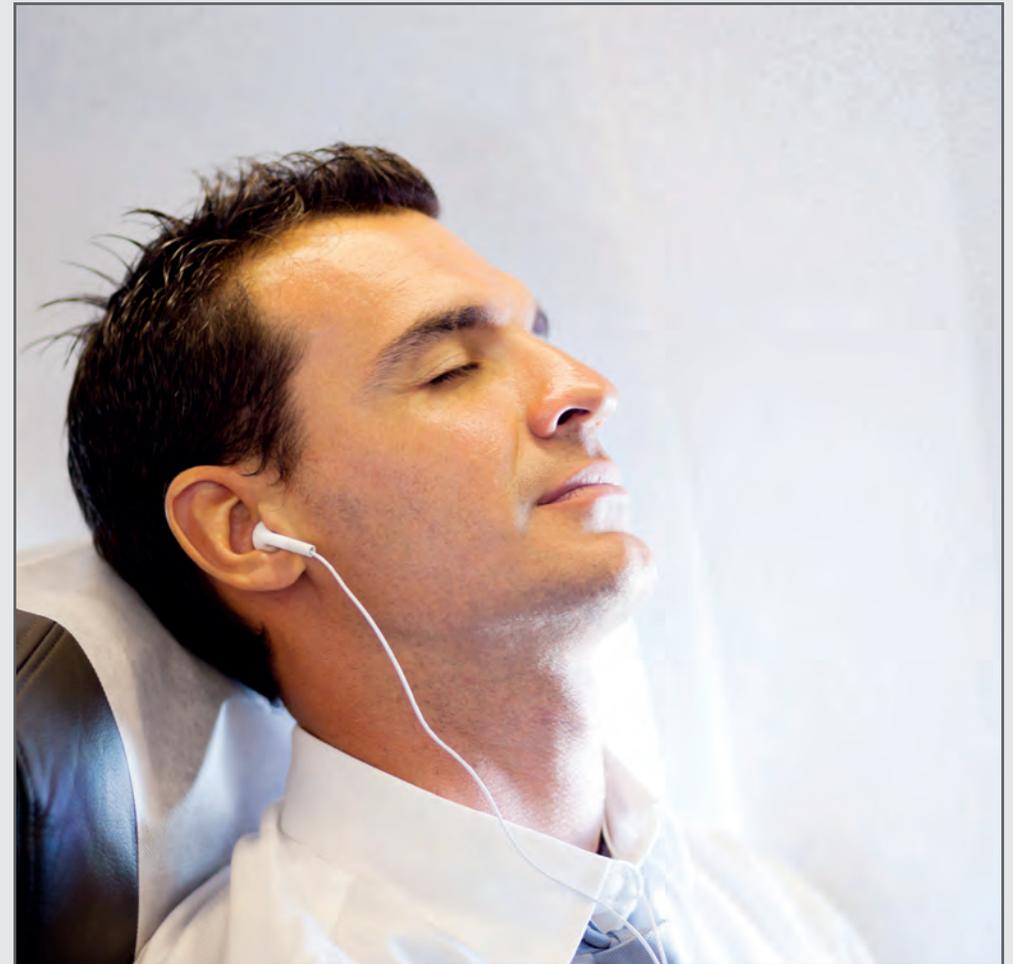
REST

Take more frequent rest breaks when working in non-optimal arrangements

During any type of screen-work / data entry situations you should take regular breaks, even if that just means raising your head / eyes from the screen and letting your hands rest in a neutral posture. The less optimal that your work arrangements are, the more frequent your breaks should be as illustrated in our hierarchy of risk control.

Use rest break software

Rest break software is available for most devices from smartphones through to laptops. Use the search term: rest break reminder, to browse and read reviews of different packages.

Research has found that regular rest breaks can improve overall performance and concentration

The following rest break targets are recommended:

Optimal conditions:

Green on hierarchy of control flowchart:

2 to 5 minutes every 30 minutes

or

5 to 10 minutes every hour.

Moderate conditions:

Amber on hierarchy of control flowchart:

2 to 5 minutes every 30 minutes

Poor conditions:

Red on hierarchy of control flowchart:

2 to 5 minutes every 15 minutes

Take micro-pauses

In between longer formal rest breaks (optimal and moderate conditions), use micro-pauses to ease the strain. Look up from your screen, pull in your chin, turn your head from side to side etc. Also remember to take your hands off the keyboard or put down the device you are using and relax your wrists and shoulders.

Micro pauses can be very short, up to just 30 seconds every 15 to 20 minutes or less [43,44]. In New Zealand they the phrase used is 'Stop, Drop, and Flop' – meaning stop working, stretch, then let your shoulders drop and let your hands flop by your sides.

Physical rest

Put bags down if you can, allow your back and shoulders to rest. If and when there is a risk of theft or forgetting the bag, keep it tethered if you have placed it placed on the ground e.g. hold on to the shoulder strap.

Rest, wellbeing and state of mind

Consider your state of mind and how you want to arrive at your destination.

Do you want to arrive refreshed and with new ideas, or tired and uncomfortable from working in sub-optimal conditions? Having to work while travelling is an inevitable part of many peoples' working lives, but consider carefully about whether it needs to be – at least to the same extent, and if you do need to work, how could you most safely do it while travelling?

Be realistic about what can be achieved while travelling

When considering work planning and role expectations employers should take into account that some people can concentrate and work better in busy travel environments than others. Because of this, time when travelling should not automatically be expected to be as productive as time in the office.

LOOKING AFTER YOUR EYES

Brightness and glare

Avoid working with sunlight directly on your screen.

Adjust your screen brightness

Adjust screen brightness if you are working in a bright environment. Most mobile devices and many newer laptops adjust their screen brightness automatically. Check that your devices are set up to do this.

Keep a clean screen

Keep your screens clean and free from dust and smears, to reduce veiling reflections (glare) which can make screens more difficult to read.

Use anti-glare screen filters

Anti-glare screen filters / screen protectors can help reduce eye-strain by reducing the amount of light reflected from your screen, making it easier to read.

Consider using blue-light filters or filter apps

Recently there has been a focus on the intensity of blue-light wavelengths emitted by modern device screens. Studies have shown links between increased levels of blue-light and melatonin suppression which leads to reduced sleep quality [46,47]. Other studies have indicated that there may be

potential for retinal damage by blue light emitted by modern device screens [45], however this link has not yet been fully confirmed.

The technology industry is moving towards screens which filter blue light, but many devices currently do not have this. Our recommendation is (given the low costs involved) to err on the side of caution and fit your devices with blue light filtering screen protectors / filters.

There are also apps - for example f.lux, Bluelight Filter for Eye Care, Twilight, and CF.Lumen which alter the blue light intensity emitted from your mobile device or computer.

We blink less and keep short fixed focal length when using mobile devices. This can strain and irritate our eyes. Remember to give them a break: 20-20-20.

Focus and the 20-20-20 rule

Bear in mind that with smartphones you are looking at a relatively small screen and often small fonts held close to your eyes. This means maintaining a fixed short focal length which puts strain on eye muscles and can result in your eyes feeling tired [19,48]. Research has also found that we tend to blink less than normal when using device screens, which can lead to eye irritation [19,48, 49].

At the very least, you should always apply the 20-20-20 rule during any screen work – for every 20 minutes focusing on the screen, look away for 20 seconds at something 20 feet away [19,48,49]. The rest periods proposed in this document are potentially longer and more frequent than this rule, if you are working in non-optimal working conditions. However even if you have a good ergonomic working arrangement and plan less frequent rest breaks, you should still take micro-pauses and 20-20-20 eye rests.

Rotate your device and zoom to increase character sizes etc.

It might sound obvious but remember to rotate your device from portrait to landscape if it enables you to read in a larger font. Also zoom in where it helps to read and see details.

TECHNOLOGY – USE IT TO MAXIMUM EFFECT

Use dictation and voice control facilities

Make good use of dictation software. If you are doing sustained work on a tablet or smartphone, or even just for sending long text messages or emails while in private, try using the voice dictation functions such as voice texting to reduce typing, or use an external keyboard.

Voice recognition software is built into modern devices and now has a good level of accuracy in most conditions, where there is not too much background noise.

Accessibility options and voice control can also be used to open apps. It is worth spending time testing these systems and getting to know them. Over the long term it could save you time and discomfort.

Hotkeys / Keyboard shortcuts

Using a Bluetooth portable keyboard and hotkey combinations can help to reduce musculoskeletal risks of sustained typing / selecting / scrolling etc. on Tablets or smartphones.

Bluetooth pens

Bluetooth pens can provide a useful alternative to sustained typing on mobile devices. These pens link with your device and whatever you write in

your notebook is sent to your device and stored digitally. These can provide a way of reducing typing and writing emails / text messages in a more natural traditional way.

FIVE KEY SUMMARY POINTS

1. Discuss and assess your mobile work with your line manager / employer and ensure you are trained in recognising the risks and how to deal with them.

2. Plan ahead to avoid sustained work in sub-optimal conditions.

3. If you are expected to do sustained mobile work, your employer should provide you with reasonably practicable controls, i.e. a laptop or tablet stand, and external keyboard and an external input device (where appropriate).

4. Take control of your work environment; how, where and when you work.

5. Take more frequent rest breaks when doing sustained mobile work.

SUMMARY

This guidance is produced to support businesses in effective management of ergonomic and health issues associated with mobile working. We want to see mobile devices being used in ways that don't compromise people's health and comfort.

Flexible working, mobile devices – it's all here to stay.

One of the most interesting findings from research, is that users do not always seem to correct their posture or change how they work with mobile devices to alleviate existing strains. This makes it all the more important that employers train their employees to understand and identify the risks of poor mobile working methods and poor posture. To reduce the risks of musculoskeletal strain means a conscious effort on the part of all of us. We need to get into good habits. Taking care of ourselves when we use our mobile devices needs to become embedded in the wider culture of mobile device use, and dealing with the work side of this is an excellent first step.

Setting an example for the next generation

For generations born from this point forward (or probably even from some years back) children are growing up habitually using mobile devices, particularly tablets and smartphones. We see children adopting a tablet slump and high levels of neck bending from an early age, and thumb scrolling on smartphones. Anecdotally the effects of this are becoming clear as younger and younger patients seek help for pain due to poor posture and device use. We hope that the messages and advice in this guidance will help not only current workers but that they will filter through to home life and younger generations. If this does not happen employers may increasingly find themselves in a position of adapting to accommodate people with existing injuries, rather than taking steps to avoid healthy people developing injuries.

Thanks to

The CIEHF would like to thank Ed Milnes and Sarah Tapley, both Chartered Registered Members of the CIEHF, who authored this guide and have donated their work to the CIEHF.

A special thank you to Jim Taylour, Head of Ergonomics at Orangebox Ltd, for starting the thought processes that led to the development of this guidance. Jim's work and his 'Mobile Generations' white paper highlighted the wide range of mobile working ergonomics issues and provided helpful direction for the work.

Lone working

The checklist in this guidance is not a lone worker risk assessment, but the assessment process is a useful opportunity to check whether a lone worker assessment is necessary. See HSE publication INDG73 for more information.
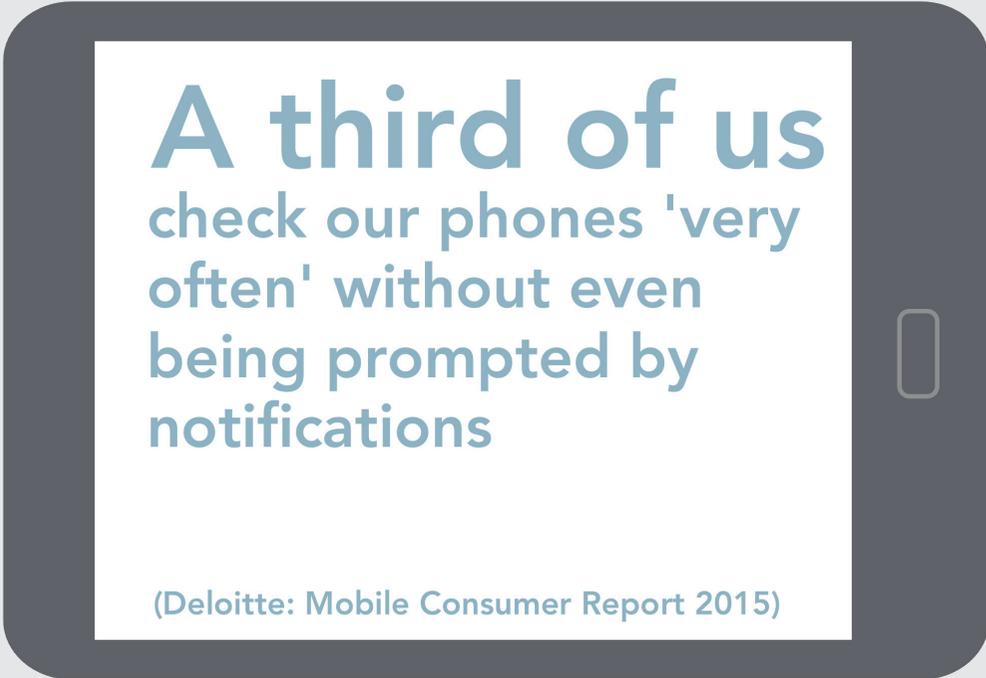
A third of us
check our phones 'very often' without even being prompted by notifications

(Deloitte: Mobile Consumer Report 2015)

Should my employer provide me with a suitable bag to carry my mobile work equipment?

If you are required to carry a laptop or tablet as part of your work, your employer should make a suitable bag available to you.

If you choose your own bag it is important that you have received guidance in selecting an appropriate bag for the weight of equipment and length of journey you typically undertake. Your employer should so far as is reasonably practicable ensure as part of your mobile working risk assessment that your choice of bag is suitable and safe.

Is my employer required to provide me with an external keyboard and laptop stand?

In short – yes if you are required or expected to work away from the office or home on a laptop or tablet provided by your employer, or a laptop or tablet which it has been agreed is to be used for work, then your employer should provide you with reasonably practicable risk control measures. This will include an external keyboard, a laptop/tablet stand/riser and an external input device. Weight and bulkiness of these should be considered by employers when choosing them for employees. The same applies to tablets if they are to be used as a device for sustained work.

People use their phones and tablets and laptops at home, how do we know if their problem is from work use? And why should we do anything about it if they are exposing themselves to these risks at home?

Consider this analogy: People do heavy lifting – for example at the gym or in the garden i.e. 'at home', but employers are still required to assess manual handling risks and provide training to employees if they area exposed to those risks at work. This is because there is a risk which arises out of the work activity itself, and it is within employers abilities to take steps to manage it. The same principle applies to the use of mobile devices if the nature of their use may present a risk to employees.

Accommodating employees

Because of the high levels of device use at home, in many situations it would probably be hard to say with a degree of certainty whether a musculoskeletal injury was caused by work or home device use. Because of the cumulative nature of musculoskeletal disorders, there is a potential that both home and work activity could contribute. Even in situations where there is a clear association between pain and a work activity it may be hard to identify a causative link with work. However, even in this situation employers have a duty to accommodate employees' musculoskeletal problems as far as is reasonably practicable. This guidance is aimed at giving companies a clearer understanding of what they can do to limit further exposure to musculoskeletal risks from mobile working.

In some cases if someone is using mobile devices for work and associates their pain with that device use, their employer may be asked by a health and safety regulator, or an industrial tribunal to demonstrate that they have managed the risks adequately. Currently in many companies those risks are not adequately managed - this guidance is aimed at changing that.

Keeping your employees work-fit.

By educating your workforce and providing equipment for safer use of mobile devices, we believe this should feed into improvements in how people use their devices at home as well as at work. This in turn should help reduce incidence of time off or reduced performance due to musculoskeletal pain. If anything, the fact that so many people are exposing themselves to the same risks outside work, means it is even more important for employers to understand the risks, manage them proactively and train their workforce properly.

GLOSSARY OF TERMS

Optimal or ergonomic arrangement – This means arrangements which allow the user to work in a similar posture to that adopted at a well set up desk in an office i.e. a laptop or tablet set up on a stand or riser with the top of the screen approximately in line with the eyes, with an external keyboard and input device. Seating for an optimal arrangement would mean an adjustable office chair. However, realistically when travelling or in hotels, cafés etc. the best you are likely to achieve is a seat which offers good back support, supports the underside of your thighs, and allows your feet to rest on the ground (while maintaining keyboard and screen at relatively ideal heights).

Sustained – e.g. 'sustained period of work'. This means longer than a few short emails or texts. It means a series of long email exchanges, or data entry, information searches etc. i.e. work tasks, which last cumulatively longer than 15 minutes (including breaks). For example if you work for 15 minutes, then take a rest break and then do another 15 minutes work, this should still be regarded as sustained work on whichever device you are using, and the risk reduction measures followed as set out in the guidance.

REFERENCES AND FURTHER INFORMATION

1. Institute of Leadership & Management (2013) Flexible working: Goodbye nine to five, London ILM. https://www.i-l-m.com/~/media/ILM%20Website/Downloads/Insight/Reports_from_ILM_website/Research_flexibleworking_march2013%20pdf.ashx

2 Leon Straker, Kerry J. Jones, Jenni Miller (1997) A comparison of the postures assumed when using laptop computers and desktop computers. Applied Ergonomics Vol28, No. 4, pp 263-268,

3 Krishna Asundi, Dan Odell , Adam Luce & Jack T. Dennerlein (2010) Notebook computer use on a desk, lap and lap support: Effects on posture, performance and comfort. Ergonomics. 53:1, p74-82

4 J.E. Gold, J.B. Driban, V.R. Yingling, E. Komaroff (2012) Characterization of posture and comfort in laptop users in non-desk settings. Applied Ergonomics (43) p392-399.

5. Horizon Scanning SR024 (June 2010) HSE Horizon Scanning Short Report: The Generation Gap: Towards Generation Z

http://www.hse.gov.uk/horizons/assets/documents/generationz.pdf

6. Deloitte: Mobile Consumer 2015: The UK cut – Game of Phones. http://www.deloitte.co.uk/mobileuk/assets/pdf/Deloitte-Mobile-Consumer-2015.pdf

7. IDG Knowledge Hub Infographic – Mobile is an integral part of working life. http://idgknowledgehub.com/2013/07/23/infographic-mobile-is-an-integral-part-of-working-life/

8. IDG Knowledge Hub Infographic – Mobile Evolution: Millenials vs Generation X. http://infographics.custominfographics.org/2015/06/15/idg-mobile-2014-survey-the-mobile-evolution-connecting-content-l-84b0359d286d966f.jpg

9. Steelcase: Global Posture Survey (2015)

http://www.steelcase.com/content/uploads/2015/01/global-posture-study.pdf

10. Berolo S, Wells RP (2011) Musculoskeletal symptoms among mobile hand-held device users and their relationship to device use: A preliminary study in a Canadian university population.

Applied Ergonomics. Vol:42(2):p371-8.

11. Lee M, Hong Y, Lee S, Won J, Yang J, Park S, Chang KT, Hong Y (2015) The effects of smartphone use on upper extremity muscle activity and pain threshold. Journal of Physical Therapy Science. June; Vol. 27(6):1743-5.

12. Sharan D1, Ajeesh PS. (2012) Risk factors and clinical features of text message injuries. Work;41 Suppl. 1:p1145-8.

13. When Technology Hurts 'Texting thumb' and other tech-related pain, explained. https://www.rush.edu/health-wellness/discover-health/when-technology-hurts

14. Blackberry Thumb: Real illness or just dumb? http://www.webmd.com/arthritis/news/20050126/blackberry-thumb-real-illness-just-dumb

15. Hoober, S (2013) How Do Users Really Hold Mobile Devices?

http://www.uxmatters.com/mt/archives/2013/02/how-do-users-really-hold-mobile-devices.php

16. Ping-Hsin Ko, Yaw-Huei Hwang & Huey-Wen Liang (2015): Influence of smartphone use styles on typing performance and biomechanical exposure, Ergonomics,

17. Gustafsson, E., Johnson, P,W., Lindegård, A., Hagberg, M. (2011) Technique, muscle activity, kinematic differences in young adults texting on mobile phones. Ergonomics, Vol. 54(5), p477-487.

18. Sojeong Lee, Hwayeong Kang & Gwanseob Shin (2015) Head flexion angle while using a smartphone, Ergonomics, 58:2, 220-226,

19. Hindsight is 20/20/20: Protect your eyes from digital devices. (2015) The Vision Council.

https://www.thevisioncouncil.org/sites/default/files/VC_DigitalEyeStrain_Report2015.pdf

20. I. A. Kapandji MD. The Physiology of the Joints, Volume III (6th Edition) Churchill Livingstone.

21. Anita N. Vasavada, Derek D. Nevins, Steven M. Monda, Ellis Hughes & David C. Lin (2015) Gravitational demand on the neck musculature during tablet computer use, Ergonomics, 58:6, 990-1004.

22. Justin G. Young, Matthieu Trudeau, Dan Odell, Kim Marinelli and Jack T. Dennerlein (2012). Touch-screen tablet user configurations and case-supported tilt affect head and neck flexion angles. Work 41 (2012) 81–91 81 IOS Press

23. Hansraj, K, K MD Assessment of Stresses in the Cervical Spine Caused by Posture and Position of the Head. Neuro and Spine Surgery - Surgical Technology International XXV

24. L. Straker, B. Maslen, R. Burgess-Limerick, C. Pollock (2009) Children have less variable postures and muscle activities when using new electronic information technology compared with old paper-based information technology. Journal of Electromyography and Kinesiology. Volume 19, Issue 2, April, p132–143

25. L26 - Work with display screen equipment - Health and Safety (Display Screen Equipment) Regulations 1992 as amended by the Health and Safety (Miscellaneous Amendments) Regulations 2002. Guidance on Regulations. HSE Books.

26. Traci Galinsky, Naomi Swanson,Steven Sauter, Robin Dunkin, Joseph Hurrell,1 and Lawrence Schleifer, (2007) Supplementary Breaks and Stretching Exercises for Data Entry Operators: A Follow-Up Field Study. American Journal of Industrial Medicine 50:519–527

27. Balci R, Aghazadeh F. (2003) The effect of work-rest schedules and type of task on the discomfort and performance of VDT users. Ergonomics. April 15;46(5):455-65.

28. Prevent pain from computer use – Harvard Health Letter http://www.health.harvard.edu/pain/prevent-pain-from-computer-use

29. Health & Safety At Work etc. Act 1974 –http://www.hse.gov.uk/legislation/hswa.htm

30. HSG65 – Managing for Health & Safety. (2013). HSE Books http://www.hse.gov.uk/pubns/priced/hsg65.pdf

31. HSE web pages – Defining reasonably practicable

http://www.hse.gov.uk/risk/expert.htm

32. C. O`Shea, J. A. Bettany-Saltikov, J.G.Warren (2006) Effect of Same-Sided and Cross-Body load carriage on 3D Back Shape in Young Adults. Research into Spinal Deformities 5. D. Uyttendaele and P.H. Dangerfield (Eds.) IOS Press.

33. Yong 'Tai' Wang , D. D. Pascoe & W. Weimar (2001) Evaluation of book backpack load during walking, Ergonomics, 44:9, 858-869

34. David D. Pascoe , Donna E. Pascoe , Yong Tai Wang , Dong-Ming Shim & Chang K. Kim (1997) Influence of carrying book bags on gait cycle and posture of youths, Ergonomics, 40:6, 631-640.

35. R. R.E.E. Motmans , S. Tomlow & D. Vissers (2006) Trunk muscle activity in different modes of carrying schoolbags, Ergonomics, 49:2, 127-138

36. J.D. Rose, E. Mendel & W.S. Marras (2013) Carrying and spine loading, Ergonomics, 56:11, 1722-1732,

37. Nasser Koleini Mamaghani, Yoshihiro Shimomura, Koichi Iwanaga &

Tetsuo Katsuura (2009) Effects of strap support in a hand-held device on the muscular activity in female workers assessed by electromyography and subjective rating. Ergonomics. 52:7, p848-859

38. Sabine Sonnentag, Pamela L. Perrewe, Daniel C. Ganster (2009) Current Perspectives on Job-stress Recovery. Research in Occupational Stress and Wellbeing Vol 7. Emerald JAI.

39. Adrian Farrell - Where's your head at – and is it causing your back pain?!

http://www.alexander-technique.london/2014/10/03/where-s-your-head-at-and-is-it-causing-you-back-pain-part-1/

http://www.alexander-technique.london/2014/11/06/where-s-your-head-at-and-is-it-causing-your-back-pain-part-2/

40. Andreas Liebl, Jörg Haller, Bernd Jödicke, Herwig Baumgartner, Sabine Schlittmeier, Jürgen Hellbrück (2012) Combined effects of acoustic and visual distraction on cognitive performance and well-being. Applied Ergonomics Volume 43 Issue 2. Special Section on Product Comfort. Pages 424–434.

41. S. Lamb, , K.C.S. Kwok A longitudinal investigation of work environment stressors on the performance and wellbeing of office workers. Applied Ergonomics. Volume 52, January 2016, Pages 104–111.

42 Asundi, K., Odell, D., Luce, A., Dennerlein, J.T. (2012) Changes in posture through the use of simple inclines with notebook computers placed on a standard desk. Applied Ergonomics – Special Section on Product Comfort. Volume 43, Issue 2, March 2012, Pages 400–407

43. Balci R1, Aghazadeh F. (2003) The effect of work-rest schedules and type of task on the discomfort and performance of VDT users. Ergonomics. 15;46(5):455-65.

44. L. McLean, M. Tingley, R.N. Scottc, J. Rickards (2001) Computer terminal work and the benefit of microbreaks. Applied Ergonomics. Volume 32, Issue 3, Pages 225–237.

45. Hawse (2006) Blocking the blue. The British Journal of Ophthalmology. Vol. 90(8): p939–940.

46. A, M Chang, D Aeschbach, J Duffy, C Czeisler (2014) Evening use of light-emitting eReaders negatively affects sleep, circadian timing, and next-morning alertness. PNAS.

http://www.pnas.org/content/112/4/1232.full.pdf

47. Brittany Wood , Mark S. Rea , Barbara Plitnick , Mariana G. Figueiro, (2013)

Light level and duration of exposure determine the impact of self-luminous tablets on melatonin suppression. Applied Ergonomics. Volume 44, Issue 2, p 237–240

48. Bababekova Y1, Rosenfield M, Hue JE, Huang RR. (2011) Font size and viewing distance of handheld smart phones. Optometry and Vision Science. Jul;88(7):795-7

49. J Bali, N Neeraj, R Thakur Bali (2014) Computer Vision Syndrome: A Review. Journal of Clinical Opthalmology and Research. Jan-Apr 2014 Vol 2(1).

NON-NUMBERED REFERENCES

Mobile Generations (2014). Taylour, J .et al. Orangebox Publication. www.mobilegenerations.org.uk

ONS Sickness Absence report 2014.

Office for National Statistics (ONS). Full Report: Sickness Absence in the Labour Market, February 2014

eMarketeer report. UK Adults Spend More Time on Mobile Devices than on PCs. http://www.emarketer.com/Article/UK-Adults-Spend-More-Time-on-Mobile-Devices-than-on-PCs/1012356#sthash.KheWPuYA.ZUW0eXRz.dpuf

Chartered Society of Physiotherapy (CSP) (February 2012) Health and Social Care Bill – Lords Report Stage briefing: Impact of NHS reforms on musculoskeletal physiotherapy

Work-related Musculoskeletal Disorder (WRMSDs) Statistics, Great Britain, 2015. Health & Safety Executive (HSE) http://www.hse.gov.uk/statistics/causdis/musculoskeletal/msd.pdf
IDG Mobile Evolution report 2014.

The Mobile Evolution: Connecting Content (2014) IDG Global Solutions.

Salesforce Mobile Behavior Report (2014) www.salesforce.com/marketingcloud

Ofcom report 2015.

Ofcom: The Communications Market (2015) http://stakeholders.ofcom.org.uk/binaries/research/cmr/cmr15/CMR_UK_2015.pdf

BIBLIOGRAPHY

Ankrum, D., Nemeth, K (2000) Head and Neck Posture at Computer Workstations – What's Neutral? Proceedings of the 14th Triennial Congress of the International Ergonomics Association. Vol 5, pp 565 – 568.

BT – Get fit for mobile working guides

http://www.insight.bt.com/en/features/get_fit_for_mobile_working?s_cid=btb_FURL_fitformobileworkinghttp://www.nhs.uk/LiveWell/WorkplaceHealth/Pages/Laptophealth.aspx
Chris Hoffman (2013) Use voice dictation to save time on android, iPhone and iPad. http://www.howtogeek.com/177387/use-voice-dictation-to-save-time-on-android-iphone-and-ipad/

Ergonomics Guidance for Mobile Devices http://web.stanford.edu/dept/EHS/prod/general/ergo/documents/laptop_guide.pdf

Eye Fatigue (on WebMD) http://www.webmd.com/eye-health/eye-fatigue-causes-symptoms-treatment#1

Handbag Ergonomics – Part I http://www.coreconcepts.com.sg/mcr/handbag-ergonomics-part-i/

Honan M. (2015) Mobile work: Ergonomics in a rapidly changing work environment. Work. 52(2):p289-301.

Health and Safety of Portable display screen equipment. HSE Contract Research Report CRR304/2000 (System Concepts). (2000) http://www.hse.gov.uk/research/crr_pdf/2000/crr00304.pdf

Jinghong Xiong & Satoshi Muraki (2014) An ergonomics study of thumb movements on smartphone touch screen, Ergonomics, 57:6, 943-955

Kamp I, Van Veen SA Vink P. (2015) Comfortable mobile offices: A literature review of the ergonomic aspects of mobile device use in transportation settings. Work. Oct.

Kim, Man-Sig. (2015) Influence of neck pain on cervical movement in the sagittal plane during smartphone use. Journal of Physical Therapy Science Vol. 27: p15–17, 2015

Kirk McElhearn (2013) Beyond Siri: Dictation tricks for the iPhone and iPad http://www.macworld.com/article/2048196/beyond-Siri-dictation-tricks-for-the-iphone-and-ipad.html

McNamara (2015) The surprising state of the pc market in two charts. http://blog.shi.com/2015/01/22/the-surprising-state-of-the-pc-market-in-two-charts/#.VhJ6jnid-Ek

NIOSH. Musculoskeletal disorders and workplace factors: a critical review of epi- demiologic evidence for work-related musculoskeletal disorders of the neck, upper extremity, and low back. Bernard B (ed.). Cincinnati: DHHS (NIOSH) Publication No. 97-141, 1997.

Park, J., Kim, J., Kim, J., Kim, K., Kim, N., Choi, I., Lee, S., Yim, J (2015) The effects of heavy smartphone use on the cervical angle, pain threshold of neck muscles and depression. Advanced Science and Technology Letters Vol.91 (Bioscience and Medical Research 2015), pp.12-17

Simon Hill (July 26, 2015) Is blue light keeping you up at night? We ask the experts. http://www.digitaltrends.com/mobile/does-blue-light-ruin-sleep-we-ask-an-expert/

Summers, K., Jinnett, K., Bevan, S (2015) Musculoskeletal Disorders, Workforce Health and Productivity in the United States. The Work Foundation & The Centre for Workforce Health and Performance.

Surprise: Mobile devices don't help office ergonomics http://www.computerworld.com/article/2484764/byod/surprise--mobile-devices-don-t-help-office-ergonomics.html

Tablets aren't killing laptops but smartphones are killing tablets http://www.howtogeek.com/199483/tablets-arent-killing-laptops-but-smartphones-are-killing-tablets/

T Minter (2013) Ergonomics and the Mobile Environment. Interface. http://www.asse.org/assets/1/7/Tina_Minter_Article.pdf

Weighed down by a man bag? http://www.chiropractic-uk.co.uk/weighed-down-by-a-man-bag-215-news.aspx

iOS (iPhone and iPad)

You can type once you have put your cursor in position, e.g. as if to start a new message, simply once you have linked a Bluetooth keyboard to your iPhone or iPad. However to use hotkeys / shortcuts and navigate apps, you need to activate VoiceOver.

To activate on VoiceOver go to Settings > General > Accessibility > and turn on VoiceOver. Once it is turned on you need to tap the OK button twice on the information pop up that appears. This returns you to the home screen. VoiceOver is now active.

You will probably also want to switch off the voice which now tells you what is selected etc. Do this by just pressing **Ctrl⌥ S**

If your iPhone or iPad goes to sleep, you will need to physically press the home key as normal, to wake it. Instead of sliding the slider you will need to either press ↑↓ simultaneously or double tap the slider area instead.

A few of the most important navigation shortcuts are below.

Key to keys:

⌘ = Command

⌥ = Alt / Option

- Ctrl⌥ H - Home button

- Ctrl_⌥_H H - Show multitask windows

- → - Next item (e.g. hop to next app)

- ← - Previous item

- ↑↓ - Tap selected item (e.g. open an app).

- Ctrl → - Go to task bar (use ctrl + any of the 4 arrow keys to hope between the apps in the main screen and the apps on the task bar)

- ⌥ → or ← - Scroll left and right (navigate through doc e.g. go to next screen of apps)

- Escape – Back button

Remember once you have moved the selection to a text entry box, you will need to double tap to enter text (i.e. to select the box for text entry).

These are not a full list of shortcuts, you can find lots more online. Navigating an iPhone and iPad using shortcuts takes a bit of practice but you may find it works for you, depending on how repetitive your actions are using your device.

Even if you don't use shortcuts, it is worth connecting a Bluetooth keyboard to your device even just for text entry.

Shortcut keys on these devices can change with new operating systems, if you find a shortcut no longer works, the likelihood is it has been replaced with another key combination which you will be able to find online.

Remember to switch off VoiceOver when you are finished – otherwise it can be quite annoying! The easiest way to do this is as Siri to do it (double tap the home key and say 'Siri – turn off VoiceOver').

Android Shortcut keys

A. Android home screen shortcut keys

Ctrl Esc - Home screen context menu

Ctrl N - Nova Launcher settings

Ctrl M - Manage Apps in Settings

Ctrl P - Settings, main system settings menu

Ctrl S - Store, Google Play Store

Ctrl W - Wallpaper manager

Alt Spacebar - Opens Android search screen; sends to default browser

Alt Tab (Alt Shift Tab) - App Switcher, hold down Alt key

Ctrl Alt+Delete - Reboots instantly

B. Global app shortcuts on windows keyboard such as logitech k400r

WindowsKEY A - Calculator, open or switch to

WindowsKEY B - Browser, open or switch to

WindowsKEY C - Contacts, open or switch to

WindowsKEY E - Email, open or switch to

WindowsKEY L - Calendar, open or switch to

WindowsKEY P - Music app, open or switch to

WindowsKEY Spacebar = Opens Android search screen; sends to default browser

C. Android default browser shortcut keys

Navigation

Esc - Go back, dismiss

Ctrl Left Arrow - Back to previous page

Ctrl Right Arrow - Forward to next page

Ctrl R - Reload Page

Scrolling

Spacebar, Page Down - Scroll down a frame

Shift Spacebar, Page Up - Scroll up a frame

Arrow keys focus on the page elements

Up Arrow - Move up one element

Down Arrow - Move down element

Left Arrow - Move left one element

Right Arrow - Move right one element

Address bar

Ctrl L - Shift focus to the address bar (doesn't always work)

Arrow keys move focus within navigation bar area; Spacebar/Enter selects

Tabs

Ctrl N - Open a new tab

Ctrl T - Open a new tab

Ctrl W - Close current tab,if last tab, return to Home screen

Ctrl Tab - Switch to the next tab

Ctrl Shift Tab - Switch to the previous tab

Ctrl 1 through 8 - Switch to the specific tab

Search/text

Ctrl F - Open the in-page search box

Shift Backspace - Forward Delete (works like a normal "Delete" key)

Bookmarks & history

Ctrl D - Bookmarks the current page

Ctrl H - Opens the Bookmarks page

Ctrl J - Opens download history as a popup

Ctrl ? - Browsing history

Other

Ctrl Esc - Page context menu

Ctrl G - Page info

Ctrl I - Zoom in (depends upon context), three levels

Ctrl O - Zoom out (depends upon context), three levels

Ctrl P - Open Settings for browser

Ctrl R - Reload page

Ctrl S - Open Share popover with page destination options including ES File Explorer (social networking sharing?)

Windows shortcut key combinations

Alt+- (Alt+hyphen): Displays the Multiple Document Interface (MDI) child window's System menu (from the MDI child window's System menu, you can restore, move, resize, minimize, maximize, or close the child window)

Ctrl Tab: Switch to the next child window of a Multiple Document Interface (MDI) program

Alt+underlined letter in menu: Opens the menu

Alt F4: Closes the current window

Ctrl F4: Closes the current Multiple Document Interface (MDI) window

Alt F6: Switch between multiple windows in the same program (for example, when the Notepad Find dialog box is displayed, ALT+F6 switches between the Find dialog box and the main Notepad window)

Shell objects and general folder/Windows Explorer shortcuts

For a selected object:

F2: Rename object

F3: Find all files

Ctrl X: Cut

Ctrl C: Copy

Ctrl V: Paste

Shift Delete: Delete selection immediately, without moving the item to the Recycle Bin

Alt Enter: Open the properties for the selected object

To copy a file

Press and hold down the **Ctrl** key while you drag the file to another folder.

To create a shortcut

Press and hold down **Ctrl shift** while you drag a file to the desktop or a folder.

General folder/shortcut control

F4: Selects the Go To A Different Folder box and moves down the entries in the box (if the toolbar is active in Windows Explorer)

F5: Refreshes the current window.

F6: Moves among panes in Windows Explorer

Ctrl G: Opens the Go To Folder tool (in Windows 95 Windows Explorer only)

Ctrl Z: Undo the last command

Ctrl A: Select all the items in the current window

Backspace: Switch to the parent folder

Shift click Close button: For folders, close the current folder plus all parent folders

Windows Explorer tree control

Numeric Keypad *: Expands everything under the current selection

Numeric Keypad +: Expands the current selection

Numeric Keypad -: Collapses the current selection.

Right Arrow: Expands the current selection if it is not expanded, otherwise goes to the first child

Left Arrow: Collapses the current selection if it is expanded, otherwise goes to the parent

Properties control

Ctrl tab/ctrl shift tab: Move through the property tabs

Accessibility shortcuts

Press Shift five times: Toggles Sticky Keys on and off

Press down and hold the right Shift key for eight seconds: Toggles Filter

Keys on and off

Press down and hold the Num Lock key for five seconds: Toggles ToggleKeys on and off

Left Alt left shift num lock: Toggles MouseKeys on and off

Left Alt left shift print screen: Toggles high contrast on and off

Microsoft Natural Keyboard keys

Windows Logo: Start menu

Windows Logo R: Run dialog box

Windows Logo M: Minimize all

Shift Windows Logo M: Undo minimize all

Windows Logo F1: Help

Windows Logo E: Windows Explorer

Windows Logo F: Find files or folders

Windows Logo D: Minimizes all open windows and displays the desktop

Ctrl Windows Logo F: Find computer

Ctrl Windows Logo Tab: Moves focus from Start, to the Quick Launch toolbar, to the system tray (use Right Arrow or Left Arrow to move focus to items on the Quick Launch toolbar and the system tray)

Windows Logo Tab: Cycle through taskbar buttons

Windows Logo Break: System Properties dialog box

Application key: Displays a shortcut menu for the selected item