



Office of Safety, Health & Environment

NUS OFFICE ERGONOMICS MANUAL

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1 INTRODUCTION

Ergonomics can be defined as fitting the job to the worker. Not all workers are the same size and everyone has limits. Ergonomics aims to design workstations, work processes, equipment, and tools to fit the user. As a worker, it is important that the user knows how to adjust the office workstation to suit his/her needs.

If a job does not fit a worker, the worker is more likely to be exposed to risk factors that may lead to musculoskeletal injury. The main ergonomic risk factors in the office include the following:

- **REPETITION:** tasks or body movements carried out over and over again (e.g. typing for long period of time).
- **AWKWARD POSTURES:** body positions which deviate from neutral such as twisting the neck to view the monitor or reaching to use the mouse.
- **STATIC FORCES:** maintaining a position for a prolonged period of time (e.g. prolonged sitting, viewing the monitor with a bent neck, or reaching for the keyboard).

Every person responds to ergonomic risk factors in different ways. For example, one worker may have symptoms of an injury while another worker performing the same tasks may not have symptoms. Ergonomic risk factors should be identified and reduced to lower the risk of injury for all workers. Even those workers who are not experiencing pain should take ergonomics seriously to reduce the risk of developing an injury.

1.1 NUS Office Ergonomics Program and Manual

The ergonomics program at the National University of Singapore (NUS) is established to support a safe and healthy work environment by minimising the risk of developing musculoskeletal disorders (MSD) that is associated with forceful exertions, repetitive motion, and prolonged, awkward or static postures.

The program is coordinated by the Office of Safety, Health and Environment (OSHE) which will provide expert advice and consult on reducing discomforting levels of strain and repetitive motion.

OSHE has developed this manual to assist the University in complying with the Workplace Safety and Health Act (2006) to provide a safe workplace and reduce work-related musculoskeletal disorders by adapting the work to fit the person, instead of making the person to adapt to the work. This Manual is also to provide general guidance for all users working in office setting.

The purpose of this manual is to highlight risk factors/ abnormal body motions related to office work tasks and work environment, solutions to common physical problems related to computer use and presentation of health issues. This will in turn attempt to facilitate employee behavioural modifications and injury prevention through instruction on proper ergonomic computer workstation set up, proper posture, identification of risk factors and exercise/stretching instructions.

1.2 Policy

The National University of Singapore (NUS) Ergonomics Policy is established for the purpose of protecting the safety and health of the University staff, students and visitors on campus from ergonomic hazards. The University is committed to reducing and/or eliminating the risk

factors associated with musculoskeletal disorders (MSD). This policy supports the other University safety and health policies.

An ergonomics program is a systematic process that communicates information to ensure that adequate and feasible solutions to ergonomic risks can be implemented to improve the workplace. The two most essential pieces of a successful ergonomics program are management commitment and employee involvement.

NUS has implemented an Ergonomics Program that includes the following components:

- A written ergonomics program and designated Ergonomics Program Coordinator (OSHE)
- Identification and prioritization of high-risk jobs and tasks
- Training for management and employees
- Implementation of control measures and follow-up evaluation

A process for early intervention and medical management

1.3 Scope

This guideline applies to all staff and students working in office environment.

1.4 Definitions

Ergonomics: Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance. (*International Ergonomics Association*)

Musculoskeletal disorders (MSD): Musculoskeletal disorders are illnesses and injuries that affect one or more parts of the musculoskeletal system and can include:

- Sprains
- Strains
- Tears
- Degeneration

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2 ERGONOMIC HEALTH ISSUES

2.1 Musculoskeletal Disorders (MSD)

In an office, there are many activities unique to that environment that can increase risk for Musculoskeletal Disorders (MSD). MSD are illnesses and injuries that affect one or more parts of the musculoskeletal system and can include: –

- Sprains
- Strains
- Tears
- Degeneration

Symptoms can include: –

- Discomfort
- Pain
- Muscle fatigue
- Swelling
- Inflammation
- Stiffness
- Numbness
- Tingling
- Burning sensations
- Heaviness
- Weakness or clumsiness in the hands (dropping things)

Other common terms for some musculoskeletal disorders are: –

- Repetitive strain injury (RSI)
- Occupational overuse syndrome (OOS)
- Cumulative trauma disorder (CTD)
- Tenosynovitis
- Tendonitis
- Epicondylitis (tennis elbow/golfers elbow)
- Carpal tunnel syndrome
- De Quervain's disease
- Rotator cuff tendonitis
- Degenerative disc disease

There are several types of MSD commonly found among office workers

Carpal Tunnel Syndrome (CTS)

Carpal Tunnel Syndrome can be caused by repetitive work with a bent wrist. CTS can be precipitated by resting the wrist on a hard surface or edge, such as the edge of a table while doing keyboarding work. If there is numbness or tingling in the first three fingers and/or pain in the wrist, forearm and elbow, one *might* have CTS. Symptoms may wake a person at night.

Wrist ganglion cysts

Ganglion cysts are a herniation of the fluid in a tendon sheath due to wear and tear. They pose no problem in and of themselves, but indicate overuse of a tendon.

Back strain/injuries

Back strain can result from working in a sustained slumped or twisted position. Also, one of the main causes of low back injuries in the office is awkward lifting. Once back muscles or ligaments are strained from repetitive pulling and lifting, injuries are more likely due to weakening of the back muscles, discs, and ligaments. Reaching overhead to lift material off of shelves and general rearrangement of heavy equipment are often sources of back strain.

Table 1. Common MSDs and causes

Injury	Cause
Tendonitis	Repetitive movements
Carpal tunnel syndrome	Repetitive work with a bent wrist
Back strain	Slumped positions, bending, lifting
Neck/shoulder tension	Forward head posture, swayed back position
Circulatory problems	Static posture

2.2 Risk Factors

Above all, **neutral posture** is the most important thing to remember when working in the in any situation. The rest of "ergonomics" is simply a means to achieve this posture. "Neutral" means that the body is under the least amount of strain and is in a comfortable position. The forces of gravity and the compression of nerves, blood vessels, tendons, and muscles cause permanent damage in our bodies. Neutral posture prevents damage. To achieve neutral posture, follow these guidelines:

- Ears over the shoulders
- Shoulders in line with the hips
- Forearms 90° angle or more from the upper arms
- Wrists straight (not bent, angled, or twisted)
- Shoulders relaxed
- Elbows hanging close to the sides (e.g. Avoid reaching away from the body or working with "winged elbows".)

Some of the most common risk factors in the office and potential solutions are listed in Table 2. More detail will be provided as will be discussed with each type activity in the following sections.

Table 2. Examples of office ergonomic risk factors and recommended solutions

Risk Factors	Solutions
Contact stress (e.g., leaning on elbows on hard work surface)	<ul style="list-style-type: none"> • Use padding and tubing to reduce pressure and force.
Force (lifting)	<ul style="list-style-type: none"> • Use equipment requiring less force. • Use a relaxed grip.
Repetition (typing for long periods without rest)	<ul style="list-style-type: none"> • Change tasks frequently throughout the day. • Take short rest breaks every 20 minutes to stretch. It is most important to build stretch breaks into the daily routine, regardless of the work load.
Static Posture (Sitting for long periods)	<ul style="list-style-type: none"> • Alternate methods for holding objects. • Vary tasks and activities and take rest breaks every 20 minutes.
Awkward Posture (lifting odd-shaped objects)	<ul style="list-style-type: none"> • Maintain neutral posture of body, arms, hands, and neck. • Sit close to work. • Keep tools and supplies within easy reach. • Use proper lifting techniques for large objects.

2.3 Other Health Concerns: Pregnant Women

Studies conducted by the National Institute for Occupational Safety and Health (NIOSH) and the American Cancer Society found no increase in the risk of spontaneous abortion (miscarriage) associated with using computers in the workplace. Working with computers does not increase a woman's risk of delivering a baby of reduced birth weight or delivering prematurely. The conventional scientific opinion is that computer use is not a radiation hazard for the pregnant worker. However, computer workstations and work tasks may have to be modified to accommodate pregnant workers. Ergonomic principles that apply to non-pregnant workers also apply to pregnant workers throughout the duration of their pregnancy.

Strenuous physical labour (e.g., prolonged standing, heavy lifting) during late term pregnancy is a recognised risk. Women over 32 weeks pregnant should limit time standing while at work. The natural S-curve in the spine is altered during pregnancy as the curve in the lower back increases. The pregnant worker's lower back muscles have to work harder to maintain balance of the body and can increase stress on the spine. These individuals should perform the majority of their work duties from a stool or chair. Pregnant women are more prone to ergonomic injuries induced by pregnancy, such as carpal tunnel syndrome or back pain. Make sure to maintain proper body mechanics and posture and ensure that the work environment is ergonomically correct for the users' needs.

3 ERGONOMICS PROGRAM ADMINISTRATION

3.1 Overview

The University aims to evaluate, prevent, and manage work-related musculoskeletal disorders by the following methods:

1. Risk assessment

An assessment that identifies jobs and workstations that may present musculoskeletal hazards, the risk factors that the hazards pose, and the causes of the risk factors.

The principle of conducting a risk assessment is to identify the ergonomic hazard that the tasks can pose to the user, determine the risk level and implement measures to control the hazard and reduce the risk to acceptable level.

2. Hazard prevention and control

Eliminating or minimising the hazards identified in the workplace assessment by changing the job design, workstation, tools or work environment to fit the worker.

3. Injury management

The effective use of available health-care resources (eg. physiotherapy, medical) to prevent or manage work-related musculoskeletal disorders using an early intervention approach.

4. Training and education

A method to give both staff and supervisors an understanding of the potential risk of injuries, their causes, symptoms, prevention and treatment.

3.2 Roles and Responsibilities

The Office of Safety, Health and Environment (OSHE) is the administrator of the Office Ergonomics Program.

NUS President

The President of NUS represents the University as the Employer. The ultimate responsibility for safety and health in the University rests with the President. The President may delegate the authority and responsibility to the ILSC, Deans, Administrators and Head of Departments (HODs) for the effective supervision of the occupational safety and health of staff and students under his / her management.

The OSHE shall report any incident or conditions of non-compliance to the NUS President, Senior Deputy President, Provost, Deputy Presidents and Vice Presidents, who are entitled to partially or fully close the offices or facilities until all safety issues are addressed.

Deans and Head of Departments

All Deans and HODs of the respective departments have management responsibility for the implementation of the Office Ergonomics Program. The HOD, with the assistance of the Departmental Safety Committee or Faculty Safety & Health Officer, is to evaluate the risk assessment of PIs.

Supervisors

The Supervisors are primarily responsible to conduct ergonomic risk assessment for all activities in the office. They are responsible to ensure that all reasonably practicable control measures are implemented and the measures are effective in eliminating or minimizing the risk.

They are also responsible in communicating the ergonomic hazards involved, the purpose of various control measures implemented. The Supervisors are to ensure that their reporting staff and students received adequate information and instructions to help minimise the risk of musculoskeletal injuries. They should ensure that staff and students under their control use the ergonomic equipment and materials provided.

Staff and Students

All staff and students are responsible to carry out their work safely. Staff and students shall cooperate with all ergonomic safety instructions of their supervisor. They should attend ergonomics training as directed by supervisor and apply principles to their tasks. They are to make proper use of all ergonomic equipment and materials provided. They should report potential ergonomic hazards, problems and symptoms to their supervisor.

Office of Safety, Health and Environment

The Office of Safety, Health and Environment (OSHE) is the designated Ergonomics Program Coordinator. It will maintain the University Office Ergonomics Manual, maintain appropriate records, and serve as liaison with all faculties, departments and external agencies in the ongoing implementation of the University's Office Ergonomics Program.

OSHE will also coordinate the provision of ergonomics training to relevant staff and students. OSHE is the university body tasked to coordinate any incident or accident investigations as called for by the President.

The Occupational Health Clinic shall oversee the medical management of possible and confirmed work-related musculoskeletal disorders.

4 RISK MANAGEMENT

Staff at all levels are responsible for developing an understanding of and becoming competent in the implementation of risk management principles and practices in their work areas.

This is a three-phase process, namely: 1. Hazard Identification 2. Risk Evaluation and 3. Risk Control

Hazard Identification

Identification of hazards associated with ergonomics should be undertaken by:

- Reviewing the duties to identify ergonomic risks (task variation, work load etc)
- Consultation with staff and students
- Direct observation of work practices
- Inspection of the task or work area
- Reviewing workplace injury records, if possible, to identify where and in what jobs occupational overuse injuries have occurred
- Completing self-assessment checklist

Risk Evaluation

Risk evaluation should occur:

- After the risk identification process
- Following the report of occupational over symptoms

And should take into account the following risk factors:

- Workplace and workstation layout
- Working posture and position
- Work environment
- Task variation

Risk Control Measures

Risk control is the process of eliminating or reducing identified and assessed risk factors. Such measures could include:

- Provision of alternate equipment
- Job re-design
- Provision of training
- Review resource allocation

The [Office Ergonomics Evaluation Checklist \(Appendix A\)](#) is a useful tool to complete to ensure appropriate workstation set up.

4.1 ACTIVITY-BASED RISK ASSESSMENT

The principle of risk management is to identify the ergonomic hazards, assessing the risk levels, prioritizing and implement measures to control the hazards and reduce the risks to acceptable level. As part of the risk management, adequate and effective control measures are necessary to control the hazards identified during the risk assessment and reduce the risks to acceptable level. Implementation of control measures will reduce the likelihood of occurrence of the adverse consequences but the severity of the potential injury will remain unchanged during risk assessment evaluation.

When determining the type of control measures, one should always consider the Hierarchy of Control:-

- a. Elimination,
- b. Substitution,
- c. Engineering control,
- d. Administrative control and lastly
- e. Personal Protective Equipment (PPE)

Elimination of potential hazards will be given the first priority, while PPE will be the last resort in all control measures implemented in laboratories. In most instances, a combination of controls is required to manage the risk effectively.

Instructions to Employers & Persons Conducting Risk Assessment (per MOM guidelines):

1. Before completing the risk assessment form, complete the **Inventory of Work Activities Form**. You may use one inventory form for each work process.
2. Outline the process workflow and indicate the process location under the "Process / Location" column.
3. For each work process, list all activities (routine and non-routine) in sequence under the "Work Activities" column. One (1) Risk Assessment Form may be used for each work process.
4. Record the names and designations of risk assessment team members in the Risk Assessment Form.
5. Start with the first activity listed in the Inventory of Work Activities Form. Record in columns 1a and 1b of the Risk Assessment Form (found in a separate Appendix)
6. Identify the hazards associated with each activity and record these in column 1c.
7. For each hazard identified, determine the consequence (possible accident / ill health and persons-at-risk) and record this in column 1d.
8. If there is any existing control measure(s) for the hazard, record this in column 2a.
9. Determine the severity of the accident or incident or ill health based on the table below, and record this in column 2b.

Table 3. Severity levels of a hazard, per MOM guidelines

Severity	Description
Minor	No injury, injury or ill health requiring first aid treatment only (includes minor cuts and bruises, irritation, ill health requiring first aid treatment only)
Moderate	Injury requiring medical treatment or ill health leading to disability
Major	Fatal, serious injury or life-threatening occupational disease (includes amputations, major fractures, multiple injuries, fatal diseases)

10. Taking into consideration the existing control measure(s), estimate the likelihood of occurrence of each accident or incident or ill health based on Table 4, and record this in column 2c.

Table 4. Likelihood levels of encountering a hazard, per MOM guidelines

Likelihood	Description
Remote	Not likely to occur
Occasional	Possible or known to occur
Frequent	Common or repeating occurrence

11. Based on the severity and likelihood, assign the Risk Level for each hazard using the risk matrix of Table 5, and record this in column 2d.

Table 5. 3 x 3 Risk Assessment Matrix, per MOM guidelines

Severity	Likelihood		
	Remote	Occasional	Frequent
Major	Medium Risk	High Risk	High Risk
Moderate	Low Risk	Medium Risk	High Risk
Minor	Low Risk	Low Risk	Medium Risk

12. Based on the Risk Level assigned, suggest appropriate risk control measures and record these in column 3a following the hierarchy in Table 6.

Table 6. Recommended Actions for different levels of risk and acceptability, per MOM guidelines

Risk Level	Risk Acceptability	Recommended Actions
Low Risk	Acceptable	No additional risk control measures may be needed. However, frequent review may be needed to ensure that the risk level assigned is accurate and does not increase over time.
Medium Risk	Moderately acceptable	A careful evaluation of the hazards should be carried out to ensure that the risk level is reduced to as low as is practicable within a defined time period. Interim risk control measures, such as administrative controls, may be implemented. Management attention is required.
High Risk	Not acceptable	High Risk level must be reduced to at least Medium Risk before work commences. There should not be any interim risk control measures. They should not be overly dependent on personal protective equipment or appliances. If need be, the hazard should be eliminated before work commences.

13. With the consensus of management or employer, assign a suitable person to implement the recommended risk control(s), and indicate the follow-up date in column 3b.

14. Repeat risk assessment for other activities and processes listed in the Inventory of Work Activities Form.

15. Management or employer must endorse and approve the risk assessment; communicate all risk assessments to employees; monitor follow-up actions, and keep the risk assessment records for at least 3 years.

16. Conduct another round of risk assessment after the risk control measures have been implemented; use a new form to indicate the reduction in risk levels.

17. Review the risk assessment records every 3 years or whenever there are changes in processes or work activities or after an accident/incident, whichever is earlier.

Figure 1. Activity-Based Risk Assessment Form

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Activity-Based Risk Assessment Form
--

Name of Department _____	Location of Lab _____
Name of Laboratory _____	Name of PI _____
Name of Researcher/LO _____	Name of Activity/Experiment _____

No	Description/Details of Steps in Activity	Hazards	Possible Accident / Ill Health & Persons-at-Risk	Existing Risk Control (Mitigation)	Severity	Likelihood (Probability)	Risk Level	Additional Risk Control	Person Responsible	By (Date)
1							0			
2							0			
3							0			
4							0			
5							0			
6							0			
7							0			
8							0			
9							0			
10							0			

Conducted By _____

Approved By
 Name _____
 Signature _____
 Approval date _____

Next Revision date _____
 (Maximum 3 years)

Figure 2. Activity Based Ergonomic Risk Assessment for Office (Example)

School / Department:	Office	
Conducted By:	Mr X (Team Leader, Asst Manager)	Approved By:
		Date Approved:
Date Conducted:	12 Jan 2011	Next Review Date:

Hazard Identification				Risk Evaluation						
1a.	1b.	1c.	1d.	2a.	2b.	2c.	2d.	3a.	3b.	3c.
No.	Description/Details of Steps in Activity	Hazard	Possible Accident / ill health to Persons-at-Risk	Existing Risk Control (Mitigation)	Severity	Likelihood (Probability)	Risk Level	Additional Risk Control	Person Responsible	By (Date)
1	Punching holes for document to be filed	Ergonomic hazard (repetitive similar action)	Muscular strains	<ul style="list-style-type: none"> ▪ Staff to adopt good ergonomics practice e.g. table height. ▪ Job rotations; avoid prolong repetitive punching operation. ▪ Brief staff on proper usage of hole punch 	3	1	3			

No.	Description/Details of Steps in Activity	Hazard	Possible Accident / ill health to Persons-at-Risk	Mitigation	Severity	Likelihood (Probability)	Risk Level	Risk Control	Person Responsible	Date
2	Filling of documents to allocated files	Ergonomics when lifting or carrying files and documents	Muscular strain	<ul style="list-style-type: none"> ▪ Break into smaller loads when lifting / carrying ▪ Heavy Items are placed at the lower level of the shelves ▪ Adopt correct manual lifting technique 	2	3	6	<ul style="list-style-type: none"> ▪ Assisted lifting for heavy objects 		
3	Use of staplers	Repetitive action Ergonomics (Stapling)	Musculoskeletal injuries disorder	<ul style="list-style-type: none"> ▪ Take regular break when too voluminous or ask for assistance 	1	3	3			
		Repetitive action Ergonomics (Removal of staples)	Cuts, puncture and stabbing	<ul style="list-style-type: none"> ▪ Use of staple remover ▪ Staff are briefed on the proper way for removal of staple (away from persons) and avoid touching the pointed areas ▪ Adopt other methods of binding the papers together (i.e. paper clips etc) 	2	3	6	Use of automatic staple remover machine		

No.	Description/Details of Steps in Activity	Hazard	Possible Accident / ill health to Persons-at-Risk	Existing Risk Control (Mitigation)	Severity	Likelihood (Probability)	Risk Level	Additional Risk Control	Person Responsible	By (Date)
4	Working in front of computer	Glare from monitor	Eye strain	<ul style="list-style-type: none"> ▪ Set of monitor (brightness and tilt) to suit user ▪ Adopt good practice (i.e., close eyes momentarily, look at a distant object and blink frequently) 	1	3	3	<ul style="list-style-type: none"> ▪ Conduct work station evaluation if necessary 		
		Ergonomic Overstress	Back or body strains	<ul style="list-style-type: none"> ▪ Refer to office ergonomics setup guideline and adopting correct posture while using computer ▪ Adopt frequent stretching ▪ Use foot rest or wrist rest, if necessary ▪ Adjust keyboard and mouse level to achieve comfort typing 	2	3	6	<ul style="list-style-type: none"> ▪ Conduct work station evaluation if necessary 		

No.	Description/Details of Steps in Activity	Hazard	Possible Accident / ill health to Persons-at-Risk	Existing Risk Control (Mitigation)	Severity	Likelihood (Probability)	Risk Level	Additional Risk Control	Person Responsible	By (Date)
5	Retrieval of files from shelves	Ergonomic Overexertion	Back injuries	<ul style="list-style-type: none"> ▪ Adopt proper work postures and practices ▪ Place the heavier files / load on the lower shelves ▪ Use of ladder / step stools to reach the higher shelves ▪ Refer to safe use of ladder guideline 	2	3	6	Properly allocate/distribute files in different shelves such that each will have equivalent amounts of weight tolerable for lifting, carrying, handling		
		Manual handling (Ergonomic)	Bodily / back injury	<ul style="list-style-type: none"> ▪ Adopt proper work postures and practices ▪ Use of trolleys / file carts to assist ▪ Seek assistance from colleague if necessary 	2	3	6	Refer to NUS Office Ergonomics manual for different types of lifts that can be adopted		
6	Use of photocopier	Glare from photocopier	Eye strain	<ul style="list-style-type: none"> ▪ Ensure that the photocopier cover is kept closed when in operation ▪ Do not look in the direction of the glare from the photocopier 	1	3	3			

5 RISK CONTROLS

5.1 Safe Work Practices for Repetitive Tasks

The following information can be used as a guideline for correctly adjusting a workstation or workbench. In addition to this information, the [Office Ergonomics Evaluation Checklist \(see Appendix A\)](#) is a useful tool to complete to ensure appropriate workstation set up.

5.2 Job Design and Work Breaks

Many jobs require the user to adopt a sustained posture and fixed visual focus, e.g. computer data encoding. Additional unrelated tasks involving dynamic muscle movement should be included wherever possible. This will increase task variety and allow time for muscles to recover from static muscle strain.

Breaks away from the computer are required at regular intervals to relieve muscle fatigue and eyestrain and to restore the level of concentration. The best means of providing breaks is to vary the tasks through job design and by providing a variety of work and autonomy over the order in which tasks are performed.

Where the job does not provide adequate breaks through task variation, it is recommended that short frequent breaks should be taken during periods of intensive work, i.e. 2 – 3 minutes every 20 – 30 minutes. These breaks should involve whole body movement to restore circulation to relieve muscle fatigue. In addition, pause / stretch exercises should be frequently completed throughout the day. Back fatigue is relieved by alternating from a sitting to a standing posture and walking around.

5.3 Task Rotation

Rotating tasks throughout the day can provide breaks from sustained posture work. Rostering some tasks within a work group can also provide variety and breaks away from computer use. Each team needs to identify high volume or repetitive tasks and ensure that adequate breaks and or task variation are incorporated.

5.4 Computer Work and Video Display Terminals (VDTs)

Most office personnel spend a significant amount of time entering data with their keyboard and mouse. Depending upon the location of the mouse, awkward reaches and manipulations of the mouse with bent wrists may occur. The following are recommended for control of ergonomic hazards associated with the use of computers.:

- Provide fully adjustable seating.
- Place monitors so the user's viewing distance is between 35 to 75 cm.
- Place monitor so the top of the screen is approximately eye level. This allows the eyes to naturally gravitate toward the centre of the screen.
- Use a document holder placed adjacent to and in the same plane as the computer screen.
- Provide foot rests, where possible, for individuals in order for them to change leg positions throughout the day.
- Provide for a choice of keyboards and mouse or other input devices for individuals who have existing musculoskeletal problems.
- Encourage mini-breaks of 2 - 3 minutes for every 20 - 30 minutes of keyboarding or mouse work. These breaks can be spent doing mild hand exercises or stretches.

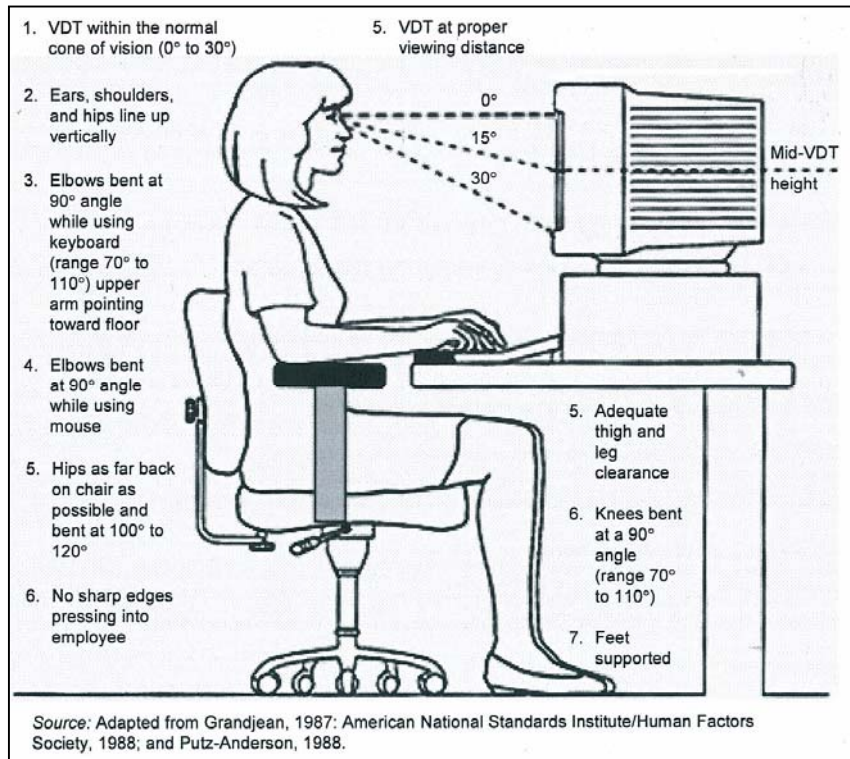


Figure 3. Guideline for computer workstation set up
(based on SS 514:2005 Code of Practice for Office Ergonomics)

5.5 Posture

The user of VDTs must be able to adopt a comfortable work posture to avoid muscular fatigue and discomfort. The design of workplace furniture should be easily adjustable to comfortably accommodate a large range of body sizes and shapes.

In a comfortable working posture at the computer: -

- the feet are supported on the floor, or a footrest (if knees are at a greater than 90° angle).
- the thighs are supported by the chair seat with no pressure caused by the front edge of the seat under the thighs
- the upper body is upright with the lower back firmly supported by the backrest
- the shoulders are in a relaxed position and are not hunched
- the elbows and upper arms are close to the body
- the forearms are parallel to the ground (or in a downward sloping position), and the wrists are in a neutral position (straight) when utilising the keyboard and mouse
- the neck remains in a neutral position (i.e. not looking upwards or downwards) when viewing the monitor

5.6 OFFICE EQUIPMENT

5.6.1 THE CHAIR

The chair is the most important part of the office workstation. The chair has to fit the user and suit the tasks that he or she does. One design of chair may not suit every worker. For example, the “average” chair is designed in some instances to fit the average male and may not suit other users.

When looking for a chair it is important that the users have the option to try several different designs before finalizing any purchase. A trial period should be long enough to allow for an opportunity to try the chair (i.e. several weeks) and to provide comments or concerns with the chair.

5.6.1.1 What makes an “ergonomic” chair?

A chair is only “ergonomic” if the user can adjust it to himself. Get to know the chair by experimenting with the controls, so that the user can make adjustments quickly and confidently. The following features are part of a good office chair.

General Chair Features

- 5-caster swivel base
- Armrests
- Height adjustable seat pan
- Tilt adjustable back rest
- Ability to make adjustments easily while sitting in the chair
- Firm padding covered with non-slip, breathable fabric

Seat pan

- Rounded front edge
- Wide and deep (long) enough to fit the user comfortably
- Adjustable in angle

Backrest

- Padding for the low back area that is curved to fit the shape of the back
- Height adjustable (separate from seat pan)
- Adjustable angle with locking mechanism
- Wide and high enough to fit the back comfortably

Note: When sitting, the back tends to lose some of its natural curvature. An effective lumbar support of a chair is designed to help maintain the natural curvature of the spine when sitting. It is important to provide appropriate support for the spine so that there is no discomfort or pain (Figure 4A). If the user is feeling pain while sitting, the lumbar support of the chair may not be placed correctly.



Figure 4A (left): Chair with lumbar support

Figure 4B (right): Chair without adequate lumbar support.

Armrests

- Ability to rest the arms as they hang freely by the sides
- Should provide height and width adjustability
- Should not interfere with the work surface



Figure 5A (left): If armrests are too high, they may cause the user to work with raised shoulders.

Figure 5B (right): The shoulders should be relaxed and hanging comfortably at the sides.

5.6.1.2 How to Adjust the Chair

In addition to having an adjustable chair, knowing how to properly use its controls is the key for ensuring a neutral working posture. The following points are designed to help ensure proper adjustment.

<p>Standing in front of and facing the chair, raise or lower the chair until the front edge of the seat pan is just below the kneecap</p>	
<p>Sit with the feet resting flat on the floor and legs at a 90-110 degree angle.</p>	

Allow enough space for a closed fist between the edge of the seat pan and the back of the legs.



Figure 6. Estimating space between seat pan and back of legs

Adjust the backrest so the lumbar support contacts the curvature in the lower back. The user may need to move the backrest up or down as well as towards or away from the user.

The adjustment for the backrest is usually located on the bottom of the seat pan (see Figure 7).



Figure 7. Adjusting the backrest

Adjust armrests so that the elbows can rest on them while the arms hang freely at the side.

A seat height that is too high can cause unwanted pressure on the thighs and not allow the feet to rest flat on the floor (see Figure 8). If you cannot adjust your chair and your feet does not reach the floor, a footrest may be appropriate. If you're wearing flat shoes, a level surface works best. If you're wearing heels, a slanted surface is better (see Figure 9).



Figure 8. Seat too high, sole of foot elevated

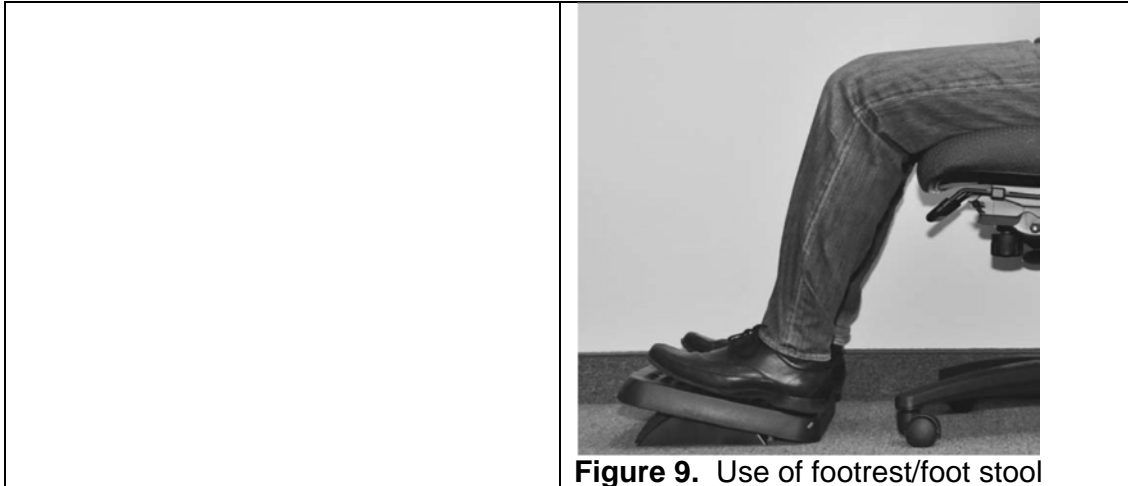


Figure 9. Use of footrest/foot stool

5.6.1.3 Chair height

If the keyboard is placed on an **adjustable support**:

- Lower the seat pan so the feet rest comfortably on the floor.
- Check for pressure points. The user should feel even pressure from the seat pan. If the user feel more pressure near the back of the seat (buttock region), raise the chair. If the user feel more pressure under the thighs (near the knees), lower the chair.

If the keyboard is placed on a **fixed surface** (i.e. desk):

- Adjust the chair height so the user can type comfortably with neutral wrist and arm positions.
- Use a footrest if the feet do not rest flat on the floor after the user has adjusted the chair.

! HELPFUL TIPS

- Stand up and place the hand in the small of the back. Notice the inward curve in the lower back. Sit down on the chair while keeping the hand on the lower back. Notice how the curve flattens out. This shows the user how easy it is to change the shape of the spine which can contribute to back pain.
- While keeping the hand on the small of the back, ensure that the lumbar support hits the hand.

5.6.2 DESKS

Height adjustable desks are the preferred option to give the user maximum flexibility in adjusting their work posture. The height adjustment mechanism should be safe and easy to operate.

5.6.2.1 General Tips

- If a fixed height desk is provided, the height to the top of the work surface should be between 68 cm and 72 cm above floor level
- The area of the work surface should be large enough to allow the equipment to be positioned as required by the operator and to provide space for any documents or reference materials used
- The minimum work surface area for mixed tasks (keyboard and clerical work) should be 15 cm x 90 cm.
- The volume of leg space should be a minimum of 80 cm wide x 55 cm deep x 58 cm high
- The viewing distance to work should be between 35 cm and 75 cm
- There should be no sharp edges, protrusions or rough surfaces
- If an adjustable keyboard tray is fitted, it should be large enough to accommodate both a keyboard and a mouse on the same level

5.6.2.2 Adjustable Desks

It is often possible to add adjustable accessories to the desk. If purchasing a new desk, consider one with adjustability built in. There are several methods of achieving adjustability:

1. The user can purchase a complete workstation that allows for both regular desk work and space for the computer. The computer section should have an adjustable portion for the keyboard and mouse, and a separate adjustable portion for the monitor. The portion designed for the keyboard should have enough space for the mouse and keyboard to be placed side by side.
2. The user can add attachments to the desk, such as keyboard tray or monitor arm.
3. The user can use a smaller separate computer workstation and continue to use the desk for regular work.
4. The user can also purchase an L-Shaped workstation that allows for a separate writing and typing area. If the user has shelves above the workstation, ensure they do not interfere with adjusting the monitor height or block overhead lights.

5.6.2.3 The Non-Adjustable Desk

Use the information in the chair and desk sections above to ensure that neutral postures are achieved.

If the work surface is too low, raise the desk using a stable support (i.e. blocks under desk legs) until the work surface or keyboard is at elbow height.



Figure 10: Providing a chair and keyboard set up that is appropriate for the user enables him/her to type at, or just below, elbow height.

5.6.2.4 How to arrange everything on my desk?

Items found on the desk should be arranged based on their weight and frequency of use. Heavier items, such as reference books, should be placed between seated shoulder and waist height.

Frequently used items, such as the keyboard, mouse and telephone should be located close to the user at a minimal reach distance. Infrequently used items, such as reference material, calculators or staplers can be located towards the back of the desk. A simple point to remember is that the more the user uses an item the closer it should be.

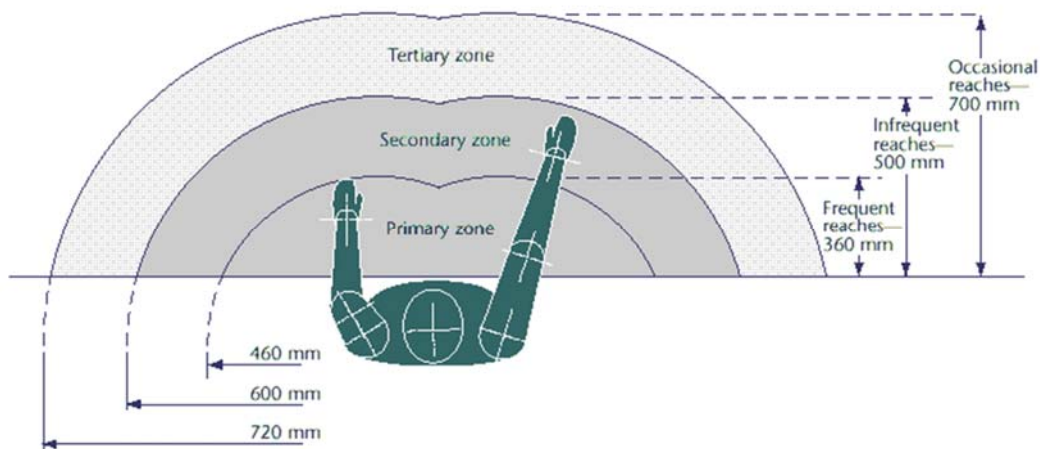


Figure 11. Zones of reach (based on SS 514:2005 Code of Practice for Office Ergonomics)

5.6.3 THE MONITOR

The location of the computer screen should take into account the visual needs of the user as well as ensuring a comfortable position of the head and neck.

It is recommended that: -

- the screen is located at approximately an arm’s length away from the user (when in an upright seated position)
- the screen is located directly in front of the user, and raised if required by a monitor raiser to ensure that the neck remains in a neutral position when viewing
- the top of the screen is at approximately eye level and the bottom of the screen can be read without a marked inclination of the head. This usually means the centre of the screen will need to be near shoulder height
- glare and reflections on the screen are eliminated

5.6.3.1 VDTs and Vision

- The American Academy of Ophthalmology describes VDTs as presenting no hazard to vision. VDT exposure does not result in cataracts or any other damage to the eye. According to the National Safety Council, any close work can cause discomfort and stress with time.

5.6.3.2 20-20-20 Rule

The US National Eye Institute recommends that the computer user should do active microbreaks to avoid any eye discomfort or stress. An example of an “active micro break” is looking 20 meters away for 20 seconds every 20 minutes to rest the eyes.

Try to alternate computer work with other tasks. For example, rather than typing continuously for an hour, stop and deliver a fax or do some filing. When taking a break from computer work with other office tasks, the arms, neck and back muscles can rest.

Schedule breaks into the day until the worker is used to taking breaks away from the computer. Use the following table and worksheet as an example to help organize some well needed breaks.

Try using the computer calendar or scheduler to remind of breaks.

5.6.3.3 LCD Monitors

Flat screen monitors Liquid Crystal Display (LCD) monitors are becoming more prevalent in today’s office environment. LCD monitors have several benefits when compared to the standard Cathode Ray Tube (CRT) monitors. These benefits are discussed in Table 7.

Table 7. Frequently Asked Questions (FAQs) for LCD Monitors:

Question	Answer
Do LCDs improve visual work performance?	<ul style="list-style-type: none"> • Visual search times for text targets are 22% faster for LCDs than CRTs, and also faster for low contrast, small characters. • Eye fixation times are 9% shorter and 15% fewer eye fixations are needed to read the same information from an LCD versus a CRT. • Visual search error frequency is 22% less when reading from an LCD than a CRT.

	<ul style="list-style-type: none"> LCDs have been shown to allow for greater postural variety during computer work.
Do LCDs eliminate geometric image distortions and flicker?	LCDs are free from flicker because they do not rely on a scanning electrobeam. CRTs are more prone to flicker.
Do LCDs reduce glare problems?	LCDs have uniform screen brightness and the screen is covered with a flexible surface that is substantially less prone to glare compared to glass covered CRT screen.
Do LCDs reduce Computer Vision Syndrome?	LCDs are flicker free, reducing the number of fixations, risk of headaches, and eyestrain.
Do LCDs save space?	LCD displays are thinner in design which can increase functional workspace.
Do LCDs save energy?	LCDs use less energy when on as well as in standby mode.
Do LCDs increase screen viewing areas?	A 15" LCD can give the equivalent area of a 17" CRT, and a 17" LCD the equivalent of a 19" CRT.
Do LCDs have better screen privacy than CRTs?	LCDs increase screen privacy as they cannot be viewed from side angles.
Do LCDs emit VLF/ELF electromagnetic radiation?	Unlike CRTs, LCDs are free from VLF/ELF electromagnetic radiation emissions associated with the scanning electron beam required for a CRT.

Note: Many LCD monitors offer height adjustability, thereby eliminating the need for monitor arms.

5.6.3.4 Adjusting the monitor

- The monitor and keyboard should be directly in front of the user.
- The top of the monitor should be at eye level.
- The monitor should be at least one arm's length away from the user.
- The monitor should be angled slightly up towards the eyes. Angling the monitor up too high can increase glare.
- If the monitor sits on top of the computer CPU, it is usually too high. Monitors are usually too low when they sit on the desk.

Note: It is often easier to raise the monitor than to lower it. If the monitor cannot be lowered enough (so the neck is straight when looking at the screen), the user may have to raise the chair. If the user raises the chair, the keyboard height may have to be re-adjusted along with the footrest height. Also, the swivel base of the monitor can easily be removed, thus lowering the monitor. If the desk does not provide enough room to have the monitor at a correct distance, try altering the furniture and /or desk layout.



Figure 12: An example of recommended monitor placement (note the height and distance away from the user).



Figure 13. Neck bent forward: Is the neck bent forward of flexed backwards when viewing the screen and/or when viewing the screen and/or document(s)?



Figure 14: If your neck is bent forward, try raising document(s). If your neck is flexed backwards, try lowering the monitor and/or documents.



Figure 15: Is the neck twisted to either side when viewing the monitor? If yes, try placing the monitor directly in front of the user.

5.6.3.5 Monitor Arms

Monitor arms should allow the monitor to move in all directions and allow the user to push the monitor completely out of the way when not in use. When buying monitor stands or arms ensure that the monitor can be located at the proper height. The arm must be strong enough to support the weight of the monitor.



Figure 16. Monitor arm

5.6.3.6 Considerations for users wearing glasses

Vision problems can lead to eye strain and headaches. If the user works in an office, the user should have regular eye examinations to determine if the user has vision problems. The user should explain the work the user does with computers to the eye doctor.

If the user wears bifocals or trifocals, the user may have trouble when working on computers since the lenses are generally designed for reading at a viewing distance of 40 to 50 cm and a downward gaze of about 25 degrees. If workstation changes do not correct bifocal/trifocal glasses problems, special computer glasses can be purchased.

5.6.4 LAPTOPS

Laptops are becoming more common in many different industries. They are light and portable, but they present some problems that are distinctly different from the desktop computer. Laptop computers have the potential to cause major musculoskeletal and visual problems if used for extended periods. Problems can result as the computer screen normally cannot be separated from the keyboard, resulting in excessive (looking downwards) neck flexion during use. Experience has also shown that people with larger hands may find it difficult to use the small keyboards or the in built mouse in laptop computers.

Laptop users should be aware of the following problems that can arise from prolonged use:

- Placing the laptop at an angle which is comfortable for the hands and arms can result in neck fatigue from bending to view the screen.
- Raising the laptop to view the screen can place the hands and arms in awkward postures.
- The small screen size can result in difficulty with reading and can lead to bending of the neck and upper back.
- Small key spacing results in cramped and awkward postures of the hands, arms, neck and shoulders.
- Using the touch pad or pointing device can result in awkward postures of the wrist and arm.
- Angling of the monitor to compensate for low height of the laptop can result in increased glare on the screen.

5.6.4.1 Recommendations for Use

- Use a computer docking station when in the office. This normally consists of a full size monitor, keyboard, and mouse with the laptop basically serving as the hard drive.
- An alternative option is to continue to use the laptop's screen and simply connect an external full-sized keyboard. In this scenario the user must adjust the viewing height and distance the same way the user would adjust a regular monitor. The external full-sized keyboard would also need to be correctly positioned. Laptop should be positioned at an appropriate height to ensure neutral neck positioning (for example using either a monitor arm or a monitor raiser)
- When on the road, pack a light-weight keyboard and mouse.

5.6.5 THE KEYBOARD

Some "ergonomic" keyboards are not adjustable and rely on a one-size-fits-all theory. This may not be appropriate for all users since people often have different sized hands.

5.6.5.1 Adjusting the keyboard and mouse

The keyboard and mouse should be slightly below elbow level and close to the body. The mouse should be beside the keyboard, and in front of the using the mouse hand. To use the keyboard and the mouse in the "neutral" position, the user should adjust the keyboard tray or the chair.

- If the user has an adjustable keyboard/mouse tray, move the keyboard and mouse to elbow level.

- If the user does not have an adjustable keyboard/mouse tray, adjust the height of the chair so the keyboard and mouse are at approximately elbow level. The keyboard should be angled so the wrists remain straight.

TRY THIS! Get a co-worker to check the wrist posture as the user type and help the user make adjustments if required.

5.6.5.2 Alternative Keyboards

“Ergonomic” keyboards, such as split keyboards, are designed to help keep the wrists in a neutral (straight) position when typing. First, make as many improvements to the workstation as possible before thinking of changing the keyboard. It is important to remember that split keyboards are most effective when used by a “touch” typist. A “touch” typist is someone who types without using the sense of sight to find the keys. Specifically, a touch typist will know their location on the keyboard through muscle memory. “Hunt and peck” typists tend to find these designs frustrating as they visually search for keys. Hunt and peck typists use their sight to find and press each key individually.

Considerations when changing the keyboard:

- The size and shape of the keyboard to ensure that the user is using neutral and relaxed positions.
- The force required to depress the keys.



Figure 17: An example of a split keyboard which allows for neutral wrist and arm posture.

5.6.5.3 Keyboard Trays

Keyboard trays come in different sizes, adjustability levels and desk top connections. The keyboard tray should:

- Allow enough room for both the keyboard and mouse.
- Be easily adjustable in both height and angle (in all directions).
- Be free of attachments under the tray that can cause bruising, scrapes or contact pressure with the thighs or knees.
- Be easily moved under the desk and out of the way.
- Allow enough space for a wrist rest if desired.



Figure 18: An example of a fully adjustable keyboard/mouse tray.

5.6.5.4 Keyboarding Duration

A total of **4 hours (not including breaks) of intensive keyboard work per day** is regarded as a “safe working level” (this may be less for individuals with underlying medical conditions or injuries, and any recommendations from treating medical practitioners should be followed).

5.6.6 COMPUTER MOUSE

A well-designed computer mouse should not cause undue pressure on the wrist and forearm muscles. A large bulky mouse may keep the wrist and forearm continuously at an uncomfortable angle. Pressure can be reduced by releasing the mouse at frequent intervals, by selecting a slim-line, low profile mouse and by using the mouse at a comfortable distance from the body. Repeated or sustained use of the mouse may result in muscular fatigue of forearm and upper body muscles.

To minimise fatigue when using the mouse: -

- Place the mouse on a mouse mat (this restricts the area of movement for the hand and arm)
- Ensure the wrist remains in a neutral position and so the elbow is positioned close to the side of the body when utilising the mouse

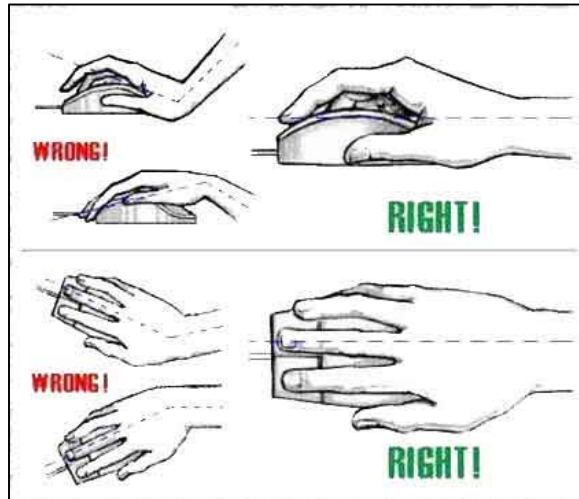


Figure 19. Improper and proper handling of the computer mouse

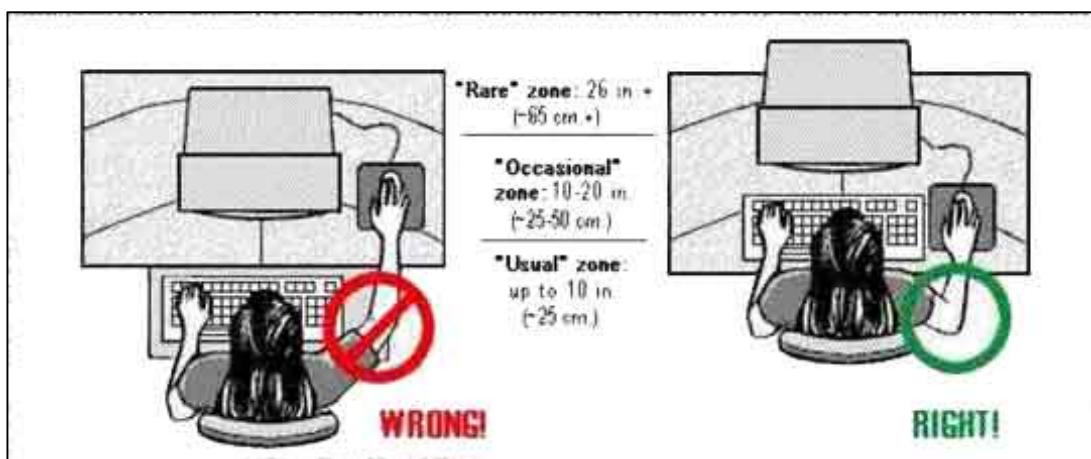
- The mouse pad should be placed as close as possible to the keyboard to avoid arm extension which will impact on shoulder / neck muscles
- The keyboard and mouse should be positioned at the same level. This will minimise shoulder strain required to elevate the shoulder

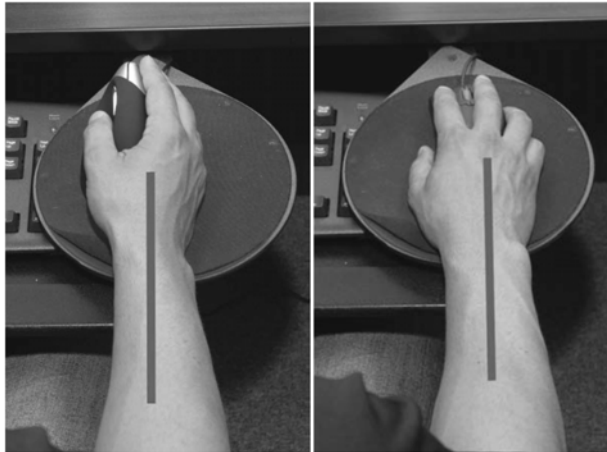
5.6.6.1 Adjusting the Mouse

Place the mouse in front of the “mouse hand”.

The user should NOT have to reach away from the body in order to operate the mouse.

- Position the mouse at the SAME height as the keyboard. Remember to maintain approximately a 90 degree elbow angle.
- Maintain neutral wrist posture when using the mouse (Figure 20).
- Rather than wrist movements alone, use the whole arm for using the mouse.





Figures 20 (left), Figure 20 (right): Placing the mouse in the correct location allows the user to work with the wrist in a neutral posture.

5.6.6.2 Mousepads

A mouse pad should be used in order to keep the mouse clean and moving easily. Even users who have an optical mouse should use a mouse pad as it provides the best surface for the movement of the mouse and for the optical sensor to detect movement.

5.6.6.3 Mouse Tips

To reduce stress on the dominant using the mouse hand, try to use the mouse with the opposite hand, provided that the user is using a universal design mouse. Alternating using the mouse hands can serve to reduce stress placed upon a particular arm while also improving working posture in some instances.

When using the mouse for prolonged periods of time, the lower arms should be supported. To support the arms:

- Rest the elbows on the armrests. Make sure the armrests do not restrict the arm movement when using the mouse.
- Rest using the mouse arm on one side of the desk if the desk is “L” shaped and the height is around elbow level.
- Learn how to use keyboard shortcuts to minimize mouse usage (see “Hot Keys” listings below).

5.6.7 HOT KEYS (Windows Shortcut Keys)

To reduce the amount of mouse work and the risk of injury, the following is a list of keyboard shortcuts (“hot keys”) for commonly performed tasks. Table 8 is not a full list, but is meant to be a quick reference guide for the most commonly used and useful shortcuts. Many more shortcuts exist that may be found through the software’s Help feature.

Table 8. Hot Keys (Windows shortcut keys)

WINDOWS GENERAL	
KEYS	ACTION
Windows Key	Brings up the start menu and the arrow keys can be used to select a program

Windows Key + D	Minimizes all open programs to show the desktop
Windows Key + E	Launches Windows Explorer
Alt + Tab	Holding Alt and pressing Tab allows to switch between open programs
Ctrl + Alt + Delete	Launches Task Manager
Alt + F4	Closes the current program
F2	Renames files/folders
Tab	Moves forwards through options in forms, dialog boxes, etc.
Shift + Tab	Moves backwards through options in forms, dialog boxes, etc.
MICROSOFT OFFICE	
KEYS	ACTION
Ctrl + A	Select all
Ctrl + S	Saves open file with current name
F12	Performs "Save As..." feature
Ctrl + P	Opens the print dialog box
Ctrl + O	Displays the open dialog box
Ctrl + N	Displays a new blank document
Ctrl + C	Copies selected item
Ctrl + X	Cuts selected item
Ctrl + V	Pastes/inserts copied or cut item
Ctrl + F	Opens the find box
Ctrl + Z	Undoes the last action
Ctrl + Y	Redoes the last action
Ctrl + B	Activates bolding
Ctrl + U	Activates underlining
KEYS	ACTION
Ctrl + I	Activates italicizing
Ctrl + }	Increases font size
Ctrl + {	Decreases font size
Ctrl + Mouse Wheel	Zooms in/out
Backspace	Returns to previous page in Explorer (Windows & Internet)
Shift + ⇐ or ⇒	Highlights
Ctrl + ⇐ or ⇒	Moves cursor one word at a time *
Ctrl + ↑ or ↓	Moves cursor one paragraph at a time *
Ctrl + End	Moves cursor to the end of the document *
Ctrl + Home	Moves cursor to the start of the document *
F2	Enters a cell at the end of existing text (Excel only)

F7	Runs Spell Check
Shift + F7	Launches the thesaurus

* Can also be used with Shift key to highlight.

5.7 Ergonomic Accessories

Well-designed workstation accessories can be used to improve posture and work efficiency of the computer operator. It is recommended that a workplace ergonomic assessment is conducted by to assist with identifying required ergonomic equipment.

A footrest is recommended when keyboard users are unable to firmly position their feet on the ground, or when there is pressure on the undersides of the thighs, when the chair height is appropriately adjusted (so that wrists, elbows and forearms are in a neutral position). Optimal back and pelvis support is achieved when the feet are firmly supported (see Figure 9).

Document holders are useful for assisting the neck to remain in a neutral position when viewing documentation whilst using the computer. Ideally, documentation should be positioned between the keyboard and the monitor. If this is not possible then the document holder should be positioned close to the computer screen at eye level.

The user should use a document holder if the user enters information from papers, files, binders, etc. Document holders help keep papers vertical or angled so the user does not have to bend the neck to read them. Often people place papers flat on the desk and this requires excessive forward neck bending.



Figure 21. Document holder

The document holder should be the same distance from the eyes as the monitor and at the same height as the monitor. When the document is close to the monitor, it is easier for the eyes to refocus between the paper and screen. By refocusing less often, strain on the eye muscles is reduced.

Various types of document holders are available including the following:

- Those that sit on desks (stand alone).
- Those that can be attached to the side of the monitor.
- Those that are on a movable arm which attach to or sit on the work surface (ensure there is enough space beside the monitor).

When buying a document holder ensure the holder has the following features:

- Large and strong enough for the different sizes and types of papers, books, files and documents the user use.
- Easily adjustable (forward, backwards and sideways).
- The mechanism to hold the paper must be firm enough to prevent the paper from slipping out of the holder, adaptable to various sized documents, and easy to operate.
- The paper should remain straight (not curl up) and be easy to read.
- Easily moved to either side of the monitor.

Wrist supports – can be utilised to ensure that the wrist remains in a neutral position when utilising the keyboard and mouse. A wrist support should only be used when the wrist is unable to achieve a neutral position.

Wrist Rests - Padded wrist rests are often used in front of the keyboard and mouse to support the wrists. Wrist rests also reduce the contact pressure on the wrists from sharp workstation edges when the user is taking a break from typing. These rests, if not used properly, can increase the pressure on the wrists, thus increasing the risk of injury, especially if used while typing.

Typing should be performed with the hands “floating” above the keyboard. The heel/pad of the hand should only be resting on the pads when taking a break. Touch typing may also improve the neck posture by reducing the number of times the user has to look down at the fingers on the keyboard.

Wrist rests should:

- Be long enough to fit in front of the entire keyboard and possibly the mouse.
- Be high enough to keep the wrist in a straight neutral position.
- Be made of moderately firm and comfortable material.
- Resting surfaces should be flat with curved edges to avoid pinch points.



Figure 22. Wrist/palm support



Figure 23. Wrist/palm rest

Headsets – are important for ensuring that the neck remains in a neutral position, and to minimise unnecessary muscle activity in the arms and shoulders when the phone is used for frequent and or extended periods of time.

Screen filters are used to reduce visual discomfort caused by the appearance of reflections and glare on the screen. However, they do reduce the brightness and sharpness of screen characters. Before resorting to a filter, identify the source of the reflections and/or glare and endeavour to provide a solution to control the problem. Common solutions are:

- Change the angle or position of the screen
- Ensure appropriate overhead lighting and diffusers
- Install or adjust curtains or blinds to control natural light



Figure 24. Screen filter

5.8 Miscellaneous Tasks

5.8.1 Telephone Usage

If the user has to write or type while talking on the phone, the user should use a headset or speakerphone to keep the hands free. This will help to reduce awkward neck and shoulder positions.



Figure 25. Awkward posture during telephone use



Figure 26. Conventional headset

5.8.2 OFFICE LIGHTING

Improper lighting can lead to eye strain and awkward postures. If light levels are too low muscles of the eyes can be strained and workers may adopt awkward postures to compensate. Since computer and paper work are commonly performed at the same time, light levels must suit both types of work. A desk lamp may be useful to control light levels as needed.

5.8.3 Glare

Glare is a common problem with lighting in offices. It makes it difficult to see the computer screen and strains the eyes. There are two forms of glare: direct and indirect.

- *Direct glare* occurs when light shines directly in the eyes.
- *Indirect glare* occurs when light is reflected from a surface. For example, light which may hit the monitor and reflect into the eyes.



Figure 27A (left): Example of direct glare, **Figure 27B** (right): Example of indirect glare.

5.8.3.1 Sources of glare

To determine sources of glare, turn off the monitor and look at the blank screen. This will display any light sources which may be affecting the screen. Identifying the source of the glare will allow the user to take the necessary precautions (i.e. dim overhead lights or install window blinds).

5.8.3.2 Reducing glare

The following are tips to reduce or eliminate glare:

- Position the monitor perpendicular to the windows and between overhead light panels.
- Use curtains and blinds to control the amount of natural light.
- Eliminate light sources that shine directly into the eyes.
- Eliminate light sources that reflect into the eyes.
- Consider the use of LCD (flat panel) monitors.
- Dim overhead lights.
- Angle the monitor away from the light.
- Place filters or fixtures on overhead lights.
- Tint windows.
- Cover the monitor with an anti-glare screen. Note: Polarized glass provides the most effective protection against glare.

5.8.4 REST BREAKS

Muscle recovery

It is important to stand up and get away from the desk and/or computer regularly throughout the day. A five minute break away from the computer every hour allows the muscles within our bodies to rest. Changing positions throughout the day will help to reduce the stress and strain that builds up from staying in one position for a prolonged period of time. For example, adjusting the angle of the back rest of the chair even slightly will help change the position of the spine, giving certain muscles a “break”. Movement is necessary to reduce the stress that builds up from sitting.

Getting up and walking around, even short distances, throughout the day helps to reduce stress by improving circulation in the muscles and the spine.

If the computer workstation can be adjusted, one option is to stand while working at the computer. Even if the work station is not fully adjustable, tasks like talking on the phone, can be done while standing. It is preferable to break up sitting and standing tasks throughout the day. Other daily tasks, such as filing and interacting with staff can be done when away from the computer. Avoid remaining seated for extended periods of time. Try to stand up and change the position every hour.

Figures 28 to 31 illustrate various body stretches that the computer user can perform while taking breaks.





Figures 28 A, B, C: Stretches for the wrists and arms.



Figures 29 A (left), 29 B (right): Stretches for the neck.



Figure 30A (left): Shows a whole body stretch.
Figure 30B (right): Shows an upper body stretch which can be performed in the chair.



Figures 31 A, B (page 50): **Figures 31 C, D (above):** Various stretches which should be performed when standing.

5.8.5 OFFICE ARRANGEMENT

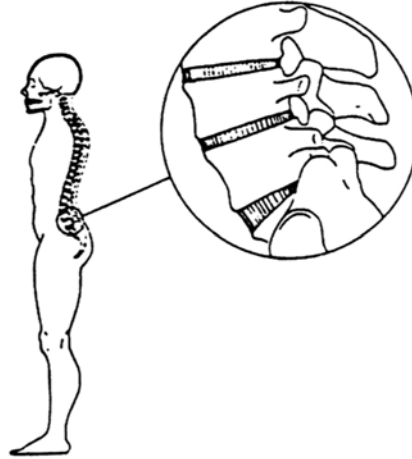
HOW SHOULD I ARRANGE MY OFFICE?

The following are some helpful hints on setting up the office.

- Allow adequate space for maintenance of equipment.
- Files and books that are used most often should be kept within reach.
- Files should be arranged in a filing cabinet so frequently used files are in the middle drawer or closest to elbow level. This should reduce the amount of bending and reaching required.
- Filing cabinets should be located so the user has to stand up from the chair and walk to them. If the cabinet is far enough away the user may have to stand to reach it. The user will be less likely to twist and reach which may result in injury.
- The user should use filing cabinets with a locking system so that no more than one drawer can be opened at once. If more than one drawer is opened there is a risk of the cabinet tipping.
- There should be enough space between the cabinet and the wall to pull open the drawers.
- File and desk drawers should be kept closed when not in use to avoid trips, bumps and scrapes.
- Heavy books should be accessed while standing and placed on the middle shelf or around elbow level.
- Shelf depth should allow for a comfortable reach.
- Equipment such as printers or fax machines should not obstruct movement.

6 MANUAL MATERIALS HANDLING

Manual materials handling or lifting and moving tasks is another area in which injuries to office personnel can occur. This type of work entails lifting, bending, and twisting, which can cause great damage to the human body if done improperly. The figure below points out the region most frequently injured from manual lifting activities.



6.1 General Lifting Guidelines

Plan the Lift

Before lifting or moving an object, plan out the movements. Make sure there is enough room to perform the task properly and ensure that any travel path is clear of obstacles. If lifting or moving an object as a team, make sure that all in agreement with how the lift and/or move will take place. Perform a countdown before actually lifting the object (“3-2-1-LIFT!”) – communication and coordination is a key part of a well-executed team lift!

Close and Centered

Whenever lifting an object, start with and keep the object close to the body. A good way to do this is to have a diagonal footing when lifting an object off the floor (one foot to the side of the object, the other foot behind the object). If lifting straight up with this footing, the object will remain close to the body. The further the person lifts and/or holds an object away from the body, the more strain it places on the back muscles and bones.

Keep the object centered in relation to the body. Keeping the object centered will help to discourage from twisting or contorting the back while lifting or holding the object. Twisting, even while lifting or carry little or no weight, can cause back injuries.

Use “Core Strength”

Having a strong “core” essentially means having strong upper, middle, and lower abdominal muscles. By tightening up the core muscles when lifting and moving objects, it will place the back muscles in a good position for lifting/moving and will help to prevent excessive force on the spine. Doing sit-ups and leg lifts will strengthen the abdominal muscles and will do a lot to protect from a back injury.

Bend the Knees, Lift with the Legs

When lifting objects from down low, bend the knees and keep the back straight when setting up the lift. While lifting the object, use the large, powerful muscles of the legs to straighten the body up (rather than the smaller, weaker, and more vulnerable muscles of the back and arms). Keep the abdominal muscles tight when lifting.

Look Ahead

Keep eyes looking in front of and slightly upward when lifting and moving objects – this will keep the upper back and neck in the best position for lifting. Avoid bending the head or neck downwards when lifting.

Don't Do It Alone

If an object is too heavy, large, or awkward to lift or move for one person, get some help.

6.2 Working with Large Bins

Lifting objects from the bottom of large receptacles or bins can be difficult and often painful if performed improperly. This is because the sides of the bin restrict the ability to bend the knees to get down low to lift the object. There are a few techniques that can be used, however, to make this task a little easier and less risky.

The Tip-Down

If there is a relatively large and somewhat to very heavy object at the bottom of a bin that needs to be get out, consider using the “Tip-Down” technique. This technique involves tipping the bin on its side and squatting or kneeling to down to drag the object out of the bin. When squatting to drag the object out, bend the knees and keep the back straight.

The Golfer's Lift

If there is a small and light object that a person can pick up with one hand and that needs to be retrieved from a deep bin, use the [Golfer's Lift \(see page 57\)](#). The Golfer's Lift gets its name from a type of lift often seen on the golf course for tee or ball retrieval.

6.3 Oversized Objects

Very large and/or heavy objects should always be moved in teams. The size of the team will vary depending on the weight and/or size of the object. Team members should be placed, at a minimum, at the ends of the object to maximize chances for even weight distribution. The lift and/or move should be planned out in advance and should be conducted with very good communication and coordination. Team members must avoid sudden movements.

6.4 Odd-Shaped Objects

Odd-shaped objects, especially if they are large, should also be lifted and moved in teams (see “Oversized Objects” above for more information on team lifting/moving). If moving a smaller, odd-shaped object alone, examine the object to determine how its weight is distributed before attempting to lift or move it. If the object has an unequal weight distribution (e.g., a sack full of grain), consider using the [Tripod Lift \(see page 55\)](#).

6.5 Working with Bags and Boxes

There are many specific techniques for lifting and moving boxes and/or bags detailed in following section of this manual.

6.6 Proper Lifting Techniques

6.6.1 Basic Lift (Diagonal Lift) - This lift is the most common method of good lifting technique. Use the basic lift for objects small enough to straddle where there is enough room to use a wide stance.

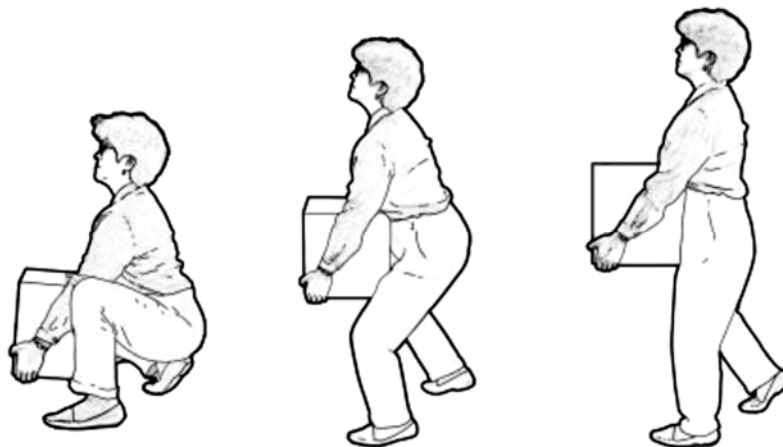


Figure 32. Basic Lift (Diagonal Lift)

Steps in performing Basic (Diagonal) Lift

1. Get close to the object.
2. Stand with a wide stance: put one foot forward and to the side of the object.
3. Keep the back straight, push the buttocks out, and use the legs and hips to lower down to the object.
4. Move the load as close to the body as possible.
5. If the box has handles, grasp the handles firmly and go to step 9.
6. Put the hand (that is on the same side of the body as the forward foot) on the side of the object furthest from the body.
7. Put the other hand on the side of the object closest to the body. The hands should be on opposite corners of the object.
8. Grasp the object firmly with both hands.
9. Prepare for the lift: look forward.
10. Lift upwards following the head and shoulders. Hold the load close to the body. Lift by extending the legs with the back straight, the buttocks out, and breathe out as the object is lifted.

If done correctly, the head will lift up first, followed by the straight back. If the hips come up first and bend the back as the person straighten up, the lift is done incorrectly.

6.6.2 Power Lift - Use the power lift for objects too large for the person to straddle. This lift is very similar to the basic lift. In the power lift, the object shifts the center of gravity forward, and must push the buttocks out to compensate. (Professional weight lifters lift using this position.)



Figure 33. Power Lift

Steps in performing Power Lift

1. Put one foot in front of the other using a wide stance.
2. Keep the back straight, push the buttocks out and use the legs and hips to lower oneself down to the object.
3. Move the load as close to the body as possible.
4. Grasp the object firmly with both hands.
5. Prepare for the lift: look forward.
6. Lift upwards following the head and shoulders. Hold the load close to the body. Lift by extending the legs with the back straight, the buttocks out (exaggerate this position), and breathe out as the object is lifted.

6.6.3 Tripod Lift - Use the tripod lift for objects with uneven weight distribution (example: sacks of food). This is recommended for people with decreased arm strength. Not recommended for people with bad knees.



Figure 34. Tripod Lift

Steps in performing Tripod Lift

1. Put one foot next to the object. Keep the back straight, push the buttocks out and slowly lower self down onto one knee. (For support as the person lowers self down, put one hand on a stool or on the thigh for support.)
2. Position the object close to the knee on the ground.
3. Grasp the object firmly with both hands.

4. Slide the object from the knee on the ground to mid-thigh. Keep the head forward, the back straight, and the buttocks out, and lift the object onto the opposite thigh.
5. Put both of the forearms under the object (with the palms facing upward) and hug the object to the stomach and chest.
6. Prepare for the lift: look forward.
7. Lift upwards following the head and shoulders. Hold the load close to the body. Lift by extending the legs with the back straight, the buttocks out, and breathe out as the object is lifted.

6.6.4 Partial Squat Lift - Use the partial squat lift for small light objects with handles close to knee height.



Figure 35. Partial Squat Lift

Steps in performing Partial Squat Lift

1. Stand with the object close to the side.
2. Place the feet shoulder width apart, with one foot slightly ahead of the other.
3. Place one hand on a fixed surface (such as a table or stool) or on the thigh.
4. Keep the back straight, push the buttocks out and slowly lower down to reach the object's handles.
5. Prepare for the lift: grasp the object and look forward.
6. For support as the object is lifted, push down on the fixed surface (or on the thigh).
7. Lift upwards following the head and shoulders. Lift by extending the legs with the back straight, the buttocks out, and breathe out as the object is lifted.

6.6.5 The Golfer's Lift - Use the golfer's lift for small light objects in deep bins and to pick small objects off the floor. Recommended for people with knee problems or decreased leg strength.

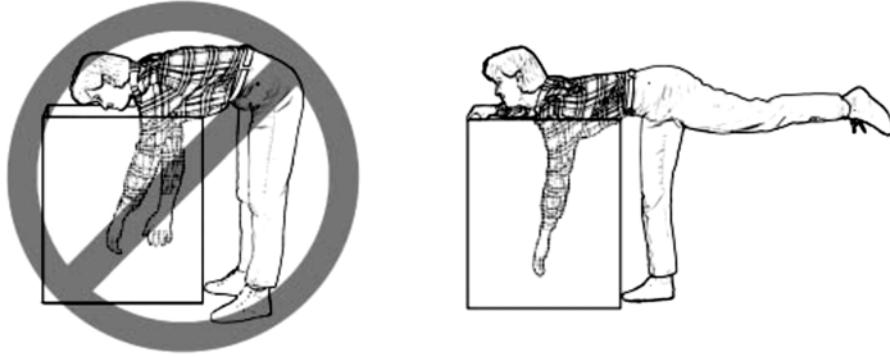


Figure 36. The Golfer's Lift

Steps in performing Golfer's Lift

1. Place hand near the edge of a fixed surface (such as the edge of a table or bin). This hand will support the upper body during the lift.
2. Keep the back straight and raise one leg straight out behind while leaning down to pick up the object. The weight of the leg will counterbalance the weight of the upper body.
3. Grasp the object firmly.
4. Prepare for the lift: look forward. Keep the leg raised as the lift is started.
5. To lift, push down on the fixed surface leg is lowered. Keep the back straight and breathe out as the object is lifted.

6.6.6 Straight Leg Lift - Use the straight leg lift when obstacles prevent from bending the knees. Be careful! Lifts over obstacles that prevent from bending the knees increase risk for muscle strain. If possible, avoid this lift. Only use this lift when absolutely necessary (i.e. lifting out of a grocery cart, car trunk).



Figure 37. Straight Leg Lift

Steps in performing Straight Leg Lift

1. Stand as close to the object as possible with knees slightly bent.
2. Do not bend the waist! Push the buttocks out.
3. If the obstacle (preventing from bending the knees) is stable, lean the legs against the obstacle for support. Use the legs and hips to lower down to the object.

4. Grasp the object firmly with both hands.
5. Prepare for the lift: look forward.
6. Lift upwards following the head and shoulders. Hold the load close to the body. Lift by extending the legs with the back straight, the buttocks out (exaggerate this position), and breathe out as the object lifted.

6.6.7 Overhead Lift - Use the overhead lift to place objects on an overhead shelf. This lift begins with the object in the hands. Be careful! Overhead lifts increase the risk for muscle strain. It can be difficult to maintain balance during the lift. If possible, avoid this lift. Only use this lift when absolutely necessary.

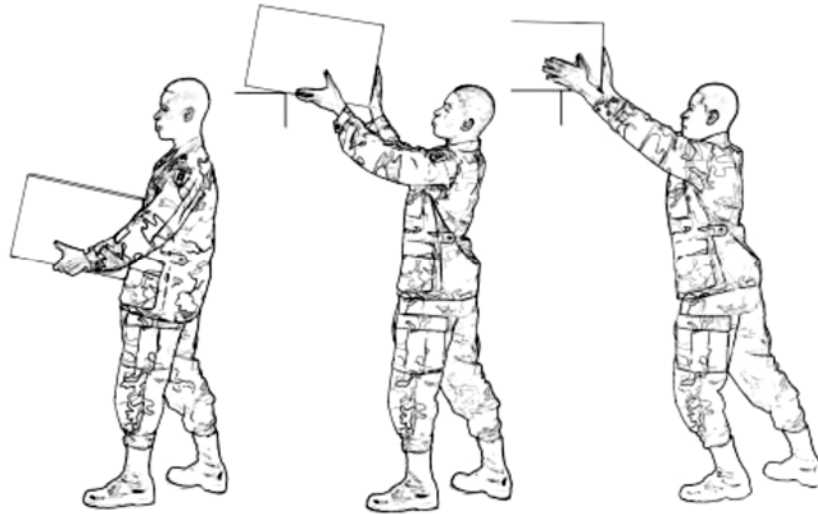


Figure 38. Overhead Lift

Steps in performing Overhead Lift

1. Hold the object very close to the body.
2. Keep feet shoulder width apart, one foot slightly ahead of the other.
3. Prepare for the lift: look forward.
4. Raise the object to shelf height using the arm and shoulder muscles. Keep the object close to the body and breathe out as the object is lifted.
5. While reaching the shelf, slowly shift the weight from the back foot to the forward foot. Keep the back straight.
6. When the load reaches the edge of the shelf, push the object onto the shelf.

6.6.8 Pivot Technique - When lifting an object and then turning to carry it away, it is common to twist the body. Twisting while lifting can cause serious damage to the tissues of the back. Use the pivot technique to avoid twisting while lifting.

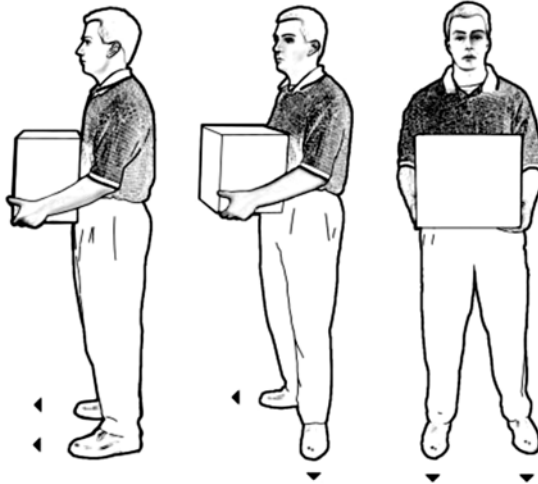


Figure 39. Pivot technique

Steps in performing pivot technique

1. Lift the load using any of the previous techniques.
2. Hold the load very close to the body at waist level.
3. Turn the leading foot 90 degrees toward the direction to turn.
4. Bring the lagging foot next to the leading foot. Do not twist the body!

7 MEDICAL MANAGEMENT

The University provides medical care to all employees injured at work. Staff and students who experience discomfort or symptoms associated with MSD should immediately report verbally and/or in writing, to their direct supervisor.

In the event of a possible work-related injury or illness, the staff or student should seek medical consultation with the Occupational Health Clinic or the University Health Centre (UHC).

Occupational Health Clinic
Office of Safety, Health & Environment (OSHE)
University Health Centre, Basement
20 Lower Kent Ridge Road, Singapore 119080.

University Health Centre (UHC)
<http://www.nus.edu.sg/uhc/>

Main Clinic
Kent Ridge Campus
20 Lower Kent Ridge Road
University Health Centre, Level 1

Operating Hours:
Mondays to Thursdays, 8:30 am – 6 pm
Fridays: 8:30 am to 5:30 pm

Closed on Saturdays, Sundays and Public
Holidays
Closed for lunch from 12.30pm – 1.30pm

General Enquiries: 6601 5035
e-mail: uhc_health@nus.edu.sg

The medical professional will:

- Provide diagnosis and treatment
- Determine if reported MSD signs or symptoms are work-related
- Recommending restricted, modified, or transitional work duties when appropriate
- Refer the staff/student to other clinical resources for therapy or rehabilitation

Any injury identified and diagnosed as a work-related MSD by a medical professional should be immediately reported to OSHE via the online Accident/ Incident Reporting System (AIRS) <http://nus.edu.sg/osh/services/airs.htm>.

8 CONCLUSION

After reading this manual, the user should be able to adjust the workstation to suit the user. Incorporating the principles outlined in this handbook will take some effort and getting used to on the part. Referring back to this handbook periodically is recommended to refresh the knowledge about office ergonomics.

Ergonomic equipment is only ergonomic if used correctly. Learn how to use the equipment. Reduce repetitive movements, awkward postures and static forces. Be conscious of the body positions and movements. Take a break away from the computer at least once every hour. Remember to keep moving. All aspects of the office interact to affect the health (e.g., workstation design, stress, air quality, noise, etc.).

9 REFERENCES

1. *Lifting Techniques*, United States Army Center for Health Promotion and Preventive Medicine.
2. *Singapore Standards 514: 2005 Code of Practice for Office Ergonomics*.
3. *Working in a Standing Position*, Canadian Center for Occupational Health and Safety http://www.ccohs.ca/oshanswers/ergonomics/standing/standing_basic.html
4. *Ergonomics*, Environmental Health and Safety Office, Massachusetts Institute of Technology, <http://ehs.mit.edu/site/content/ergonomics>
5. *Office Ergonomics Handbook, Occupational Health Clinics for Ontario Workers (OHCOW)*

9.1 USEFUL INTERNET RESOURCE:

UCLA has summarized basic office ergonomics concepts through the video link below:

<http://www.youtube.com/watch?v=IAMKVJnHNsA>

10 APPENDICES

Appendix A – Office Ergonomics Evaluation Checklist

Note: This checklist is meant for use by the individual office user. It is a tool that can assist in designing a safe and comfortable computer workstation. A "no" response may indicate sign of user discomfort. Please consult your faculty safety officer, or Mr. Pramoth Chandrikamohan (Ergonomics Programme Lead, e-mail: oshpc@nus.edu.sg) for a thorough evaluation of your office workstation. More information on the office ergonomics programme can be found at

https://share.nus.edu.sg/corporate/procedures/safety_and_health/Ergonomics/Manuals/office-ergonomic.pdf

Self-check of workstation can also be done through the use of the “Ergo App” application developed by the Workplace Safety & Health Institute. This mobile application can be downloaded in iOS and Android smart phones and tablets. The Ergo App application is a tool used to identify ergonomic hazards in the workplace and provide recommendations to prevent musculoskeletal complaints. It can also help to raise general awareness of good postures. The application can be downloaded from

<https://play.google.com/store/apps/details?id=com.mom.ergo&hl=en>.

Ergonomics Checklist	Yes	No	N.A.
Work Surface			
Are you able to adjust the height of your work surface?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you have sufficient knee clearance and leg room?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If computer work is your main task, is the monitor positioned in front of you? Is your work surface large enough to perform the required tasks and to hold all the equipment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are frequently accessed items (e.g. phone and files) within easy reach?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chairs			
Is your chair height adjustable?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is your chair backrest adjustable (backward, forward and vertically)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is your seat pan size suitable for you?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does your seat pan have a rounded edge?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does your arm rest allow you move closer to your workstation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does your chair have five castors?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is your chair able to revolve?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all the chair adjustments easy to locate and operate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Monitor			
Is your monitor at least 14 inches in size?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is the top of your monitor screen at or slightly below your eye level?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is your monitor located at about an arm’s length in front of you?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If you use a document holder, can you position it at the same height and the same distance from the screen?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can your monitor be tilted forward, backward and rotated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is your monitor free from any noticeable flicker?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Ergonomics Checklist	Yes	No	N.A
Input Devices			
Is your mouse located beside or close to the keyboard?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is your mouse at the same height as your keyboard?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
Do you keep your wrists straight while using the input devices?	<input type="checkbox"/>	<input type="checkbox"/>	
Software			
Does the software help you perform your task efficiently?	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
Is the software easy to use?		<input type="checkbox"/>	
Work Posture			
Do you sit in a slightly reclining and relaxed posture with the back supported and the feet resting comfortably on the floor or foot-rest? Are you able to avoid adopting poor working postures (e.g., neck bending or twisting or unsupported back)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manual Handling			
Are you free from frequent reaching above the shoulder or below the knee level?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you use the trolleys or carts to move heavy objects instead of carrying them?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lighting			
Do you think you receive enough lighting on your workstation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you experience eye strain from glare or poor lighting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If YES: Please specify: _____			
Ambient Noise			
Do you consider your work environment to be noisy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are there any forms of noise isolation or enclosure for equipment generating noise?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Work Practices			
Do you have sufficient control over the way you do your work? Does your work allow variation of activities and frequent posture change?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you receive sufficient training for the task to be carried out?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix B – Eye Exercises and Stretches

Eye Comfort Exercises

- A. Blinking (produces tears to help moisten and lubricate the eyes)
- B. Yawning (produces tears to help moisten and lubricate the eyes)
- C. Expose eyes to natural light

Palming

- A. while seated, brace elbows on the desk and close to the desk edge
- B. let weight fall forward
- C. cup hands over eyes
- D. close eyes
- E. inhale slowly through nose and hold for 4 seconds
- F. continue deep breathing for 15-30 seconds



Eye Movements

- A. close eyes
- B. slowly and gently move eyes up to the ceiling, then slowly down to the floor
- C. repeat 3 times
- D. close eyes
- E. slowly and gently move eyes to the left, then slowly to the right
- F. repeat 3 times

Focus Change

- A. hold one finger a few centimetres away from the eye
- B. focus on the finger
- C. slowly move the finger away
- D. focus far into the distance and then back to the finger
- E. slowly bring the finger back to within a few centimetres of the eye
- F. focus on something more than 2.5 metres away
- G. repeat 3 times

Appendix C – Musculoskeletal System Exercises and Stretches

Deep Breathing

- A. while standing, or in an otherwise relaxed position
- B. place one hand on the abdomen and one on the chest
- C. inhale slowly through the nose
- D. hold for 4 seconds
- E. exhale slowly through the mouth
- F. repeat once

Cable Stretch

- A. while sitting with chin in, stomach in, shoulders relaxed, hands relaxed in lap, and feet flat on the floor, imagine a cable pulling the head upward
- B. hold for 3 seconds and relax for a few seconds
- C. repeat 3 times



Sidebend: Neck Stretch

- A. tilt head to one side (ear towards shoulder)
- B. hold for 15 seconds
- C. relax for a few seconds
- D. repeat 3 times on each side



Diagonal Neck Stretch

- A. turn head slightly and then look down as if looking in your pocket
- B. hold for 15 seconds
- C. relax for a few seconds
- D. repeat 3 times on each side

Shoulder Shrug

- A. slowly bring shoulders up to the ears and hold for approx 3 seconds
- B. rotate shoulders back and down
- C. repeat 10 times



Executive Stretch

- A. while sitting, lock hands behind head
- B. bring elbows back as far as possible
- C. inhale deeply while leaning back and stretching
- D. hold for 20 seconds
- E. exhale and relax for a few seconds
- F. repeat once

Foot Rotation

- A. while sitting, slowly rotate each foot from the ankle
- B. rotate 3 times in one direction, then 3 times in the opposite direction
- C. relax for a few seconds
- D. repeat once



Hand Shake

- A. while sitting, drop arms to the side
- B. shake hands downward gently
- C. repeat as appropriate

Hand Massage (Note: Perform very gently!)

- A. massage the inside and outside of the hand using the thumb and fingers
- B. repeat as appropriate (including before beginning work)

Finger Massage (Note: Perform very gently!)

- A. massage fingers of each hand individually, slowly, and gently
- B. move toward nail gently
- C. massage space between fingers
- D. perform daily

Wrist Stretch

- A. hold arm straight out in front of you
- B. pull the hand backwards with the other hand, then pull downward
- C. hold for 20 seconds
- D. relax for a few seconds
- E. repeat 3 times each



