

**Welcome**

# Manual Handling Awareness



## Aims & objectives

At the end of this session, participants will be able to:

- ❖ define 'manual handling';
- ❖ explain how manual handling can give rise to injury;
- ❖ understand good handling technique; and
- ❖ state the principles for the control of manual handling risk and apply these to a practical situation.

# Introduction

# Definition of manual handling

The **Manual Handling Operations Regulations** define it as ‘the transporting or supporting of a load by hand or by bodily force’, and of which includes:

- ❖ lifting;
- ❖ putting down;
- ❖ pushing;
- ❖ pulling;
- ❖ carrying;
- ❖ moving; and
- ❖ use of mechanical aids such as trolleys.



# Three most important things to you?

- ❖ family;
- ❖ home;
- ❖ relationships;
- ❖ wealth and ability to earn;
- ❖ leisure activities and sport; or
- ❖ health.

Any injury sustained as a result of handling could well impact on any or all of the above-mentioned priorities.



# Employers' legal duty

The **Manual Handling Operations Regulations** require that employers:

**Avoid** - manual handling, so far as is reasonably practicable, by redesigning the task to avoid moving the load or by automating or mechanising the process;

**Assess** - hazardous manual handling in a 'suitable' and 'sufficient' way where it cannot be avoided; and

**Reduce** - the risk of injury so far as is reasonably practicable, taking into account the; task, individual, load and the environment.



# Appropriate control measures

To reduce the risk of harm consideration must be given to:

- 1) eliminate the need for the task;
- 2) automate or mechanise;
- 3) provide manual handling aids; and/or
- 4) implement people measures e.g.
  - ❖ safe lifting techniques;
  - ❖ team handling;
  - ❖ safe operating procedures; and/or
  - ❖ personal protective equipment (as the last resort).



# How big is the problem?

# Lifting & handling

Lifting and handling is something we do everyday, most of the time we don't actually think about the risks and the damage we could do our ourselves.

Failure to carry out correct manual handling techniques may well result in an injury.



# The problem

Handling is a broad category of work-related injury and such injuries include:

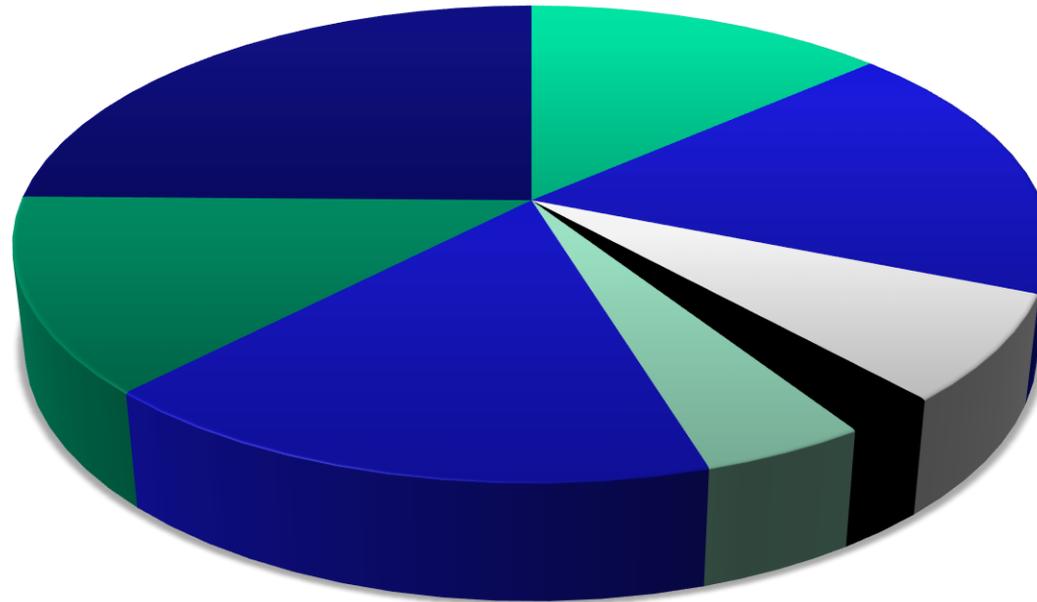
- ❖ injury as a result of lifting & carrying;
- ❖ pushing & pulling of loads;
- ❖ strains & sprains; or
- ❖ trapped fingers and cuts from sharp objects.

Approximately 8 out of 10 people in the UK suffer back pain at some point in their life.



# University of Warwick - 2013

## Comparison of more common accidents

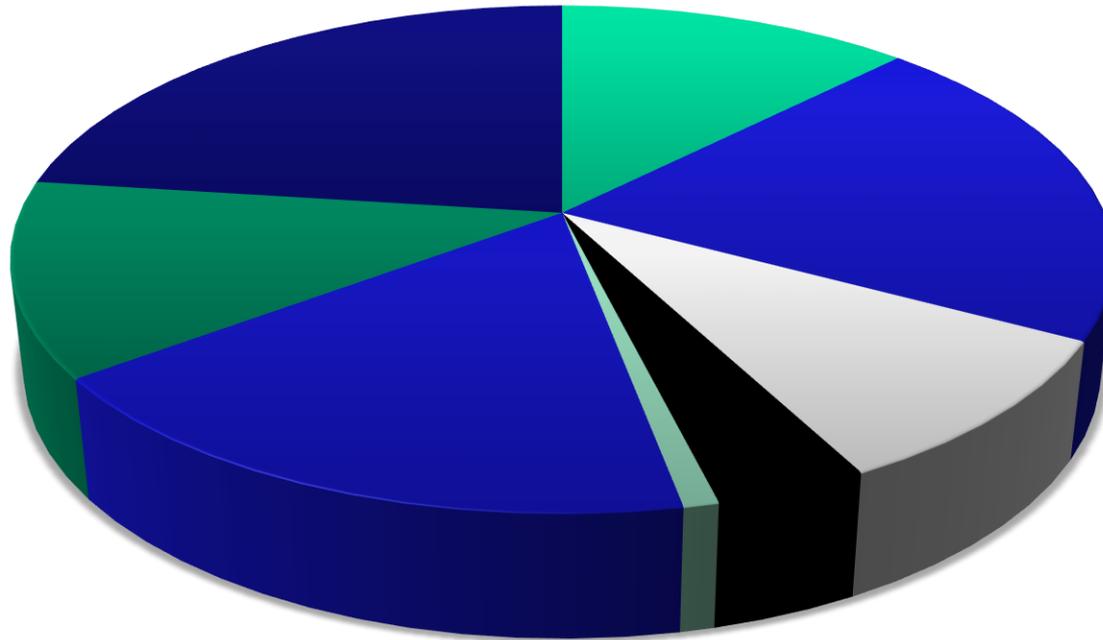


- Contact - fixed object
- Contact - sharp object
- Contact - hot/cold object
- Electrical
- Fall from height
- Hit by moving item
- Manual handling
- Slips, trips & falls



# University of Warwick - 2014

## Comparison of more common accidents



- |  |  |   |
|--|--|---|
|  Contact - fixed object |  Contact - sharp object |  Contact - hot/cold object |
|  Electrical             |  Fall from height       |  Hit by moving item        |
|  Manual handling        |  Slips, trips & falls   |   |



# Nationwide - how big is the problem?

In 2013/2014p:

- ❖ estimated 909,000 working days lost as a result of handling injuries.
- ❖ average of 6.6 days lost for each handling injury.
- ❖ handling accounted for almost a quarter of reported injuries.
- ❖ > 7-day injuries accounted for more than 9 from 10 of total reported accidents (18,354 RIDDOR)



# Injuries arising from manual handling

- ❖ fractures
- ❖ damage to muscles, ligaments and tendons
- ❖ spinal disc injuries
- ❖ trapped nerves
- ❖ abrasions and cuts
- ❖ burns
- ❖ work related upper limb disorders
- ❖ hernias
- ❖ death



# Cause of injury

## Traumatic stress

Relates to immediate cause and effect, where it is obvious what caused the injury e.g. cut to finger when handling a knife, or trapping a finger in a door jamb



# Cause of injury

## Cumulative stress

Someone may undertake a particular handling task for years or maybe decades and never encounter a problem.

It is reckoned that for every 1 hour of hard physical work that a 6 hour recovery rest period is required.

Typically that does not happen, therefore, cumulative stress builds up over long period of time, eventually manifesting itself as a painful injury.



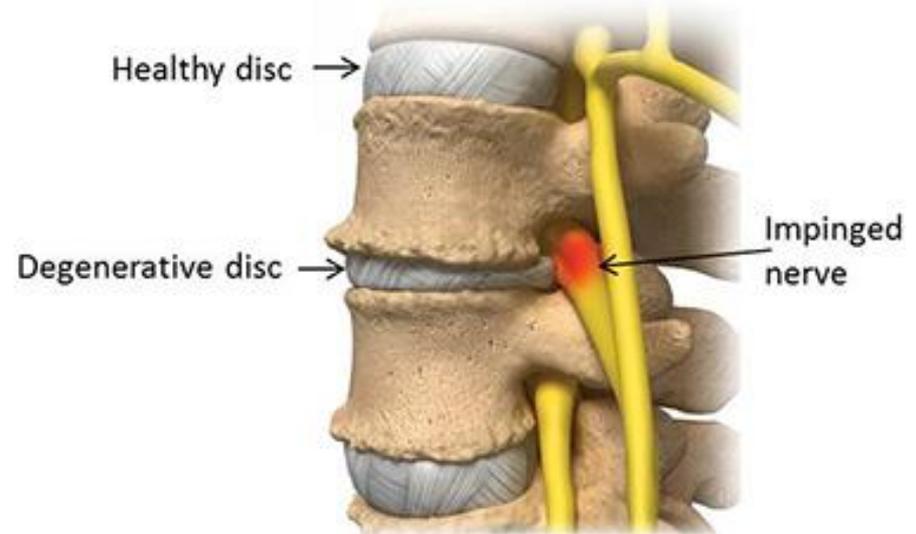
# Cause of injury

## Degenerative stress

A person's age leads to reduction in flexibility, strength and stamina.

In respect to the spine the vertebrae and discs become less able to hydrate with age - resulting in dehydration and shrinkage.

Cartilage in the discs become less flexible and there is a heightened risk of injury.



# Poor posture may result in injury



# Who is at risk - vulnerable groups?

A number of factors increase the likelihood of back injuries:

- ❖ **age** - less flexible, vertebral discs dehydrate and thin, spinal bones become less solid.
- ❖ **youngsters** - may be more prone to injury due to lack of experience in lifting techniques, macho tendencies?
- ❖ **stature** - due to mechanics of spine, each 1lb of excess weight carried adds 10lb of strain to abdomen.



# Who is at risk - vulnerable groups?

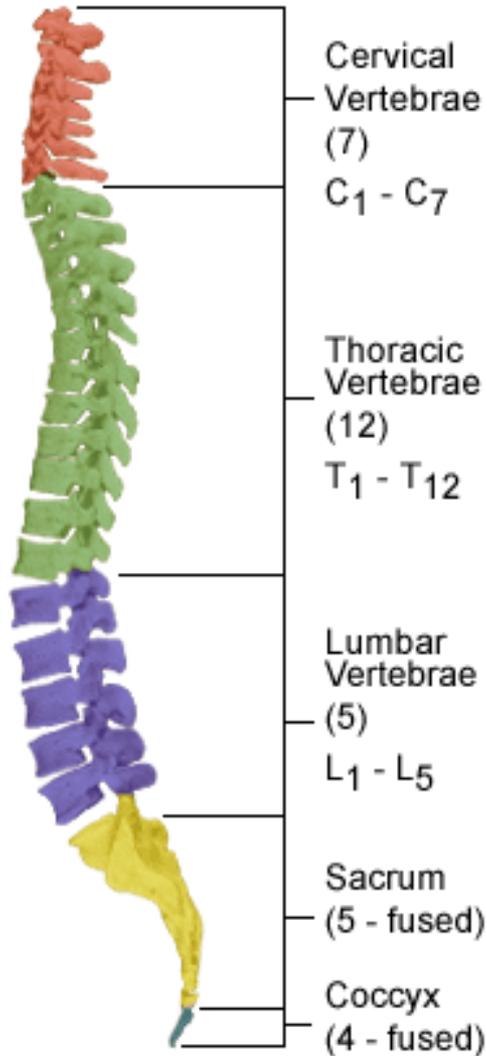
- ❖ **untrained** - ignorance as to how to avoid or reduce likelihood of injury.
- ❖ **predisposition to injury** - those who have suffered with bad backs before or have certain medical conditions.
- ❖ **tiredness** - recover less quickly, cumulative stress more likely, reduction in concentration and potential to cut corners.
- ❖ **pregnant women** - hormonal changes occur, leading to relaxation of supporting ligaments (length of spine), more susceptible to damage and for 6 months after giving birth.



# Anatomy



# The spine & vertebrae



**Cervical Spine:** upper 7 vertebrae - protect upper spinal cord and exiting nerves to upper extremities and are muscle attachment sites for the shoulder girdle.

**Thoracic Spine:** mid back has 12 vertebrae - commonly labelled T1 through T12.

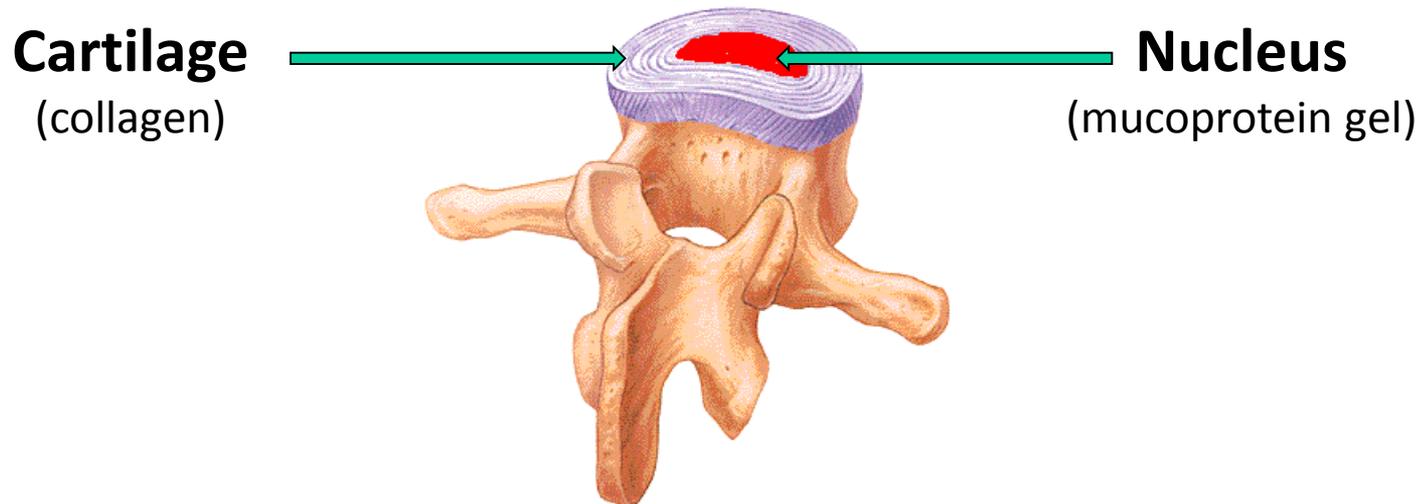
**Lumbar Spine:** has 5 vertebrae and bears significant amount of weight comparatively and is a common source of pain.

**Sacrum and Coccyx:** being 9 fused vertebrae that typically form a solid fused region that connect the very strong ligaments to the pelvis.

# Vertebral discs

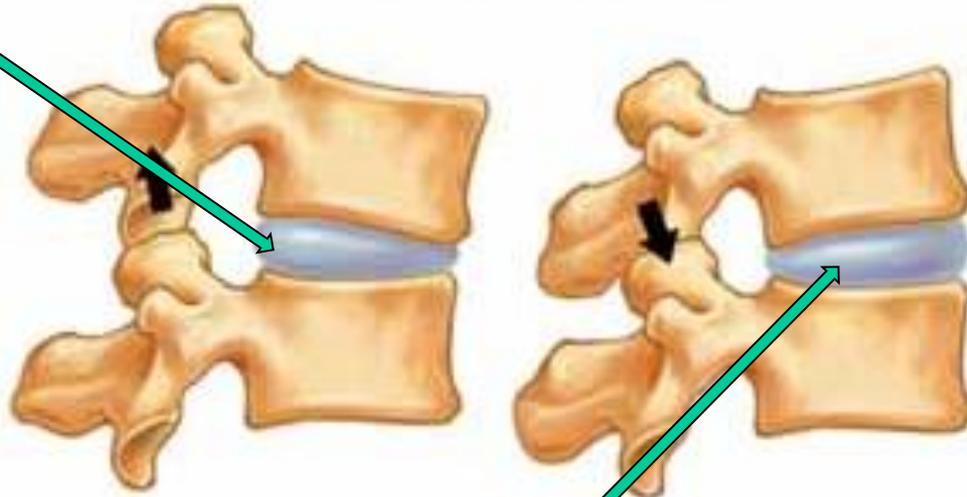
These allow slight movement of the vertebrae and acts as ligament to hold the vertebrae together.

Role as shock absorbers in the spine is crucial.



# Working facet joints

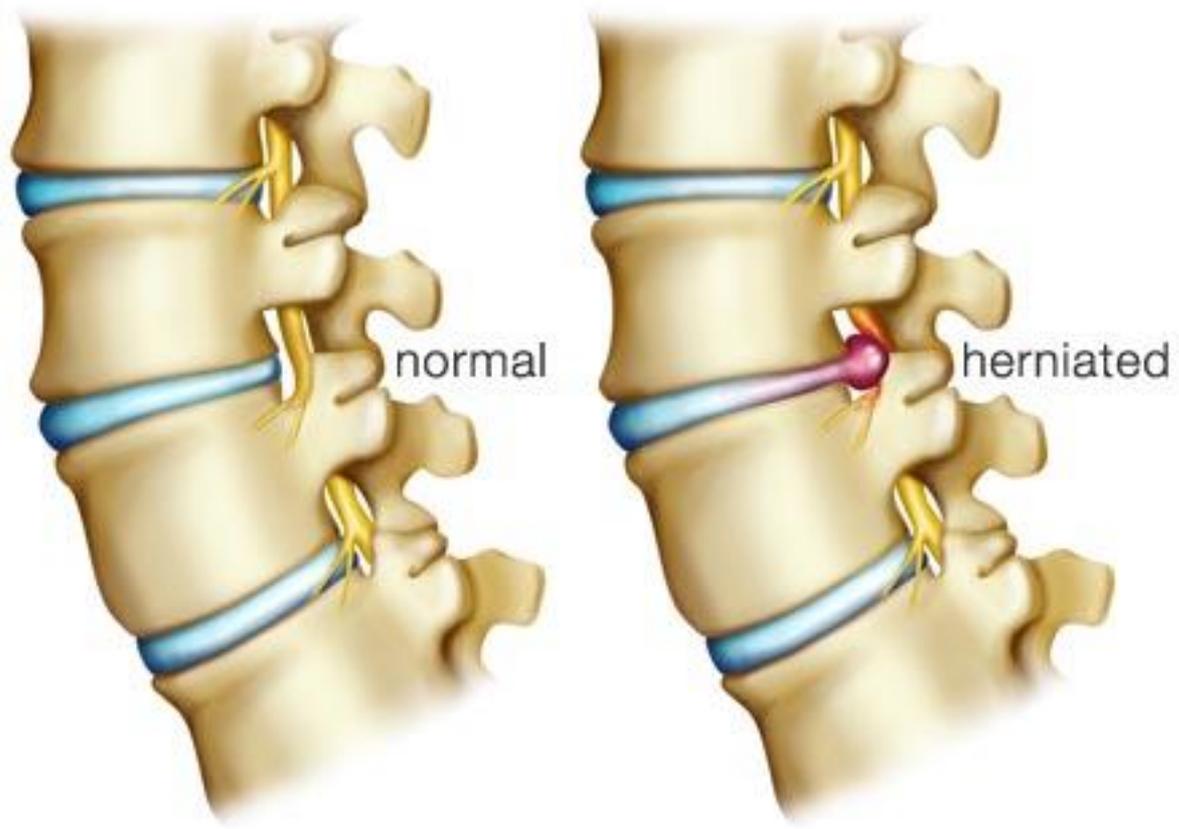
Flexion (stretching when bending forward)



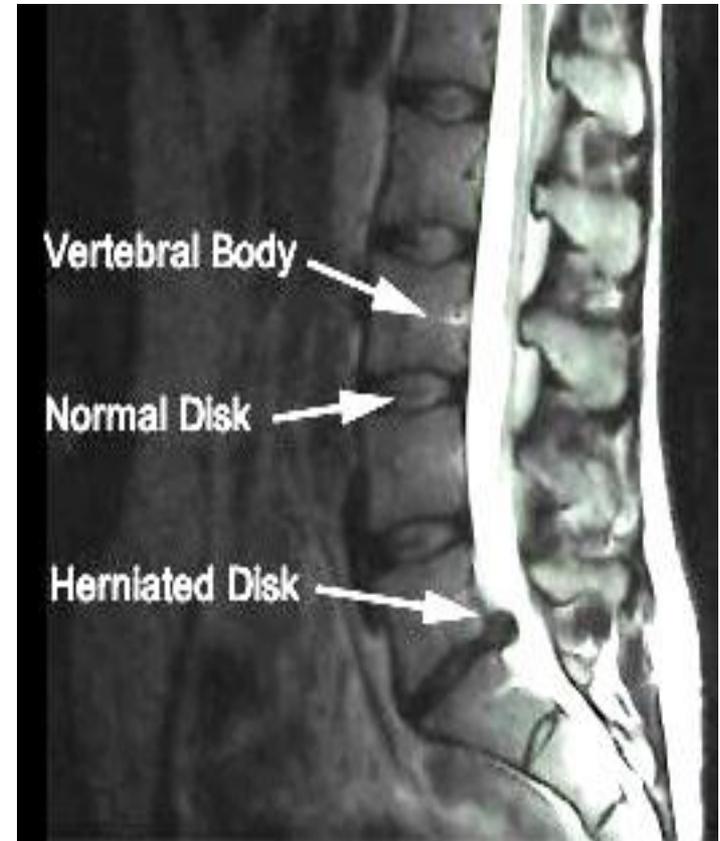
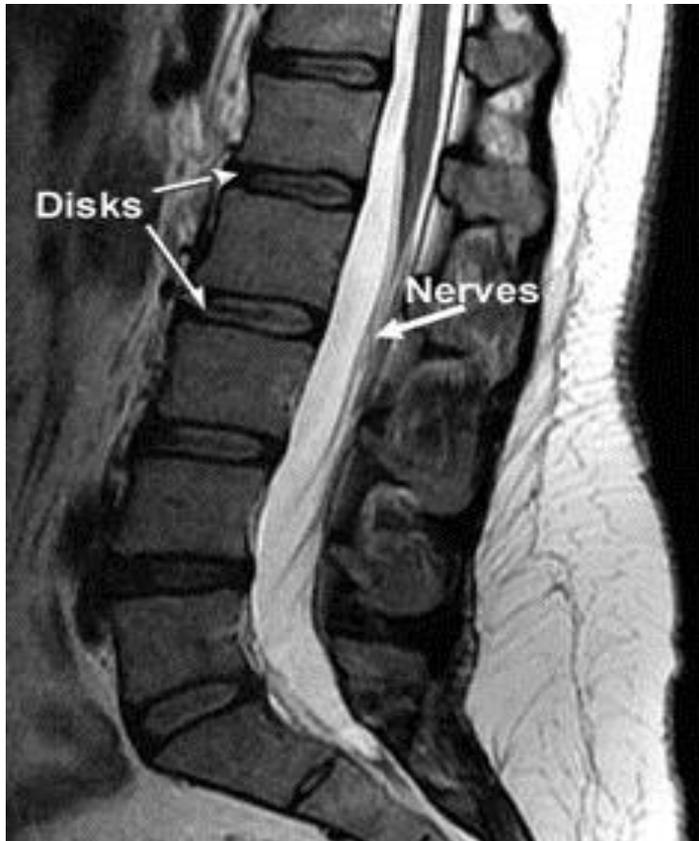
Extension (expansion when bending backwards)



# Herniated (prolapsed) disc



# MRI scan showing herniated disc



# Vertebral discs - comparison to jam doughnuts

- ❖ whilst no pressure is applied to the doughnut the jam stays inert.
- ❖ apply pressure to one side of the doughnut and the jam will move to the other side.
- ❖ if you press hard enough the jam will squirt out.

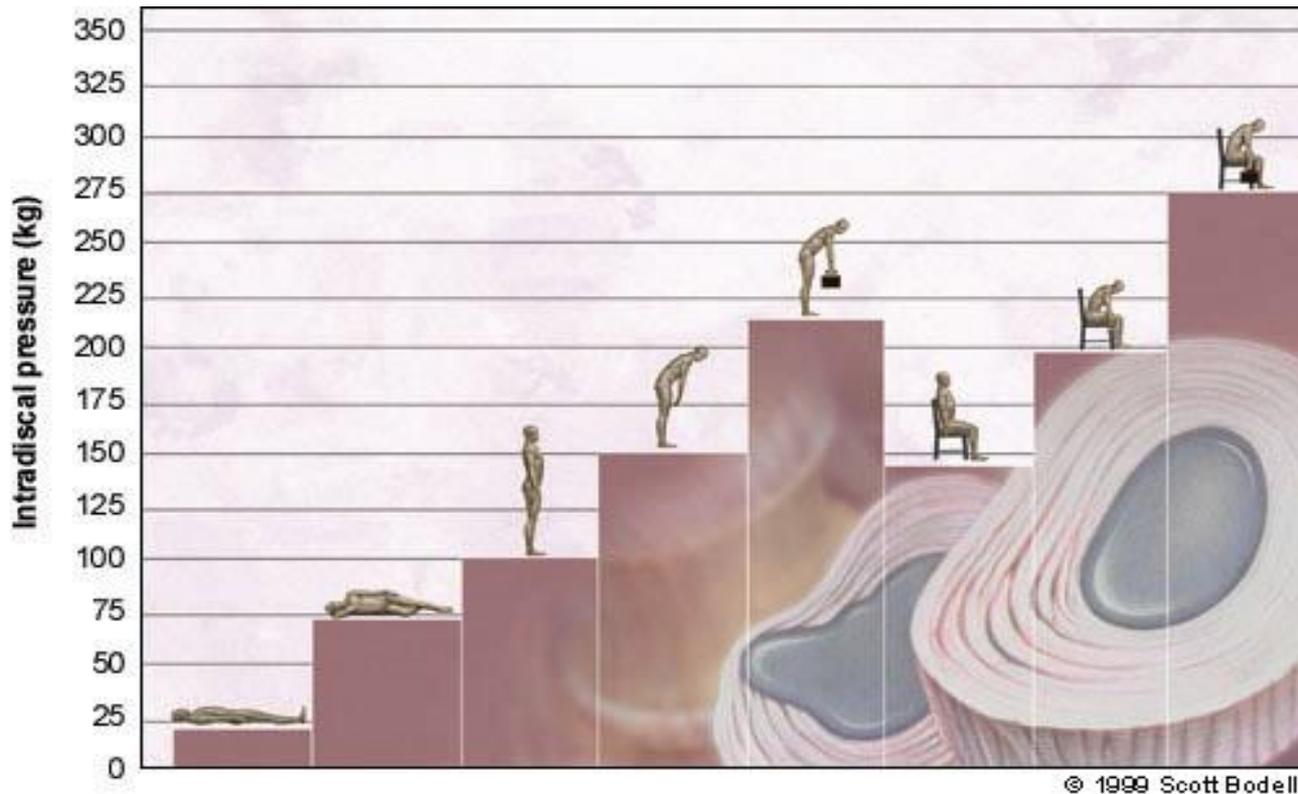


The same principle can be applied to the vertebral disc if put under undue pressure or exposed to injury.



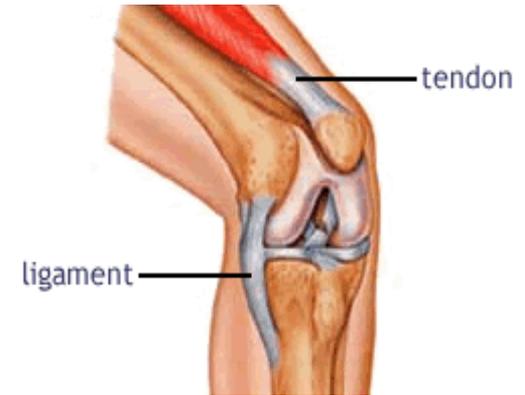
# Disc pressures within L3

Pressure applied to the middle (3<sup>rd</sup>) vertebrae of the lumbar spine when the body adopts different positions.



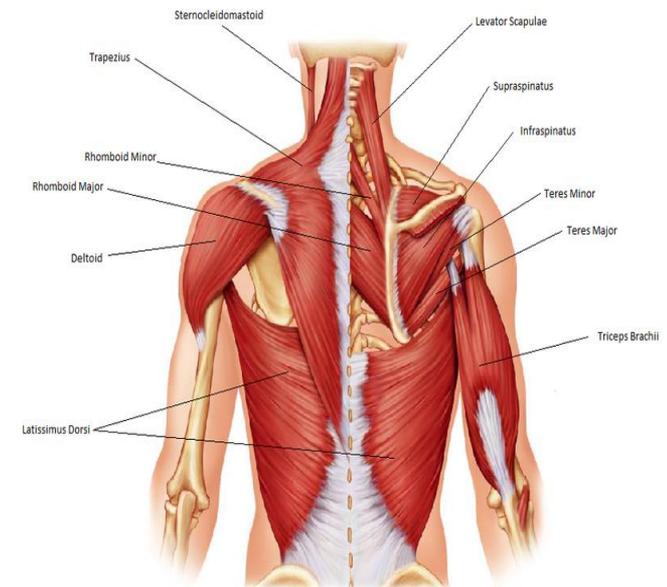
# Ligaments, tendons & muscles

**Ligaments;** fibrous tissue connecting bone to bone.



**Tendons;** fibrous tissue connecting muscle to bone.

**Muscle;** contractile tissue that produces force and motion.



# Elements of human movement

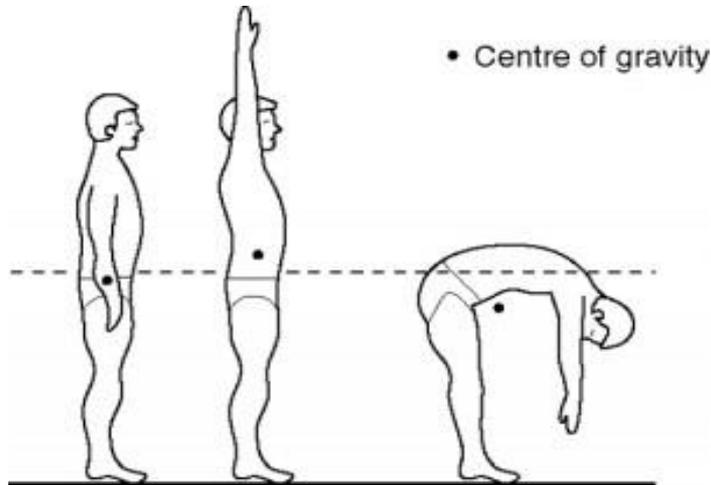


# Stability and centre of gravity

Standing upright, the centre of gravity will typically fall just to the front of the spine around the area of the pelvis.

For the average person, a constant load of 40-60kg will pass through their discs.

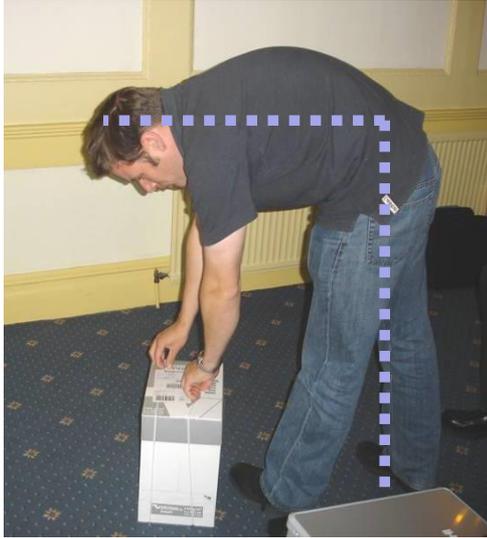
When leaning forward, the centre of gravity shifts, meaning the person is potentially unstable.



When sitting down the lumbar section has to support the majority of the weight of the upper body, of which accounts for  $\frac{2}{3}$  of our total body weight.

# The centre of gravity

Poor posture



Good posture

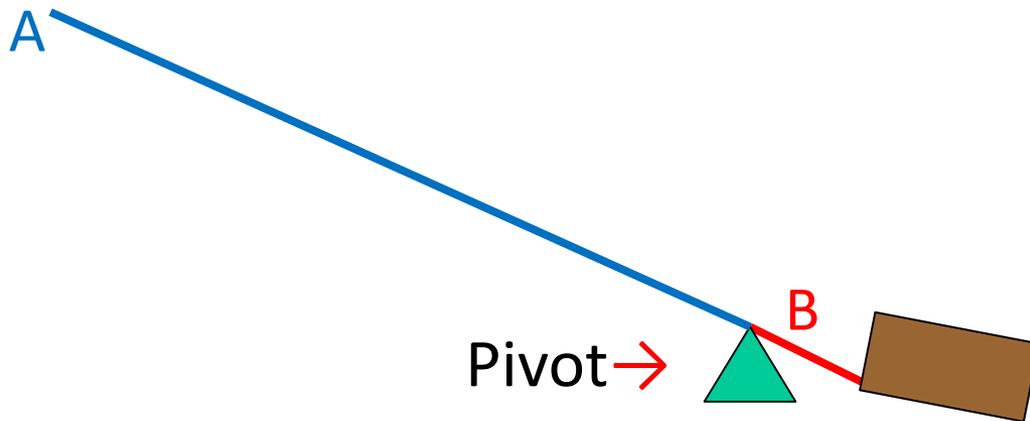


# Leverage

If the large brown block is too heavy to move by hand, the use of a lever and pivot will magnify the amount of force we can apply.

If line **B** is 5 times less than that of line **A**, then the force applied to the upper end of the lever will be magnified 5 times.

Therefore if the block weighs 100kg, we only need to apply 20kg of force to lift it.



# The lever principle

A poor lifting technique, as illustrated, has the same elements of lever, load and pivot point, but in reverse .

The lower back becomes the pivot supporting the weight of the body plus the load.

The pivot has shifted away from the load, meaning the lever effect is working against us, as opposed to working for us.

As a result, the load may only weigh 10kg, but 10 times (100kg) this strain might be exerted at the pivot point.



# Team handling

There may be times when more than one person is required to lift a heavy/awkward load, however team handling can present its own issues, for example:

- ❖ **Poor communication**; confusion between team lifters.
- ❖ **Poor co-ordination**; not lifting/moving at the same time.
- ❖ **Disparity of individuals**; differing statures of people and speed of movement etc.
- ❖ **Awkward areas**; in cramped areas, the more handlers for team handling, the more cramped it becomes.



# Team handling

The Health & Safety Executive advises that:

- ❖ 2 people only lift 66% of their combined capabilities.
- ❖ 3 people only lift 50% of their combined capabilities.



Bring third person  
into the equation.



2 = Combined lift of 44.2 kg (not 67kg)

3 = Combined lift of 49kg (not 98kg)

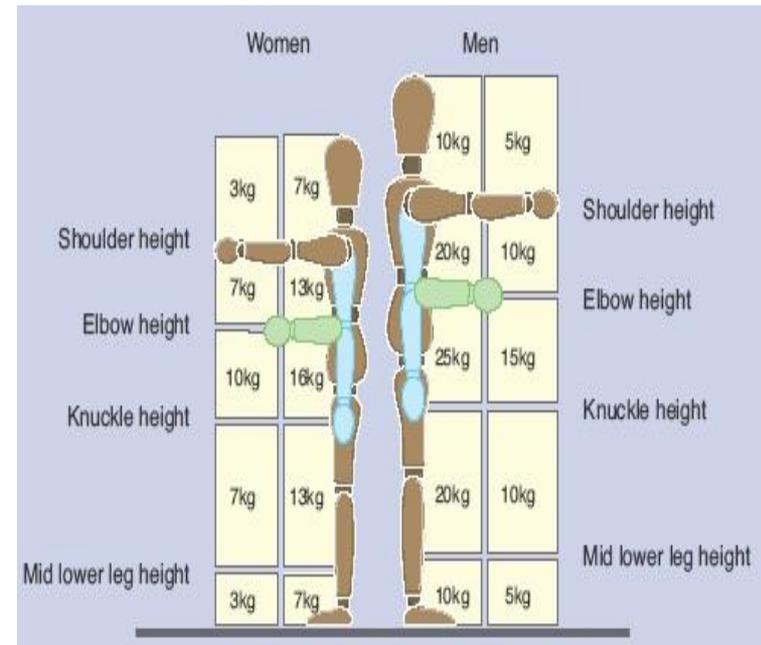
# What can I lift under existing regulations ?

Legislation does not dictate what can or what cannot be lifted.

In the UK there are no set weight limits for 'safe' loads, as it recognises that 'weight' is just one of 30 or more factors that contribute towards risk.

The filter mechanism shown acts as guidance only and of which assists in deciding whether a formal manual handling risk assessment is needed.

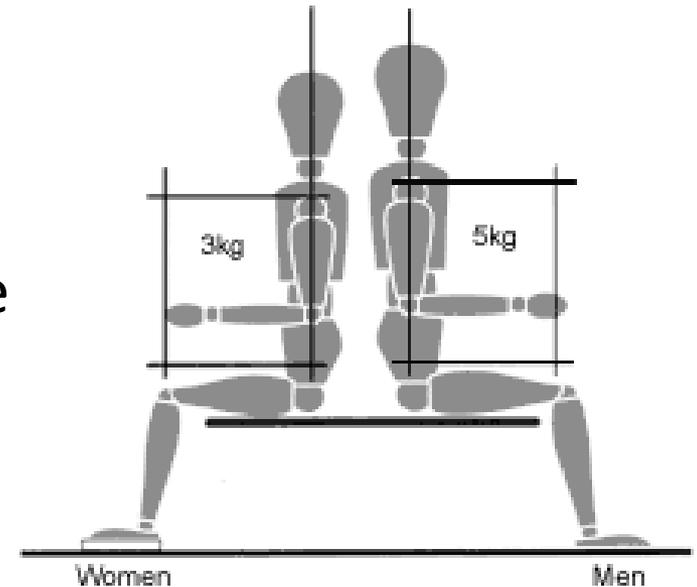
Only lift what you feel comfortable with!



# Decrease in ability to lift

Ability to lift is significantly reduced when seated as the main muscle groups cannot be used (e.g. legs and buttocks) to support the load.

In addition, the weight of the handlers body cannot be used to counterbalance the load.



# Be aware of problem loads

## Unexpected issues

- ❖ light
- ❖ heavy
- ❖ centre of gravity

## Intrinsically harmful

- ❖ staples
- ❖ acids

## Unpredictable behaviour

- ❖ partly-fixed load
- ❖ liquids - centre of gravity
- ❖ ineffective securing of container



# Factors contributing to risk during manual handling

- ❖ **T**ask
- ❖ **I**ndividual
- ❖ **L**oad
- ❖ **E**nvironment



# Task

Does it involve:

- ❖ lifting, carrying, twisting & turning
- ❖ bending down & over-reaching
- ❖ repetitive movements
- ❖ process dictated by work-rate

Consider:

- ❖ improving the work routine
  - ❖ use of team handling
  - ❖ use of machinery and/or manual handling aids
  - ❖ alternating the work pattern
  - ❖ improving the task layout
-

# Individual's capacity

Could the task be affected by:

- ❖ upper body strength
- ❖ stature
- ❖ age
- ❖ health status
- ❖ existing injury

Consider:

- ❖ right person for the job
- ❖ underlying injury/condition



# Load

Is it:

- ❖ heavy
- ❖ large
- ❖ hard to grasp
- ❖ unstable

Consider making the load:

- ❖ lighter and smaller
- ❖ easier to grasp
- ❖ more stable by providing a trolley etc.
- ❖ less inherently risky to handle



# Environment

Does it include:

- ❖ a confined space
- ❖ restricted movement
- ❖ uneven or damaged floor surfaces
- ❖ external elements
- ❖ blocked travel routes

Consider the working environment:

- ❖ improve work-place layout and condition of floor
- ❖ keep to one level
- ❖ improve environmental conditions
- ❖ good housekeeping



# FLUENCY

The acronym describes the manner in which loads should be lifted and carried:

- ❖ **F**eet
- ❖ **L**oad
- ❖ **U**nlock
- ❖ **E**ven
- ❖ **N**eutral
- ❖ **C**ontrol
- ❖ **Y**our back



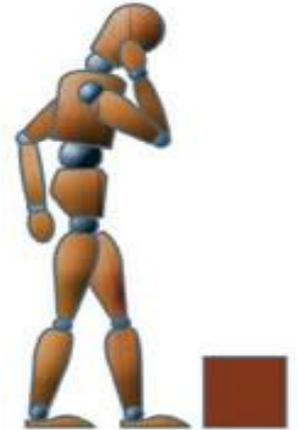
# Feet

- ❖ Ensure surface and footwear are suitable, good base is essential.
- ❖ Ideally, face the intended direction of travel.
- ❖ Set slightly wider than shoulder width apart in order to keep feet flat on floor and provide good stable base.
- ❖ One foot leading - to aid forward/backward stability.
- ❖ Placed close to load (without it interfering with handler) so that centre of gravity of load is close as possible to that of handler.



# Load

- ❖ Assess the load:
  - is it manageable.
  - where is the centre of gravity.
  - will weight of load shift during lift or movement.
  - are there any intrinsic hazards, such as broken packaging, sharp edges, staples, hot etc.
- ❖ Can load be improved for handling:
  - tilt load to raise off ground to reduce amount of bending required.



# Unlock

- ❖ Do:
  - bend knees and unlock hips to lower your centre of gravity close to that of load being lifted.
- ❖ Do not:
  - allow thighs to pass a parallel with ground.
  - sit on your haunches, your centre of gravity will shift too far back.

..... as pressure will be increased on the knees and you will have exceeded the effective range of the big muscles.



# Even

- ❖ Ensure load is addressed in an even manner so that the resulting weight is spread evenly through both knees and feet.
- ❖ Check that your knees are at a similar height above ground-level.
- ❖ Check that your hands are at a similar height above ground-level.



# Neutral (natural)

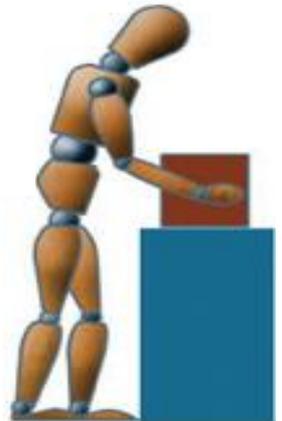
- ❖ Remember to use the natural curvature of the spine.
- ❖ Raising your head prior to the lift will assist in ensuring that your spine is in the right position, as may tilting of your pelvis.
- ❖ Use your body as close to its natural posture as possible:
  - arms straight and down.
  - close in to body when carrying a load and not out in front of you at 90°.



# Control

- ❖ Lift in a fluid motion and ensure control is maintained throughout the lift.
- ❖ Do not:
  - allow thighs to pass a parallel with ground.
  - sit on your haunches, your centre of gravity will shift too far back.

..... as pressure will be increased on the knees and you will have exceeded the effective range of the big muscles.



# Getting closer to the load

Drop down on one knee, but adopting the correct posture as identified in **FLUENCY**.



Move close

Firm grip

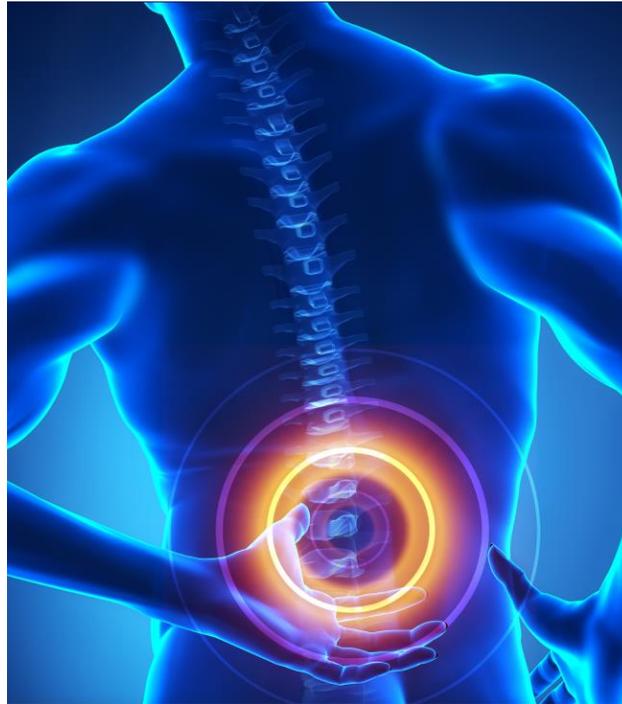
Bend knees

Lift using legs



# Your back

- ❖ You only have one back and it has to last a 'life-time'



**Treat it with respect**



# Pushing and pulling

Many manual handling aids have wheels and of which provide help through friction reduction, for example.



Where there is an option then 'pushing' is typically preferable.

Make sure the appropriate handling aid is chosen for the task in-hand.



# Pushing and pulling

The benefits of 'pushing' are, you can:

- ❖ push the load away from you (in the event it topples);
- ❖ usually face straight onto it - using both arms as well as large muscles (creating shape of an 'A' frame); and
- ❖ see where you are going (if load is not stacked too high).

In addition 'pushing' places compression on the joints and muscles, which is preferable to the stretching forces applied during 'pulling', is particularly true for the shoulder girdle, arms, wrists and hands.



# Pushing and pulling

If 'pushing' and/or 'pulling', operators need to consider:

- ❖ **Route;** ideally avoiding slopes, pot holes, narrow points.
- ❖ **Equipment;** wheels in good condition, pointing in right direction with brakes off.
- ❖ **Loading;** centre of gravity low down, height of load restricted for visibility.
- ❖ **Neutral position for arms;** as far as possible with hands close-in and between shoulder/waist height.
- ❖ **Avoiding impacts;** hands normally at widest point of load e.g. pushing a roll cage, consider risk of impact injuries.
- ❖ **Use of major muscles;** through creation of 'A' frame.

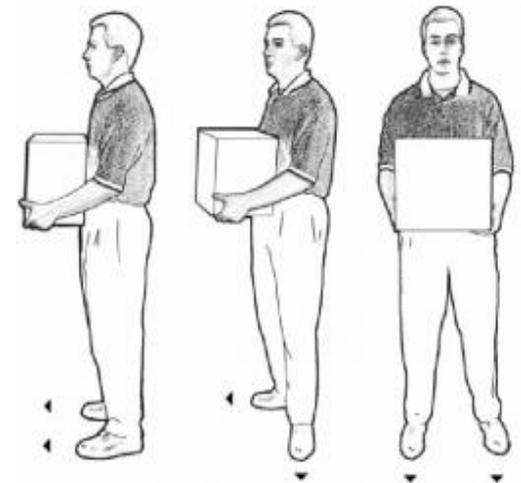


# Twisting & turning

Twisting and turning whilst lifting can cause serious damage to the tissues of the back.

Use the pivot technique to avoid twisting while lifting:

- ❖ lift the load using any of the previous techniques;
- ❖ hold the load very close to your body at waist level;
- ❖ turn the leading foot 90 degrees toward the direction you want to turn; and
- ❖ bring the lagging foot next to the leading foot. Do not twist your body!



# Stretching

Stretching has a range of benefits including the increase in blood-flow, flexibility and range of movement, together with a reduction in the likelihood of injury.

Dynamic stretches can be beneficial prior to work, which could entail smaller versions of the work to be performed.

For example, an employee stacking or retrieving items from shelving may well consider starting off by handling lighter items or by focussing on those at a good working height before moving on to more awkward ones.

