Hazards and risks associated with manual handling in the workplace

Summary

Manual handling occurs in almost all working environments, though workers in construction, agriculture, hotels and restaurants are most likely to be exposed to heavy loads.

Manual handling of loads may cause cumulative disorders due to gradual and cumulative deterioration of the musculoskeletal system through continuous lifting / handling activities, e.g. low back pain. It can also cause acute trauma such as cuts or fractures due to accidents.

Work-related low back pain and injuries are the most common musculoskeletal disorders caused by manual handling. About a fourth of European workers suffer from back pain, which tops the list of all reported work-related disorders.

Factors that increase the risk of injury include the load being too heavy, large, difficult to grasp or unstable, the task being too strenuous or involving awkward postures or movements, and the working environment lacking sufficient space, having slippery, uneven or unstable floors, having extreme temperatures or poor lighting.

Individual factors also make some workers especially vulnerable.

Employers are required to carry out risk assessments, and take action to protect workers from the risks of manual handling.

Prevention measures include:

- Designing and organising tasks to avoid manual handling completely, or at least restrict it.
- Using automation and lifting equipment.
- Organising manual handling tasks in a safe way, with loads split into smaller ones, and proper rest periods provided.
- Providing information and training to workers on tasks, and the use of equipment and correct handling techniques.

The Agency provides detailed information on correct handling techniques.

What is manual handling?

Manual handling is any transporting or supporting of a load by one or more workers. It includes the following activities: lifting, holding, putting down, pushing, pulling, carrying or moving of a load.[1] The load can be an animate (people or animals) or inanimate (boxes, tools etc) object.
Manual handling is also sometimes called 'manual material handling' (MMH).

Where does it occur?

Manual handling occurs in almost all working environments (factories, warehouses, building sites, farms, hospitals, offices etc). It can include lifting boxes at a packaging line, handling construction materials, pushing carts, handling patients in hospitals, and cleaning.

According to the Fourth European Working Conditions Survey[2] carried out in the EU-27 in 2005, 35% of all workers are exposed to the risk of carrying or moving heavy loads for at least a quarter of their working time. The highest exposure rates are found amongst skilled agriculture and fishery workers, craft and related trades workers, plant and machine operators and assemblers. Young workers reportedly are the most exposed of all age groups.

A sectoral breakdown of rates of exposure to manual handling shows that workers in agriculture, construction, hotels and restaurants are most likely to be exposed to heavy loads (68%, 64% and 48% respectively), followed by workers in the sectors of manufacturing and mining, wholesale and retail trade (close to 42%), and transport and communications (35%).

What are the possible negative health effects of manual handling?

Manual handling can result in fatigue, and lead to injuries of the back, neck, shoulders, arms or other body parts. Two groups of injuries may result from manual handling:

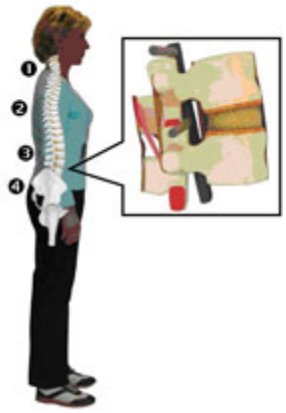
- Cuts, bruises, fractures etc, due to sudden, unexpected events such as **accidents**
- Damage to the musculoskeletal system of the body (muscles, tendons, ligaments, bones, joints, bursa, blood vessels and nerves) as a consequence of gradual and cumulative wear and tear through repetitive manual handling. These injuries are called **'musculoskeletal disorders' (MSDs)**[3] and can be divided into 3 groups:
  - Neck and upper limb disorders
  - Lower limb disorders
  - Back pain and back injuries.

Work-related low back pain and low back injuries are the most common kind of musculoskeletal disorders caused by manual handling. These work-related low back disorders are a significant and increasing problem in Europe.[4] About 25% of European workers consider that their work affects their health in the form of back pain, which tops the list of all reported work-related disorders. The highest proportion of such workers (28-47%) is found in agriculture, construction, transport and communication sectors.[2]

Work-related musculoskeletal disorders due to manual handling (e.g. low back disorders) may have serious consequences to workers, and may restrict their ability to undertake a wide range of work and leisure activities for the remainder of their lives. Therefore, **prevention is vital.**

The back

The back has 4 natural curves. The muscles and joints in the back receive least strain in an upright posture which maintains the natural curves. These natural curves should be maintained in order to prevent back disorders.



Source: Demaret JP, Gavray F and Willems F (Prevent). Aidez votre dos. Manuel de la formation «prévention des maux de dos dans le secteur de l'aide à domicile». Proxima, 2006

When a load has to be manually handled, it should be held or manipulated as close to the body as possible. **Twisting, turning** and **bending** of the back should be **avoided**.

Source: Demaret JP, Gavray F and Willems F (Prevent). Aidez votre dos. Manuel de la formation «prévention des maux de dos dans le secteur de l'aide à domicile». Proxima, 2006

What makes manual handling hazardous?

There are several factors that make manual handling hazardous, and increase the risk of injury. These are called risk factors. The risk factors, particularly for back injury, are related to 4 aspects of manual handling: the load, the task, the environment and the individual.[1,5]

The load

The risk of back injury increases during lifting, carrying, pushing and pulling of loads, if the load is:

- Too heavy
  There is no exact weight limit for manual handling. A weight of 20 to 25 kg is heavy to lift for most people, especially if the load is handled several times in an hour. Note that pushing or pulling often imposes less loading on the body than lifting or carrying.
- Too large
  One basic rule for lifting and carrying is to keep the load as close to the body as possible. In order to get a broad load close to the body, the worker has to open the arms to reach and hold the load. The arm muscles cannot produce force when reaching as effectively as with the arms held in close. Thus, the muscles will get tired more rapidly when handling a large bulky load.
- Difficult to grasp
  Loads that are difficult to grasp can result in the object slipping, causing sudden movement of the load. Gloves usually make grasping more difficult than with bare hands. Providing the objects with handles or using aids for gripping (e.g. when carrying plate material) reduces the load on the worker. Loads with sharp edges or of dangerous materials (solids or liquids) can injure workers, especially in the event of a collision.
- Unbalanced, unstable or if the contents can move
  With unbalanced objects, it is difficult to hold the centre of gravity of the load close to the middle of the body. This leads to uneven loading of muscles, and fatigue. Unstable or moving content, such as a liquid, causes uneven loading of the muscles and sudden movements of the load can make workers lose their balance and fall.
- Difficult to reach
  Loads that can only be reached with outstretched arms, or by bending or twisting the trunk, require more muscular force. The spine may easily be hurt if the trunk is bent or twisted while lifting.

The task

The risk of back injury increases if the task:

- Is too strenuous
  Tasks may be very demanding if they have to be carried out too frequently or for too long with insufficient rest or recovery time (e.g. continuous lifting or carrying for long distances, or activities where the

working speed is imposed by a process which cannot be altered by the worker).

- Involves awkward postures or movements
  Working with a bent and/or twisted trunk, raised arms, bent wrists, a bent neck and turned head increases the risk of back injury and should be avoided, as should twisting, turning and bending movements of the trunk, overreaching, sudden movements and repetitive handling.

Posture

Manual handling involves muscular work. There are two main types of muscular work:

- **static work:** when maintaining a posture (holding the body or part of the body in a fixed position), certain skeletal muscles remain contracted
- **dynamic work:** when moving body parts, active skeletal muscles contract and relax rhythmically.

The difference between these two types is shown in the following example: when you carry boxes, your arm muscles perform static work in holding the boxes, while your leg muscles carry out dynamic work in walking.[6]
Static as well as dynamic work can cause fatigue and lead to injuries. Manual handling should therefore be carried out as much as possible in a neutral posture.
Posture is the position of your body (including your arms and legs) while you are working. You're working in a bad (constrained, awkward or poor) posture when your joints must be held beyond their comfortable, neutral position, and close to the extreme end of their maximum range of movement. In a constrained posture muscles can produce less force than in a more extended, comfortable one. This means that muscles will get tired faster in awkward postures, even when the work activity does not require high muscle forces. Also, the mechanical load on the spine and joints is higher in these postures than in comfortable ones.

The environment

The following characteristics of the work environment may increase the risk of back injury:

- Space available
  A lack of space to carry out manual handling may lead to inappropriate body postures and dangerous imbalance in the loads.
- Floor
  Handling loads on different working levels or on floors that are slippery, uneven or unstable (such as working platforms or fishing boats) may increase the risk of accidents and back injury.
- Climate
  The physical climate (temperature, humidity and ventilation) may affect the risk of back injury. Heat makes you feel tired, and sweat makes it

hard to hold tools, requiring more force. Cold can make your hands numb, making it hard to grip.[7]

- Lighting
  Insufficient lighting may increase the risk of accidents when handling loads. It may also make you work in awkward positions to see clearly what you are doing.

The individual

There are also some individual factors that can influence the risk of back injury:[5]

- Experience, training and familiarity with the job (for example, new episodes of low back pain are common in the first year of employment)[8]
- Age (the risk of low back disorders increases with the number of years at work: the first episode of low back pain occurs in most people by the age of 30)
- Physical dimensions and capacity (length, weight, strength, etc.)
- Personal lifestyle (smoking may, for example, increase the risk of low back disorders)
- History of back disorders (this is a predictor of future back injuries)
- Willingness to use personal protective equipment (for example, clothing and footwear).

Risk assessment of manual handling activities

Employers are required to assess the health and safety risks resulting from working tasks and activities, and including manual handling. A risk assessment is a careful examination of what in the work could cause harm to people. It can then be decided whether sufficient precautions have been taken, or whether it is necessary to do more to prevent harm. The challenge is to eliminate, or at least reduce, the potential for accidents, injury or ill health that arise from working activities and tasks.

Simple steps can be followed to carry out an effective risk assessment in the workplace:

- Look for the hazards that could cause accidents, injuries or ill health, taking into account the load, the task, the environment and the operator[i]
- Decide who might be harmed and how: evaluate the potential consequences of the hazards
- Decide whether the existing precautions are adequate or whether more should be done: find ways to reduce the risk
- Monitor the risks, and review preventive measures.

[i] A hazard is anything that could cause illness or injury. The risk is the likelihood of it happening.

Prevention measures

The negative health effects of manual handling can be prevented by trying to eliminate or at least reduce the risk factors involved. The following hierarchy of prevention measures should be used:

Elimination

First, can the work be designed and organised in such a way that manual handling can be avoided completely, or at least restricted (e.g. using powered or mechanical handling equipment such as conveyor belts, lift trucks, electric hoists or gravity-inclined roller track)?

Technical measures

If manual handling cannot be avoided, automation, mechanisation and the use of lifting and transport equipment should be considered (e.g. conveyors, hoists, cranes, vacuum lifting devices, lift tables, pallet trucks, lift trucks, barrows, trolleys).
However, attention should be paid to ensure that new work risks are not created (e.g. through noise, or hand-arm vibration).

Organisational measures

Organisational or administrative measures should only be considered if elimination of manual handling is not possible, and if technical measures are not effective in reducing the risks involved in manual handling.
Heavy or frequent manual handling tasks should be carried out by several people or, if possible, the amount that is handled should be reduced or the load split into smaller ones.
The rate of manual handling should not be set by a machine, supervisor or colleagues. The time taken to carry out manual handling tasks should be extended by taking breaks, or by alternating them with other tasks so that the muscles have time to recover.

Provide information and training to workers

If workers have to carry out manual handling activities, they should be informed of the risks of accidents and ill health, particularly concerning their specific tasks.
They should also receive training on the use of equipment and on correct handling techniques (see below).

Correct handling techniques

Lifting

Before lifting the load, you should plan and prepare for the task. Make sure that:

- You know where you are going

- The area around the load is clear of obstacles
- Doors are open and there is nothing on the floor that could trip someone or make them slip
- You have a good grip on the load
- Your hands, the load and any handles are not slippery
- If you are lifting with someone else, both of you know what you are doing before you start

Source: Demaret JP, Gavray F and Willems F (Prevent). Aidez votre dos. Manuel de la formation «prévention des maux de dos dans le secteur de l'aide à domicile». Proxima, 2006

You should adopt the following technique when lifting the load:

- Put your feet around the load and your body over it (if this is not feasible, try to keep your body as close possible to the load and in front of it)
- Use the muscles of your legs when lifting
- Keep your back straight
- Pull the load as close as possible to your body
- Lift and carry the load with straight arms.

Pushing and pulling

Pushing and pulling handling devices such as trolleys and barrows is particularly strenuous for the back, shoulders and arms.

It is important that:

- Pushing and pulling is done using the body's own weight: when pushing you should lean forward, when pulling you should lean backward
- You have enough grip on the floor in order to lean forward/backward
- You avoid twisting, turning and bending the back
- Handling devices have handles/hand grips that you can use to exert force. Handle height should be between the shoulder and waist so that you can push/pull in a good, neutral posture
- Handling devices are well-maintained so that the wheels run smoothly
- Floors are hard, even and free from rubbish (good housekeeping).

Legislation on manual handling

Workers are protected against work-related musculoskeletal disorders by health and safety guidelines and Directives. One such is **Council Directive 90/269/EEC**[1], which sets out health and safety requirements for the manual handling of loads, particularly where there is a risk of back injury to workers. The Directive places the following general obligations on employers:

- To avoid the need for manual handling of loads
- To take the appropriate organisational measures to reduce the risk if manual handling cannot be avoided
- To ensure that workers receive adequate information on the weight of a load, the centre of gravity, or the heaviest side when a package is unevenly loaded
- To provide proper training and precise information on how to handle loads correctly.

The requirements of other European Directives[ii], standards (e.g. ISO standards) and guidelines, together with provisions within individual Member States, may also be relevant to the prevention of work-related health problems caused by manual handling.

Further information

Agency

MSDs Single Entry Point page: http://osha.europa.eu/topics/msds

Others

- Health and Safety Executive (United Kingdom) - Getting to grips with manual handling: http://www.hse.gov.uk/pubns/indg143.pdf
- Occupational Safety and Health Service of the Department of Labour and the Accident Compensation Corporation (New Zealand) - Code of practice for manual handling: www.osh.govt.nz/order/catalogue/pdf/manualcode.pdf
- Commission for Occupational Safety and Health - Code of practice for manual handling: http://www.worksafe.wa.gov.au/newsite/worksafe/media/codes/Code_manual_handling.pdf

[ii] For more information see the Agency's website: http://osha.europa.eu/legislation

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[5] "Musculoskeletal disorders in construction" - Agency
[6] Adapted from http://www.ergonomics4schools.com/lzone/work.htm
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