

Ergonomics

Manual Handling of People in the Healthcare Sector



An edited summary of
ISO Technical Report 12296



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An edited summary of ISO Technical Report 12296

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In order to purchase a complete version of the full ISO Technical Report on Ergonomics: Manual handling of people in the healthcare sector ISO/TR 12296, please go to <http://www.iso.org>.

Key



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Education



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1. From the Chair



In the years 2003–2007, ISO has produced specific ergonomics standards (ISO 11228 series) addressing manual handling in the general manufacturing sectors. However, these standards do not fully cover aspects of manual handling when applied to living persons.

National and international statistics provide evidence that healthcare staff have a very high risk of musculoskeletal disorders, derived mainly from poor manual patient handling practices. Experiences from both literature and practice have shown that an ergonomic approach could have a significant impact on reducing risk from patient manual handling, and on improving quality of care.

“Healthcare staff have a very high risk of musculoskeletal disorders, derived mainly from poor manual patient handling practices.”

As a consequence, ISO, in agreement with the European Normalization Agency (CEN), decided to produce a specific Technical Report (TR) as a tool for assisting with the application of the ISO 11228 series in the context of the healthcare sector.

The European Panel on Patient Handling Ergonomics (EPPHE) was available during this process to support ideas, and provide materials and additional resources to assist ISO TC 159 in the development of the TR. EPPHE is a collaboration of experts on Healthcare Ergonomics and Musculoskeletal Disorders from the International Ergonomics Association (IEA).

The added value of the ISO TR consists in outlining a comprehensive strategy for prevention, based on analytical risk assessment that considers all potential determinants (organizational, structural and educational) as a basis for consequent risk reduction. The annexes provide relevant and detailed information for an adequate application of all aspects of this strategy.

This edited summary of the TR has been kindly provided by ArjoHuntleigh as an overview of all the key points required for implementation of a manual patient handling strategy. It is not a substitute for the TR but a valuable guide. Most importantly, both the TR and this summary show that a comprehensive and participatory approach is essential in changing work practices, defining training needs, purchasing technology/equipment and designing work environments.

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2. Introduction



Manual patient handling = any activity requiring force to push, pull, lift, lower, transfer or in some way move or support a person or body part of a person with or without assistive devices

What is the ISO TR about?

The ISO TR gives an overview of evidence based methods to assess problems and risks associated with manual patient handling, and details how to identify and apply **strategies** and **solutions** to reduce these risks. It reviews hazard identification and **risk assessment**, not just in relation to health risks, but also in identifying and solving problems.

Manual patient handling can induce high loads to the musculoskeletal system of the caregiver, and static overload is a risk when patient handling is being undertaken.

The ISO TR has two main objectives:

- To improve caregivers' working conditions by decreasing the risk of **biomechanical** overload, limiting work-related illness and injury, and the consequent absenteeism and costs;
- To ensure patients' quality of care, safety, dignity and privacy while continuing to meet their needs, including personal care and hygiene.

It provides recommendations for patient handling based on the following:

- Estimation and evaluation of risk;
- Work organization of patient handling interventions;
- Handling aids and equipment;
- Buildings and environments where patients are handled;
- Caregivers' education and training;
- Evaluation of intervention effectiveness.

The ISO TR is based on studies of approaches to manual patient handling and on the consensus of international experts from several fields. This edited document is a summary of the full ISO Technical Report, intended as a guide and ready reference to the main issues covered by the report. For full details of the recommended approaches for assessing problems and risks associated with manual patient handling, please read the full ISO Technical Report ISO/TR 12296.

Who should read the ISO TR?

All users involved in healthcare manual handling should be aware of the main issues covered in the report or this edited summary, namely:

- Healthcare managers and workers;
- Occupational safety and health operators;
- Producers of assistive devices and equipment;
- Education and training supervisors;
- Designers of healthcare facilities.

2. Introduction



Musculoskeletal disorder:
An injury that affects the muscles, joints, tendons or spinal discs. This type of injury is most likely to affect the back, shoulders and neck, and legs. Symptoms can include pain, aching, discomfort, numbness, tingling and swelling.



Biomechanics: the mechanics of the functional activity of the human body – in particular the activity of the muscular system

“Analyzing work organization including all handling tasks and risk conditions can help greatly in reducing risks to caregivers.”

Why is the ISO TR important?

Healthcare staff are subject to some of the greatest risks of musculoskeletal disorders in comparison with other jobs. In particular, the manual handling of patients often places considerable strain on the musculoskeletal systems, particularly the lower back, other areas of the spine and the shoulders.

Both the human and the economic costs of these injuries are significant, and can cause the following problems for all concerned:

- Long term injuries;
- Absence from work;
- Staff turnover, staff leaving work due to injuries, leading to poorer patient care;
- Increased costs to healthcare providers;
- Litigation and insurance claims against healthcare providers.

Understanding all of the issues involved in creating a safe patient handling environment, decreasing risk and limiting work-related illness and injury while not compromising the quality of patient care, is therefore essential for all those involved in patient handling.

Several issues should be taken into account when considering the factors which affect the risks of musculoskeletal disorders. These are:

- The number, capacity, experience and qualifications of caregivers;
- The number, type and condition of patients to be handled;
- Awkward postures and exertion;
- The inadequacy (or absence) of suitable equipment;
- Restricted spaces for patient handling;
- Lack of education and training on specific tasks for caregivers.

A comprehensive multi-factorial ergonomics intervention approach can be effective in reducing manual handling injury risk, particularly those including risk assessments, the observation of workers in their working environment, tailored training for individual needs, and redesign of equipment and handling tasks.

The ISO TR is structured as follows:

An overview of recommendations for risk assessment and hazard identification, followed by detailed annexes on:

- Methods and guidelines for risk estimation and evaluation;
- Organizational aspects of patient handling interventions;
- Criteria for the choice and use of aids and equipment;
- Buildings and environment in relation to risk estimation and evaluation;
- Staff education and training;
- Evaluation of intervention effectiveness.

The aim is to create an effective strategy to improve the working conditions of caregivers, decreasing risk and limiting work-related illness and injury, while at the same time improving patients' quality of care, safety, dignity and privacy.

3. Risk estimation and risk evaluation



The figure below outlines a strategy for risk prevention based on analytical assessment of the risk itself, all of its potential determinants, and on some key aspects of risk management.

Figure 1 – Comprehensive strategy



Risk assessment is one of the pillars of preventive strategies. A systematic strategy for risk assessment and management must be comprehensive to be successful.

3. Risk estimation and risk evaluation



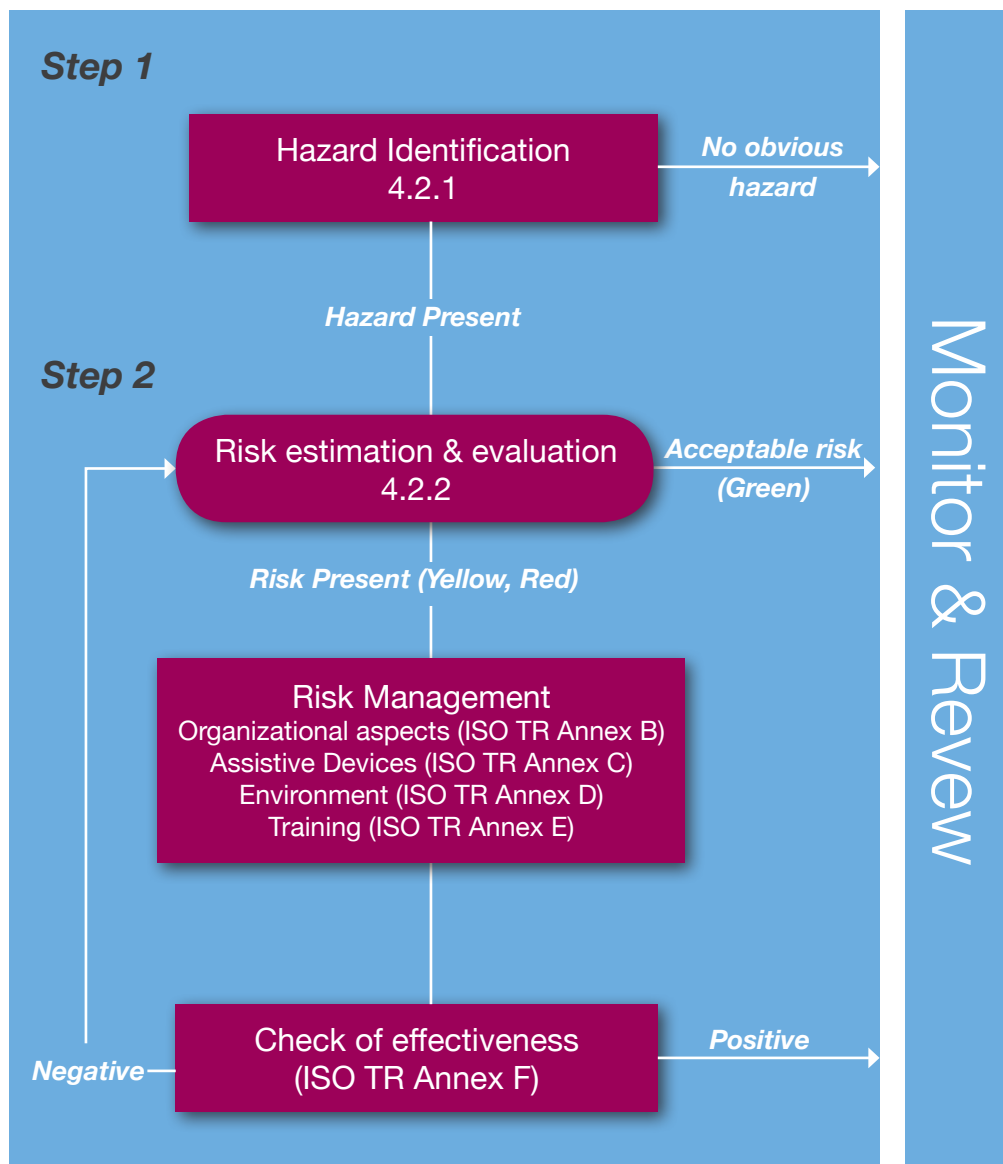
The risk assessment model below can be used to demonstrate how hazard identification and risk assessment are related at health risk identification, in problem identification and in problem solving.

Figure 2 - Risk assessment model



Risk assessment consists of the following:

- Hazard/problem identification
- Risk estimation/evaluation



[Adapted from ISO TR 12296]

A risk assessment is recommended when:

- New equipment is introduced;
- Organization is modified (i.e. number of caregivers, number of non co-operating patients);
- Spaces are reorganized from an environmental viewpoint (i.e. rooms, services);
- Other changes are implemented that could affect risk characteristics.

3. Risk estimation and risk evaluation



“Using an ergonomic approach has a significant impact on reducing risk from manual patient handling.”

Hazard identification

As the manual handling of patients presents a hazard, patient numbers should be calculated (i.e. on a daily average), depending on the area of healthcare being assessed. This is an important starting point in assessing handling frequency. The following other factors should also be taken into account:

Type of handling

- This is defined by the task to be performed (e.g. repositioning a patient lying in the bed, or bed pan placement) as well as by the handling technique used;
- The patient's functional mobility, i.e. handling a co-operating patient may result in a low hazard, while handling a non co-operating patient may produce a much higher hazard;
- Use of conventional or biomechanical methods to execute handling, particularly if small handling aids are also used.

The different types of handling carried out in a given healthcare area should be assessed to allow the most appropriate method of handling and use of handling aids to be chosen, and also to calculate the number of caregivers needed.

Work organization

Crucial factors to be assessed:

- The number of caregivers carrying out patient handling and their organization (one or more caregivers) over the day;
- Handling frequency;
- Type of handling.

Caregivers should be trained to perform each task safely and to recognize hazardous workplaces, tasks, equipment conditions and time allocated to the task.

Posture and force exertion

The spine can be subject to high mechanical stress during patient handling. Stress induced through patient handling is regarded as one of the most important factors in lower-back pain and spinal problems in caregivers. Awkward postures can be caused by various factors such as available space, equipment used, number of caregivers handling the patient, and caregiver education and training. Awkward postures often lead to increased risk of injury.

When handling a patient, the caregiver should have a stable and balanced posture enabling application of his/her body weight to their environment (e.g. bed, chair and patient) and therefore minimizing stress on the back and shoulders.

Assistive devices

The lack or inappropriate provision of aids and equipment is a hazard during patient handling. Use of appropriate aids and equipment is strongly recommended to reduce strain on the lower spine and limit risk to caregivers, and training in equipment use while implementing safe patient handling is essential. Equipment and facilities must be properly maintained for safe usage. Equipment purchase should be based upon clear task requirements (type of handling, type of patient) and the environment where they are to be used.

3. Risk estimation and risk evaluation



Environment

The environment where patients are handled may be a hazard if it is inadequate or inappropriate. All spaces where patients are handled should be assessed for compatibility with equipment use and correct handling postures. Additional factors such as steps, obstacles and slippery floors must also be considered.

Individual characteristics of the caregiver

The individual skills and capabilities, level of training, age, gender and health status of the caregiver must be considered when carrying out a risk assessment. Caregiver skill and experience are likely to reduce the risk of injury, and suitable training may increase the level of skill and ability to carry out a task. Clothing and footwear should be functional and should facilitate movement and a stable posture.

Patient's characteristics

The mobility level of patients should be assessed using the following criteria:

'Non co-operating' (NC)	Patients who need to be fully lifted during handling
'Partially co-operating' (PC)	All other patients needing help during handling (lifting or moving)
'Fully co-operating'	Patients who do not need any help in handling

The patient's body weight may be a hazard by itself. In particular, obese or overweight patients require adequate equipment and space for their needs. Handling even a part of the patient's body may produce a risk of strain.

If a patient opposes the attempt to move or lift him or her due to psychiatric or cognitive problems, this may cause particular hazard.

Risk estimation and evaluation

An accurate analytical risk assessment should consider the presence of several factors and how they are related:

- The type of patient;
- The induced 'care load';
- The available caregiver staff;
- Available and adequate equipment;
- The building, environment and spaces;
- The training and skill of nursing staff.

“The environment where patients are handled may be a hazard if it is inadequate or inappropriate.”

Methods of risk assessment

The risk assessment method used should allow the collection of pertinent data regarding the type and quantity of required handling, availability and requirements of handling aids and equipment and the level of specific training received (including the consequent training needs) of caregivers.

There are many methods for risk estimation and evaluation in the scientific literature; Annex A.1 of the TR reports an 'oriented' review of these methods, as derived from literature or from relevant national or international guidelines. Annex A.3 of the TR reports examples of the practical application of four selected, commonly-used methods (Dortmund Approach, TiThermometer, MAPO and PTAI), so the intended users can choose the most appropriate one for the situation to be assessed.

3. Risk estimation and risk evaluation



Jäger M, Jordan C, Theilmeier A, Luttmann A; the DOLLY Group. Lumbar-load quantification and overload-risk prevention for manual patient handling - The Dortmund Approach. In: Mondelo P, Karwowski W, Saarela K, Hale, A. Occhipinti, E. (eds). Proc 8th Int Conf Occup Risk Prevention ORP2010, CD-Rom, Valencia 2010;

Karhula K, Rönholm T, Sjögren T. A method for evaluating the load of patient transfers. Occupational Safety and Health Administration, 2009;

Knibbe J & Friele R. The use of logs to assess exposure to manual handling of patients, illustrated in an intervention study in care home nursing. International Journal of Industrial Ergonomics 1999;24:445-54;

Knibbe JJ & Knibbe NE. Een hap uit de Olifant. LOCOmotion, Netherlands, 2005. (Chapter 4 translated);

Knibbe JJ & Knibbe NE. Monitoring the effects of ergonomic covenants for workers in Dutch healthcare, LOCOmotion, I.E.A. congress Maastricht NL, 2006.

Dortmund Approach

This aims to assess the load on the spine for occupational manual materials handling, and is applied here to the specific occupational tasks of manual patient handling (Jäger et al. 2010). The Dortmund approach is based on laboratory research into patient handling (The Dortmund Lumbar Load Study 3 – DOLLY 3).

- Risk assessment
- Risk levels and comments regarding the tasks assessed
- Overall assessment and hints for work design

MAPO-Index

This methodology aims to provide an index of parameters that represent the risk level of the unit being assessed. It therefore analyses all of the determinants that may contribute to a definition of risk level in the unit.

It focuses on several issues, such as relevant organizational issues (number of caregivers), distribution over working shifts, number and type of non-collaborating patients, types of handling, use of equipment (if available) and the education of operators to specific risk and handling environment.

The MAPO Index puts risk classification into three zones (green, yellow and red) which correspond to increased likelihood of acute low back pain.

To calculate the MAPO index, a data-recording worksheet is used consisting of two parts: Part I is completed during an interview collecting all information concerning organizational and training aspects; Part II is completed during an on-site inspection for the analysis of environmental and equipment characteristics aspects.

PTAI (Patient Transfer Assessing Instrument)

The PTAI (Karhula, Rönholm & Sjögren 2009) is a practical tool that can be used by occupational safety and occupational health professionals to evaluate the risk of patient transfers in the unit. A total of 15 factors are assessed, both observed and interviewed. The criteria enable risk classification by the 3-zone model (green, yellow and red). The assessment is begun by the evaluator, who fills in the first factors on the basis of their observation of the work environment and the nurse performing the patient transfer. The assessment is completed by an interview with the nurse, in which the final factors are assessed according to the nurse's answers.

TilThermometer (or CareThermometer)

The purpose of this instrument is to assess potential exposure to physical overload for caregivers, and to assess compliance with the Netherlands Guidelines for Practice (Knibbe & Friele 1999; Knibbe & Knibbe 2006). It is available for all care sectors, and results can be easily extrapolated from ward level to facility level or any larger scale. It is used in the Netherlands on a national scale, and is endorsed by unions, employers and the Health and Safety Executive.

In The Netherlands, the TilThermometer is frequently used in combination with the BeleidsSpiegel (Policy Mirror) (Knibbe & Knibbe 2005) as a monitoring instrument at ward, facility and national level. Both instruments are compulsory. The ISO TR recommends this combination with the Policy Mirror to facilitate an adequate preventive policy.

3. Risk estimation and risk evaluation



For further reading on risk assessment methods, see ISO Guideline on Ergonomics: Manual handling of people in the healthcare sector ISO/TR 12296, Annex A.1

Knibbe JJ, Knibbe NE. Monitoring progress and improving quality of your preventive policy with the Care Thermometer; International validation in four countries and experiences with use. Poster SPHM conference Florida, 2011;

Knibbe JJ, Knibbe NE. An international validation study of the Care Thermometer, a tool supporting the quality of ergonomic policies in health care. Submitted Professional Safety, 2011

The Policy Mirror is a six-page checklist that is completed annually. It provides recommendations according to union, employer and Health and Safety Executive national standards, and imparts a means of checking for any unfavourable policy issues within the facility.

It monitors the following:

- Training and education;
- Spatial and environmental problems;
- Patient mobility level;
- Performance of risk assessment/evaluation done;
- Physical overload ;
 - To caregivers/nurses;
 - To other staff;
- Presence of an active policy in place;
 - For care staff;
 - For other staff;
- Presence of explicit standards and Guidelines for Practice to reduce dynamic and static overload for caregivers and other staff;
- Identification of specific individuals responsible for implementing policy for physical overload and platform existence;
- Presence of official peer leaders per functional group/on ward level;
- Occurrence of regular meetings;
- Scheduling of patient assessments to determine mobility of the patient and requirement for solutions;
- Presence of a policy for specific situations, such as aggression, pregnant staff, 50+ staff, young staff, fall prevention, what to do after a fall, transferring bariatric patients, mortuary transfers;
- Sufficient equipment;
- Equipment maintenance.

The TilThermometer has been further developed into the Care Thermometer (Knibbe & Knibbe 2011; Knibbe & Knibbe 2012; <http://www.carethermometer.com/>), an easy-to-use, web-based, multilingual self-assessment tool which is designed to present risks of physical care load visually, also using a green, yellow and red scale. The Care Thermometer can also be used in conjunction with the Policy Mirror as an instrument for evaluating interventions.

The method used for risk assessment should also enable risk classification by the 3-zone model (green, yellow and red) as in the table on page 12; the subsequent action to take depends on which zone is allocated to the risk.

3. Risk estimation and risk evaluation



There are also a number of national or international guidelines for managing manual patient handling. They are addressed in ISO/TR 12296, Annex A.2 or see www.patienthandling-guidelines.com for more information.

Hignett S. *Intervention strategies to reduce musculoskeletal injuries associated with handling patients: a systematic review. Occupational and Environmental Medicine, 2003, 60(9):E6.*

Risk estimation/evaluation: Final assessment criteria

ZONE	EXPOSURE CLASSIFICATION	CONSEQUENCES
GREEN	ACCEPTABLE	Acceptable, no consequences.
YELLOW	NOT RECOMMENDED	Set up of improvements is advised with regard to structural risk factors, or suggestion of other organizational and educational measures. Further evaluation is required, and adequate measures taken if necessary.
RED	UNACCEPTABLE/TO BE AVOIDED	Redesign or take actions to lower the risks

[Adapted from ISO TR 12296 with permission from ISO]

Risk reduction

Once risks/problems have been identified by an analytical risk assessment, a comprehensive approach for risk reduction should be adopted based on the results of the risk assessment.

Risk reduction can be achieved by a combination of interventions. These will take the form of improvements to different potential risk factors, including:

- The number and quality of staff taking care of the different kind of patients;
- The selection and correct use of appropriate aids for patient handling;
- Staff information, education and training programs. These should be part of the risk management system of the organization, and should be complementary to the other intervention types considered (interventions based exclusively on technique training are reported to have had insufficient impact on working practices or injury rates (Hignett et al. 2003);
- The definition of a general risk management system and of clear policies and procedures by the organization.

4. Organizational aspects of patient handling interventions



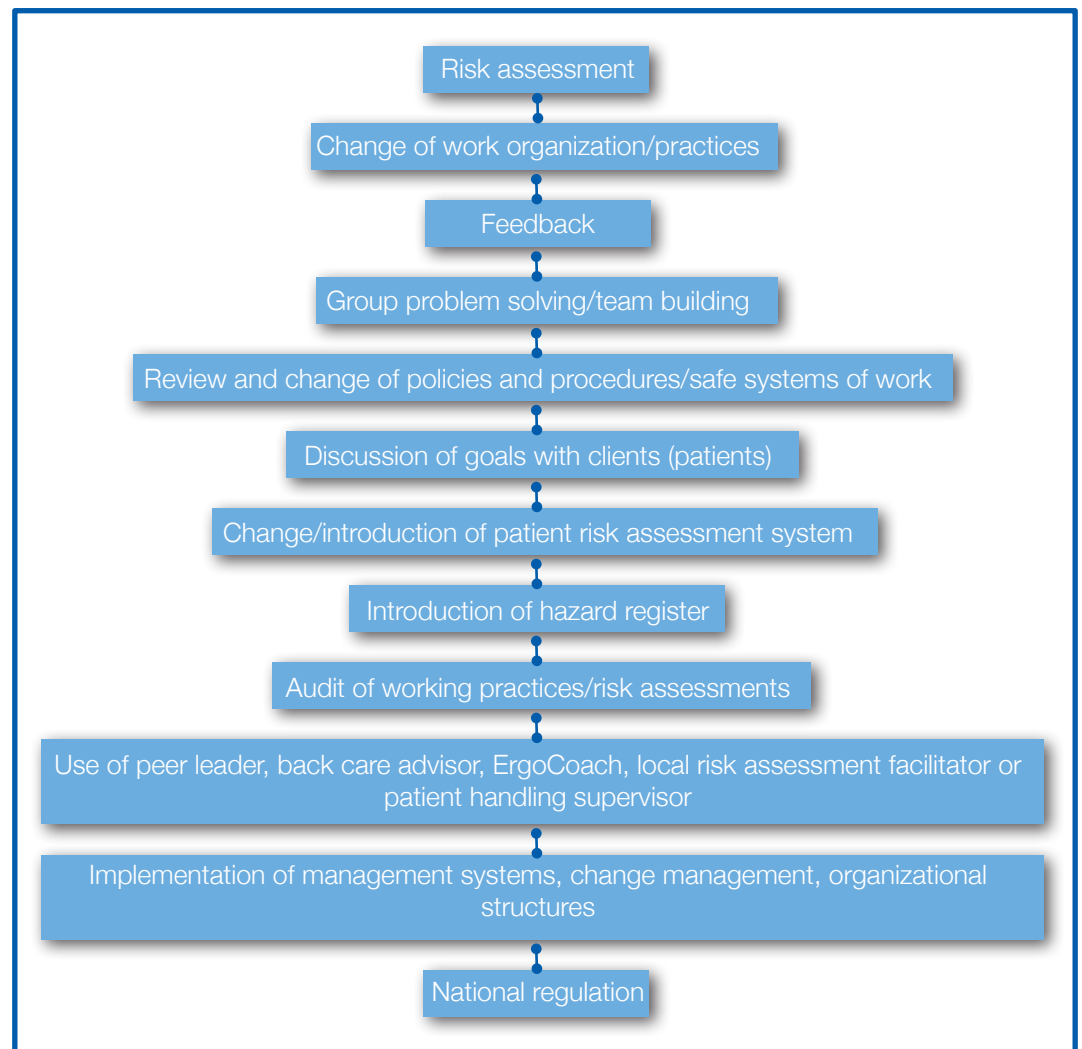
Intervention = involvement in a situation to alter or hinder an action or development

Amick B, Tullar J, Brewer S, et al. Interventions in health-care settings to protect musculoskeletal health: a systematic review. Toronto: Institute for Work and Health, 2006;

Hignett S, Crumpton E, Ruszala S, Alexander P, Fray M, Fletcher B. Evidence based patient handling: tasks equipment and interventions. London, Routledge, 2003.

The use of policies and procedures help an organization to direct its resources and staff behavior effectively. By implementing and using a safer handling policy, the organization commits itself to actions that reduce risks to staff.

Published reviews of patient handling intervention literature have identified a wide range of strategies to reduce patient handling risks (Hignett et al. 2003, Amick et al. 2006). These can be categorised by 3 approaches, organizational, physical and personal interventions.



The following intervention strategies can be identified within an organization:

Effective implementation of complex, multi-factorial patient handling interventions requires organizational leadership and control. Development of a positive safety culture is also an important factor.

4. Organizational aspects of patient handling interventions



Hignett S. Embedding ergonomics in hospital culture: top-down and bottom-up strategies. *Applied Ergonomics* 2001;32:61–9.

The following should be utilized when developing, measuring and reinforcing an effective safety culture:

- Creation of robust management structures, policies and procedures to create positive organizational behavior;
- Identification of financial and high level managerial commitment to lead by example and facilitate positive behavior;
- The provision of skilled and motivated personnel to deliver expertise and facilitate workplace changes, adding to the positive culture;
- The provision of an occupational health service which can support injured workers through their injury to the point of successful return to work. This develops the feeling of a caring organization which again supports positive patient handling culture.

“The provision of a suitable management structure to manage patient handling risks is key.”

Specific guidance for organizational systems

Management systems

A clear line of responsibility and accountability should be identified to create a positive environment for change. These management structures must reflect the local legislation and the type of healthcare organization.

Using a systematic ergonomic approach identifies both top-down and bottom-up solutions for the effective implementation of patient handling risk management strategies (Hignett 2001). A suitable management structure should be provided to manage patient handling risks. This structure must define management roles and responsibilities to ensure that appropriate control measures for risk reduction are in place.

Policies and procedures

The provision of a safer patient handling policy can drive the implementation of risk management systems in many healthcare organizations. Policy content can cover many different issues but should clearly represent the strategy that the organization has for reducing potential losses from the risks of moving and handling patients.

The use of systems or procedures can assist organizational behavior. The development of integrated policies and procedures can also allow the development of clinical practice to include safety aspects of patient movement. Documents should include local arrangements and practice.

Financial commitment

An organization needs to demonstrate that financial assistance for implementing changes or purchasing equipment is available. The financial pressures on healthcare delivery suggest that the cost benefits of these interventions need to be justified.

4. Organizational aspects of patient handling interventions



Provision of appropriate staff

When an organization decides on its staff structure for managing the risks of patient handling, there are many different functions that could be created to assist the process.

The following should be taken into consideration;



The successful management of patient handling risks is essential in a healthcare organization. Provision of suitable risk assessment, analysis and risk reduction methods is only a part of the process. It is essential that management at all levels of an organization show commitment to implementing structures which allow the appropriate human, time, financial and physical resources to be in place to reduce potential losses from patient handling tasks.

Knibbe JJ, Knibbe NE. Monitoring the effects of the ergonomics covenants for workers in Dutch health care. In Pikaar, RN, Konigsveld, EAP, Settels, PJM. (eds.) Proceedings of the XVth Triennial Congress of the International Ergonomics Association, Meeting Diversity in Ergonomics 11–14 July 2006, Maastricht, Netherlands;

Nelson A, Matz M, Chen F, Siddharthan K, Lloyd J, Fragala G. Development and evaluation of a multifaceted ergonomics program to prevent injuries associated with patient handling tasks. Int. J. Nurs Studies. 2006;43: 717–33.

Staff to patient ratios:

The development of safe systems for patient handling will affect the staff numbers needed for any given care location, and will also interact with the competence and qualification levels of the staff in a given area. It is recommended that the numbers required for safe patient handling tasks be incorporated into calculations of staffing ratio.

Lifting teams:

The development of lifting teams introduces a highly skilled and physically competent group of specialist lifters; it is important that an appropriate number of lifters is available when required.

Patient handling advisor:

In some organizations, specifically in the UK, a single individual has been assigned the central role of supporting, facilitating and delivering a patient handling strategy.

Peer safety leaders:

An alternative to the above is the creation of a series of location-based individuals to provide risk assessment and management expertise at a local level. They are supported by peer group feedback and education, and sometimes assist in conjunction with the patient handling advisor; examples include: Back Injury Resource Nurse (BIRN) (Nelson et al. 2006), and Ergo-coach Knibbe & Knibbe 2006).

Occupational health management services:

To reduce the effects of potential injuries on the organization as a whole, it is essential that an organization provides a suitable occupational health system.

5. Aids & Equipment



The use of appropriate aids and equipment for handling and moving patients with limited mobility is a fundamental part of a preventive policy, both to reduce the risk of musculoskeletal disorders from manual patient handling, and to increase the quality of care.

Examples of aids and equipment used include:

- Medical bed and power drive device
- Couch/stretcher
- Sliding sheet/board
- Horizontal air device
- Stand aid
- Mobile active or passive lift
- Aid for early mobilization
- Ceiling lift/wall-mounted lift
- Sling
- Shower chair or trolley
- Height adjustable bath
- Bath lifts
- Wheelchair
- Grips and handles
- Compression stocking applicator

“The use of appropriate aids and equipment for handling and moving patients with limited mobility is a fundamental part of a preventive policy.”

Preventative maintenance of equipment is also important, although the regulations for this differ between countries.

The process for aid selection should consider the following issues:

- Organizational issues (i.e. caregivers' distribution over 24 hours);
- Type of patients needing handling;
- Frequency of handlings collected by type (i.e. bed - wheelchair, etc.);
- Environments where equipment is used;
- Definition of basic ergonomic requirements.

5. Aids & Equipment



Further reading: Knibbe JJ, Waaijer, EM. Mobility Gallery, ArjoHuntleigh, Sweden 2008; <http://www.arjohuntleigh.com/>

Battevi N, Menoni O, Ricci MG, Cairoli S. MAPO index for risk assessment of patient manual handling in hospital wards: a validation study. Ergonomics. 2007;49: 671–87;

Granger CV, Hamilton BB, Linacre JM, Heinemann AW, Wright BD. Performance profiles of the functional independence measure. Am J Phys Med Rehabil. 1993;72: 84–9;

Hignett S, McAtamney L. Rapid Entire Body Assessment. Applied Ergonomics. 2000; 31:201–5;

Knibbe JJ, Knibbe NE. Monitoring the effects of the ergonomics covenants for workers in Dutch health care. In Pikaar RN, Konigsveld EAP, Settels PJM. (eds.) Proceedings of the XVth Triennial Congress of the International Ergonomics Association, Meeting Diversity in Ergonomics 11-14 July 2006, Maastricht, Netherlands;

Nelson A. Safe Patient Handling and Movement. 2009, Springer, USA.

Specific procedure for aid selection

Different models are used worldwide to select the right technique, number of caregivers and right equipment. These are all based on the major principles of quality of care and safety of the caregiver.

In the US and Canada the Safe Patient Handling algorithms (Nelson 2009) are the most common used instrument in caregiver selection.

Key assessment criteria are:

- Ability of the patient to provide assistance;
- Ability of the patient to bear weight;
- Upper extremity strength of the patient;
- Ability of the patient to cooperate and follow instructions;
- Patient height and weight;
- Specific physician orders or physical therapy recommendations.

Tools for assessment of caregiver aid selection in the UK, US and Australia

- REBA (Hignett & McAtamney 2000)
- FIM (Granger et al. 1993)
- Resident Assessment Instrument (RAI)
- Mobility Gallery (Knibbe & Knibbe 2006)

In Italy the MAPO instrument is widely used (Battevi et al. 2006), and in the Netherlands the Guidelines for Practice (Knibbe & Knibbe 2006).

Stimulating and maintaining patient's mobility is an important objective in the care sector, but at the same time it is important to keep the safety/physical load for the caregivers within acceptable limits.

Number of aids/equipment

Many facilities do not provide optimal equipment numbers, although this can be variable depending on daily practice requirements, which may differ depending on factors such as ward type, working practice and hygiene restrictions. Annex D of the ISO TR provides some examples of indices for calculating aids/equipment numbers.

Patient handling activity

The relevant handling activities for each patient should be recorded, along with how these are to be carried out, what kind of aids/equipment are to be used, and with how many caregivers.

Staff education and training

Information, education and training in proper use of aids/equipment is essential to promote behavioral and attitude changes among staff to achieve safer working practices, less physical exertion when handling patients, and improvements in quality of care. Training and education alone, however, cannot replace proper workplace design.

6. Buildings & Environment



For further reading on risk assessment methods in buildings and environments, see ISO TR on Ergonomics: Manual handling of people in the healthcare sector ISO/TR 12296, Annex D.

The environments where patients are manually handled may present a hazard if they are not adequate for use. All spaces where patients are manually handled should be considered with regard to equipment use and correct working postures.

In general, the environments for manual patient handling are locations in purpose built or adapted buildings where healthcare services are provided. The environment will typically include treatment, caring and hygiene activities.

In practice, caregivers may not be able to use the equipment provided due to lack of working space, or may work in bad postures due to restricted or confined spaces.

Slopes, ramps and steps in a work environment increase the physical effort needed to walk or to move equipment, increasing the musculoskeletal load and therefore the risk of injury. The surface over which equipment is moved should be suitable and well maintained. Wet or contaminated surfaces can present particular hazards to the operator.

A risk assessment should be able to identify all deficiencies of the spaces where patients are handled, and to identify any barriers on the surface over which the patient is moved (with or without assistive devices). The risk assessment can also provide advice on selection of equipment that is appropriate to the specific environment being assessed.

In Annex D, the ISO TR gives guidance on analyzing and identifying deficiencies in the various different spaces in which patients may be handled. The following environments are included and defined in the TR:

- Adult bed space (general medical/surgical ward);
- Hygiene facilities;
 - Toilet/shower;
- Intensive care units;
 - Adult;
 - High-dependency;
 - Neonatal;
- Operating rooms;
- Ambulatory procedure unit;
- Elderly care facility;
- Other;
 - Bariatric facilities;
 - Obstetric;
 - Emergency department;
- Diagnostic department;
- Primary care;
- Circulation spaces, clearance (corridors, access/egress, turnings);
- Flooring surfaces, elevators, stairs;
- Doors, grab handles, hand rails.

“Adequate space for proper use of aids/equipment is essential.”

The TR also provides information on existing standards relating to building design, but excludes home care environments and vehicles (such as ambulances).

7. Staff education and training



Amick B, Tullar J, Brewer S, et al. *Interventions in health-care settings to protect musculoskeletal health: a systematic review*. Toronto: Institute for Work and Health, 2006;

Bos EH, Krol B, Van Der Star A, Groothoff JW. *The effects of occupational interventions on reduction of musculoskeletal symptoms in the nursing profession*. *Ergonomics*. 2006;49:706–23;

Knibbe JJ, Knibbe NE. *An international validation study of the Care Thermometer, a tool supporting the quality of ergonomic policies in health care, accepted for the IEA conference in Recife 2012*.

Martimo KP, Verbeek J, Karppinen J, et al. *Effect of training and lifting equipment for preventing back pain in lifting and handling: systematic review*. *BMJ*. 2008;336:429–31;

Nelson A, Baptiste AS. *Evidence-based practices for safe patient handling and movement*. *Online J Issues Nurs.*;9:4.

Staff education and training are essential to promote the right behavioral changes that achieve safer working practices, less physical exertion when handling patients and improvement in the quality of patient care. Training caregivers to use proper body mechanics alone has not been shown by research to reduce physical exertion/extortion (Nelson & Baptiste 2004; Amick et al. 2006; Bos et al. 2006, Martimo et al. 2008).

An effective training program requires management commitment and support, and should be part of the organization's safety management system. The program should include all persons who carry out patient handling in the organization, as well as the training of specialists.

Periodical assessment of education and training effectiveness is recommended.

“Training in patient handling should be part of the risk management system of the organization”

The following should be considered when planning a training program:

- Appropriate training of:
 - Management (program compliance, to facilitate change and set standards);
 - All levels of staff who perform patient handling activities.
- Provision of appropriate equipment, which must be available before training;
- Implementation of good practice by co-workers;
 - It is recommended that each unit has one to three individuals whose role is to support good practice in trainees, i.e. key-worker/Ergo-coach/peer leader;
- Defined competencies for trainer, key worker and health care worker;
- Inclusion of theoretical and hands-on practice in the training program;
- Sufficient time allocation for staff skills training based on their learning needs;
 - New and untrained staff ought to receive more comprehensive education;
 - Sufficient time must be allocated for staff to take part in training;
- Tailoring of training content to the needs of staff and patients;
 - Based on the risk assessment and on a set of required core competencies for staff;
- Comprehensive training of all new staff;
 - Followed by an on-going process of training and review or refresher training at least every three years for staff remaining in the same workplace under the same working conditions;
- More-frequent retraining and support of key workers;
- Maintenance of appropriate records and supervision of training.

Accidents and incidents resulting from patient handling activities must be reported, and the circumstances of the accident/incident reviewed. Appropriate steps must be taken to prevent the subsequent occurrence of a similar accident/incident.

8. Evaluation of intervention effectiveness



Direct comparison between studies and against existing standards is not possible at the present time unless the studies have been measured using the same methods.



*Further reading:
Johnsson C et al. A direct observation instrument for assessment of nurses' patient transfer technique (DINO). *Appl Ergon.* 2004;35:591–601;*

Evaluation of manual patient handling is a complex process, and comparison between studies is difficult because:

- Outcomes are frequently measured using different tools, qualities and quantities;
- There is little agreement between what is acceptable best practice for the various intervention levels (organizational, physical and personnel).

Given the difficulties associated with comparison of manual patient handling interventions, it may be more practical to measure the reduction of risk exposure than to try and show the reduction in musculoskeletal disorders.

The following can therefore be assessed:

- Organizational interventions
- Physical and engineering interventions
- Personal level interventions

In the individual

Correct training, education and behavior can be assessed using two components which measure safety culture and safety performance in the individual:

Competence

Measures the ability of the healthcare worker to use equipment appropriately, set up the environment correctly, use suitable body mechanics and understand the needs of the patient being transferred.

Compliance

Measures the extent to which the individual worker has followed the risk assessment rules and guidance agreed and implemented by the organization in question.

In the patient

Measured patient outcomes include any form of physical or subjective feedback created by the patient being moved, including clinical outcomes such as wound care, rehabilitation or mobility level.

In all intervention types

To allow comparison between intervention strategies and the development of worldwide standards, a range of intervention studies that measure the effects of the intervention changes are still needed. The principal method for evaluating intervention is the Fray and Hignett Intervention Evaluation Tool.

8. Evaluation of intervention effectiveness



The CareThermometer (Knibbe & Knibbe 2011; Knibbe & Knibbe 2012) can also be used in conjunction with the Policy Mirror as an instrument for evaluating interventions.*

Fray, M. A comprehensive evaluation of outcomes from patient handling interventions. PhD Thesis. Loughborough Design School, Loughborough University, 2010.

The Fray and Hignett Intervention Evaluation Tool uses a single metric to measure intervention, based on 12 individual section scores and an overall management performance score. The 12 outcomes measured are as follows:

	Theme (Outcome)	Definition
1	Safety culture	A measure of organisational behaviour and how its management systems control patient handling risk. This is an audit of procedures rather than behaviours e.g. policy, risk assessment, records of training etc., and should measure the support for the prevention programme both financially and organisationally
2	MS health measures	The measurement of the level of MSD in the working population, injuries, chronic conditions, fitness for work, staff turnover, work capacity etc.
3	Compliance, competence	Measures of the staff's individual behaviour to complete patient transfers, competence, skill, compliance with safe methods and equipment use
4	Absence or staff health	Measures that record the time away from work or lost productivity due to MSD, days/shifts lost, staff on reduced work capacity, staff turnover
5	Quality of care	When a patient is being moved are all their requirements for dignity, respect, safety, empathy, being met?
6	Incidents and accidents	The recording of incidents, accidents or near misses from patient handling where staff could have been injured in a central location as a performance measure
7	Psychological well-being	Measurement of the staff's mental health status, measures of psychological stress, strain, job satisfaction etc.
8	Patient condition	Does the patient handling method affect the length of stay, treatment progression, level of independence?
9	Patient perception	The subjective assessment of a patient when being moved in transfers or mobility situations, fear, comfort etc.
10	MSD exposure measures	Physical workload factors that place the staff under strain, forces, postures, frequency of tasks, workload measures
11	Patient injuries	Records of incidents, accidents or injuries to patients when being assisted to move, bruises, lacerations, tissue damage etc.
12	Financial	The financial impact of MSD in an organisation, lost staff time, lost productivity costs, compensation claims, litigation, all direct and indirect costs against the costs of any prevention programme

MS, musculoskeletal; MSD, musculoskeletal disorders [Adapted with permission from Dr M Fray]

*www.arjohuntleigh.com

9. Summary



Applying the recommendations presented in the ISO TR and in this edited summary

The recommendations presented in the full ISO TR allow identification of hazards and evaluation of the risks associated with manual patient handling, followed by recommendations for the application of solutions and implementations for risk reduction and evaluation.

It can be difficult to change a culture, even when it fosters, for whatever reasons, an imperfect attitude towards risk and injury to its staff. This cultural change can only be possible when all stakeholders work together in identifying and following the necessary procedures to make it happen. In the TR, and this edited summary, we have looked at how this implementation can be made using the following steps:

- **By understanding the real risks to healthcare staff involved in manual handling;**
- **By understanding how to undertake a risk assessment, and evaluate that risk with a view to risk reduction;**
- **By looking at the organizational aspects of patient handling interventions;**
- **By examining the use of aids and equipment;**
- **By studying the buildings and environment where patient handling takes place;**
- **By looking how staff training can affect the reduction of patient handling injuries;**
- **By incorporating all the above into a management system;**
- **By evaluating the success of patient handling outcomes.**

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