

PD CEN ISO/TR 12296:2013



BSI Standards Publication

Ergonomics — Manual handling of people in the healthcare sector

bsi.

...making excellence a habit.
AVA Documents™
Document Sharing Hub

National foreword

This Published Document is the UK implementation of CEN ISO/TR 12296:2013. It is identical to ISO/TR 12296:2012. It supersedes PD ISO/TR 12296:2012, which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee PH/9, Applied ergonomics, to Subcommittee PH/9/-/4, Ergonomics – Anthropometry and Biomechanics.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2013.
Published by BSI Standards Limited 2013

ISBN 978 0 580 82214 8

ICS 13.180

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2012.

Amendments/corrigenda issued since publication

Date	Text affected
30 September 2013	This corrigendum renumbers PD ISO/TR 12296:2012 as PD CEN ISO/TR 12296:2013

English Version

**Ergonomics - Manual handling of people in the healthcare sector
(ISO/TR 12296:2012)**

Ergonomie - Manutention manuelle des personnes dans le
secteur de la santé (ISO/TR 12296:2012)

Ergonomie - Manuelles Bewegen von Personen im Bereich
der Pflege (ISO/TR 12296:2012)

This Technical Report was approved by CEN on 19 August 2013. It has been drawn up by the Technical Committee CEN/TC 122.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

The text of ISO/TR 12296:2012 has been prepared by Technical Committee ISO/TC 159 “Ergonomics” of the International Organization for Standardization (ISO) and has been taken over as CEN ISO/TR 12296:2013 by Technical Committee CEN/TC 122 “Ergonomics” the secretariat of which is held by DIN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of ISO/TR 12296:2012 has been approved by CEN as CEN ISO/TR 12296:2013 without any modification.

Contents

Page

Introduction	iv
1 Scope	1
2 Terms, definitions and abbreviated terms	1
3 Recommendations	2
3.1 General aspects	2
3.2 Risk assessment	3
3.2.1 Hazard identification	4
3.2.2 Risk estimation and evaluation	6
3.3 Risk reduction	7
Annex A (informative) Risk estimation and risk evaluation	8
Annex B (informative) Organizational aspects of patient handling interventions	38
Annex C (informative) Aids and equipment	43
Annex D (informative) Buildings and environment	59
Annex E (informative) Staff education and training	71
Annex F (informative) Relevant information regarding the evaluation of intervention effectiveness	74
Bibliography	80

Introduction

National and international statistics provide evidence that healthcare staff are subject to some of the highest risks of musculoskeletal disorders (particularly for the spine and shoulder), as compared with other jobs.

Manual patient handling often induces high loads on the musculoskeletal systems, in particular on the lower back. Manual patient handling ought to be avoided where possible¹⁾ or be performed in a low-risk manner.

Factors such as the number, capacity, experience and qualification of caregivers can interact with the following conditions to produce an increased risk of musculoskeletal disorders:

- number, type and condition of patients to be handled;
- awkward postures and force exertion;
- inadequacy (or absence) of equipment;
- restricted spaces where patients are handled;
- lack of education and training in caregivers' specific tasks.

An ergonomic approach can have a significant impact on reducing risk from manual patient handling.

A good analysis of work organization, including handling tasks and the above-mentioned risk determinants, is extremely important in reducing risks to caregivers.

The recommendations presented in this Technical Report allow identification of hazards, an estimation of the risk associated with manual patient handling and the application of solutions. They are based primarily on data integration from epidemiological and biomechanical approaches to manual (patient) handling and on the consensus of international experts in patient handling.

The assessment and control of risks associated with other aspects of manual handling can be found in ISO 11228-1, ISO 11228-2, ISO 11228-3 and ISO 11226.

Ergonomics — Manual handling of people in the healthcare sector

1 Scope

This Technical Report provides guidance for assessing the problems and risks associated with manual patient handling in the healthcare sector, and for identifying and applying ergonomic strategies and solutions to those problems and risks.

Its main goals are

- to improve caregivers' working conditions by decreasing biomechanical overload risk, thus limiting work-related illness and injury, as well as the consequent costs and absenteeism, and
- to account for patients' care quality, safety, dignity and privacy as regards their needs, including specific personal care and hygiene.

It is intended for all users (or caregivers and workers) involved in healthcare manual handling and, in particular, healthcare managers and workers, occupational safety and health caregivers, producers of assistive devices and equipment, education and training supervisors, and designers of healthcare facilities.

Its recommendations are primarily applicable to the movement of people (adults and children) in the provision of healthcare services in purposely built or adapted buildings and environments. Some recommendations can also be applied to wider areas (e.g. home care, emergency care, voluntary caregivers, cadaver handling).

The recommendations for patient handling take into consideration work organization, type and number of patients to be handled, aids, spaces where patients are handled, as well as caregivers' education and awkward postures, but do not apply to object (movement, transfer, pushing and pulling) or animal handling. Task joint analysis in a daily shift involving patient handling, pulling and pushing or object handling and transport is not considered.

2 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms, definitions and abbreviated terms apply.

2.1

aids and equipment

assistive devices eliminating or reducing the caregiver's physical effort during handling of a non- or partially cooperating patient

2.2

caregiver

individual required by his or her job specification to perform manual patient handling activities

2.3

environment

all physical conditions of the area where patients have to be handled, including space, climate and surfaces

2.4

manual patient handling

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

2.5

patient

individual who requires assistance to move

Note 1 to entry: Types of patients include

- totally non-cooperating patients (to be fully handled by a caregiver),
- partially cooperating patients (to be partially handled by a caregiver).
- fully cooperating patients.

Note 2 to entry: Missing willingness of the patient for cooperation may induce an increase in musculoskeletal load for the caregiver.

Note 3 to entry: Other types of patient classifications are mentioned in C.4.

Abbreviated terms

NC	totally non-cooperating patient
PC	partially cooperating patient
MSD	musculoskeletal disorders
MPH	manual patient handling
LBP	low-back or lower-back pain
PU	pressure ulcer

3 Recommendations

3.1 General aspects

A systematic review of patient handling literature shows that a strategy for risk assessment, application of engineering controls and management must be comprehensive (multifactor interventions) to be successful.

Consequently, a strategy for risk prevention based on analytical assessment of the risk itself, all of its potential determinants (organizational, structural and educational), and on some key aspects of risk management is outlined below (see Figure 1).

The strategy includes the use of managerial processes and systems for reducing causes and effects of musculoskeletal and other organizational losses from healthcare institutions.

The participatory approach is emphasized in all aspects especially in changing work practices, defining training needs, purchasing technology/equipment and designing work environments.

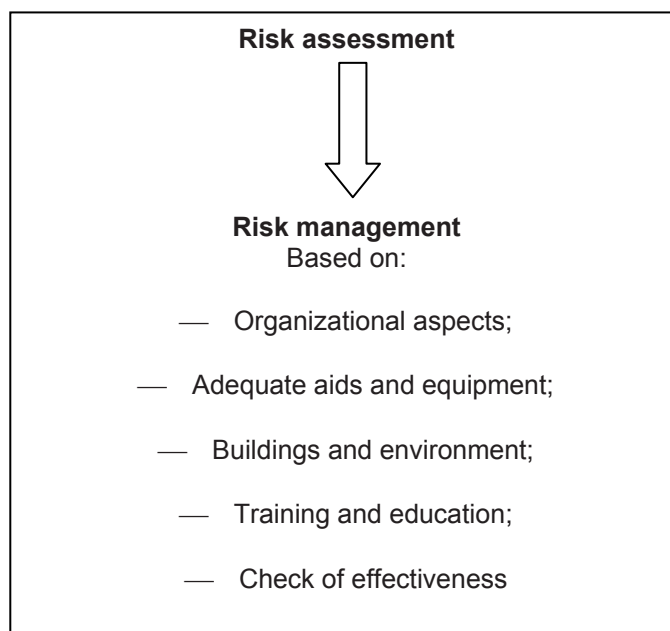


Figure 1 — Comprehensive strategy

The annexes present details of the main relevant aspects of the general strategy: risk assessment (Annex A); organizational aspects (Annex B); aids and equipment (Annex C); buildings and environment (Annex D); staff education and training (Annex E); effectiveness check (Annex F).

The following sections (3.2 and 3.3) describe the basic recommendations for this strategy.

3.2 Risk assessment

Risk assessment is one of the pillars of preventive strategies. Risk assessment consists of the following steps: hazard/problem identification, risk estimation/evaluation.

It is emphasized that for the purposes of this Technical Report, hazard identification and risk assessment are related not just at health risk identification but also in problem identification and problem solving.

A risk assessment is recommended when new equipment is introduced, organizational issues are modified (number of caregivers, number of non-cooperating patients), spaces are reorganized from an environmental viewpoint (rooms, services) and whenever other changes could affect risk characteristics, even if the previous condition was found to be acceptable.

For the purposes of this Technical Report, the risk assessment model shown in Figure 2 is used.

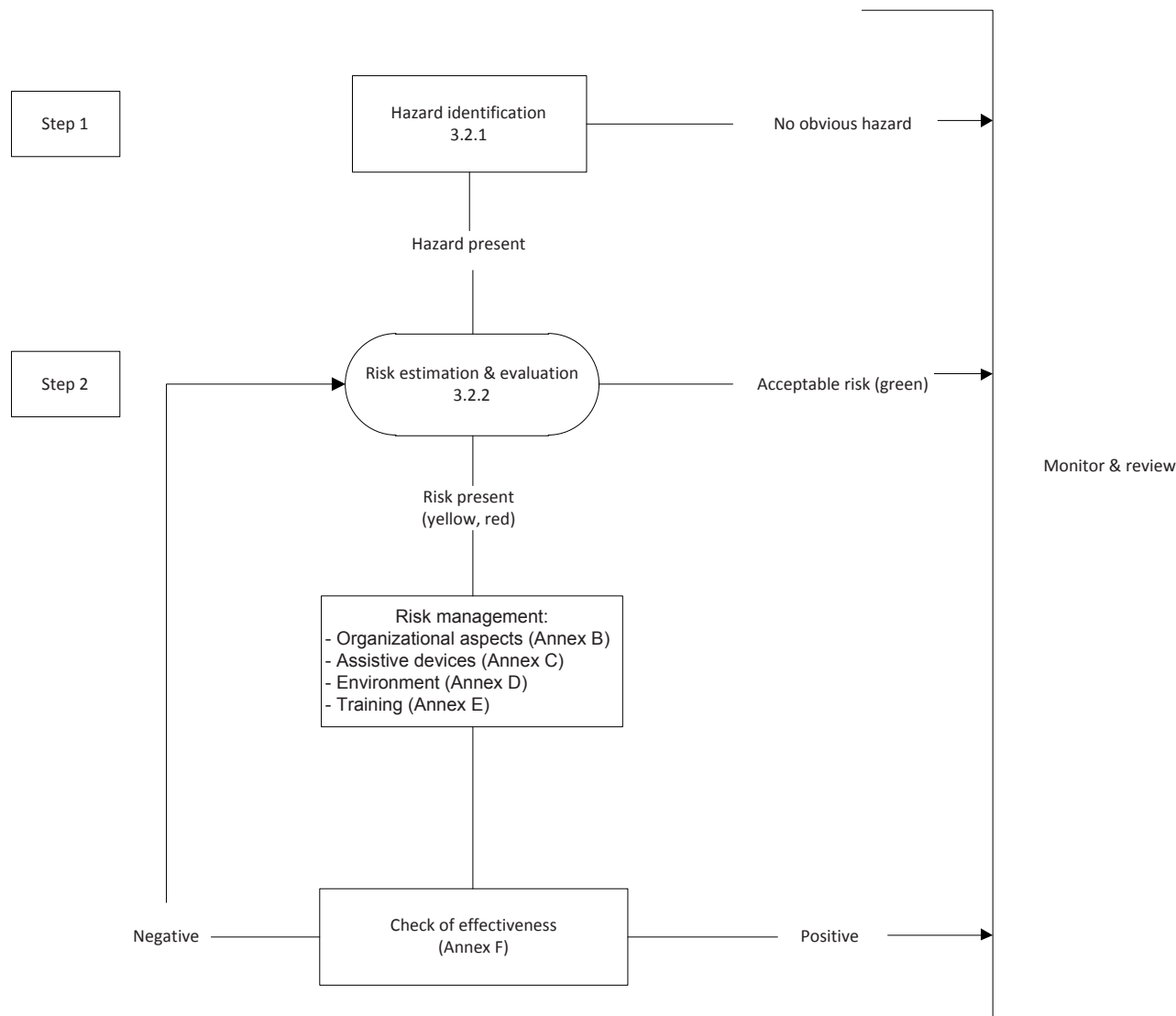


Figure 2 — Risk assessment model

3.2.1 Hazard identification

A hazard is present when patients are manually handled. The number and type of these patient transfers should be quantified (e.g. on a daily average) in different ways according to the healthcare area considered. For example: in operating theatres it would constitute the number of operations needing patient handling; in outpatient operations, the number of access requests for patients; in hospital wards, the number of patients. Patient quantification will be a preliminary factor to assess the time, number and frequency of handling.

Also the presence of a hazard requires that other factors should be taken into account that may address the subsequent risk evaluation.

3.2.1.1 Type of handling

The type of handling is defined by the task to be performed (e.g. repositioning a patient lying in the bed, or emplacing the bed pan) as well as by the handling technique applied for task execution. Task execution may be biomechanically improved, in particular, if small aids are additionally used. Furthermore, the type of patient (totally non-cooperating, partially or fully cooperating) and the type of assistive procedures will determine the handling method used by caregivers to a certain extent. The type of handling associated with patient's functional mobility level will define different hazard levels. A handling type used for cooperating patients may result in a low hazard while for a non-cooperating patient the same handling method may produce a much

higher hazard. Analysing patient handling currently carried out in a given healthcare area should lead to quantification of different types of handling necessary to address both the choice of most appropriate handling mode and usage of aids in that situation and also the number of caregivers needed throughout the day.

3.2.1.2 Work organization

The overall work organization can modify the risk of injury. The number of caregivers carrying out patient handling and their organization (one or more caregivers) over the day is a crucial factor to assess along with handling frequency and mode. Furthermore, caregivers should be trained to safely perform each task and how to recognize hazardous workplaces, tasks, equipment conditions and time allocated to the task.

3.2.1.3 Posture and force exertion

During patient-handling activities, the spinal column of caregivers, especially the lumbar section, is subject to high mechanical loading (i.e. compressive and sagittal or lateral shear forces at the intervertebral discs). Biomechanical load through patient handling is regarded as one of the most relevant factors inducing low-back pain and the development of degenerative disorders at lumbar spinal structures. Lumbar load strongly depends on the mobility status of the patient, equipment in use, posture adopted and the forces exerted by the caregiver to perform the handling action. Patient handling often coincides with postures and asymmetric forces with respect to the median sagittal plane that result in relatively high biomechanical load and an increased overload risk. Awkward postures due to various elements and conditions (available spaces, equipment used, number of caregivers handling the patient and education and training) often lead to decreased abilities for force exertions and increased risk of injury from high loads being placed on body joints or segments. For postures, asymmetry may be due to arm position or lateral trunk flexion or torsion. Forces may act laterally or are bilaterally imbalanced. A reduction of high lumbar loads can be achieved by using biomechanically efficient transfer methods.

The caregiver should exert the force with a stable and balanced posture enabling application of his/her body weight to their environment (e.g. bed, chair, patient) and thus minimizing the forces acting on the back and shoulders.

3.2.1.4 Assistive devices

The lack, absence or inappropriateness, of aids and equipment is a hazard during patient handling. The application of appropriate aids and equipment is strongly recommended to obtain a vital load reduction for the lumbar spine and to limit the biomechanical overload risk for the caregivers. Equipment and facilities must be currently and properly maintained for safe usage. The equipment purchase process should be based upon clear task requirements (type of handling) and the environment where they are used, and thus result in the selection of equipment fit for the specific workplace and task conditions.

3.2.1.5 Environment

The environment where patients are handled may be a hazard if inadequate. All spaces where patients are handled should be considered for equipment use and correct handling postures. Additional factors such as thermal constraints, steps, thresholds, obstacles and slippery floors should be considered.

3.2.1.6 Individual characteristics

Individual skills and capabilities, level of training, age, gender and health status of the caregiver should be considered when carrying out a risk assessment. Skill and experience are likely to benefit the caregiver when performing the task and reduce the risk of injury. 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.

3.2.1.7 Patient characteristics

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

overload. Special hazards may arise in case patients oppose the motion for psychiatric or cognitive problems or issues due to medication. In this case, biomechanical load of musculoskeletal structures could be high.

From an operative point of view it is recommended to proceed with the next step (risk estimation/ evaluation) whenever there is a presence of non- (or partially) cooperating patients and one or more of the above quoted hazards/problems are identified.

The next step (risk estimation/evaluation) should include patient characteristics such as non- (or partially) cooperating patient, and/or body size and mass.

3.2.2 Risk estimation and evaluation

An accurate analytical risk assessment, including data collection for consequent preventive measures, should consider the presence of several factors and their interrelationships: type of patient; induced “care load”; available caregiver staff; available and adequate equipment; building; environment and spaces and training and skill of nursing staff. Given the above factors, the use of consolidated methods applicable to manual handling of objects (such as those reported in ISO 11228-1 and ISO 11228-2) for patient handling is difficult.

Annex A is devoted to risk estimation and risk evaluation:

A.1 reports an “oriented” review of several methods useful for the purposes of risk estimation or evaluation as intended in this Technical Report, as derived from literature or from relevant national or international guidelines.

The methods described are classified primarily in relation to their simplicity/complexity. Complexity generally entails a more involved task of risk estimation or detailed risk evaluation. Methods can also be classified in relation to the healthcare sectors in which they could be most effectively applied.

Users of this Technical Report should start with the information in Annex A to select the appropriate method to use for a simple or detailed risk assessment, depending upon the kind of hazards and risk factors identified in step 1, the healthcare sectors examined and the experience of the analyst in the use of the proposed methods.

A.2 presents guidelines, taken primarily from national sources, for risk assessment for manual patient handling and provides suggestions on any relevant issue (aids, environment, caregivers' training and education, etc.) directed to reducing risk. As such they are not actual risk assessment tools but do provide useful information.

A.3 reports, on the basis of the same scenario, practical applications of four methods (Dortmund Approach, TilThermometer, MAPO and PTAI), so the intended users can choose the most appropriate one for the situation to be assessed.

The risk assessment method used (estimation, detailed evaluation) 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 (and the consequent training needs) of caregivers.

The method used for risk assessment should allow risk classification by the three-zone model (green, yellow, red) and address the consequent action to take according to criteria given in Table 1.

Table 1 — Risk estimation/evaluation — Final assessment criteria

Zone	Exposure classification	Consequences
GREEN	ACCEPTABLE	Acceptable, no consequences.
YELLOW	NOT RECOMMENDED	Advisable to set up improvements with regard to structural risk factors or to suggest other organizational and educational measures. Further evaluation is required and adequate measures have to be done if necessary.
RED	UNACCEPTABLE/TO BE AVOIDED	Redesign or take actions to lower the risks.

3.3 Risk reduction

Where a presence of risk/problems resulted from the previous step, a comprehensive approach (multifactor interventions) for risk reduction should be adopted. The comprehensive approach is most likely to be successful. This approach should be based on the results of the analytical risk assessment. A proper risk/problem assessment is the basis for appropriate choices in risk reduction.

Risk reduction can be achieved by combining improvements to different risk factors and should consider, among other things:

- The adequate number and the quality of the staff for taking care of the different kind of patients.
- The selection and correct use of appropriate aids for handling patients. Aids should be chosen according adequate ergonomics and quality criteria (see Annex C).
- Adequate programs of staff information, education and training considered as part of the risk management system of the organization and as complementary to the other interventions types here considered (literature reports that interventions based solely on technique training had no impact on working practices or injury rates).
- The definition of a general risk management system and of clear policies and procedures by the organization.

A check on the effectiveness of the intervention (part of the risk reduction strategy) is highly recommended.

Annex B presents organizational aspects of patient handling interventions.

Annex C presents criteria for the choice and use of adequate aids and equipment.

Annex D presents information on buildings and environment for the aspects involved in this Technical Report.

Annex E presents information regarding the fundamentals of staff education and training.

Annex F presents information regarding the evaluation of intervention effectiveness.

Annex A (informative)

Risk estimation and risk evaluation

A.1 Methods of risk estimation and evaluation

This annex provides a synthetic description of risk estimation and risk evaluation methods found in scientific literature. For each of them the main characteristics are described.

Method	Quantified factors	Main determinant risk factor/s	Benefits	Limitations	Type of use	When and where applied (also grey literature)
OWAS (Karhu et. al. 1977)	Postures of whole body, force and frequency	Posture of all body segments	It allows scoring as well as analytical speed; it considers all body segments and is useful for redesign. It fits analysis of nearly all working tasks. It can be used in all healthcare sectors.	It analyses posture-related aspects as the only determinant. It makes it difficult to define selection criteria of postures to be analysed. It requires some time commitment.	Analysis of gesture modes; it can be used in an effectiveness check system.	Though it has not been designed for this specific goal, it has been applied in risk assessment of operating theatres.
LBP as a function of patient lifting frequency (Stobbe et. al. 1988)	Average frequency of manual lifting by shift	Lifting frequency	It determines the manual lifting frequency and analysis speed. It may predict effects on caregiver's health. It can be used in hospital departments and at home.	It analyses only some types of handling (bed–wheelchair and vice versa, wheelchair–wheelchair) and action frequency is the only risk determinant considered.	Rough analysis of areas-departments more at risk	
BIPP (Feldstein 1990)	Full movement analysis: from preparation to implementation	It assesses preparation to movement, caregiver's position at beginning of movement, dynamic behaviour and at the end of movement repositioning, if necessary.	Task analysis seems to be exhaustive. Seven items are used to identify a final score of movement modes through direct observation analysis. It can be applied in all healthcare areas and also at home.	It neglects all the other risk determinants (frequency, environment, work organization, etc.).	It can be used in an effectiveness check system.	

Method	Quantified factors	Main determinant risk factor/s	Benefits	Limitations	Type of use	When and where applied (also grey literature)
REBA (McAtamney and Hignett, 1995)	Postures of full body, force mainly determined by handled loads	Posture of all body segments	Determination of scores, analysis speed useful to identify ergonomic problems associated with awkward postures and load manual handling. Extremely useful in hospitals and can be used in all healthcare areas.	Like OWAS it practically assesses posture as the only risk determinant. Actually the load exceeding 10 kg always produces a similar score. It is difficult to define the selection criteria of postures to be analysed. It requires a moderate time commitment.	Analysis of gesture modes. It can be used in an effectiveness check system.	
PATE (Kjellberg et. al. 2000)	Full movement analysis: from preparation to implementation	It assesses preparation to movement, caregiver's position at movement beginning and dynamic behaviour.	Task analysis seems to be exhaustive. 17 items are used to identify a final score of movement modes through video camera. It can be used in hospitals and at home.	It requires a video shot and hence may be expensive in terms of time. It analyses only manual movements and not those regarding bathrooms. It neglects all the other risk determinants (frequency, environment, work organization, etc.).	It can be used in an effectiveness check system.	
DINO (Johnson et. al. 2004)	Analysis of patient transfer manoeuvres	It assesses preparation, implementation and results with 16 items. Directly at workplace without movies.	Task analysis seems to be exhaustive. A final score of movement modes is identified. It can be used in hospitals and at home.	It neglects all the other risk determinants (frequency, environment, work organization, etc.)	It can be used in an effectiveness check system.	
Patient handling assessment (Radovanovic and Alexandre 2004)	Anthropometry, disability degree, furniture and environment	There is not one factor only, but all those that have been mentioned have the same impact.	Fast analysis with a score for 8 items. Assessment sum can identify crucial areas.	It must be carried out for each patient and at present it has been assessed only for two departments: Cardiology and Coronary Unit. It seems, however, oriented to assessing assistance rather than PMH risk.	Rough analysis of areas — departments more at risk	At time of publication of this Technical Report, it had been applied in only two wards.

Method	Quantified factors	Main determinant risk factor/s	Benefits	Limitations	Type of use	When and where applied (also grey literature)
PTAI (Karhula et. al. 2007)	Frequency of observed and experienced manual patient transfers, classification into the three categories	It assesses frequency of patient transfers, environment, use of aids, physical load on back, arms and legs, handling skill, guidance, work arrangements, experienced physical and mental strain.	Uses both observation and employees interview. Allows classification into three areas (green, yellow and red). The repeatability and usability of the method is studied in two different pilot studies, validity was corresponded to expert evaluations. The method is available both in Finnish and in English from the Internet.	A video shot is recommended. The method is validated only for hospital wards. The calculation of overall load index requires some time commitment.	It can be used as a practical tool in the identification and evaluation of the risks and as an effectiveness check system. It helps to develop work and work conditions. Includes work-design hints	
MAPO (Menoni et. al. 1999, Battevi et. al. 2006)	Work organization, average frequency of handling and type of patients, equipment, environment and education and training	Considers interaction of factors.	It allows classification into three zones green, yellow and red, which correspond to increased likelihood of acute low back pain. It considers the different factors in an integrated manner and analysis of a ward needs a short evaluation time, approx. 1 h (interview and inspection)	For the time being, the method was validated only for hospital wards.	It can be used for risk analysis in hospital wards.	Applied in 400 wards for a total of approx. 6 000 exposed subjects
TilThermometer (Knibbe et. al., 1999)	Analysis of exposure to physical loads during patient care Complements the use of the TilThermometer	It assesses exposure level to physical load, specifies the use of equipment, identifies compliance with the national guidelines and assesses developments in the care load.	Covers main sources of exposure, not limited to lifting and handling, but also static load and pushing and pulling. Fairly quick to use. Experienced as easy to use and practical. Software available for free on the internet. National statistics available as reference material. Data collection on a	It is not specific enough for individual assessments in the patients care plan. This will require additional individual assessments. The combination with the <i>Beleidsspiegel</i> (Policy Mirror) is recommended to ensure an adequate preventive policy.	It is used for monitoring purposes on a regular basis.	Four national monitoring studies are performed with this instrument. (numbers of patients assessed exceeds 150 000)

Method	Quantified factors	Main determinant risk factor/s	Benefits	Limitations	Type of use	When and where applied (also grey literature)
			national scale. If weak spots are identified in the policy users are referred to solutions in order to improve their policies. Tool available for all healthcare sectors with minor differences.			
Manual Handling Assessments in Hospitals and the community (Ref [190])	It defines three risk assessment levels: patient-based level, department or ward level and top level. There are no factors quantitatively defined.	Checklists are provided to assess issues concerning: load, posture and movement, duration frequency and job design, environment, training, organization	The method can easily be used by skilled staff and is applicable in wards and communities	Since no criteria to define checklist items are available, the result of different detectors is hardly comparable. It needs an in-depth training for the detector and a well-structured nursing case file.	It can be used for risk analysis in hospital wards and community but also for monitoring purpose.	Manual Handling Assessments in Hospitals and the community
The Dortmund Approach (Jäger et. al. 2010)	Full movement analysis for caregiver and patient Measurement of caregiver's action forces transferred to the patient Biomechanical modelling: forces and moments at lumbar intervertebral discs	Awkward postures; exertion of high action forces; disadvantageous action-force direction; jerky movement; inadequate handling mode; disuse or misuse of aids or equipment; inadequate load-bearing capacity (e.g. due to age, gender)	Lumbar-overload prevention for patient-handling activities Sophisticated measurement-based determination of the biomechanical load on the lumbar spine and its evaluation with regard to lumbar overload; identification of ergonomic work-design measures (posture, movement, handling technique, aids, etc.)	It is focussed on and, hence, restricted to - selected handling activities, - the mechanical load on the lumbar spine, - handling by one caregiver, - "normal" patient body weight and stature, - cooperation of patient, - adjusted bed height, - adequate standing position of the caregiver. It neglects other risk determinants: - handling frequency, - restricted space, - environment, - insufficient physiological capacity of caregiver.	It can be used for rapid evaluation of low-back loading, i.e. for the identification of performance deficits. Work-design hints are evident.	Principles and quantities are standard, applied in every corresponding occupational disease evaluation in Germany to assess the individual work-related presuppositions.

A.2 National guidelines for managing manual patient handling

The annex presents the synthetic contents of guidelines, generally at the national level, set up for an overall management of patient handling risk. They also reflect the cultural level and sensitiveness of the publication country. It is impossible to know the actual application (in the sense of how many structures have been applied), but no doubt they are useful tools to check, reduce and follow in time the issues associated with manual patient handling risk. In most cases they are resources that can be freely downloaded from the web.

<i>A Back Injury Prevention Guide For Health Care Providers</i> (Ref. [23])	Presents general guidelines that can be used in any healthcare sector and are addressed only to physical risk factors. The guide deals with the following topics: understand why LBP is a problem, analyse the workplace to identify associated activity, equipment and factors likely to contribute to LBP development, identify and implement solutions, assess results. The first section reports a set of interesting data on LBP injury incidence and an evaluation of its (high) direct and indirect costs. A part is dedicated to the different risk occurrence (lifting, use of equipment, etc.). A second section is specifically dedicated to assessment of working activities. Some steps are analytically defined: Involve workers and discuss with them, Obtain statistics on number, type and seriousness of injury, use a set of tools (cards/forms) providing an actual work/risk assessment only after identifying (from previous actions) the key problems. As to the latter point, check lists were prepared to analyse: the risk associated with type of patient, the risk associated with specific task, type and adequacy of equipment, environment, administration issues associated with this problem (presence of procedures, aid purchasing modalities, education, etc.). The most detailed section regards identification and suggestions for the most effective solutions with special reference to the proposal (to be further investigated) to set up a team dealing with non-cooperating patients' lifting. It also includes two interesting effectiveness studies. A part of the guide includes "information resources" whose exhaustive iconographic documentation shows which lifting devices and minor aids are useful for patient's hygiene for which operations/patients, etc. A list of suggested characteristics needed in the different equipment is also suggested for each type of device. The same section also provides information on the behaviours to be enacted in the different handling, repositioning and other daily activities (e.g. hygiene). Like other guides, it highlights workers' involvement through all process stages because of its positive impact at different levels. The problem rough analysis comes from information gathered on injury and disease. There are no standardized criteria to judge the magnitude of MPH risk but the judgement is at "expert's" discretion. Management is less involved than in other guide lines. There is a proposal of a team specifically engaged in patients' transfer/handling. Iconography is useful to implement a solution data bank (like in other guides).
--	--

<i>Patient Care Ergonomics Resource Guide: Safe Patient Handling and Movement</i> (Ref. [24])	Developed by the Patient Safety Center of Inquiry (Tampa, FL), Veterans Health Administration and Department of Defence after over thirty years of experience on this particular topic, the website can be used also to tackle special issues of MPH risk management. They are extremely interesting guidelines and need to be analytically investigated as regards manual patient handling accidents, a full-time caregivers' team tackling the problem and continuous patient monitoring: in this regard an accurate patient's case file is necessary. In short, MPH risk management proposal is based on 9 steps that have to be sequential. Assessment of all MPH accidents with (direct and indirect) quantification. Selection and identification of high risk wards according to accident occurrence. Interview with ward heads for pre-assessment of the different factors jointly producing the specific risk: type of patient and disability (subdivided according to how many times a week the patient needs total lifting), furniture and spaces, equipment, education and training. Identification of high risk tasks and proposed improvements. Inspection on concerned area for checking collected information. Summary of risk analysis. Recommendations to improve identified risk issues. Selection of equipment Monitoring of results. The guidelines end with a section devoted to bariatric patients (Special Handling and Movement Challenges Related to Bariatrics). For each stage, protocols, administration modalities and (not always) assessment criteria will be provided. A special feature is the development of an algorithm for each of the key transfer and repositioning tasks designed to assist healthcare employees in selecting the safest equipment and techniques based on specific patient characteristics.
<i>The Guide to the Handling of People</i> (Ref. [211])	This publication is a collaboration of BackCare (formerly the National Back Pain Association) and National Back Exchange in association with the Royal College of Nursing, Chartered Society of Physiotherapy, College of Occupational Therapy, Institute of Ergonomics and Human Factors, Health and Safety Executive and NHS Employers. Previous editions date back to 1981, recording an advanced cultural background which may not be easily exportable to other countries. It is subdivided into sections on Manual handling legislation, Risk management, Ergonomics in health and social care, Mechanics and human movement, Systems approach to safer handling practice, Training strategies, Equipment strategies and Health and wellbeing. The third section provides a summary of core practical skills with rich iconographic references.
<i>Transferring people safely — A guide to handling patients, residents and clients in health, aged care, rehabilitation and disability services</i> (Ref. [27])	Australian guideline in its third edition. Produced specifically for Victorian employers to assist in reducing the incidence and severity of injuries to their staff resulting from manual handling risks when transferring people. This guide complements the publication, <i>A guide to designing workplaces for safer handling of people</i>. It provides a series of tools for managing manual patient handling risk classified as follows: The patient risk assessment worksheet that guides the assessment of manual handling risks for an individual task. Assessment takes into consideration environmental issues (furniture, space, equipment). Organizational issues (training, adequate staff numbers, working hours) and patient characteristics (cognitive, physical and behavioural signs). No criteria are defined for judgement of different proposed items. The patient transfer guide. A set of completed risk assessments for 12 common transfer or moving procedures. For each of them, risk-ranked solutions are provided: from highly recommendable to highly hazardous. Patient and resident records should be done when the patient arrives in the unit and whenever her/his condition changes significantly. Examples of patient recording forms are provided that staff may use to identify risks and record the handling/moving procedures. This needs a nursing chart or a specific form to

	start a “handling programme”. Task assessments and class risk assessments. A description of each task from the Patient transfer guide and a discussion of the risk factors based on: type of patient disability, characteristics of equipment, characteristics of environment and finally organizational characteristics (staff education and training and number of available caregivers). In the light of this description it is clear that this guideline can be used in wards (acute or chronic patients) and in home assistance. As regards risk assessment, it considers different elements in an integrated manner: type of patient, equipment, environment and work organization. No effectiveness assessment tools of adopted strategies are provided even if periodically a report is produced.
Dutch Guidelines for Practice 2002	These guidelines are based on ergonomic standards and are formulated in simple “care language” and state the do's and don'ts for daily practice in healthcare. The total set of guidelines (for details see the scenario and Annex C) comprises a maximum of two pages depending on the healthcare sector. There are marginal differences between health care sectors. The guidelines were developed with full participation of nurses themselves to ensure their commitment and to facilitate a complete and easy integration in normal day-to-day care routines. For each of the healthcare sectors groups of 15–20 representatives from practice were closely involved. They also piloted draft versions in a few stages in their own facility. After these phases the guidelines were officially supported by the covenant parties: unions, employers and the government. Following this formal stage of official commitment considerable effort was made to implement the guidelines from management.
AORN Guidance Statement: <i>Safe Patient Handling and Movement in the Perioperative Setting</i> (2007)	A broad panel of experts was set up to identify risk factors for musculoskeletal disorders for registered nurses and other members of the perioperative team. After a systematic assessment of task demands, direct measurement of weights and forces involved in the tasks, and direct observation of work tasks and equipment, the panel applied ergonomic principles to develop clinical tools for utilization in the perioperative area. Seven high risk tasks were identified: transferring patients on and off operating table, repositioning patients on the operating table, lifting and holding the patient's extremities, standing for long periods of time, holding retractors for long periods of time, lifting and moving equipment and sustaining awkward positions. For each task an algorithm was set up to avoid biomechanical overload. Algorithms account in particular for applied effort and number of caregivers involved at the same time. Also indications on recommendations for object handling and frequent pulling and pushing frequent in operating theatres are interesting. Also measurement of lifting index and directly measured pulling and pushing are provided. It is a guideline applicable only in operating theatres and is task-oriented. It is especially useful for working procedure and policy writing.

A.3 Example of an application of the methods commonly used for risk assessment of manual patient handling

It is possible, to some extent, to compare on the basis of similar scenario, described below, the practical application and the differences among methods.

A.3.1 Scenario

A medical ward with 25 beds is considered, all being generally occupied and with 10-day average hospitalization stay. The staff involved in manually handling patients consists of nine people: in the first shift four workers are present simultaneously, in the second three and at night two workers. During the first morning shift of assistance to patients, nurses are organized in two couples of workers, in the second and third shifts, only one couple and in the afternoon the operator who works on her/his own assists partially cooperating patients (PCs).

Patients who require assistance with transfers are on average elderly patients with multiple diseases confined to bed and whose hospitalization is addressed to diagnostic assessment (specialized tests). Out of the 20

patients with severely limited mobility (that are those who have to be lifted or moved during assistance operations), i.e. non-cooperating patients (NCs) who are present on average, 12 have to be fully lifted or moved while eight have residual movement capabilities in lower limbs and hence have to be partially lifted and cannot or may not bear full body weight.

Most manual patient handling activities are as follows.

- Transfers upwards in bed and turning for all disabled patients every shift, which may be in the first shift at least twice. These manoeuvres are currently performed manually. In short this category is named “repositioning in bed”.
- Bed–wheelchair transfer and wheelchair–toilet transfer and vice-versa (only for all PCs) in the morning and afternoon. These manoeuvres are performed manually.
- Only 2 or 3 patients are moved via a bed-stretcher lifting and vice versa for diagnostic tests only in the unit. The other transfers (stretcher–X-ray bed and vice-versa) are performed in radiology by radiology technicians.

The present equipment consist of a sliding board and a height-adjustable stretcher (always used during bed–stretcher transfer and vice versa, for totally non-cooperating patients).

In this ward there is no shower chair available and all patients are washed in bed. The patients cannot take a bath or a shower.

Anti-embolism stockings above grade 2 are used.

All beds are manually driven, mechanically height adjustable and have a three-section profiling surface. The environments in which the patients are handled have enough space and/or little encumbrances. Only one room out of 13 and two bathrooms out of 14 have inadequate spaces for equipment use. There are few (six) wheelchairs available but one is not optimal from an ergonomic point of view (brake malfunctioning, non-extractable armrest and cumbersome backrest).

Specific education and training on specific risk of handling patients has never been implemented.

A.3.2 Risk evaluation, applied to the scenario, based on the Dortmund Approach

A.3.2.1 Introduction

The *Dortmund Approach* aims at a biomechanically oriented assessment of the load on the spine for occupational manual materials handling, here applied to the specific occupational tasks of manual patient handling (Jäger et. al. 2010). The method is based on laboratory investigations into selected patient handlings (The *Dortmund Lumbar Load Study 3 – DOLLY 3*), applying:

- a) posture recordings of caregiver and patient;
- b) measurements of caregiver's action forces transferred to the patient;
- c) subsequent 3-D dynamic biomechanical computer simulations;
- d) quantitative description of the (bio-)mechanical load on the lumbar spine by several indicators (i.e. compressive and shear forces as well as bending and torsional moments at the lumbosacral disc).

With regard to possible mechanical overloading the lumbar-spine structures, the discal compressive forces for the analysed tasks are compared with recommended limits for work design. The corresponding lumbar-overload risk of the diverse tasks is classified by a 3-zone model (**GREEN, YELLOW, RED**) so that:

- a) lumbar load can be evaluated rapidly;

- b) performance deficits can be identified and;
- c) measures of work design can be derived directly in order to enable a biomechanically-justified ergonomic task performance.

DOLLY 3 elucidates that lumbar load is often very high for the caregivers and may exceed the ergonomic limits mentioned below, in particular, in case of “conventional” task execution modes and/or for moving more or less passive patients (partially non-cooperating patients); accordingly, the risk is classified **RED**. A considerable reduction can be achieved by a biomechanically “optimized” mode of execution, when indicated accompanied by the use of small aids; according to the individual task conditions, the risk is classified **YELLOW** and, in some cases, it can be lowered to achieve the **GREEN** zone.

In Table A.1, the compressive forces at the lumbosacral disc for several patient handlings are listed. Lumbosacral disc-compression is, in this context, regarded as a typical indicator for the mechanical load on the lumbar spine during manual handling activities. Lumbar-load values, represented by means and ranges, are provided for three handling modes: conventional, optimized and optimized using small aids additionally. In the right part of Table A.1, risk classification according to the 3-zone model is demonstrated; categorization mainly depends on task conditions, handling mode and patient's cooperation level. Conditions for lowering the risk are thereby evident, i.e. the task conditions specified in Table A.1 represent “minimal demands” and the biomechanical overload risk can be diminished in case of more advantageous task-or-execution characteristics.

Criteria for risk classification according to the 3-zone model are derived from Table A.2 as follows:

GREEN disc-compressive forces lower than lowest recommended limit (nearly 2 kN for older female adults), i.e. the work is assumed acceptable for almost all persons under the given circumstances;

YELLOW disc-compressive forces in the range of the recommended limits for females (nearly 2 to 4,5 kN dependent on age), i.e. the work may be acceptable under improved circumstances;

RED disc-compressive forces higher than highest recommended limit for females (approx. 4,5 kN for younger female adults), i.e. the work is assumed unacceptable for females under the given circumstances.

The recommended limits mentioned in these definitions are based on the so-called *Dortmund Recommendations* (cf. Table A.2) representing ergonomic limits for the lumbar-disc compressive forces during manual materials handling (Jäger et. al. 2001a, ISO 11228-2). The limits were derived in analogy to NIOSH's Action Limit (1981); the underlying data base on the ultimate compressive strength of lumbar-spine sections enabled the consideration of the most influencing factors on spinal load-bearing capacity, i.e. age and gender of the task-performing person.

Table A.1 — Lumbar load during manual patient handling and risk-level categories for biomechanical overload — Lumbosacral compressive forces (mean and range) caused by activities performed in three execution modes, and classification by a 3-zone risk model accompanied by task-condition description

Patient-handling activity	Lumbar load [mean (range)] Lumbosacral compressive force in kN			Risk zone <i>yellow, green:</i> The specified task conditions represent "minimal demands", i.e. the biomechanical overload risk can be lowered in case of more advantageous conditions.
	conventional	optimized	optimized + small aids	
Raising a patient from lying to sitting in bed or vice versa	3.4 (1.8 - 5.4)	2.3 (2.0 - 2.5)	n.a.	red in all cases except yellow or green condition yellow optimized technique + part. co-op. pat. green fully co-op. pat.
Elevating a patient from lying to sitting at the bed's edge or vice versa	5.0 (3.3 - 6.2)	2.7 (2.0 - 3.6)	n.a.	red in all cases except yellow condition yellow optimized technique + part. co-op. pat.
Moving a patient towards the bed's head (CG at bed's longside)	6.9 (5.6 - 8.1)	5.4 (3.7 - 6.5)	2.8 (2.3 - 3.2)	red in all cases except yellow condition yellow using small aids + fully co-op. pat.
Moving a patient towards the bed's head (CG at bed's head)	5.7 (2.8 - 8.9)	2.5 (2.0 - 3.0)	2.4 (2.2 - 2.8)	red in all cases except yellow condition yellow optimized technique <u>or</u> using small aids <u>or</u> fully co-op. pat.
Moving a patient in the bed sideways	4.9 (3.3 - 5.8)	2.6 (2.0 - 3.4)	1.9 (1.6 - 2.2)	red in all cases except yellow or green condition yellow optimized technique + part. co-op. pat. green using small aids + part. co-op. pat.
Lifting a leg of a lying patient or vice versa (CG at bed's longside)	2.8 (1.9 - 4.0)	n.a.	n.a.	yellow in all cases except green condition green CG at bed's foot (see below)
Lifting a leg of a lying patient or vice versa (CG at bed's foot)	1.8 (1.8 - 1.8)	n.a.	n.a.	yellow CG at bed's longside (see above) green in all cases except yellow condition
Lifting both legs of a lying patient or vice versa	3.5 (3.0 - 4.5)	n.a.	n.a.	yellow in all cases except green condition green presumed for CG at bed's foot
Inclining the bed's head with the patient lying in the bed or vice versa	4.3 (3.8 - 5.4)	4.1 (3.5 - 5.2)	n.a.	red in all cases except yellow condition yellow inclining: optimized technique + fully co-op. pat.; lowering: no further demands
Shoving a bedpan or vice versa	4.2 (2.6 - 6.5)	3.3 (3.3 - 3.3)	n.a.	red inadequate transfer technique yellow in all cases except red condition
Placing small aids or vice versa	n.a.	2.4 (2.2 - 2.6)	n.a.	red presumed for totally non co-operating patients yellow optimized technique + part. co-op. pat.
Transferring a patient from bed to bed	n.a.	n.a.	2.4 (2.3 - 2.4)	red presumed for totally non co-operating patients yellow using small aids + part. co-op. pat.
Placing a patient from sitting at bed's edge in a chair or vice versa	5.1 (3.8 - 6.5)	3.7 (2.3 - 4.4)	3.1 (1.6 - 5.3)	red in all cases except yellow and green condition yellow opt. tech. <u>or</u> small aids (exc. inadequate use) green small aids + fully co-op. pat. with max. 70 kg
Raising a patient from sitting to upright standing position or vice versa	4.9 (3.8 - 6.4)	2.5 (1.9 - 3.1)	n.a.	red in all cases except yellow condition yellow raising: optimized technique + fully co-op. pat.; lowering: fully co-op. pat. with max. 70 kg
Raising a patient from lying on the floor to standing position	4.1 (3.3 - 4.7)	n.a.	n.a.	red all cases except yellow condition yellow fully co-op. pat.
Key: CG: caregiver n.a.: not applicable or not analyzed fully co-op. pat.: fully co-operating patient part. co-op. pat.: partially co-operating patient without co-operation: The handling of totally non co-operating patients was not studied explicitly, however, a high risk may be presumed in many cases.				
Risk zone and level red high: risk unacceptable yellow medium: risk eventually acceptable under improved circumstances green low: risk acceptable				

Table A.2 — Dortmund Recommendations — Age-and-gender related limits for lumbar-disc compressive forces during manual materials handling to avoid biomechanical low-back overload, here applied to the evaluation of manual patient-transfer activities

<i>Dortmund Recommendations</i> evaluating the (bio-)mechanical load on the lumbar spine during manual materials handling		
Limits for compressive forces on lumbar discs		
Age	Female	Male
20 years	4.4 kN	6.0 kN
30 years	3.8 kN	5.0 kN
40 years	3.2 kN	4.1 kN
50 years	2.5 kN	3.2 kN
≥ 60 years	1.8 kN	2.3 kN

A.3.2.2 Risk assessment

A.3.2.2.1 General remark — Risk levels and comments regarding the tasks 1 to 3

Education, training and follow-up checks are unequivocally necessary to enable an adequate application of “biomechanically optimized manual patient handling techniques” and a proper use of small and/or technical aids. Otherwise, optimized handling cannot be guaranteed, and the induced biomechanical overload risk is presumed being too high in most cases of manual patient handling actions (risk level RED).

1) ----- TASK ONE a+b -----

a) **“transfers upwards in bed”** is interpreted as “moving the patient towards the bed's head”;

NC: The risk class is RED, the work is assumed unacceptable for females under the given circumstances.

The minimal demand to receive a YELLOW risk is, in case of the caregiver acting at the bed's long side, a fully cooperating patient instead of a non-cooperating. In case of a carer acting at bed's head, a partial cooperation of the patient is demanded to enable a YELLOW risk. Hence, for non-cooperating patients, the conditions for a YELLOW risk are not fulfilled.

PC: The risk class is YELLOW if an optimized technique without or with small aids is applied (sliding sheet or mat which are, however, actually not present on the ward and should then be allocated to the caregivers) and the handling action is performed from the bed's head.

Interpreting measurements' results in an extrapolating manner, the risk class can potentially be changed to GREEN if two or more caregivers act simultaneously in well-timed co-ordination and adequate small aids are applied (actually not present on the ward).

b) **“turning”** is interpreted as “moving a patient in the bed sideward”;

NC: The risk class is RED, the work is assumed unacceptable for females under the given circumstances.

The minimal demand to receive a YELLOW or a GREEN risk is a partial cooperation.

PC: The risk class is YELLOW if an optimized technique without small aids is applied.

The risk class can be changed to GREEN if an optimized technique with usage of small aids would be applied (sliding sheet or mat which are, however, actually not present on the ward and should then be allocated to the caregivers).

2) ----- TASK TWO -----

“bed-wheelchair transfer” and **“wheelchair-toilet transfer”** are interpreted both as “placing a patient from sitting at bed's edge in a chair or vice versa”.

NC: Totally non-cooperating patients are not intended to be transferred in this case.

PC: The risk class is YELLOW if an optimized technique without or with small aids is applied (a sliding board is available on the ward; if supportive equipment is used, it should be applied adequately, i.e. users should be trained in its use).

Even if an adequate small aid is applied (the available sliding board) and even if only patients of limited weight are transferred (up to approx. 70 kg), the risk can nevertheless not be changed to GREEN as PC patients support the action insufficiently, in comparison to fully cooperating patients. However, the risk class can potentially be changed to GREEN if technical lifting aids would be used: e.g. stand-assists which are, however, actually not present on the ward and should then be allocated to the caregivers.

3) ----- TASK THREE -----

“bed-stretcher lifting” is interpreted as “transferring a patient from bed to bed”;

Whoever this task will perform (i.e. a caregiver on the ward or a radiology technician in radiology) is subject to a lumbar overload risk which is therefore to be evaluated.

NC: Although not explicitly analysed in corresponding laboratory studies, the risk class is evaluated RED, the work is assumed unacceptable for females under the given circumstances.

The minimal demand to receive a YELLOW risk is a partial cooperation of the patient and usage of small aids, i.e. a rolling board which is actually not present on the ward and should then be allocated to the caregivers.

PC: The risk class is RED, even if an optimized technique is applied, as an appropriate small aid (i.e. a rolling board) is not available on the ward and can therefore not be applied.

The risk class can be changed to YELLOW if an optimized technique with usage of small aids is applied (i.e. a rolling board which is, however, actually not present on the ward and should then be allocated to the caregivers).

The risk class can potentially be changed to GREEN if two or more caregivers act simultaneously in well-timed co-ordination and adequate small aids would be applied, or if technical lifting aids are used (e.g. total-body lifter, actually not present on the ward).

A.3.2.2.2 Overall assessment and hints for work design

The tasks to be performed on the ward as described in the scenario (see A.3.1, tasks 1 to 3) are evaluated with regard to potential biomechanical overload of the spinal structures of female caregivers by applying the Dortmund Approach:

- For moving NCs, the risk class is RED for all manual handling activities assumed in the scenario.
- For PCs, a YELLOW risk class can be attained if, at minimum, a biomechanically optimized handling technique is applied. In specified tasks, an adequate small aid must be applied supplementary to enable a YELLOW risk.

- c) A GREEN risk class may be achieved for specified tasks, but only for partially cooperating patients, if two or more caregivers act simultaneously in well-timed co-ordination and apply adequate small aids, and/or if technical aids are used properly.
- d) Allocation of adequate small aids (e.g. sliding sheets or mats and a rolling board in addition to the sliding board) is unequivocally necessary; for performing some extremely high-loading tasks, usage of technical aids (e.g. total-body lifter, ceiling lifter) is recommended.

A.3.3 Risk evaluation, applied to the scenario, based on MAPO index application

A.3.3.1 Introduction

MAPO methodology is aimed at providing a parametric index representing the risk level of the unit considered, hence it is not addressed to analysing the single movement but to the whole of the determinants negatively or positively contributing to defining the risk level for unit operators.

Focus is on work organizational issues (number of operators, distribution over working shifts, handling and education to specific risk) which thus become of major importance.

For the sake of simplicity, the patients to be fully lifted during handling are defined as “non-cooperating” (NC) while all the other patients needing help during handling (lifting or moving) are defined as partially cooperating (PC). The patients who do not need any help in handling are defined as fully cooperating patients.

The data collection form is configured to acquire information for MAPO index calculation and description of characteristics needed to formulate an intervention/improvement appropriate for the specific situation.

Completing the form requires an interview, generally lasting 30–40 min, with the head nurse or anyhow someone having worked for a long time in the unit considered.

This stage is followed by an inspection addressed to collect further information on equipment and environment where patients are handled: hence just a tape measure is necessary. This stage generally needs 30 min. The inspection is also a check of the information gathered in the interview.

The MAPO index is calculated considering in an integrated manner the organizational issues, type of patients, type of handling, use of equipment (if available), education of operators to specific risk and handling environment.

A.3.3.2 Risk assessment

DATA COLLECTION SHEET — RISK ASSESSMENT FOR MANUAL PATIENT HANDLING IN WARDS WITH MAPO METHODOLOGY

HOSPITAL : __Example__ WARD : __MEDICINE UNIT__ ward code : ____

No beds: __25__ AVERAGE NUMBER OF HOSPITALIZATION DAYS: ____10__ date ____/____/____

1. INTERVIEW

NURSING STAFF ENGAGED IN PATIENT TRANSFERRING: please mark the total number of operators by job.			
Nursing staff: 6	Nurses aides: 10	other: //	
of these how many operators with limitations/prescriptions to MPH: 0			
No OPERATORS ENGAGED IN MPH OVER 3 SHIFTS: please mark the number of operators present in each shift.			
	morning	afternoon	
Shift schedule: (00:00 to 00:00)	from __7.00__ to __14.00__	from __14.00__ to __21.00__	from __21.00__ to __7.00__
No of operators over the whole shift	4	3	2
(A) Total of operators present over the whole shift =			9
No of PART-TIME OPERATORS : please mark the exact timetables worked and calculate them as unit fractions (in relation to the overall duration of the specific shift).			
No of present part-time operators	Presence timetable in shift: (00:00 to 00:00)	Unit fraction	(unit fraction by No of present operators)
	from ____ to ____		
	from ____ to ____		
(B) Total of operators (as unit fractions) present by shift duration =			
TOTAL N° OF OPERATORS ENGAGED IN MPH IN THE 24 HOURS (Op): please sum the total number of operators present over the whole shift duration (A) to the total number of part time operators (B)			9 Op

Is the work carried out by two nurses? If yes, please indicate the number of couples by shift:

1st morning __2__ 2nd afternoon __1__ 3rd night __1__

TYPE OF PATIENTS:

By totally Non-cooperating patients (**NC**) we mean the patient who is to be fully lifted in transfer operations. By Partially Cooperating patient (**PC**) we mean the patient who is only partially lifted.

DISABLED PATIENT (**D**) __20__ (please indicate their number as a daily average)

Non-cooperating patients (**NC**) No. __12__ Partially Cooperating patients (**PC**) No. __8__

DISABLED PATIENTS	No. NC	No. PC.
Elder with several diseases	12	8
Hemiplegic		
Surgical		
Severe ictus/stroke		
Dementia		
Other neurologic diseases		
Fractured		
Bariatric patients		
Other		
Total	12	8

OPERATORS' EDUCATION AND TRAINING					
EDUCATION AND TRAINING			INFORMATION		
Attended theoretical-practical course	☐ YES	☒ NO	Only trained to equipment use	☐ YES	☒ NO
If yes, how many months ago? How many hours per operator?	months ____	hours ____	Provided only information material on MPH	☐ YES	☒ NO
If so, how many operators attended?			If so, to how many operators?	0	
Attendance is documented, EFFECTIVENESS CHECK?			☐ YES	☐ NO	

PATIENT HANDLING TASKS CURRENTLY CARRIED OUT IN SINGLE SHIFTS:

MANUAL HANDLING: please describe the usually tasks involving total or partial patient lifting	Total lifting (TL) WITHOUT EQUIPMENT			Partial Lifting (PL) WITHOUT EQUIPMENT		
	morning	afternoon	night	morning	afternoon	night
	A	B	C	D	E	F
Please indicate in each shift the amount of tasks involving manual patient handling						
X lifting towards pillow	X X □□	X □□□	X □□□	X X □□	X □□□	X □□□
X rotations in bed (for decubitus change)				X X □□	X □□□	X □□□
X bed/wheelchair and vice-versa	□□	□□	□□	X X	X X	□□
☐ lifting from seated to upright position				□□	□□	□□
☐ bed/stretcher and vice-versa	□ □	□ □	□□	□□	□□	□□
X wheelchair/toilet and vice-versa	□□	□□	□□	X X	X X	□□
☐ other	□□	□□	□□	□□	□□	□□
☐ other	□□	□□	□□	□□	□□	□□
TOTAL: please calculate the total of each column	2	1	1	8	6	2
Sum of total (STL) or partial (SPL) lifting manual tasks	A+B+C = STL		4	D+E+F=SPL		16

AIDED HANDLING: please describe the usually tasks involving total or partial lift of patients aided by available equipment	Total lifting (TL)			Partial Lifting (PL)		
	AIDED			AIDED		
Please indicate in each shift the amount of tasks involving patient AIDED handling	morning	afternoon	night	morning	afternoon	night
	G	H	I	L	M	N
☐ lifting towards pillow	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
☐ rotations in bed (for decubitus change)				□□□□□	□□□□□	□□□□□
☐ bed/wheelchair and vice versa	□□	□□	□□	□□	□□	□□
☐ lifting from seated to upright position				□□	□□	□□
X bed/stretchers and vice versa	X X	□□	□□	X X	□□	□□
☐ wheelchair/toilet and vice versa	□□	□□	□□	□□	□□	□□
☐ other	□□	□□	□□	□□	□□	□□
☐ other	□□	□□	□□	□□	□□	□□
TOTAL: please calculate the total of each column	2			2		
AIDED handling total (ATL) or partial (APL) lifting	G+H+I = ATL		2	L+M+N=APL		2
% OF AIDED TOTAL LIFTING OPERATIONS (% ATL)	ATL (STL + ATL)		2/6=33 %			
% OF AIDED PARTIAL LIFTING OPERATIONS (% APL)				APL (SPL + APL)		2/18=11 %

NOTE There is a sliding BOARD and an adjustable height stretcher always used when necessary

ON SITE INSPECTION: EQUIPMENT FOR DISABLED PATIENT LIFTING/TRANSFER

DESCRIPTION OF EQUIPMENT	No.	Lack of essential requirements		Lack of adaptability to patients		Lack of adaptability to environment		Lack of maintenance	
LIFTING EQUIPMENT type :		YES	NO	YES	NO	YES	NO	YES	NO
LIFTING EQUIPMENT type :		YES	NO	YES	NO	YES	NO	YES	NO
LIFTING EQUIPMENT type :		YES	NO	YES	NO	YES	NO	YES	NO
Adjustable STRETCHER type : mechanical	1	YES	X NO	YES	X NO	YES	X NO	YES	X NO
Adjustable STRETCHER type :		YES	NO	YES	NO	YES	NO	YES	NO

OTHER AIDS (MINOR AIDS):

Sliding sheets No.____ or Sliding boards No. 1	ERGONOMIC BELTS No.____	POWERED STANDING ASSIST LIFT No.____	ROLLERS No.____
---	----------------------------	---	--------------------

WHEELCHAIRS:

TYPE OF WHEELCHAIR

FEATURES AND INADEQUACY SCORE OF WHEELCHAIRS	Score	A	B	C	D	E	F	G	Total no. of wheelchairs
		No 3	No 2	No 1	No	No	No	No	
Poor maintenance									_6_
Malfunctioning brakes	1		X	X					
Not extractable armrest	1			X					
Not extractable footrest									Total wheelchair score
Cumbersome backrest	1			X					
Width exceeding 70 cm	1	cm	cm	cm 80 X	cm	cm	cm	cm	
Column score (No. wheelchairs × sum of scores)		0	2	4					6

Mean score (**MSWh**) = Total wheelchair score/No Wheelchairs

|_1,0_| **MSWh**

STRUCTURAL FEATURES OF ENVIRONMENT BATHROOMS (centralized or individual in rooms):

TYPE OF BATHROOMS WITH SHOWER/BATH

FEATURES AND INADEQUACY SCORE OF BATHROOMS WITH SHOWER/BATH centr = centralized in ward indiv. = in room	Score	A	B	C	D	E	Total no. bathrooms
		centr X indiv.	centr X indiv.	centr X indiv.	X centr indiv.	centr indiv.	
		No. 2	No. 1	No. 10	No. 1	No.	
Free space inadequate for use of aids	2	X					_14_
Door opening inwards (not outwards)		X	X				
No shower							
No fixed bath		X	X	X			Total score bathrooms:
Door width less than 85 cm	1	X		X			
Non-removable obstacles	1	X					
Column score (No. bathrooms × sum of scores)		8	0	10	0		18

Mean score bathrooms (**M.S.B.**) = total score bathrooms/total N. bathrooms :

|_1,28_| **MSB**