



Comparison between five risk assessment methods of patient handling



A. Villarroya ^{a, *}, P. Arezes ^b, S. Díaz-Freijo ^c, F. Fraga ^c

^a *Lucus Augusti Hospital, Servizo Galego de Saúde, Rúa Dr. Ulises Romero, nº 1, 27004, Lugo, Spain*

^b *Research Centers for Industrial and Technology Management and Algoritmi, School of Engineering, University of Minho, 4800-058, Guimarães, Portugal*

^c *Department of Applied Physics, Faculty of Science, University of Santiago de Compostela, Lugo, Spain*

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ABSTRACT

Several methods currently exist to assess risks resulting from manual handling of patients, based on various perspectives and analyzing different working conditions in the health-care sector. For that reason, a comparison of the main tools properties is discussed in the current study, establishing their strengths and weaknesses in order to provide guidance for the selection of a potential ideal method to use. The comparison is done based on ten items selected from MAPO, DINO, PTAI, Care Thermometer and Dortmund Approach methods, by qualifying each one with different scores, according to a pre-determined criterion. For this purpose, a previous fieldwork was performed in various hospital wards and operating rooms of a public health service hospital, comparing the results of partial and total scores. It was observed that, although the five methods compared are similar in nature, the methodology of each them is different and, therefore, the results obtained are unequal. On one hand, it was found that MAPO, PTAI and Care Thermometer methods provide a more balanced approach on the different variables that, in a preventive level, influence the patient handling. On the other hand, it was evidenced that DINO and Dortmund Approach methods focus almost exclusively on the technical work of the caregiver and on the detailed postural analysis that determines the lumbar load, respectively. As a conclusion, we believe that it is necessary to advance with the improvement of these tools, and in this sense we propose the basic lines of a method that integrates those factors that were top rated.

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1. Introduction

Preventing musculoskeletal disorders resulting from patient handling requires accurate assessment tools to properly identify risks. Initially, some general methods of assessment, such as REBA (Hignett and McAtamney, 2000) could be used to detect risk factors or to evaluate certain transferring patient's techniques, but nowadays specific instruments are available. Although there are already numerous methods that assess such risks, which are included in related literature with several descriptive studies and validations (Battevi et al., 2006; Jager et al., 2010; Johnsson et al., 2004; Karhula et al., 2009; Steer and Knibbe, 2008), all of them have advantages and disadvantages that make them more or less appropriate in a

preventive level to treat a specific aspect of patient care. On the contrary, just a few studies are available in the current scientific literature comparing various risk assessment methods of patient handling, which are mostly focused in pointing out their similarities and differences (Tamminen-Peter et al., 2009). For this reason, the aim of this work is to compare, in the most objective way possible, the features of five assessment tools, and to determine their strengths and weaknesses in order to provide guidance for the method to be used.

2. Assessment methods selected

To perform the mentioned comparison, five of the most prominent specific methods of risk assessment of patient handling referenced in the international literature were selected, namely MAPO, DINO, PTAI, Care Thermometer and Dortmund Approach, all of which are also included in the "ISO/TR 12296:2012 Ergonomics standard. Manual handling of people in the healthcare sector". The reason underlying the selection of these five methods has been the

* Corresponding author.

E-mail addresses: alberto.villarroya.lopez@sergas.es (A. Villarroya), parezes@dps.uminho.pt (P. Arezes), santifreijo@mundo-r.com (S. Díaz-Freijo), fraga@usc.es (F. Fraga).

different range of aspects valued by each of them, which allows to cover a wide range of study variables. These include the work organization (MAPO), the mobilization and transfer of the patient technique (DINO), the physical load caused by transferring patients (PTAI), the care given to residents (Care Thermometer) or the lumbar load supported by caregivers (Dortmund Approach), among other factors. Each of these tools has therefore specific and complementary features that make them valuable to analyze and significant of its inclusion in our study. Below is a brief summary of the characteristics of each method and the way each one values the exposure risk.

2.1. Brief description of the assessment methods

2.1.1. MAPO

The MAPO method (*Movimentazione and Assistenza di Pazienti Ospedalizzati*) assess the risk of transferring patients in different work areas, such as hospitals, nursing homes or hospice services (Battevi et al., 2006). The methodology quantifies the risk level in a unit or service, taking into account organizational aspects that determine the frequency of patient mobilization performed by unit operators. Also, MAPO method assesses the risk of biomechanical overload in the lower back during patient handling.

This method is widely applied from Italy to Spain, where it was recommended by the INSHT (*Instituto Nacional de Seguridad e Higiene en el Trabajo*). The method was validated in hospital and residences for both acute and long-term patients. Nevertheless, the method isn't applicable in accident and emergency, operating theatres and physiotherapy (Battevi et al., 2011).

2.1.1.1. Exposure assessment. With the final MAPO index obtained three possible levels of exposure are defined: negligible (green), medium (yellow) or high (red). From the collected ratings, green corresponds a value between 0 and 1.5, where the risk is negligible, which means that the prevalence of back pain is identical to that of the general population (3.5%). Yellow relates to a range of values between 1.51 and 5, where the back pain can have an incidence 2.5 times higher than green level. Finally, the red level corresponds to a value greater than 5, where the back pain may have an incidence 5.6 times higher (Menoni et al., 1999).

2.1.2. DINO

The DINO method (*Direct Nurse Observation instrument for assessment of work technique during patient transfers*) is a direct observation instrument that assesses whether the work technique of the caregivers performing patients' handling is safe or not (Johnsson et al., 2004). DINO can be used by a person with knowledge in transfer methods and ergonomics, although specific initial training is needed to learn the items, definitions and the scoring system.

The method observes 16 items, divided into three phases of the patient: Preparation phase, Performance phase and Results phase. The method is applicable in wards, in patients' homes, in a classroom setting or in other places where transfers occur. Therefore, it has a wide range of applications, for example to evaluate work technique during patient transfers before and after training, or to register what items nurses do not perform in a safe way in the three phases mentioned.

2.1.2.1. Exposure assessment. For each transfer observed, from the point of view of work safety, the method gives a score. A 1 is granted if the task is safe, and a 0 is given for tasks that are carried out in an unsafe manner and that could derive into a musculoskeletal type risk factor.

2.1.3. PTAI

The PTAI (*Patient Transfer Assessment Instrument*) method is a tool for assessing the load of patient transfers in the unit assessed. Also, the method assesses ergonomic working postures and the workers skills during patient transfer. The method combines the requirements of Finnish occupational safety legislation, ergonomic work postures and patient transfer skills, and has a wide scope of the load caused by patient transfers. The usability and repeatability of the form for evaluating the load of patient transfers has been tested in four surgical wards in the Central Health Finland Care District (Karhula et al., 2009).

The evaluation method has 15 factors observed. The first nine are filled by the assessor observing the work of carers, and the last six are completed based on worker interviews. For its part, the questions of the interview describe the opinion of carers about the overall load of patient transfers. Caregivers answer "Yes" or "No" depending on what situation occurs more often.

2.1.3.1. Exposure assessment. The physical load index is calculated based both on the results of the observations and interview, and expresses the relation between the items that are "In order" and the items that are "Partially in order." The index lower than of 60% stands in the red zone, the index between 60 and 80% corresponds to the yellow zone and the rate over 80% is placed in the green zone.

2.1.4. Care Thermometer

Care Thermometer is an instrument to assess the exposure of physical overload while care is provided to residents (Steer and Knibbe, 2008), and is an evolution of the TiiThermometer tool (Knibbe and Friele, 1999). The tool can be used on an international level, as it is shown by a validation study (Knibbe and Knibbe, 2012) that took place in UK, USA, Germany and Netherlands.

Care Thermometer focuses on the evaluation of exposure to physical loads and on the overbearing of suffering musculoskeletal disorders. Such loads may be dynamic, such as lifting or transferring dependent residents, or static, such as adopting an forward-leaning posture over a patient for an extended period of time, or during a resident hygiene. The mobility level of residents is directly correlated to the physical load on caregivers, and therefore with the level of exposure. To monitor the physical load care, Care Thermometer uses the "Mobility Gallery" (Knibbe and Waaijer, 2008), a classification system of five levels of mobility –from A to E– ranging between totally independent and totally dependent residents.

2.1.4.1. Exposure assessment. The three risk levels are correlated by red, yellow and green bar colors, explained as follows:

- red risk level: Transfer or activity is "unacceptable" for the caregiver. In that case, a high risk of physical overload is revealed during transfer activity when comparing equipment provision to resident mobility.
- yellow risk level: Transfer or activity is "unsafe" for the caregiver. The assessment reveals a medium risk of physical overload during the transfer or activity when comparing equipment provision to resident mobility.
- green risk level: Transfer or activity is "safe" for the caregiver. It shows a low risk of physical overload during transfer or activity when comparing equipment provision to resident mobility.

At the end, the method provides a percentage of each risk level, when pointing to the thermometer at the corresponding risk segment, under the heading "Care Temperature" of each unit evaluated. This thermometer reflects the total physical care load, summarizing the risk levels of all activities evaluated.

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