Unravelling the relationship between patient handling performance and safety climate: a mesoergonomic analysis

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Abstract. In this paper we describe our use of the Karsh et al. (2014) mesoergonomics framework in order to provide a clearer understanding of the relationship between patient safety climate and patient handling within a neurological rehabilitation setting. Six acute medical wards in a large UK teaching hospital took part. Data were collected using the TROPHI (Tool for Risk Outstanding in Patient Handling Interventions) and SCS (Safety Climate Survey). The results highlighted strengths and weakness in safety climate and patient handling performance. Correlations were achieved between TROPHI Safety Climate scores and SCS Overall Mean. The results suggest that the differences between scores across a variety of measures indicate that a wider range of data may be required to best represent the measure of safety climate in this occupational setting.

Keywords. Patient handling; Safety climate; Mesoergonomics; Macroergonomics

1. Introduction

The last few years have seen an explosion of interest in applying theories and concepts drawn from Human Factors and Ergonomics (HFE) to healthcare and patient safety. These studies span a range of work covering all of the traditional components of HFE including organisational, cognitive and physical ergonomics. In addition, a number of macroergonomic systems models have been developed in order to provide further insights into the relationship between work organisation, technology, work tasks and environmental and organisational variables (e.g., Holden et al., 2013). More recently, Karsh et al. (2014) and Ko and Bindman (in press) have argued the need for studies which examine micro- and macroergonomics across a number of systems levels, that is, work which seeks to measures variables at individual-team or team–organisational levels and examine their inter-relationship. In this paper, we describe a case study which aimed to satisfy this need. In particular, we sought to examine in greater depth the relationship between patient handling practices (a traditional focus of inquiry within occupational ergonomics) and measures of patient safety climate (normally seen as a macroergonomics concern).

1.1 Patient safety climate (PSC)

Patient safety climate (PSC) is sometimes defined as "the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization's health and safety management" (Nieva and Sorra, 2003). The first safety climate tools designed specifically for use in healthcare began to appear around 2004. Many of these tools are in the form of survey instruments or questionnaires, the two most well-known being the Hospital Survey on Patient Safety Culture (HSPSC) developed by the US Agency for Healthcare Research and Quality (AHRQ) and the Safety Attitudes Questionnaire (SAQ – Sexton et al., 2006).

Typically PSC instruments are made up of a number of dimensions with specific questions covering, for example: staff perceptions of safety; management and leader support for safety; staffing levels; and attitudes towards mistakes and error.

1.2 Patient handling performance

Safe patient handling (PH), as defined in ISO/TR 12296:2012, as "any activity requiring force to push, pull, lift, lower, transfer or in some way move or support a person or body part...". The outcomes from ineffective PH interventions range from discomfort, pain, emotional distress, musculoskeletal injuries, pressure sores, and, death (Alexander, 2011). The measurement of the performance of these complex interventions has been approached using various methods. The Tool for Risk Outstanding in Patient Handling Interventions (TROPHI, Fray and Hignett, 2013) was developed in order to measure outcomes and comparing performance across interventions. In its present form TROPHI consists of a set of organisational behaviour measures (safety culture); measures of safe or quality behaviour (incidents, accidents); and measures of effects on individuals (health, absenteeism).

1.3 Study objectives

The study involved two main objectives:

5. To compare a set of measures assessing the systems controlling patient handling performance with a similar set of measures assessing patient safety climate;
6. To interpret the findings of this comparison using a framework for structuring micro-macro ergonomics investigations (Karsh et al., 2014 – figure 1).

2. Methods of study

2.1 Setting and participants

Six Stroke Units (A-F) took part in the study. All areas were considered to have a high level of varied PH activity, use of equipment, documentation and techniques which would require staff to assess the patients' manual handling requirements. The units were spread over a city-wide geographical location and on five different sites. The study sample was qualified and unqualified nursing staff in each unit.

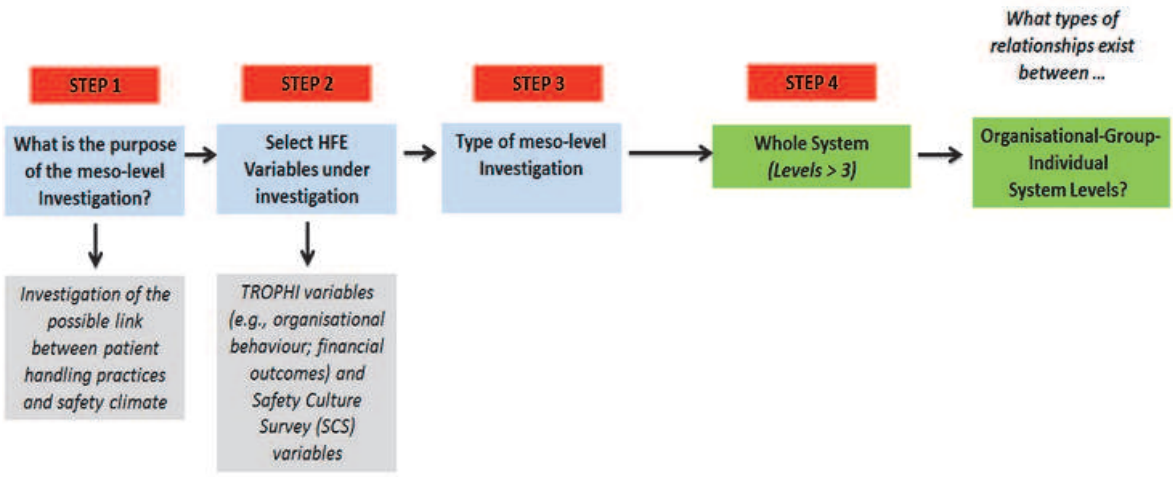


Figure 1: Applying a mesoergonomic framework (Karsh et al., 2014) to patient handling and safety climate

1.2. Measures

TROPHI consists of four types of data collection activities covering the four types of measures: organisational review (interviews, workload assessments); patient handling safety climate (surveys); patient transfers (observations); and, ward-level measure (surveys of MSD occurrence, staff well-being). The data is used to create an overall TROPHI score and a series of 12 performance scores covering, safety climate, musculoskeletal health prevalence, competence and compliance, musculoskeletal absence numbers, quality of care, PH accident numbers, psychological well-being, patient condition, patient perception, exposure to musculoskeletal risks, patient injuries and financial effectiveness. We used a version of the Safety Climate Survey to measure PSC. The SCS contains 19 questions to measure respondents' attitudes about various aspects of patient safety (covering aspects of the management of safety, leadership and staff perceptions of safety).

1.3. Data collection

Staff questionnaires were allocated to all, excluding those on maternity leave or long term sickness leave. Observations of the patient handling tasks were completed using a convenience sample of the tasks completed during the survey. Data for TROPHI and SCS were recorded in all areas and the process and results were compared.

2. Findings

3.1 Response rates

A total of 97 responses covering both the TROPHI and SCS measures were received. This represented a response rate of 67% across the six data collection sites.

3.2. SCS Scores

The scores for the SCS are indicated in Table 1. Overall Mean (OM) and Safety Climate Mean (SCM) are 0-5 scales and the Total Safety Climate Score (SCS) and % reporting positive safety culture (%+ve) are 0-100%.

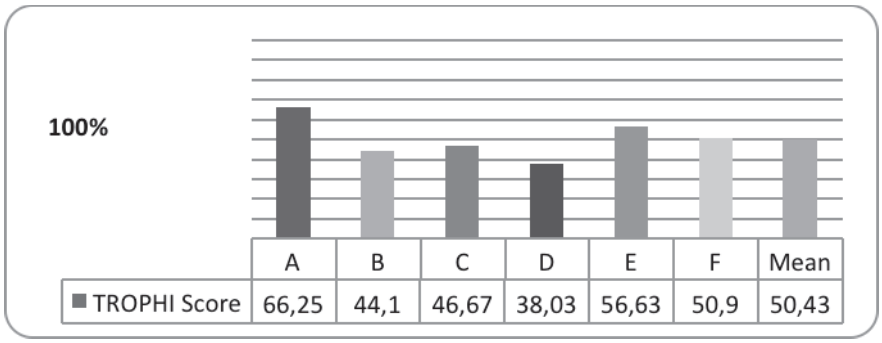
Site	A	B	C	D	E	F	Mean
OM	3.84	3.81	4.11	3.06	3.65	4.08	3.76
SCM	3.94	3.99	4.32	2.62	3.66	3.82	3.73
SCS	73.4	74.7	82.9	40.4	66.7	70.5	68.1
%+ve	43.7	63.6	87.5	0	25	50	45.0

Table 1: Safety Climate Survey (SCS) scores

3.3 TROPHI scores

The overall TROPHI scores and the 12 section scores were calculated for the 6 wards. The total scores for the TROPHI tool are shown in Table 2.

Table 2: TROPHI scores



3.4 Comparing SCS and TROPHI

Spearman's Rank Order Correlation was used to evaluate the level of association between the two sets of scores (table 3). The TROPHI measures of Safety Climate and Patient Condition showed significant correlation ($p<0.05$) with the SCS overall mean (OM). Safety Climate, MS Health Measures, Psychological Well-being and Patient Condition showed strong positive correlation across all measures of the SCS data but were not significant. The authors of the SCS tool suggest that relationships with % Totals SCS and the % positive scores are more important. Though the sample was small number of wards (6), the relationships between the different safety climate and performance scores collected showed good agreement in several areas.

*Table 3 Spearman's Correlation coefficients ($p<0.1$ *, $p<0.05$**, $p<0.025$***)*

	OM	**SCM**	**SCS score**	**% +ve**
TROPHI Total	0.314	0.086	0.086	-0.029
1 Safety Climate	*0.886***	0.429	0.429	0.543
2 MS Health Measure	0.486	0.600	0.600	*0.657**
3 Competence/Compliance	0.029	-0.086	-0.086	-0.143
5 Quality of Care	-0.029	-0.206	-0.206	-0.059
7 Psychological well-being	*0.696**	0.522	0.522	*0.667**
8 Patient Condition	*0.829***	0.486	0.486	0.453
9 Patient Perception	0.058	-0.464	-0.464	-0.464

3. Discussion

We recognise that this was only a relatively small study, (6 locations, 97 participants) and that our conclusions can only be preliminary. Despite these limitations, the correlation between the TROPHI measure of safety climate and the SCS overall climate mean provides some confidence that the two tools are measuring similar constructs. The other correlations between the tools are in many respects more interesting, particularly with regard to the framework for mesoergonomics (figure 1). The positive correlations between the tools (MSD health measures, psychological well-being, and patient condition) , suggest that a positive patient handling climate may be associated with lower levels of MSD's and staff with higher levels of job satisfaction. The role of these and other constructs (e.g., patient condition) need to be further investigated.

Likewise the negative correlations between the tools (competence and compliance, quality of care and patient perceptions), suggest that we need to probe deeper into alternative links between TROPHI and workplace and workforce characteristics (figure 2). In many respects, this was the main reason for using the mesoergonomic framework, namely to suggest alternative mechanisms (e.g., mediators, moderators) governing the relationship between the TROPHI and SCS tools. In our future work, we hope to delve deeper into these and use a mixed methods approach (e.g., interviews, observations and surveys) in order to' unpick' these mechanisms.

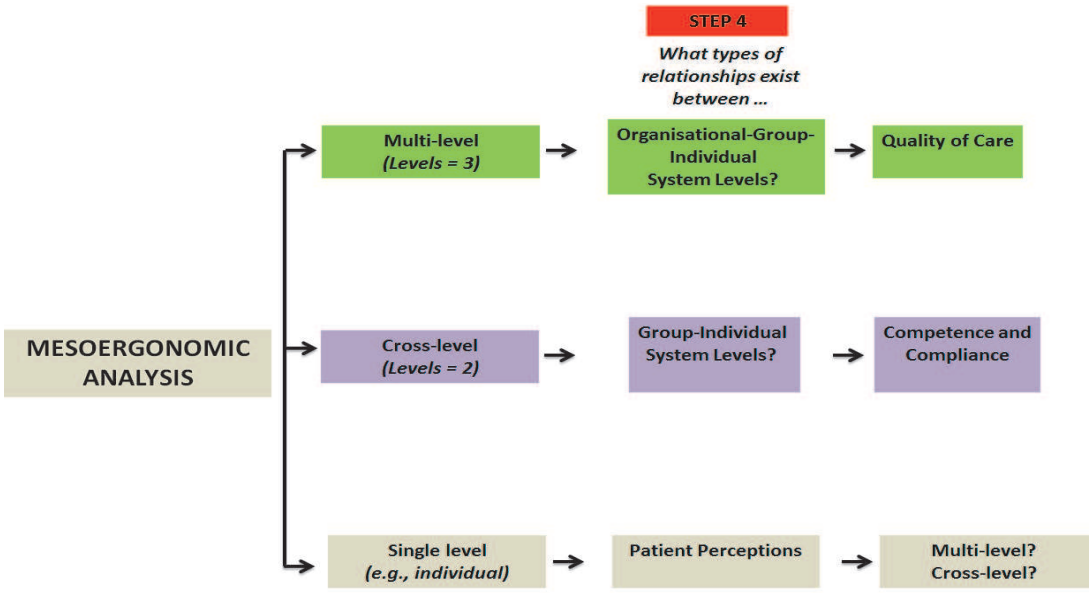


Figure 2: Applying the mesoergonomic framework to the study findings

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