

# It's not about the hoist: A narrative literature review of manual handling in healthcare

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## Abstract

The manual handling of people and objects is integral to the provision of nursing care to patients globally. Despite over 30 years of research intended to guide improvements for nurses' safety, substantial rates of manual handling injuries persist internationally within the nursing profession. This paper reviews the contemporary international literature regarding manual handling interventions noting the unique context for injury prevention strategies within healthcare. The review includes the recognition of underlying assumptions inherent in the conceptualisation of manual handling and its management, and the preponderance of the post-positivist paradigm in this field.

The complexity of manual handling in healthcare has resulted in a theoretical shift from single factor interventions based on technique training towards an emerging multidimensional approach. However the key elements for sustainable solutions to reduce nurses' manual handling injuries have not yet been identified and consensus is lacking regarding the implementation and appropriate evaluation of injury prevention programmes. Furthermore, whilst the literature is replete with data derived from surveys or insurance industry records of compensation claims, there is a dearth of literature exploring nurses' manual handling experiences. The in-depth investigation of nurses' perspectives on manual handling may uncover new knowledge critical to improvement of the manual handling issues.

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**Keywords**

injury prevention, interventions, manual handling, manual handling injuries, moving and handling, nurses

**Introduction**

Despite more than 30 years of international research, substantial rates of manual handling injuries persist within the nursing profession (Nelson et al., 2006). The injuries sustained by nurses may have long lasting physical, psychological and social consequences, and previous attempts to enhance nurses' manual handling safety have had limited success. The context for nurses' manual handling experiences has not been comprehensively explored in traditional intervention strategies and this may account, in part, for their limited efficacy (Baptiste et al., 2006; Denis et al., 2008, Hignett and Fray, 2010; Holman, 2006).

Strategies to assist with 'manual materials handling', the manual handling of goods, first emerged in a variety of industrial settings outside of healthcare. Administrators and occupational health professionals anticipated that the direct application of the generic principles gleaned from industry would be sufficient to manage manual handling activities within healthcare settings (Denis et al., 2008). However, this assumption has not been supported in the light of the persistence of disproportionately high rates of manual handling injuries internationally amongst nurses in comparison with other occupations (Australian Safety and Compensation Council (ASCC), 2009).

The purpose of this paper was to comprehensively review the literature on both the contemporary practices of manual handling and the injury prevention interventions adopted for use within healthcare settings. This is a narrative review incorporating international research as the manual handling issues are pertinent to an international audience.

***Unique features of the healthcare environment***

Normative data for moving and handling objects, such as the threshold recommendations issued by the National Institute of Occupational Safety and Health (NIOSH) are used to inform many manual handling initiatives, yet the data were generated from controlled laboratory experiments. While this may be of little consequence for the manual handling of inanimate objects, it is hardly relevant to the animate, unpredictable and potentially uncooperative nature of human loads encountered during the manual handling of patients (Hignett, 2001). The potentially transient nature of a patient's mobility and cognitive status is illustrative of the complex manual handling scenarios faced by nurses.

Healthcare involves many and varied manual handling tasks that are integral to patient care and unique to the industry (Retsas and Pinikahana, 2000). For example, when assisting a patient, nurses may be required to perform potentially hazardous actions such as twisting-turning, lowering, pushing-pulling, prolonged standing, heavy or frequent lifting or bending (Holman, 2006; Larese and Fiorito, 1994). Therefore, manual handling is not limited to lifting and the use of hoists to perform this task. However, manual handling and associated injury prevention strategies have predominantly focussed on the utilisation of hoists for lifting and moving patients until recently. Moreover, potentially hazardous manual handling is not confined to lifting tasks alone, but can arise consequential to numerous activities related to patient care needs. This was demonstrated clearly in the study by Retsas and Pinikahana (2000) whereby a variety of manual handling activities

were identified by survey respondents; those that directly involved patient handling and those related to other non-direct care activities, such as moving equipment.

Manual handling complexity within healthcare has been exemplified by various studies, including research undertaken in acute care domains. Waters and colleagues (Waters et al., 2011b; Waters et al., 2011d; Waters et al., 2011e) examined high risk tasks present in critical care environments. These studies illustrated the diverse nature of manual handling risk exposure in clinical settings, by detailing the numerous actions inherent in the nursing of patients who are undergoing surgery (Waters et al., 2011a). For example, the positioning and transferring of patients demands consideration of the patient's cognitive status, which may be impaired by drug effects, in conjunction with the maintenance of medical devices and attachments during manoeuvres (Waters et al., 2007).

Arguably, the unique nature of 'people-handling' activities, as opposed to materials handling, demands closer examination of context-specific issues and more discretely tailored injury prevention strategies (Denis et al., 2008). Many strategies appropriate for the safe handling of inanimate loads are unsuitable for people-handling tasks. For instance, a common technique to reduce manual handling risk is to physically divide the load into smaller parts: however this is impossible when moving and handling patients. Other strategies, such as the utilisation of mechanical devices are also more problematic for patient handling contexts (Moody et al., 1996; Smallwood, 2006; Swain et al., 2003).

The complexity of manual handling in healthcare is also illustrated by misunderstandings that have emerged relating to manual handling and associated injury prevention strategies. Nelson et al. (2003) identified and addressed several common misconceptions relating to manual handling. For example, education programmes and the provision of assistive devices have been viewed as sufficient stand-alone actions to reduce manual handling risks, despite evidence to the contrary. In their paper, Nelson et al. highlighted the need for appropriate infrastructure to support manual handling safety initiatives and the critical appraisal of evidence-based interventions.

## **Conceptualising manual handling**

### *Defining manual handling*

In Australia, the National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work defines manual tasks as the performance of physical actions utilising the musculoskeletal system (ASCC, 2007). Similarly, the Code of Practice for Manual Handling in Victoria notes a similar range of actions relating to the application of force to lift, lower, push, pull, move, carry, hold or restrain in defining manual handling activities (WorkSafe Victoria, 2000). The European Union's Manual Handling Directive, issued in 1990 (Hignett et al., 2007), and the United Kingdom (UK) National 1992 Manual Handling Operations Regulations (Health and Safety Executive (HSE), 1992) present similar explanations of manual handling. Definition and guidance relating to manual handling is less formalised in the United States (USA), and primarily directed by the American Nurses' Association's 'Handle With Care' campaign (Iakovou, 2008).

### *Manual handling injuries*

Musculoskeletal disorder (MSD) is the term applied to a variety of injuries and conditions arising from manual handling activities (ASCC, 2007; WorkSafe Victoria, 2000).

MSDs include sprains, strains or injury to muscles, tendons, ligaments, nerves, bones, joints, intervertebral discs, abdominal hernias and other soft tissue or vascular disorders. The aetiology of injury development varies from sudden onset after a single, identifiable event to the accumulation of multiple minor traumas over a prolonged time frame (Waters et al., 2011b; Waters et al., 2011c; WorkSafe Victoria, 2000). It is important to note that the term MSD can refer to reports of pain or discomfort as well as formally diagnosed injuries. Back injuries have been recognised as the most common type of manual handling injury sustained by nurses, although MSDs can occur at other sites. The early manual handling literature was frequently confined to the investigation of low back pain in nurses and high prevalence rates were identified in the 1980s (Buckle, 1987; Owen, 1989; Stubbs et al., 1986). This continued focus on back injuries was also demonstrated by the 2011 Cochrane Collaboration Review (Verbeek et al., 2011) that examined the efficacy of training in the prevention of back pain associated with materials handling tasks. Pain is generally viewed as a precursor to more substantial injuries and the investigation of injuries at other bodily locations, such as the shoulders and upper body, has commenced in recent years (Edlich et al., 2005; Engkvist, 2008; Hignett et al., 2003). Reflective of an expanded understanding of manual handling injuries in recent years, the scope of injury prevention programmes is no longer confined to lifting activities or back injuries and includes a multiplicity of tasks and a range of potential injury sites (ASCC, 2007, Hignett et al., 2007, Iakovou, 2008).

### *Formal recognition of injuries*

A common measure of manual handling injury statistics is the number of claims for compensation received (Bird, 2009; Charney et al., 2006; Collins et al., 2004; Martin et al., 2009). However, compensation claim approvals are only a subset of manual handling injuries as claim numbers are consequential to both reporting and approval processes (Menzel, 2008). As such, compensation claim statistics do not recognise all manual handling injuries which have been incurred and thus underestimate injury prevalence (Retsas and Pinikahana, 2000). This is particularly significant in the healthcare environment where underreporting of injuries and incidents is believed to be much higher than in other industries, but remains difficult to quantify (Collins and Menzel, 2006; Menzel, 2008). The recognition of potential underreporting is important to consider when reviewing the manual handling literature. Interventions designed to prevent injuries are tailored towards prevention of identified injuries such as those reported, and therefore do not necessarily address issues associated with injuries that are unreported and potentially unacknowledged.

### *Biomechanical model of manual handling*

Manual handling activities undertaken by nurses can lead to substantial injuries and the biomechanical model has been used to explain the development of these injuries (Waters et al., 2011b). The biomechanical model offers an explanation of how manual handling activities impact upon human physiology in that the musculoskeletal system generates substantial forces in response to manual handling task demands. Similarly, non-lifting actions may result in injury to nurses when a significant biomechanical load is present. In summary, the biomechanical model suggests that manual activities expose human beings to high forces generated internally in order to perform the required task.

### **Biomechanical model and injuries**

The biomechanical model postulates that MSDs occur as a consequence of excessive forces on body components or in the presence of repetitive actions preventing sufficient recovery time between events (Waters et al., 2011b). An early publication by Waters et al. (1993) emphasised the presumptive nature of causal links between manual handling and lower back injuries. Although plausible, the relationship between manual handling and injuries is theoretical and difficult to confirm empirically. A similar point was clearly reiterated in the systematic literature reviews by van der Molen et al. (2005) and Martimo et al. (2008) whereby the limits of scientific knowledge were noted in relation to manual handling injuries and interventions. The limited understanding of the nature of forces experienced during manual handling tasks was illustrated by Marras et al. (1999), and later confirmed by their later publication (Marras et al., 2009). The findings by Marras and colleagues in the two aforementioned publications contradicted earlier estimates of the forces experienced by nurses during patient care episodes; such forces had previously been underestimated in earlier research and falsely believed to be below the threshold for injury development in the majority of individuals. Hence early interventions to prevent injuries had been based on inaccurate data and this may have contributed to the lack of success of some manual handling strategies.

### **Foundations for injury prevention strategies**

Injury prevention strategies aim to reduce load exposure and thereby reduce the likelihood of injury (van der Molen et al., 2005). Notably, all strategies for injury prevention assume a direct association between the manual handling of loads and the development of MSDs. As noted in the previous paragraph, an understanding of forces and loads associated with manual handling has changed with advances in scientific knowledge. Table 1 lists key studies that have investigated the biomechanical nature of manual handling in healthcare, including those related to patient handling assistive devices, and therefore have contributed to the body of knowledge regarding human physiology and biomechanical loads during manual handling actions.

### **Impact of manual handling injuries**

The consequences of a single manual handling injury may be considerable and extend beyond the individual. An injury may impact the injured nurse's personal and professional context as well as current or future healthcare employers (Freshwater and Cahill, 2010). At a minimum, an injured nurse may experience physical trauma, pain and possibly distress. Furthermore, psychological and/or mental health consequences of injury and disablement, whether temporary or permanent, may also result from work-related MSDs (Langford, 1997).

A manual handling injury may lead to a reduction in quality of life and cause financial disadvantage, particularly if the injury endures beyond an acute episode (Retsas and Pinikahana, 2000). At an organisational level, the financial burden of manual handling injuries includes productivity limitations and direct costs associated with replacement of staff and lost time. Vocational choices and employment decisions may be influenced by manual handling concerns and contribute to a negative perception of nursing as an occupation (Charney and Schirmer, 2007; Palumbo et al., 2010). Of note, Owen (1989) reported that occupational manual handling injuries led to employment changes for 20%

**Table 1.** Literature pertinent to biomechanical load reduction

Author(s)	Year	Country	Topic	Type of paper
Marras et al.	2010	USA	Load exposure and low back injury	Quantitative
Marras et al.	2009	USA	Ceiling and floor based hoists – spinal forces	Quantitative
Baptiste et al.	2006	USA	Friction reducing devices – clinical use	Quantitative
Lloyd and Baptiste.	2006	USA	Evaluation of friction reducing devices for patient transfers	Quantitative
McGill and Kavcic	2006	Canada	Technique for friction reducing devices	Quantitative
Brace	2005	USA	Pushing and pulling – limits	Scholarly
Chhokar et al.	2005	Canada	Ceiling hoists – 3 year follow up	Quantitative
van der Molen et al.	2005	Netherlands	Physical work demands – intervention type; implementation process	Systematic literature review
Wright et al.	2005	USA	Slings for lifting hoists	Scholarly
Trinkoff et al.	2003	USA	Hoists and MSD	Quantitative
Spiegel et al.	2002	Canada	Ceiling hoists – 1 year follow up	Quantitative
Marras et al.	1999	USA	Dynamic force measurements	Quantitative

MSD: musculoskeletal disorder.

of the nurses in their study and an additional 12% of participants expressed an intention to leave their current position.

## Literature search strategy

The discussion thus far has provided the contextual background for manual handling in addition to an overview of the key terms in the manual handling field. The literature pertaining to manual handling will be presented in the forthcoming sections, following the delineation of the search strategy used to identify suitable papers for inclusion.

The manual handling literature reviewed in this paper was primarily obtained by searching electronic databases using keywords and combination keywords as outlined in Table 2. Further searching was performed by the manual inspection of reference lists from retrieved papers, and was confined to papers available in the English language.

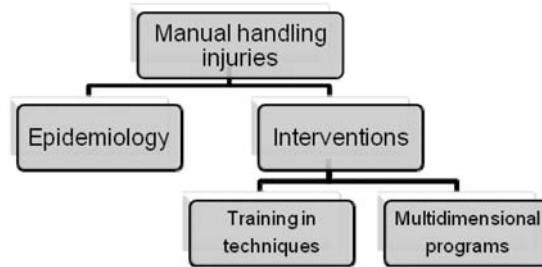
The extensive search performed for this narrative manual handling review highlighted the emphasis on injuries within the literature. The manual handling literature predominantly comprises two main subsets of articles on injuries: epidemiology studies and evaluations of injury prevention programmes (see Figure 1). The majority of interventions reported were case studies that utilised cross-sectional or pre- and post- designs and lacked control groups.

## Manual handling injury epidemiology

Early reviews of manual handling injury rates provided estimates of lifetime low back injuries in nursing ranging from 35–80% (Buckle, 1987). Subsequent research reported

**Table 2.** Databases and results

Databases searched	Time period	Keywords	Results
CINAHL	1999–2011	manual handling OR moving and lifting	87
Academic Search Complete		patients AND nurs*	66
Health Source – Nursing/ Academic Edition			43
MEDLINE			139
CINAHL	1999–2011	manual handling OR moving and lifting	8
Academic Search Complete		patients AND nurs* AND attitud*	2
Health Source – Nursing/ Academic Edition			1
MEDLINE			21
CINAHL	1999–2011	manual handling OR moving and lifting	1
Academic Search Complete		patients AND nurs* AND belief*	1
Health Source – Nursing/ Academic Edition			1
MEDLINE			1
CINAHL	1999–2011	manual handling OR moving and lifting	11
Academic Search Complete		patients AND nurs* AND	5
Health Source – Nursing/ Academic Edition		experienc*	3
MEDLINE			17
Journals@Ovid	1999–2011	manual handling OR moving and lifting	109
		patients AND nurs*	
Journals@Ovid	1999–2011	manual handling OR moving and lifting	4
		patients AND nurs* AND attitude*	
Journals@Ovid	1999–2011	manual handling OR moving and lifting	2
		patients AND nurs* AND belief*	
Journals@Ovid	1999–2011	manual handling OR moving and lifting	10
		patients AND nurs* AND	
		experienc*	
ProQuest science journals	1999–2011	Manual handling AND nurs* AND	108
		musculo*	
ProQuest science journals	1999–2011	Manual handling AND nurs* AND	25
		musculo* AND attitude*	
ProQuest science journals	1999–2011	Manual handling AND nurs* AND	1
		musculo* AND belief	
ProQuest science journals	1999–2011	Manual handling AND nurs* AND	89
		musculo*AND experience*	
Index to Theses	1999–2011	Nurs* AND manual handling	3
ProQuest Dissertations and Theses			0
Australian Digital Theses			5
Index to Theses	1999–2011	Nurs* AND back pain	10
ProQuest Dissertations and Theses			0



**Figure 1.** Representation of themes in the manual handling literature

similar injury rates across Europe, Scandinavia, Canada, America and the United Kingdom (Hignett, 1996; Hignett et al., 2007; Nelson et al., 2006; Owen et al., 2002; Smedley et al., 2003; Stenger et al., 2007). An Australian paper published in 2008 predicted a lifetime injury rate of 95.5% based on their cohort of 111 first year graduate nurses (Mitchell et al., 2008). Furthermore, self-reported student nurse injury rates suggested a point prevalence of 26% in a UK cohort (Kneafsey and Haigh, 2007), and a 31% seven-day prevalence in an Australian study (Mitchell et al., 2008). Notwithstanding differing injury measurement categories and the methodological limitations of the above studies, the findings within these international studies revealed the importance of ongoing health issues for nurses. Table 3 lists studies that incorporated or had MSD prevalence rates as a central feature.

## Manual handling interventions

### *Technique training*

The persistently high prevalence of MSDs amongst nurses (Kneafsey and Haigh, 2007, ASCC, 2008) has challenged the utility of traditional injury prevention methods within the healthcare industry. Scholars report that the training of nurses in specific lifting techniques has not adequately prevented manual handling injuries (Hignett et al., 2003; Nelson, 2006; Nelson et al., 2003). On occasion, training may appear to improve manual handling practices temporarily (Engkvist, 2006), however the impact is short-lived in most instances (Bird, 2009; Hignett et al., 2003).

Although training and education are low order risk control strategies, they have been widely adopted in the healthcare industry (Nelson and Baptiste, 2006). The conventional method of injury prevention by way of technique training, aspires to modify nurses' physical and behavioural characteristics in order to assist nurses to meet the task demands inherent in their occupation (Allen et al., 2002; Baptiste et al., 2006; Ilmarinen, 2009).

Technique training is typified by a reliance on traditional knowledge and a focus on strength, technique and compliance by individuals (Hignett and Crumpton, 2007; Nelson and Baptiste, 2006; Nelson et al., 2008). Whilst many scholars include the use of hoists and other assistive equipment in their recommendations, their papers may reinforce an assumed centrality of specific techniques to effectively combat injury risk. The development of tools to assess technique performance may likewise infer credibility for technique training. Consequently, attention to the physical environment and contextual factors may be overlooked by attention to individual performance (Hignett and Fray, 2010). Finally, training content, quality of delivery and suitability have rarely been scrutinised



**Table 3.** Literature representative of prevalence studies

Author(s)	Year	Country	Topic	Type of paper
Yeung and Yuan	2011	Hong Kong	Low back pain – aged care assistants	Quantitative
ASCC	2009	Aust	MSD prevalence – across industries	Quantitative
Mitchell	2009	Aust	Personal factors for MSD – students	Quantitative
ASCC	2008	Aust	MSD prevalence in nurses	Quantitative
Mitchell	2008	Aust	MSD – students and first year graduates	Quantitative
Kneafsey and Haigh	2007	UK	Student experiences and injury prevalence	Quantitative
Trinkoff et al.	2006	USA	Physical demands and MSD rates	Quantitative
Engkvist	2004	Aust	Back injury factors- accident process	Quantitative
Smith and Leggat	2004	Aust	MSD prevalence in student nurses	Quantitative
Smedley et al.	2003	UK	Neck and shoulder injury – risk factors	Quantitative
Trinkoff et al.	2003	USA	Prevalence with aids or training	Quantitative
Engkvist et al.	2001	Sweden	Work conditions of nurses	Quantitative
Retsas and Pinikahana	2000	Aust	Scope of nursing demands and prevalence	Quantitative
Burton et al.	1997	Belgium and Netherlands	Prevalence of MSD – workload, psychosocial measures	Quantitative
Langford	1997	Aust	Prevalence of nurses' injuries and nurses' experiences	Quantitative
Hignett	1996	UK	Review of studies – epidemiology; interventions; physiological; techniques	Scholarly
Love	1996	UK	Causative factors for lifting injuries	Quantitative
Larese and Fiorito	1994	Italy	Prevalence of MSDs – work organisation influences	Quantitative
Owen	1989	USA	Prevalence rates	Quantitative
Buckle	1987	UK	International prevalence rates	Quantitative

Aust: Australia; MSD: musculoskeletal disorder.

(Kneafsey and Haigh, 2007; Mitchell et al., 2008) and inconsistency across programmes may be a confounding variable in evaluation studies (Denis et al., 2008). Intervention evaluations that included training or techniques as a key component, are listed in Table 4 below. The research reviewed in this table highlights the continued focus on training programmes despite limitations for this style of intervention as will be further discussed in the next section.

### *Multidimensional approach to injury prevention*

The systematic literature reviews itemised in Table 5 have repeatedly demonstrated the inadequacy of training programmes for injury prevention, particularly when adopted as the primary or sole intervention (Dawson et al., 2007; Hignett, 2003; Hignett et al., 2003; Martimo et al., 2008; Verbeek et al., 2011). The papers by Clemes et al. (2010), Dawson et al. (2007), Martimo et al. (2008) and Verbeek et al. (2011), all reviewed high quality quantitative studies and concluded that training and advice had no impact on occupational back pain or back injury. These four systematic reviews suggested that more extensive interventions, those

**Table 4.** Literature relevant to training or manual handling techniques

Author(s)	Year	Country	Topic	Type of paper
Hughes et al.	2011	USA	Prolonged standing in ORs	Scholarly
Spera et al.	2011	USA	Tissue retraction during surgery	Scholarly
Waters et al.	2011	USA	Transferring patients in OR	Scholarly
Waters et al.	2011	USA	Repositioning patients in OR	Scholarly
Waters et al.	2011	USA	Limb holding during surgery	Scholarly
Waters et al.	2011	USA	Carrying OR equipment and supplies	Scholarly
Waters et al.	2011	USA	Moving wheeled OR equipment	Scholarly
Hignett and Lu	2010	USA	Space to perform tasks	Scholarly
Waters et al.	2007	USA	Techniques for intensive care settings	Scholarly
Johnsson et al.	2006	Sweden	Measuring student nurse techniques after training	Quantitative
Johnsson et al.	2004	Sweden	Tool to measure nurses' technique for patient transfers	Quantitative
Massy-Westropp and Rose	2004	Aust	Manutention programme – training focus	Quantitative
Warming et al.	2004	Denmark	Combined tool to measure transfer technique	Quantitative
Kjellberg et al.	2003	Sweden	Assessing nurses' techniques	Quantitative
Trinkoff et al.	2003	USA	Hoists, transfer sheets, postural training	Quantitative
Allen et al.	2002	UK	Equipment and 'good' technique	Quantitative
Bewick and Gardner	2000	Aust	Training program evaluation	Quantitative
Kjellberg et al.	2000	Sweden	Assessing individual performance of techniques (see also Johnson et al., 2004)	Quantitative
Kilgariff and Best	1999	Aust	Comparison of training programmes	Quantitative
Langerström et al.	1998	Sweden	Evaluation of training programme	Mixed method
Best	1997	Aust	Manutention training - evaluation	Quantitative

Aust: Australia; OR: operating room.

of a multidimensional nature, may be more effective for reducing MSD prevalence. Hignett (2003) and Hignett et al. (2003) included quantitative and qualitative studies in their review of 63 and 225 papers respectively and also directed attention to multidimensional injury prevention strategies. Multidimensional interventions have several aspects which are combined together into one programme, rather than the introduction of a single factor solution to manual handling difficulties. The reviews in Table 5 suggest that a combination of elements appears to be more successful in reducing manual handling injuries than the provision of a single component programme.

### *Ergonomics and injury prevention*

Multidimensional programmes commonly include the use of ergonomics to address manual handling issues. Table 6 cites international literature that incorporated ergonomic approaches to injury prevention.

**Table 5.** Systematic reviews relevant to multidimensional interventions

Authors	Year	Number of Articles	Time period	Topic
Verbeek et al.	2011	9 RCT + 9 cohort	To Feb 2011	Cochrane review -Manual handling training and assist devices
Clemes et al.	2010	53	1980–2009	Manual handling training – healthcare and other industries
Koppelaar et al.	2009	19	Jan 1988 –Jul 2007	Barriers and facilitators to patient handling interventions
Martimo et al.	2008	6 RCT and 5 cohort	To Nov 2005	Training and equipment for back pain prevention – nurses and others
Dawson et al.	2007	8 RCT + 8 non RCT	To Nov 2004	Back injury prevention for nurses
Hignett	2003	63 includes qualitative	1960–2001	Prevention of MSDs from patient handling
Hignett et al.	2003	225	1960–2001	Patient handling tasks, equipment and interventions

RCT: randomised controlled trial; MSD: musculoskeletal disorder.

**Table 6.** Literature depicting ergonomic based interventions

Author(s)	Year	Country	Topic	Type of paper
Lim et al.	2011	Canada	Ergonomic programme and reinjury events	Quantitative
Bird	2009	Aust	Retrospective case study	Quantitative
Martin et al.	2009	Aust	Retrospective longitudinal study VNBIPP	Quantitative
Denis et al.	2008	International	Critical review of prevention programmes – 1980 to 2003	Scholarly review
Nelson et al.	2008	USA	Safe handling and patient outcomes	Quantitative
Knibbe et al.	2007	Netherlands	Ergonomic training programme	Quantitative
Stenger et al.	2007	USA	Evaluation – ergonomic programme - equipment, policy	Quantitative
Badii et al.	2006	Canada	Programme evaluation- 1 year post: ergonomic and early return to work	Quantitative
Charney et al.	2006	USA	Evaluation of No-lift programme - equipment	Quantitative
Engkvist	2006	Aust	No-lift programme evaluation	Quantitative
Collins et al.	2004	USA	Ergonomic programme – equipment, policy	Quantitative
Nelson et al.	2003	USA	Myths about nurses' back injuries	Scholarly
Passfield et al.	2003	Aust	Retrospective case study	Quantitative

(continued)

**Table 6.** Continued

Author(s)	Year	Country	Topic	Type of paper
Trinkoff et al.	2003	USA	Hoists, transfer sheets, postural training	Quantitative
Owen et al.	2002	USA	Programme evaluation – 5 years post	Quantitative
Hignett	2001	UK	Ergonomics and hospital culture	Quantitative
Owen	2000	USA	Ergonomics - transfers in OR	Quantitative
Garg and Owen	1992	USA	Ergonomic intervention and forces	Quantitative

Aust: Australia; VNBIPP: Victorian nurses' back injury prevention project.

The critical review by Denis et al. (2008) warrants examination as this paper promotes the importance of context in relation to manual handling initiatives due to the complex nature of manual handling activities. The authors argue that the classical ergonomic approach of generic problem-solving has become the dominant model for MSD intervention. However, they contend that this informal consensus amongst occupational health professionals has emerged without a detailed understanding of the processes critical to the implementation of chosen interventions. Denis et al. (2008) provided a novel classification of ergonomic intervention types which incorporated contextual factors in each of the key steps for development of intervention strategies, in an attempt to organise the wide variation encountered in the structure and application of ergonomic interventions.

### *Safety climate and safety culture*

Haslam (2002) presented a slightly different emphasis on context relevance and posited that ergonomics frequently includes persuading people to accept practice changes and that such acceptance is moulded by each individual's knowledge, beliefs and attitudinal disposition. He asserted that improved outcomes are possible when beliefs and attitudes are recognised, assessed and formally incorporated into ergonomic-based interventions for manual handling issues. (Table 7 outlines papers related to manual handling issues and safety culture.) Haslam (2002) suggested that the generalised concept of safety culture, which incorporates the notions of beliefs, attitudes and behaviours, has applicability to the field of manual handling also. Further, he noted in accordance with other scholars, that behavioural modification programmes such as training have limited success when used in isolation.

In an examination of safety climate and culture in work environments, Flin (2007) reviewed factors that might be transferable to healthcare contexts. In this paper, the author noted differences in the safety expectations within healthcare when compared to other industries. High reliability organisations (HRO) within high risk industries, such as the petrochemical or aviation industries, successfully maintain high levels of safety. These HROs commonly accept human error as an inevitable feature of task performance, and safety systems are designed to accommodate this understanding. Flin (2007) argued that healthcare safety systems are based on a framework expectant of error-free human performance as evidenced by a reliance on behaviour modification, in contrast to the presence of multiple systemic safeguards within HROs. Flin et al. (2000) linked organisational culture with successful modification of work practices, and noted the influence of attitudes and perceptions inherent in shaping culture, and hence practice.

**Table 7.** Literature relating to safety culture

Author(s)	Year	Country	Topic	Type of paper
Haney and Wright	2007	USA	Sustaining ergonomic programmes in ICU	Scholarly
Flin	2007	UK	Safety climate review	Scholarly
Hignett et al.	2005	USA	Participatory ergonomic programmes	Scholarly
Straker et al.	2004	Aust	Assessing ergonomic intervention efficacy	Quantitative
Haslam	2002	UK	Ergonomics and health promotion strategies – stage of change model	Scholarly
Hignett	2001	UK	Ergonomics and hospital culture	Quantitative
Flin et al.	2000	UK	Safety culture	Scholarly
Kneafsey	2000	UK	Occupational socialisation and handling	Scholarly
Westgaard and Winkel	1997	Norway	Review of ergonomic interventions	Scholarly

Aust: Australia; ICU: intensive care unit.

In particular, workers' perceptions of management commitment to safety was posited as a key influence on organisational culture. This may partially explain the heterogeneous findings regarding injury prevention programmes. Interventions that are predominantly tailored to individual compliance with institutional policies may be less robust than systemic strategies to maintain safe working environments.

### *Injury prevention strategies - summary*

Training nurses in specific lifting techniques to prevent injury has not heralded success and the uptake of multidimensional manual handling interventions is being encouraged. However the key elements for sustainable solutions to reduce nurses' manual handling injuries have not yet been identified. Consensus is yet to be reached regarding critical features for manual handling intervention programmes in healthcare and the appropriate measures for evaluation of these programmes (Department of Human Services (DHS), 2004; Dawson et al., 2007; Engkvist, 2006; Hignett and Fray, 2010; Hignett et al., 2003). The unsubstantiated nature of training-based interventions can leave nurses vulnerable to serious manual handling injuries. If injuries persist following the implementation of an injury prevention programme, policy compliance rather than intervention efficacy may be held to account for the unanticipated outcome (Kay and Glass, 2011; Cornish and Jones, 2010; Kneafsey and Haigh, 2007). That is, when manual handling injuries occur, instead of prompting a critical examination of intervention effectiveness, the focus moves to an emphasis on compliance with policy. If this perspective is adopted, then the fault is seen to be located within the worker rather than the intervention.

### **Manual handling from the nurses' perspectives**

A small number of studies have examined the manual handling beliefs, attitudes or experiences of nurses within quantitative methodology. These studies are listed in Table 8 and include three studies related to student nurse populations exclusively, and three papers that examined attitudes and perceptions regarding manual handling assistive devices.

**Table 8.** Sample of quantitative literature regarding nurses' manual handling experiences, belief and attitudes

Author(s)	Year	Country	Topic	Type of paper
Holman et al.	2010	USA	Nurses' perceptions of organisational factors influencing patient handling	Quantitative
Cornish and Jones	2007	UK	Students' experiences	Mixed method
Engkvist	2007	Aust	Attitudes to No-Lift intervention and equipment	Quantitative
Kneafsey and Haigh	2007	UK	Students' experiences	Quantitative
Wardell	2007	USA	Perceptions about use of equipment	Quantitative
Smallwood	2006	UK	Students' beliefs; workplace culture	Mixed method
Geiger-Brown et al.	2004	USA	Nurses' MSDs and perceptions of work environment	Quantitative
Swain et al.	2003	UK	Students' manual handling practices	Quantitative
Trinkoff et al.	2003	USA	Nurses' perceptions of physical demands of nursing and MSD reporting	Quantitative
Owen	2000	USA	Equipment use and attitudes	Quantitative
Langford	1997	Aust	Survey of nurses' experiences of occupational injuries	Quantitative

Aust: Australia; MSD: musculoskeletal disorder.

**Table 9.** Qualitative literature regarding nurses' manual handling experiences, belief and attitudes

Author(s)	Year	Country	Topic	Type of paper
de Ruiter and Liaschenko	2011	USA	Influences on nurses' assessments of patient handling needs	Qualitative
Gropelli and Corle	2011	USA	Nurses' and therapists' experiences of MSDs	Qualitative
Cornish and Jones	2010	UK	Students' experiences and perceptions	Qualitative
de Ruiter	2008	USA	Institutional ethnography to understand patient handling practices	Qualitative
Holman	2006	USA	Influences on lifting performance	Qualitative
Smallwood	2006	UK	Students' beliefs; workplace culture	Mixed method
Green	2002	UK	Students' reflections	Qualitative
Green	1996	UK	Practices of nurses – observation and experiences	Qualitative
Moody et al.	1996	UK	Attitudes to equipment use	Qualitative
Hignett and Richardson	1995	UK	Model for influences on patient handling – nurses' perceptions	Qualitative

MSD: musculoskeletal disorder.

The most recent paper by Holman et al. (2010) used postal surveys to explore nurses' perceptions of manual handling in the USA by way of quantitative analysis. Other scholars have used quantitative methodology to investigate MSDs and the physical environment in which nurses function (Geiger-Brown et al., 2004; Trinkoff et al., 2003).

Table 9 provides details of qualitative studies relating to nurses' experiences and beliefs regarding occupational manual handling. The earliest paper by Hignett and Richardson (1995) employed a qualitative approach to analyse nurses' perceptions of manual handling and ergonomic interventions. In the following year, Moody et al. (1996) interviewed nurses specifically to investigate their attitudes towards manual handling aids. The studies listed in Table 9 represent the few qualitative manual handling studies undertaken in healthcare as identified by an extensive search of the literature. These early studies demonstrate the limited use of qualitative research to explore manual handling issues and contextual influences, as both papers examine specific, limited aspects of manual handling. In attempting to uncover more in-depth data beyond the scope of aids and hoists, additional research has been undertaken by some scholars. The findings based on qualitative methodologies have the potential to expand the knowledge of manual handling in healthcare by examining context-specific issues that may not be easily uncovered by other methodologies. Nurses are intimately acquainted with the healthcare environment and research exploring their experiences and perceptions may offer new knowledge about the complexities of manual handling in healthcare settings.

## **Conclusion**

The consideration of context is important in addressing manual handling issues in healthcare because the movement and care of patients is different from the handling of inanimate objects. Industries that successfully manage high risk scenarios tend to incorporate an assumption that human error will occur, and build their systems around this. However, the healthcare industry, characterised by high risk and considerable error, frequently manages risk based on strategies that do not accommodate the likelihood of human error. Therefore, when healthcare staff sustain a manual handling injury, organisational responses to this predicament may include attributing blame to the injured party. In these instances, an assumption of poor compliance with policies dominates rather than the interrogation of the intervention's efficacy in reducing manual handling risks and thereby preventing injuries.

Systematic literature reviews have repeatedly demonstrated the inadequacy of training programmes to combat manual handling risks, particularly when adopted as the primary or sole intervention. Over the past eight years, the need for more comprehensive strategies to resolve manual handling issues in healthcare has been consistently identified.

From a review of the available literature there is a dearth of research pertaining to nurses' manual handling experiences. Staff attitudes and beliefs are important components of workplace culture and warrant consideration during intervention development and implementation. Further investigation of nurses' perspectives on manual handling may elicit critical features of manual handling issues that have previously been overlooked.

There have been only a few qualitative research studies in the field of manual handling in healthcare. The application of a qualitative approach promises to bring new opportunities for research to address this important occupational health concern. It is critical to explore new ways to extend contemporary knowledge, particularly given the ongoing and complex nature of manual handling issues in healthcare. Despite years of research and a variety of attempts to reduce the risk of manual handling injury for nurses, including technological developments such as lifting and standing hoists, the problem remains unresolved.

### Key points for policy, practice and/or research

- Manual handling is more problematic in healthcare than in other industries where only inanimate objects are manipulated, as demonstrated by the high prevalence of MSDs amongst nurses.
- Compensation claim statistics underestimate injury prevalence, due to the constraints inherent in models for, and the reporting of, manual handling injuries.
- Limitations arising from the conceptualisation of manual handling and its management may hinder the development of efficacious healthcare interventions to prevent MSDs.
- Training and education are widely adopted strategies for injury prevention in healthcare, despite systematic literature reviews identifying the need for broad-based, multidimensional interventions.
- Further exploration of nurses' perspectives may identify previously overlooked contextual features that are critical to the resolution of manual handling issues.

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