What makes a Moving and Handling People Guideline work?

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'Only the person not reading the forecast is surprised by the storm'

– Unknown

Abstract

Moving and handling of people (MHP) is a major reason for developing musculoskeletal disorders (MSD) in the healthcare sector worldwide. To reduce MSD from MHP, many national and state level guidelines targeting MHP have been developed. However, little is known about their impact on injury claims rates, how they are intended to work, if intended users are aware of and use them, which parts of the guideline are being used, and how they are implemented. Therefore, the overarching goal of this thesis was to contribute to understanding what makes a MHP guideline work. It was addressed by examining the effects of introducing the New Zealand Accident Compensation Corporation '*Moving and Handling People: The New Zealand Guidelines*' (MHPG), using a mixed-methods approach in five sequential studies. An analysis of claims data (Study 1) showed that MHP related claims rates declined before, but increased after the introduction of the MHPG. A study of the MHPG programme theory (Study 2) showed that key actors for implementation were MHP coordinators, H&S managers, and therapists. The developers argued for implementing a multifaceted MHP programme where implementation of organisational systems should create the foundation for implementing the core components. A questionnaire analysis (Study 3) showed that a high proportion of MHP coordinators, H&S managers, and therapists were aware of the MHPG, while a high proportion of therapists used it. In contrast, fewer carers were aware of and used it. A second questionnaire analysis (Study 4) showed that more key actors were familiar with and used the core components compared to the organisational systems. A low proportion of actors experienced change after use. Case studies (Study 5) showed that organisational motivation to implement a MHP programme was initiated by MHP related staff injuries. The implementation process was gradual, changing MHP practices during multiple steps, and dependent on a dedicated person to drive implementation.

This thesis shows that making a MHP guideline work requires a dedicated actor, with support from management, to facilitate implementation and organisational changes needed. However, many contextual factors affect implementation, ranging from national, e.g. legislation and policies, to individual level, e.g. individuals conducting MHP.

Preface

In your hands, or on your screen, you have the thesis 'What makes a Moving and Handling People Guideline work?'. This thesis attempts to contribute to improving our understanding of what makes a moving and handling people guideline work. This was done by examining the New Zealand Accident Compensation Corporation's '*Moving and Handling People: The New Zealand Guidelines'*. The thesis investigated what parts of the guidelines worked, for whom, under what circumstances and, most interestingly, why they worked for some but not for others. The research described in the thesis was approved by the Massey University Human Ethics Committee Southern B (SOB 15/78) and conducted between October 2015 and December 2018.

I am very grateful to the many people who have supported and helped me bring this thesis to completion.

Foremost, my humblest gratitude is directed towards the organisations allowing me to be their guest and all the people who were willing to spend their valuable time, either being interviewed, filling out the questionnaire, or participating in a workshop, hereby providing me the opportunity to acquire heaps of rich and interfluent information. None of you are mentioned by name, but without your involvement and contributions, there would have been no thesis.

I would like to thank my supervisors for their guidance in this process. Kirsten B Olsen for always having an open door, being willing to spend an enormous amount of time on conceptual discussions, and for the ability to explain New Zealand context from a Danish perspective. Stephen J Legg, for triangulation talks, providing the wider perspective, and for a shared interest in the incredible abilities of human beings. Fiona Trevelyan, for being willing to come on board in the middle of the process and for sharing your huge insight and knowledge on case studies in the healthcare sector.

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Lastly, to ESL, for being part of a journey were doing a PhD was merely a footnote…

Mark Lidegaard

Roskilde, December 20th 2018

Abbreviations

ACC	New Zealand Accident Compensation Corporation
DHB	District Health Board
FCC	The Five Core Components
FTE	Full-Time Equivalent employment
H&S	Health and Safety
MHP	Moving and Handling of People
MHPG	The New Zealand Accident Compensation Corporation '*Moving and Handling People: The New Zealand Guidelines*'
Moh	Ministry of Health
MSD	Musculoskeletal Disorders
OSC	The Organisational System Components

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List of publications and presentations

Peer-reviewed papers

1. **Lidegaard, M**, Olsen, KB, Legg, SJ, and Douwes, J. The impact of national guidelines covering moving and handling of people on injury rates and related costs. *Scandinavian Journal of Work, Environment, and Health. E-pub ahead of print. https://doi:10.5271/sjweh.3818*
2. **Lidegaard, M**, Olsen, KB, and Legg, SJ. How was a national moving and handling people guideline intended to work? The underlying programme theory. *Evaluation and Program Planning. Apr; 73:163–75. https://doi.org/10.1016/j.evalprogplan.2019.01.002*
3. **Lidegaard, M**, Olsen, KB, Legg, SJ, and Douwes, J. Awareness and use of a national moving and handling people guideline. *(Manuscript in preparation)*
4. **Lidegaard, M**, Olsen, KB, and Legg, SJ. Familiarity, use, and change after use of the components of a national moving and handling people guideline. *(Manuscript in preparation)*
5. **Lidegaard, M**, Olsen, KB, Legg, SJ, and Trevelyan, F. How are moving and handling people programmes implemented – learnings from three case studies. (*Manuscript in preparation)*

Peer-reviewed conference contributions

1. **Lidegaard, M**, Olsen, KB, and Legg, SJ. Identifying the program theory underlying a national intervention programme: the New Zealand Moving and Handling People Guidelines. International Scientific Conference on the Prevention of Work-Related Musculoskeletal Disorders (PREMUS) 2016. Abstract accepted for oral presentation, (presentation withdrawn)
2. Lahti, H, Legg, SJ, **Lidegaard, M**, and Olsen, KB. Effectiveness of National Moving and Handling People Programs. Human Factors and Ergonomics Society of Australia Conference (HFESA). May 2017. Abstract accepted for poster presentation
3. **Lidegaard, M**, Olsen, KB, and Legg, SJ. Uptake and use of national health guidelines on moving and handling of people- A questionnaire survey of a national health

guideline. International Ergonomics Association Congress (IEA), August 2018. Abstract accepted for oral presentation

4. **Lidegaard, M**, Olsen, KB, and Legg, SJ. What facilitates or hinders the implementation and impact of a national health guideline - learnings from case studies in the healthcare sector. International Ergonomics Association Congress (IEA), August 2018. Abstract accepted for oral presentation
5. Olsen, KB, **Lidegaard, M**, and Legg, SJ. Chronicle Workshops as Data Collection Method in Evaluation of National Work Environment Intervention. International Ergonomics Association Congress (IEA), August 2018. Abstract accepted for oral presentation
6. Lahti, H, Olsen, KB, **Lidegaard, M**, and Legg, SJ. Barriers and Facilitators in Implementing a Moving and Handling People Programme –An Exploratory Study. International Ergonomics Association Congress (IEA), August 2018. Abstract accepted for oral presentation
7. Olsen, KB, **Lidegaard, M**, and Legg, SJ. What makes a national moving and handling guideline work or not? Nordic Human Factors and Ergonomics Society Conference, August 2019. Abstract accepted for oral presentation.

Non-peer reviewed presentations

1. **Lidegaard, M**, Olsen, KB, and Legg, SJ. Uptake, Use & Impact of the ACC New Zealand Moving and Handling People Guidelines, 2012. Moving and Handling Association of New Zealand (MHANZ) Annual General Meeting May 2016. Oral presentation
2. **Lidegaard, M**, Olsen, KB, and Legg, SJ. How/Do national health guidelines work? A realist analysis of the New Zealand Moving and Handling People Guidelines. Human Factors and Ergonomics Society of New Zealand Conference (HFESNZ), September 2016. Oral presentation

3. **Lidegaard, M**, Olsen, KB, and Legg, SJ. Use of the ACC 'Moving and Handling People Guidelines, 2012 - Results from a national survey. Moving and Handling Association of New Zealand (MHANZ) Annual General Meeting, May 2017. Oral presentation
4. Lahti, H, Olsen, KB, **Lidegaard, M**, and Legg, SJ. Can guidance material about moving and handling of people help to reduce musculoskeletal discomfort in the health care sector? Human Factors and Ergonomics Society of New Zealand Conference (HFESNZ), September 2017. Oral presentation

Reports

1. Olsen, KB, **Lidegaard, M**, and Legg, SJ. Assessment of the uptake and impact of the ACC New Zealand Moving and Handling People Guidelines (2012). Report. Stage 2: Uptake and use, Part A: Descriptive analysis of questionnaire findings. New Zealand Accident Compensation Corporation, November 2016
2. Olsen, KB, **Lidegaard, M**, and Legg, SJ. Assessment of the uptake and impact of the ACC New Zealand Moving and Handling People Guidelines (2012). Report. Stage 2: Uptake and use, Part B: Analysis of questionnaire findings stratified by role in relation to moving and handling people and by sub-sector in health care. New Zealand Accident Compensation Corporation, January 2017
3. Olsen, KB, **Lidegaard, M**, and Legg, SJ. Assessment of the uptake and impact of the ACC New Zealand Moving and Handling People Guidelines (2012). Report. Stage 3: Injury claims. Trends in injury claims and claims cost related to moving and handling people 2005 - 2016. New Zealand Accident Compensation Corporation, June 2017
4. Olsen, KB, **Lidegaard, M**, and Legg, SJ. Assessment of the uptake and impact of the ACC New Zealand Moving and Handling People Guidelines (2012). Report. Stage 4: Case studies. Factors facilitating and hindering implementation and impact of the MHPG and MHP programme elements. New Zealand Accident Compensation Corporation, December 2017

5. Olsen, KB, **Lidegaard, M**, and Legg, SJ. Assessment of the uptake and impact of the ACC New Zealand Moving and Handling People Guidelines (2012). Final report, recommendations. New Zealand Accident Compensation Corporation, December 2017

Chapter 1. Introduction

Musculoskeletal disorders (MSD) in the working population are widespread throughout the world (van der Beek et al., 2017; Pearce et al., 2004; Punnett and Wegman, 2004; Roquelaure et al., 2006; Taylor, 2005). MSD are estimated to affect as much as 30% of the working population (Punnett and Wegman, 2004), and accounts for up to two-thirds of all registered occupational diseases (Punnett and Wegman, 2004; Roquelaure et al., 2006). The most common type of MSD is consistently reported to be back pain (Badley et al., 1994; Bernard, 1997; Choi et al., 2001; Driscoll et al., 2014; Riihimäki, 1991; Thiese et al., 2014), which is reported to frequently affect around 25-30% of the working population (Hildebrandt, 1995; Hoy et al., 2012).

The occurrence of MSD is not equally distributed. Certain occupational groups have a higher prevalence of MSD than others (Punnett and Wegman, 2004). Healthcare workers, e.g. nurses, healthcare assistants, and residential care staff, are among the occupations with the highest prevalence of MSD and back pain (Deyo et al., 1991; Hussain et al., 2012; Leighton and Reilly, 1995; Yassi and Lockhart, 2013) with around 60 % of healthcare workers reporting low back pain (Jensen et al., 2010; Lagerström et al., 1998; Nelson et al., 2008).

The majority of MSD related injuries occurring in healthcare workers are caused by moving and handling of people (MHP) (Alnaser, 2007; Coman et al., 2018; Davis and Kotowski, 2015; Engkvist, 2008; Kay et al., 2014; Koppelaar et al., 2009; Smedley et al., 1995; Tullar et al., 2010). In hospitals, 72% of MSD to healthcare workers result from MHP (Lipscomb et al., 2012). MHP related activities have especially been associated with the development of low back pain and neck/ shoulder pain (Kurowski et al., 2012; Warming et al., 2009) with a higher frequency of MHP related activities increasing the risk of low back pain (Holtermann et al., 2013).

Knowledge and guidance on how to improve MHP originate from different sources, most commonly as interventions, programmes, and guidelines. Interventions are a combination of a specific set of activities and accompanying materials developed with the intention of modifying behaviours or a specific outcome, e.g. to improve staff safety, on an individual or organisation

level. A distinguishing characteristic of an intervention is that it investigates two or more subjects allocated to a dedicated set of activities, e.g. intervention vs. control, which are followed prospectively to compare the effect of the intervention. In contrast to an intervention, a programme is often not compared to a control group. A programme consists of a homogeneous group of planned activities that aim to reach a broad, long-term objective. In order to reach the objective, specific approaches and methods are applied. As a result, a programme can include multiple and various kinds of interventions, all designed to contribute to the common objective. Guidelines contain a set of recommendations to the intended users on how to act in a given situation, often when standards do not exist. Guidelines offer comprehensive guidance on particular issues in order to optimise specific processes according to best practices. Guidelines are not legal documents, hence applying a guideline is not mandatory. As a result, the implementation of a guideline, or any components of a guideline, is open to interpretation, hence implementation depends on a deliberate choice to implement. Guidelines are often developed by governmental agencies but can be issued by any type of organisation.

A common approach used to try to reduce MSD injuries following MHP is to provide the healthcare sector with guidelines (Humrickhouse and Knibbe, 2016; Kneafsey and Haigh, 2007). This approach builds on the assumption that following the introduction of a MHP guideline, the level of MHP related injuries will decrease as the guideline will encourage and help healthcare organisations implement a MHP programme (Nelson A et al., 2006; Thomas and Thomas, 2014). Because guidelines are based on existing knowledge from evaluations of interventions they provide decision makers with the best foundation for implementing MHP programmes to prevent injuries (Gagliardi et al., 2011). The idea of presenting the healthcare sector with MHP guidelines is widely applied across the world, with multiple state or federal MHP guidelines existing in Europe, US, and Australasia (Hignett, 2003; Koppelaar et al., 2009; Verbeek et al.,

2012). Lahti (2017) have identified at least 41 national or state-level MHP guidelines or programmes worldwide (Lahti, 2017)[1].

The impact of MHP programmes and guidelines on injury claims rates

Although there are many national or state level MHP programmes or guidelines, very few have been evaluated for their impact on injury claims rates, prevalence of MSD, or MHP related claims rates. Lahti (2017) reported that only eight national or state-level MHP guidelines or programmes had been evaluated for efficacy, whilst only five had been evaluated for their impact on injury rates (Fagerström, 2013; Martin et al., 2009; Michaelis and Hermann, 2010; Nelson A et al., 2006; Powell-Cope et al., 2014; Silverstein et al., 2011, 2012). An overview of the evaluations is presented in table 1.1. Further, Kurowski et al (2017), Schoenfisch et al (2013), Dennerlein et al (2017), and Teeple et al (2017) also reported on the impact of a MHP programme on injury rates.

[1] The study by Lahti 2017 was conducted as a BSc Thesis concurrent to my PhD research. I assisted and advised in the conduct of the study and I am included as a co-author of a conference paper based on the study.

Table 1.1 *Overview of evaluations of MHP programmes and guidelines*

Evaluation	MHP programme/ guideline	Nature of the programme	Findings
Martin et al. 2009. Effect of a nurse back injury prevention intervention on the rate of injury	Victorian Nurses Back Injury Prevention Project. Australia, 1998.	**Aims**: • Minimise MHP activities in healthcare organisations • Encourage cultural change and ownership **Content**: • Implementation, monitoring and evaluating the nurses back injury prevention programs • Training in No Lifting principles and techniques • Funding for MHP aids and equipment	• Reduced claims rate for back injury during the implementation period and increased during the post-implementation period • No significant change in wrist, knee, and ankle injuries during the evaluation period
Fagerström 2013. Developing patient handling ergonomics in nursing – Multilevel controlled intervention study in elderly care	The Ergonomic Patient Handling Card® – scheme. Finland, 2009.	Aims: • Determine competencies, skills and knowledge required to perform safe MHP • Improve patient safety and quality of care Content: • E-learning in prevention of MSD • Training evidence-based MHP principles • Application of training at the workplace • Final exam	• Reduction in nurses' neck disorders one year following the intervention
Michaelis & Hermann, 2010. Evaluation of the nursing concept "Back Protective Patient Transfer"	Back Protective Patient Transfer (BPPT) in health care and nursing homes. Germany, 1995.	Aims: • Reduce MHP related mechanical strain, and increase work safety and workers health Content: • Ergonomic work principles • MHP principles and techniques • Application templates	Back injury claim rate: • Significantly lower levels of back complaints among the BPPT users • Decreased low back pain rates • Decrease in MSD related to work absence

Table 1.1, continued, *Overview of evaluations of MHP programmes and guidelines*

Evaluation	MHP programme/ guideline	Nature of the programme	Findings
Nelson et al. 2006. Development and evaluation of a multifaceted ergonomics program to prevent injuries associated with patient handling tasks **Powell-Cope et al., 2014.** Effects of a national safe patient handling program on nursing injury incidence rates	Patient Care Ergonomics Resource Guide: Safe Patient Handling and Movement. The United States of America, 2001.	Aims: • Reduce incidences from and severity of MHP work-related injuries Content: • Risk assessments of workplace and patients • Equipment selection, storage, and maintenance • Peer-Safety Leaders (Back Injury Resource Nurses) • Best practise for MHP • MHP competency training • No-Lift Policy • Monitoring tools	Nelson et al, 2006: • Decreased injury rate following the intervention Powell-Cope, 2014: • Reduction in claims rate five years following the introduction of the MHP programme
Silverstein et al, 2011 Washington State Department of Labor and Industries' SHARP Program-Implementation of Safe Patient Handling in Washington State Hospitals **Silverstein et al, 2012** Washington State Department of Labor and Industries' SHARP Program-Implementation of Safe Patient Handling in Washington State Hospitals, Final report	Washington State Legislature 2006. Washington Hospital Safe Patient Handling Law (ESHB 1672). The United States of America, 2006.	Aims: • Reduce MHP related injuries for patients and healthcare staff Content: • Hospitals were required to establish a safe MHP committee, a safe MHP program, and purchase safe MHP equipment • Hospitals with a fully implemented programme would receive a discount from workers' compensation	Silverstein et al, 2011: Back pain more frequently reported in the intervention group compared to the control group than 2007 and more in Washington Silverstein et al, 2012: • Initial reduction in injury rate during the first two years following the introduction for the intervention group. This was followed by an increase in injury rate. • Initial reduction in injury rate during the first year following the introduction for the control group. The was followed by a relatively stable period

Martin et al (2009) reported on an evaluation of the Victorian Nurses Back Injury Prevention Project (VNBIPP). The VNBIPP was established in 1998 with the aim of implementing a back injury prevention programme. It focused on minimising the MHP activities within healthcare organisations. It encouraged cultural change and ownership amongst staff in public healthcare organisations and emphasised equality in importance between staff and patient safety. It provided training in 'No Lifting' principles and techniques, as well as funding for procurement of MHP aids and equipment. The VNBIPP included an implementation framework. Organisations included in the evaluation were required to have a designated programme coordinator with adequate time and resources available, comprehensive training of staff, regular audits, as well as a process for monitoring the effectiveness of the programme.

The evaluation examined the effect of the VNBIPP on frequencies of nurses' back injury claims and corresponding claim incidence rates. It aimed to evaluate the effect of introducing a 'No Lifting' policy on nurses' back injuries, using workers' compensation claims rates. The study included 92 of the 111 participating organisation, which received funding through the VNBIPP. Standard claims data from the Victorian WorkCover Authority on back injuries, neck and shoulder injuries, and wrist, knee, and ankle injuries were included. The evaluation focused on a ten-year period that covered pre-implementation, initial implementation, and post-implementation. The analysis was based on quarters and claim rates per 1,000 full-time equivalent employment (FTE) and applied an analysis of variance (ANOVA) as well as an interrupted time series approach

The study reported a reduction in the estimated claims rate for back injuries from pre-implementation to post-implementation of 0.79 claims per 1,000 FTE. A downward, non-significant trend ($p=0.28$) was seen for the estimated claims rate for back injuries during the pre-implementation period. A significant reduction ($p=0.03$) was reported during the initial implementation, whereas a significant increase ($p=0.02$) was reported during the post-implementation period. Claims rate for neck and shoulder injuries increased significantly pre-implementation and showed no statistical change during the evaluation period. No change in

claims rate was reported for wrist, knee, and ankle injuries during the evaluation period (Martin et al., 2009).

The study has a number of limitations and critiquing points that potentially can affect their findings. The study itself identifies factor such, change in government policies and staff mobility, which affects all longitudinally studies. Further, the lack of a control group was considered a limitation. In addition, the study determined FTE inconsistently, as 40 of the participating organisations directly report their FTE through a survey, while the FTE for the remaining 52 was estimated. This introduced an uncertainty to the accuracy of the FTE, which directly influenced the claims rate.

In a PhD thesis, Fagerström (2013) evaluated a MHP intervention that included the Ergonomic Patient Handling Card® -Scheme (EPHC). The EPHC was introduced in 2009 by the Finnish Institute of Occupational Health. It aimed at determining competencies, skills, and knowledge required to perform safe MHP, as well as improving patient safety and quality of care (Tamminen-Peter and Fagerström, 2014). The EPHC is a standardised tool that consists of i) e-learning, i.e. preventing MSD when performing MHP, ii) training in MHP principles, i.e. using MHP techniques and equipment, and iii) applying the training at the workplace. These components are followed by an exam. After passing the exam, the EPHC is valid for five years, renewal requires a one-day refresher training session. The EPHC is targeted towards people conducting MHP, primarily within the healthcare sector (Tamminen-Peter and Fagerström, 2014).

The thesis evaluated how a MHP intervention that included the EPHC training component affected MSD (Fagerström, 2013). Further, it studied changes in organisational MHP policies and procedures, and the level of MSD among nurses. The thesis included twelve units from eight different healthcare organisations that were divided in an invention group consisted of 147 nurses from six units, and a control group consisted of 145 nurses from six different units. The thesis used questionnaire data collected before and after the intervention, as well as one year

following the intervention to assess the level MSD. The thesis reported a reduction in neck disorders of 72 % one year following the intervention (Fagerström, 2013).

The thesis has, from an evaluation of the EPHC and claims rates point of view, several critiquing points. First of all, the intervention in the thesis only included one of the components in the EPHC, hence it is not possible to determine the potential effect of the entire EPHC. Further, the thesis did not use central claims data, which makes it difficult to compare changes in the level of MSD reported. In relation to this, the thesis has a limited study population, thereby making it impossible to determine if this is a large-scale effect of using the EPHC component or if this is just a local phenomenon at the included units. Lastly, the thesis did not include back pain as an outcome, despite back pain were the most frequent type of MSD following MHP.

Michaelis and Hermann (2010) reported on an evaluation of the Back Protective Patient Transfer in Health Care and Nursing Homes (BPPT). The BPPT was developed in 1995 by the association of German public insurance institutions. The BPPT aimed at reducing MHP related mechanical stress, and increase work safety and workers' health. The BPPT included ergonomic work principles, MHP principles, MHP techniques, and application templates. The BPPT was implemented in the healthcare and elderly care sector by centrally trained instructors.

The evaluation examined the effect of the BPPT in reducing low back pain. It aimed to assess the application and long-term effect of implementing the BPPT, including the level of back complaints. The evaluation applied a prospective questionnaire approach and included a total of 413 nurses employed in hospitals and nursing homes. It showed that the respondents applying the BPPT had a significantly lower level of low back pain compared to respondents that did not apply it. Further, the application of all BPPT components decreased low back pain rates by up to 25 %. In addition, an additional analysis using health insurance data from one of the associate insurance institutions indicated a decrease in MSD related to work absence particularly within the early phase of implementation (Michaelis and Hermann, 2010).

The evaluation is limited due to not stratifying on a sector level, but merely treating healthcare and elderly care as equals despite the difference between these two sectors. By stratifying, the

evaluation could have identified potential difference between the sectors hereby creating a more comprehensive picture of the effect of the BPPT. Further, the use of claims data in the evaluation is insufficient. Only using information from one insurance provider does not ensure comparability across the target sectors, hereby introducing a risk of misinterpreting the effect of the BPPT.

Nelson et al (2006) and Powell-Cope et al (2014) reported on an evaluation of the Patient Care Ergonomics Resource Guide: Safe Patient Handling and Movement (PCERG). PCERG was introduced in 2001 and aimed at reducing injuries related to MHP as well as their severity. It was targeted MHP teams, staff conducting MHP, and staff influencing workplace safety, e.g. health and safety (H&S) managers. PCERG consisted of a comprehensive programme that provided guidance on and templates for multiple components, including risk assessment related to workplace and patient, equipment selection, storage, and maintenance, best practice for MHP, MHP competency training, a 'No-Lift' policy, and tools for monitoring progress and evaluating outcomes.

Nelson et al. (2006) assess the effects of implementing PCERG on injury rates using two intervention periods of nine months in 23 high-risk units across seven facilities. The intervention focused on the following components: risk assessment related to workplace and patient, peer safety leaders, MHP equipment, after action review, and 'No Lift policy' (Nelson et al., 2006). Information on injury rates was prospectively collected using injury logs administrated locally at the individual facilities. The study reported a significant decrease ($p=0.036$) in injury rate from 24.0 to 16.9 per 100 FTE following the intervention period. A limitation of this study was that it only reported injury rates for nurses. As MHP also is being performed by several other job titles in the healthcare sector, a sole focus on nurses does not provide a comprehensive overview of the potential effects of the MHP guideline.

Powell-Cope et al. (2014) evaluated the effect of PCERG on injury rates over a three-year period. The study included data from the implementation of CPERG in all 153 facilities of the US Veterans Health Administration. Information on injury rates was obtained through Veterans

Affairs administrative databases, in particular, the nursing outcomes database. The study reported a reduction in claims rate from 34.3 to 24.8 per 1,000 FTE five years following the implementation of the MHP programme (Powell-Cope et al., 2014). The study has the same critiquing points as the study by Nelson et al (2006). In short, only focusing on nurses rather than assessing the effect of the MHP guideline on all relevant job titles.

Silverstein et al (2011) and Silverstein et al (2012) reported on an evaluation of the Washington Hospital Safe Patient Handling Law (ESHB 1672) (WHSPHL). The WHSPHL was passed in Washington State in 2006 with the intended to reduce injuries related to MHP for both staff and patients. The WHSPHL, which was implemented in 95 acute care hospitals, required hospitals to establish a safe MHP committee, a MHP programme, and purchase sufficient MHP equipment (Silverstein et al., 2011). By having a fully implemented MHP programme, the hospital would receive a discount of around 16 % from workers' compensation premium risk class (Silverstein et al., 2012).

Silverstein et al (2011) reported on the impact of the WHSPHL on staff injury rates. It used a survey design providing a baseline measure of staff injury rates before the introduction of the WHSPHL and a follow-up measure three years after the introduction. In addition, the evaluation compared the changes in injury rates in Washington State with Idaho, which did not have any MHP legislation. Analysis of variance was used to compare changes between hospitals and states. The follow-up survey included 333 employees from Washington and 295 employees from Idaho. It reported that back pain was more frequently reported following the introduction of the WHSPHL ($p=0.017$), and more frequently in Washington compared to Idaho ($p=0.003$) (Silverstein et al., 2011). A limitation of the evaluation was the use of a different state as a control group. As a substantial number of contextual factors would differ between hospitals in one state compared to the other, the comparisons between hospitals in the two states are hard to interpret.

Silverstein et al (2012) reported on the impact of the WHSPHL on staff injury rates. It assessed workers' compensation claims incidence rates for hospitals. The evaluation used nursing homes as a control group, as the WHSPHL did not apply here. It reported a decrease in workers'

compensation claims rates in hospitals until 2009, whereafter the claims rate increased. After an initial decrease, the claims rate for nursing homes remains relatively stable during the period. (Silverstein et al., 2012). A point for critique it the choice of nursing homes as control group. Due to their contextual factors, hospitals are not equal to nursing homes with respect to job tasks, organisation, and services provided. Hence it is unlikely that the introduction of a MHP law will have the same effect within the different subsectors of the healthcare sector.

Kurowski et al (2017) aimed to assess the effect of a MHP programme on injury rates among nursing home staff six years following the implementation. The MHP programme was implemented in 2004 and focused on risk assessment of residents, equipment purchase and maintenance, and staff training in use of equipment. The programme was administered by a commercial risk management company. The study included injury claims data for a seven-year period and included 22,454 claims (Kurowski et al., 2017). It reported a reduction in claims rates from 93.0 to 63.3 per 1,000 employees three years following the implementation, and a further reduction to 57.4 per 1,000 employees six years following the implementation (Kurowski et al., 2017). The study has two severe weaknesses. First, it solely focuses on one part of the healthcare sector, hence the results of the study are not comparable to the entire healthcare sector. Second, the programme evaluated is not a nationwide programme. As a result, it is questionable if the programme can be applied outside the particular organisation, as the programme is specifically tailored to this exact setting.

Schoenfisch et al (2013) aimed to evaluate the effect before and after a MHP intervention in a large tertiary medical centre and a community hospital. The intervention was introduced in 2004 and consisted of a 'minimal patient lifting policy', purchase of lifting equipment, and training of MHP 'champions' (Schoenfisch et al., 2013). The study included injury claims data from seven years before the intervention and five years following. It found no change in MHP related injury claims at the medical centre following the intervention, but reported a 44% reduction in claims rate in the community hospital (Schoenfisch et al., 2013). The study has two main critiquing points. First, the intervention introduced does not include a full MHP programme, but only a

limited number of components. Therefore the study is not in a position to evaluate whether a comprehensive MHP programme would have had any effect on the claims rate. Second, like the study by Kurwoski et al (2017), this study did not evaluate a nationwide programme.

Dennerlein et al (2017) aimed to evaluate the effect of a MHP and mobilisation programme on injury rates within an academic hospital setting compared to a control hospital. The MHP programme included an organisational MHP policy, the introduction of MHP equipment, and training, which included risk assessment, for staff performing MHP. Prior to the implementation of the MHP programme both hospitals had previously invested in MHP lifting equipment. The study included data on injury rates 12 months prior to initiating the MHP programme and 12 months after finalising training (Dennerlein et al., 2017). It reported a reduction in injury rates for lifting and exertion injuries from 11.1 to 8.2 per 100 FTE, and neck and shoulder injuries from 3.0 to 2.0 per 100 FTE in the intervention hospital, however, no change was seen in the control hospital (Dennerlein et al., 2017). The study has the same critiquing points as the study by Schoenfisch et al (2013). In short, the study did not evaluate a comprehensive MHP programme, but rather a programme focusing on training and equipment. Further, the study focused on evaluating the effect of a MHP programme used within a few hospitals rather than a nationwide programme.

Teeple et al (2017) aimed to assess the effectiveness of MHP and mobilisation programmes on injury rate ratios by conducting a meta-analysis. The study includes 27 evaluations in English published no later than October 2016. It reported an overall reduction in injury rate ratio of 0.44 (95% CI 0.36, 0.54) (Teeple et al., 2017). The reduction was greater in intensive care units compared to hospitals. A critiquing point of the study was that it only includes evolutions published in peer review journals. As a result, the meta-analysis did not take findings from non-peer reviewed evaluation into account, hence potentially skewing the effect from MHP programmes. Further, the exclusion of evaluations in languages other than English also introduces the possibility of omitting relevant evaluations.

Summary

Although a great deal of effort has been put into the development and implementation of national guidance material for the prevention of MSD due to MHP, only a small number have been evaluated for their efficacy and impact on the injury rates of MSD. None present clear evidence of a positive impact on injury claims rate. Some of the evaluations have methodological shortcomings, others simply do not report any reduction. As a result, there is no current consensus regarding the impact of MHP guidelines on MHP related injury claims rates. Consequently, there is a need for an evaluation of a national MHP guideline based on claims data. Thus the first aim of this thesis is to assess the impact of a MHP guideline on the injury claims rate.

How are MHP programmes and guidelines intended to work

Evaluations of the effectiveness of guidelines have classically focused on measuring a single outcome, e.g. the reduction of injuries or cases, through an epidemiological approach and thus have primarily examined the 'cause and effect' relationship. In general, they have only used simple before-and-after measurements to evaluate their effectiveness (Richardson and Rothstein, 2008). This raw effect of a guideline is, of course, interesting but organisational interventions based on guidelines are complex and are influenced by numerous contextual factors, such as changes in legislation, the effect of other programmes on the healthcare sector, local labour market, and internal cultures and structures. This makes it difficult to relate an outcome (e.g. reduction of MHP related injury claims rates and related costs) to a single initiative (e.g. an evidence-based national guideline) (Nielsen and Randall, 2013). Thus, to find out if a guideline works and is effective, its evaluation needs to examine both process (dissemination, uptake, and implementation) and outcome (Nielsen and Randall, 2013) as well as understanding the context in which the guideline is introduced and how this context affects the uptake, use, and effect (Julnes et al., 1998; McConnell et al., 2013; Olsen et al., 2008). In order to evaluate an intervention in relation to how it was intended to work by the developers, i.e. to identify the programme theory of the intervention, it is also necessary to find out what worked and what did not work. The programme theory is the onset for a realist analysis that identifies for whom, how,

why, and in which circumstances the intervention was intended to work (Pawson, 2006; Pawson and Tilley, 1997a, 2004).

A programme theory explains how the programme developers intend a programme to work. It builds on a logical sequence of inputs, activities, and outputs that subsequently lead to short- and long-term outcomes. Programmes are implemented in specific contexts determining what (which mechanism) will influence the intended users to use the programme and whether it will lead to the intended outcome (Byng et al., 2008; Hoddinott et al., 2010; Macaulay et al., 2011). The programme theory is the underlying combination of mechanisms, which makes a programme work in specific contexts and leads to the desired outcome (Pawson, 2006). Thus, a realist analysis first aims to identify the programme theory to provide an understanding of the Context-Mechanism-Outcome (CMO) relationships within the programme (Pawson and Tilley, 1997a).

Context, in realist analysis perspective, describes the environment in which programmes are introduced (Pawson and Tilley, 2004; Wong et al., 2014). Rycroft-Malone et al (2011) found that context in relation to organisational interventions could be identified on: micro- (individual), meso- (department or team) or macro- (organisational) level (Rycroft-Malone et al., 2011). For a national intervention programme, context outside the organisation influencing whether and how it will be implemented should also be identified. The thesis calls this the supra-macro level. It includes industry and national relationships such as national legislation and other national programmes as mentioned earlier (Hasle et al., 2014, 2017). The different contextual levels should not be considered as independent of each other, but rather as interlinked.

Mechanisms are causal forces or powers that cause things to happen, that make people act. Some mechanisms work in some contexts but not in others. They are context sensitive and create outcomes, thus described as promoters of change (Pawson, 2013; Wong et al., 2014). Mechanisms consist of two elements: resources and reasoning (Dalkin et al., 2015). Resources are offered by the programme and introduced into the context in which the programme should be implemented. The resources make the actors reason with respect to the programme, which results in actions to reject or implement the programme to a varying extent (Dalkin et al., 2015).

There are three different types of mechanisms that can make the actor decide to implement a programme: incentives - forms of reward if the programme is implemented; regulation - threats of penalty if the programme is not implemented and; information provision – logic arguments persuading the actor to implement the programme because it is the right thing to do (Vedung, 1998). The mechanism attached to a guideline by itself is information provision. It gives information that should persuade the user to read and implement the content. The guideline may be attached to other programmes like legislation, which requires the guideline to be followed and then the mechanism that makes the user implement the content might be the punishment mechanism. The same could be the case if the guideline was attached to an incentive programme that rewarded the organisation for implementing the content. The arguments used in the guideline can also be seen as mechanisms that the developer thinks will make the intended user act and implement the content of the guidelines. There might be different arguments or mechanisms attached to components or groups of components of a guideline arguing for the implementation of multiple components. Thus, the arguments for implementing parts of or the whole guideline may vary in the guidelines and influence different actors in different contexts to implement the guidelines.

Outcomes are the changes that emerge, either intended or unintended, from the interaction between a mechanism and the users within a specific context (Pawson and Tilley, 2004). In other words, the outcome is the result of the resources provided and the reasoning of the users within the present context. The outcomes can be short, medium, or long term. Implementing guidelines in organisations will often involve several steps where actors introduce resources or arguments for changes at different levels in the organisation that in turn make other actors reason and make changes, thus changing the context in which the intervention is implemented. This will be influenced by many parallel interventions or change processes that may and may not be related to the intervention but may influence the outcome.

As the CMO relationships are dependent on the context in which they are present, applying the same mechanisms to another context would not necessarily result in the same outcomes

(Rycroft-Malone et al., 2010). Thus, instead of merely identifying the cause and effect of an intervention, realist analysis and programme theory attempt to provide a deeper understanding about what makes an intervention work or not (Rycroft-Malone et al., 2010).

An evaluation based on programme theory and realist analysis will afford identification of what worked and what did not, and if other aspects contributed to how it worked. This type of theory-based evaluation has been used to evaluate interventions mainly within public health (Best et al., 2012; Greenhalgh et al., 2009; Jagosh et al., 2012; McGuire, 2005) but also, more recently, in workplace H&S (Hasle et al., 2017; Legg et al., 2010; Nielsen and Hohnen, 2014; Olsen et al., 2012; Pedersen et al., 2012). Realist analysis aims to identify and explain how processes of a programme work and why it results in specific outcomes (Pedersen et al., 2012). This contrasts with other kinds of evaluations that are based only on analysing the outcome.

Whilst the programme theory has been identified for numerous public health and workplace H&S programmes, this has never been done for any MHP programme or guideline. As a result, there is a lack of fundamental understanding regarding how a MHP guideline is intended to work. Consequently, there is a need to establish the programme theory of a MHP guideline. Thus the second aim of this thesis is to understand how a MHP guideline was intended to work.

Awareness and use of MHP programmes and guidelines

In the healthcare sector, MHP guidelines are introduced alongside clinical guidelines. Both types of guidelines are introduced into the same setting. Hence they are affected by some of the same contextual factors and it can, therefore, be argued that they need to overcome similar types of organisational challenges in order to be effective. The effectiveness of clinical guidelines have been the topic of evaluations for more than 20 years (Brouwers et al., 2010; Burgers et al., 2003; Grimshaw and Russell, 1993; Lugtenberg et al., 2009; Thomson et al., 1995). However, clinical guidelines differ from MHP guidelines in at least two ways: i) they often have a homogenous target group that delivers care, i.e. medical doctors, and ii) they focus directly on the core business of the healthcare sector, i.e. quality of care and health of the patients. In contrast, MHP guidelines have a diverse target group and their content does not directly guide care of patients.

In general, they provide guidance about how to assess a patient's need for handling and how to safely handle patients (people). Here safety relates mainly to the carer handling the patient. Since MHP guidelines have a more diverse target group, it might be more difficult to reach their intended users and to persuade them to use the guidelines in an organisational setting. Thus, the factors influencing awareness and use of clinical guidelines are likely to differ from those for MHP guidelines.

Further, MHP guidelines often argue for the implementation of a multifaceted MHP programme that consists of multiple components targeting different topics, e.g. risk assessment or training. This follows the belief that multifaceted interventions are more effective when being compared to single-component interventions (Institute of Medicine (U.S.), 2011). Looking at MHP interventions, this is being supported by four systematic reviews (Bos et al., 2006; Dawson et al., 2007; Hignett, 2003; Tullar et al., 2010). These four systematic reviews collectively indicate that single-component interventions, especially when focusing solely on MHP training, seem to be less effective compared to various forms of multi-component interventions in reducing injuries following MHP (Bos et al., 2006; Dawson et al., 2007; Hignett, 2003; Tullar et al., 2010). As a result, the intended users are required to be aware of and use the individual components of the programme in order to receive the full benefit of the programme.

Several studies have examined awareness and use of clinical guidelines (Brennan et al., 2018; Cabana et al., 1999; Kotzeva et al., 2014; Kovacs et al., 2018; Rodgers, 2000; Rose et al., 2012). They have shown that lack of awareness among the intended users is often one of the reasons for lack of use, that guideline material did not always reach the intended users (Cabana et al., 1999; Joosen et al., 2015; Kastner et al., 2011), and that they were commonly unsuccessful because of poor dissemination (Thomson et al., 1995). In addition, most of the clinical guidelines in these studies relied on passive dissemination strategies (Closs and Cheater, 1997; Graham et al., 2003; Sandström et al., 2015), e.g. mass mailings, publication of written information, and untargeted presentations to heterogeneous groups (Rabin et al., 2006), which could explain, at least partially, low awareness amongst intended user groups.

Despite the great focus on awareness of clinical guidelines in the healthcare sector, no previous studies have looked at awareness of MHP guidelines, how intended users become aware, how many of the intended users read and use them, as well as which components are being used. Consequently, there is a need for assessing whether the intended users of a MHP guideline are aware of its existence and use the guidance provided as well which parts of the guideline are being used. Thus the third aim of this thesis is to assess the awareness and use of a MHP guideline among the intended users. In addition, a fourth aim of this thesis is to assess the familiarity and use and change after use of the specific components of a MHP guideline, also amongst intended users

How are MHP programmes and guidelines being implemented

For any type of guideline to be effective, it needs to be implemented into the intended context. Implementation of an evidence based national healthcare guideline can be described as providing a new resource into the context of an organisation with the intention of changing the behaviour of individuals in the organisation. The guideline thereby intends to encourage the individuals and organisations to apply the recommendations of the guideline (Closs and Cheater, 1997; Masso and McCarthy, 2009). The implementation process of a guideline is the phase where strategies are developed within the organisation in order to operationalise the recommendations of the guideline (Thorsen and Mäkelä, 1999). Implementation of most guidelines is a complex process that needs to consider the contextual factors of the industry, e.g. the healthcare sector, in which the guideline is introduced (Boaz et al., 2011). Further, to increase the implementation of a guideline, the mechanisms related to the implementation process need to be identified on a theoretical basis (Thompson et al., 2007). However, it is essential to recognise that no universal all-purpose solutions exist and that implementation of any guideline should be tailored to fit both the specific guideline and the context where the guideline is intended to be introduced (Masso et al., 2014; Richens et al., 2004).

A range of theories attempts to explain the dynamics of how evidence based guidelines are implemented through describing the factors responsible for creating the change in behaviour of

individuals and hence changing the organisational behaviour (Eccles et al., 2005). However, few of these theories have ever been proven to work in a practical healthcare setting (Gagliardi et al., 2011; Rycroft-Malone, 2007). As a result, the implementation of guidelines in the healthcare sector constitutes a challenge, among others because the implementation from a political perspective receives less attention compared to the actual development of healthcare guidelines (Richens et al., 2004). Further, guideline developers often consider organisations as being responsible for implementing a guideline as well as believing that the bare existence of a guideline automatically leads to implementation (Gagliardi et al., 2011; Richens et al., 2004).

A systematic review identifying factors either facilitating or hindering the implementation of MHP interventions found that environmental factors e.g. management support or employee participation, rather than individual factors, e.g. motivation or capability, accounted for the majority of the barriers and facilitators, with a ratio of 3:1 (Koppelaar et al., 2009). The most frequently reported environmental factors were the availability of resources, e.g. time to transfer, equipment and trained staff, and a supporting management climate, while the most frequently reported individual factor was motivation, e.g. willingness to change (Koppelaar et al., 2009). Several other studies echo and add to these findings as management support or interest (Dogherty et al., 2013; Lahti et al., 2019), availability of equipment (Dogherty et al., 2013; Engkvist, 2008; Krill et al., 2012; Olkowski and Stolfi, 2014), budget constraints (Dogherty et al., 2013; Silverstein et al., 2012), insufficient time (Dogherty et al., 2013; Kanaskie and Snyder, 2018; Krill et al., 2012), lack of staff (Dogherty et al., 2013; Engkvist, 2008; Kanaskie and Snyder, 2018; Olkowski and Stolfi, 2014; Silverstein et al., 2012), inadequate training (Kanaskie and Snyder, 2018; Olkowski and Stolfi, 2014), and workplace culture (Kanaskie and Snyder, 2018) have been identified as contextual factor facilitating or hindering the implementation of MHP interventions. However, it is important to note that no single barrier or facilitator acted alone in any of the studies and that the implementation, therefore, is dependent on several facilitating or hindering factors.

Even though a lot of knowledge exists about the contextual factors acting as barriers or facilitators related to the implementation of MHP interventions, this information is, inevitably, based on interventions. Hence it is unknown how the implementation of a comprehensive MHP guideline is being affected. Consequently, there is a need for assessing how a comprehensive MHP guideline is being implemented in a healthcare organisation. Thus a fifth aim of this thesis is to establish how a MHP programme is implemented.

Summary

Despite the existence of many national and state level guidelines targeting MSD as a result of MHP in the healthcare sector, little is known about i) how they impact on injury claims rates, ii) how they are intended to work, iii) whether intended users are aware of their existence and use them, iv) which parts of the guideline are being used and v) how they are implemented.

Aims of this Thesis

The overarching goal of this thesis is to contribute to improving our understanding of what makes a MHP guideline work. Specifically, what worked, for whom, under what circumstances, and why they may have worked for some, but not for others? The aims of this thesis are to:

i) assess the impact of a MHP guideline on injury claims rate

ii) understand how a MHP guideline was intended to work

iii) assess the awareness and use of a MHP guideline, among intended users

iv) assess the familiarity and use and change after use of the specific components of a MHP guideline, among intended users

v) establish how a MHP programme is implemented.

Specifically, the above aims were addressed by examining the New Zealand Accident Compensation Corporation (ACC) *'Moving and Handling People: The New Zealand Guidelines'* (MHPG).

The 'Moving and Handling People: The New Zealand Guidelines'

The MHPG is an example of a MHP guideline. It was introduced in 2012 (Accident Compensation Corporation, 2012). The MHPG was developed on the basis of an evaluation (Thomas et al., 2009b) of ACC's previous guideline (Accident Compensation Corporation, 2003a) by a guideline development group comprising: an ACC project manager, an ACC injury prevention specialist, two MHP expert practitioners, and two evaluation experts. The previous guideline was perceived to be out-dated, focusing too much on MHP training and techniques, and failing to include all the elements of a MHP programme necessary to secure a reduction in MHP related injuries. Further, an internal, unpublished ACC document claimed that there had been no reduction in injury claims as a result of introducing the 2003 guideline. Thus, the MHPG was developed using the 'latest' evidence and included all the elements for a MHP programme necessary to reduce MHP. The purpose of the MHPG was to reduce H&S risks related to MHP hereby reducing MHP related injuries, injury claims, and related claims costs.

The MHPG has 14 sections and provides guidance on implementing a multifaceted intervention programme. Sections 1 and 2 provide information about the importance of using and implementing a MHP programme. Sections 3-9 identify five core components (FCC) - risk assessment, techniques, training, equipment, facility design, and focus on the content of the MHP programme (3 - risk assessment, 4 - MHP techniques, 5 - training in MHP, 6 - organisation of training, 7 - MHP equipment, 8- maintenance, 9 - facility design). Sections 10-13 identify organisational system components (OSC) of a MHP programme and focus on how it can be integrated into an organisation's management (10 -policy development, 11 - workplace culture, 12 - monitoring, evaluation, 13 - audit). Section 14 is on bariatric patients. The MHPG recommends the implementation of a multifaceted programme, which consists of the FCC (5 components) and the OSC (4 components)[2]. It emphasises that an effective MHP programme needs to have all nine components implemented. The MHPG was available in three formats; on Internet; in a hard copy ring binder; and as a CDROM.

[2] For analysis in the case studies (study 5), the components for 'Monitoring & evaluation' and 'Audit' were merged, leaving eight, instead of nine, components for that specific analysis.

The MHPG targets all subsectors of the healthcare sector and other sectors where MHP takes place. It specifically mentions the following sub-sectors: District Health Boards[3], private hospitals, residential care facilities and hospitals for aged care, community care services for elderly people and those with disabilities, clinics and surgeries, and schools with disabled children. It identifies five overall categories of intended users: i) managers (ward and unit manager, occupational H&S manager and advisor, MHP trainers and coordinators); ii) carers (nurses, health assistants, doctors and medical specialist, school teachers, ambulance staff); iii) senior management (directors and decision makers, owners and operators of private and non-profit making facilities); iv) facility designers (project managers, architects, tradespeople) and; v) education and training institutions (lectures, tutors, students) (Accident Compensation Corporation, 2012).

When the MHPG was published, a number of parallel programmes existed which, in general, addressed prevention of work-related injuries and specifically MSDs. These were mainly driven by three government agencies- Ministry of Health (MoH), Department of Labour, and ACC. The parallel programmes included national strategies ('New Zealand injury prevention strategy' (Accident Compensation Corporation, 2003b) and 'Workplace Health and Safety Strategy for New Zealand to 2015' (Department of Labour, 2005)), programmes based on information and training ('Preventing and Managing Discomfort, Pain and Injury' (Accident Compensation Corporation, 2006) and 'National Falls Prevention Strategy' (Accident Compensation Corporation, 2005)), incentive schemes based on audited H&S management systems ('Measuring Your Capabilities in Workplace Safety Management' (Accident Compensation Corporation, 2008)), and legal requirements and standards such as the national H&S legislation, which specifically focused on risk management and building regulations and standards e.g. space requirements. Prevention of MHP related injuries was a priority for ACC because it perceived a high proportion of claims from the healthcare sector were caused by MHP, as in many other countries.

[3] In New Zealand, these include all public hospitals

Thesis design and methodology

Overall, the thesis evaluates the uptake, use, and impact of a national MHP guideline - the MHPG - in the healthcare sector in New Zealand through a multi-study, mixed-methods approach. The methodological framework for this thesis was the use of realist analysis (Pawson, 2006; Pawson and Tilley, 1997, 2004).

Realist analysis

Realist analysis is a theory-based evaluation approach grounded in realism (Pawson and Tilley, 1997) that intends to illuminate and explain the processes and effects of a programme (Pedersen et al., 2012). It aims to provide a greater insight into the programme through a mixed-methods approach, which combines the use of quantitative and qualitative methods (Pawson and Tilley, 1997). A realist analysis should not be considered as a method or particular procedure, but should rather be seen as a logic of inquiry (Pawson and Tilley, 1997). The process of a realist analysis is iterative. It requires engaging with documents and stakeholders, often retrospectively (Pawson, 2006; Rycroft-Malone et al., 2011). The process requires a detailed understanding of the setting in which the guideline is to be implemented, as well as how the guideline is intended to operate within this setting. As a result, the use of qualitative data is often favoured when using a realist analysis approach within occupational health research (Hasle et al., 2012; Kvorning et al., 2015; Spiegel et al., 2012).

Realist analysis distinguish itself from the traditional approach of a systematic review and evaluations of randomised controlled trials, which may be considered as being too narrow and rigid (McCormack et al., 2007; Pawson et al., 2005), by allowing for a comprehensive evaluation that acknowledges the unique characteristics and dynamics of a complex, organisational programme (Pawson, 2006). As a result, a realist analysis is not restricted to the defined answers of a systematic review (Pawson, 2006). In contrast, when evaluating a complex, organisational guideline, the criteria of systematic reviews, e.g. often only including randomised controlled trials, are considered to be insufficient in providing a detailed evaluation as some of the criteria, e.g. the intervention, being independent of other changes, are regarded as unrealistic (Olsen et al., 2008).

Realist analysis is based on the epistemological foundation of critical realism (Pawson and Tilley, 1997). However, it has been argued that realist analysis is substantially different from critical realism (Pawson and Tilley, 1997). From a social sciences perspective, one of the main differences is that critical realism is rather more a critical exercise than an empirical science (Pawson, 2006). According to Pawson (2006), the result if this is that the main objective of critical realism is to provide a privileged and moral-based criticism of the explanations used to understand how and why a programme worked or not. In contrast, realist analysis is capable of conceptualising and using empirical patterns to evaluate how and why a programme worked or not (Pawson, 2006). However, the difference between critical realism and realist analysis has been contested (De Souza, 2016; Porter, 2015a). Porter (2015a), especially, has argued that critical realism and realist analysis are much less significant than Pawson states. Porter (2015a) argues that the only main difference relates to how critical realism sees structure and agency as core concepts, while realist analysis has a more pragmatic vision of context (structural researches) (Porter, 2015a).

As an approach, realist analysis also attempts to dissociate itself from constructivist evaluation (Pawson and Tilley, 1997). It differentiates itself on three main points: i) the basis (data) for any constructivist evaluation is a construct, thus any evolution of the data would merely be another construct; ii) constructivist evaluations tend to overlook the contextual factors at a supra-macro level, and iii) the findings from a constructivist evaluation are bound to a particular context, and thus they are not transferable to different contexts (Pawson and Tilley, 1997). This presentation of constructivist evaluation is contested by Dahler-Larsen (2001), who argues that the criticism builds on a narrow and too unsubtle interpretation of constructivist evaluation (Dahler-Larsen, 2001).

Criticisms of realist analysis

One of the main criticisms of realist analysis has been that it is difficult to conceptualise (Byng et al., 2008; Dalkin et al., 2015; Greenhalgh et al., 2009; Jagosh et al., 2015; Marchal et al., 2012; Porter, 2015b). This has especially been the case for mechanisms (Astbury and Leeuw, 2010;

Koenig, 2009; Weiss, 1997). The criticism relates to the idea that mechanism, as a concept, is perceived as too 'mechanical', i.e. like a machine always delivering the same output when having a certain exposure, which is not the case in complex organisational programmes that are context dependent (Astbury and Leeuw, 2010). However, this presentation is too simplistic as one of the key concepts for mechanisms, as a concept, is the actors' reasoning when interacting with the resource provided by the programme. Hence a change is not the result of a programme resource by itself, but rather the reasoning from an intended actor (Dalkin et al., 2015; Weiss, 1997)

Another criticism, which also relates to conceptualising realist analysis, is provided by Porter (2015b), who states that the theoretical framework of realist analysis is ambiguous, inconsistent, and contradictive (Porter, 2015b). To some extent, this is the result of an inconsistent philosophical approach that changes between realism, idealism, and empiricism (Porter, 2015b).

Furthermore, Astbury (2013) argues that theory-based evaluations, such as realist analysis, have at least five substantial shortcomings: i) they have a tendency to focus on why programmes work or not, instead of evaluating whether they work, ii) due to lack of proven social science and programme theories, they are not feasible to conduct, iii) if not properly conducted, e.g. in an *ad hoc* and too simplistic fashion, they can be counterproductive, iv) they can be biased, in particular if evaluators are evaluating programme theories, the development of which they may have - in some way or in part -have contributed, and v) they are time consuming and require substantial resources (Astbury, 2013).

Despite the criticism of realist analysis, three main reasons justify the use of realist analysis as an overall methodological framework for this thesis: i) realist analysis provides a framework that examines how context and mechanisms affect the outcome of an intervention, e.g. assisting in 'opening the black box' (Marchal et al., 2012), in which in particular realist analysis identifies mechanisms at several contextual levels, thereby providing explanations for behaviours and how social structures interact (Marchal et al., 2012), ii) realist analysis is able to evaluate complex programmes as well as complex causal pathways (Marchal et al., 2012), and iii) realist analysis focuses on how and why a certain effect occurs after the introduction of a programme rather

than determining simply that there is an effect of the programme. Hence the use of realist analysis acknowledges that no programmes are built on full knowledge about CMO, but can help to improve knowledge (Pawson, 2006; Pawson and Tilley, 1997, 2004).

The five studies of the thesis

The five aims of the thesis are addressed in five separate studies. Each study is described in a separate chapter and forms the basis of a peer-reviewed publication. Each study contains study-related objectives. The relationship between the five studies is shown in Figure 1.1.

All of the studies were approved by the Massey University Human Ethics Committee (SOB 15/78) and were performed in accordance with the Helsinki Declaration.

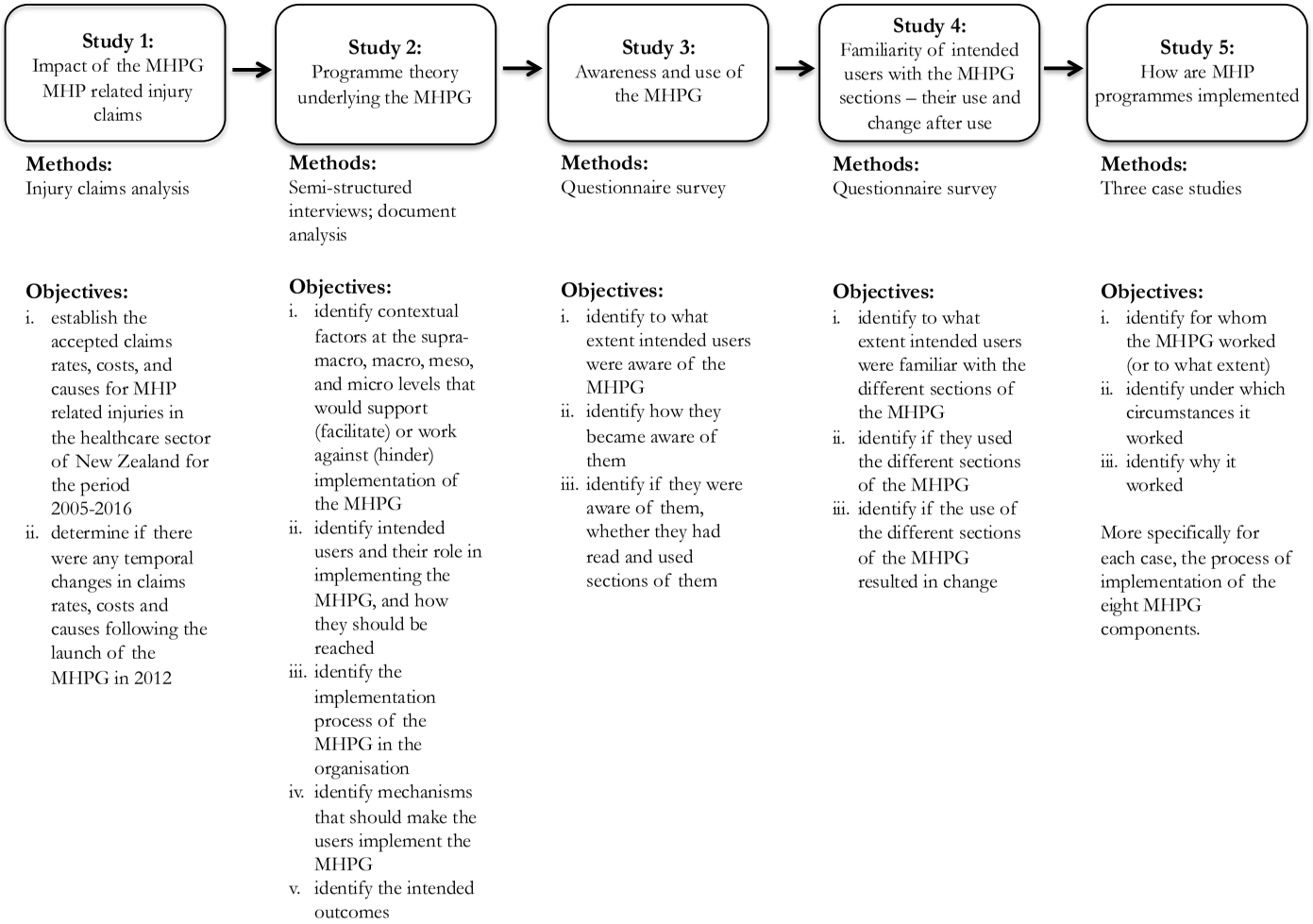


Figure 1.1 *Relationship between the five studies in the thesis*

Justifications for the methods used in each of the five studies

Study 1 - Impact of the MHPG on MHP related injury claims

In order to identify if there had been any changes in MHP related injuries following the introduction of the MHPG, study 1 assessed the extent of MHP related injuries in the healthcare sector. This was done through an injury claims data analysis of ACC claims data. From an ACC perspective, the intended outcome of the MHPG was a decline in MHP related injuries and associated cost in the healthcare sector. However, the injury claims and associated cost particularly related to the MHPG had never been established. Further, the development of the MHPG was funded by tax money. Hence, there was a public justification to know whether the money spent on creating a MHP guideline actually contributed to solving the problem. Thus, in order to establish if the launch of the MHPG could have had an effect on MHP related injuries and associated cost, it was important to identify the overall trends with respect to MHP related injuries within the New Zealand healthcare sector before starting to understand how and why the MHPG had worked.

From a methodological point of view, it can be argued that an injury claims data analysis rarely is able to provide definite answers with respect to the effect of the introduction of any type of national guideline (Quinlan et al., 2010). On the contrary, an injury claims data analysis often results in several unanswered questions with respect to what caused or could have caused the change in injury claims rates. Also, whether the number of lodged claims truly reflects the actual number of claims is another uncertainty as this is influenced by several factors. This is especially the case for vulnerable job groups, e.g. unskilled or casual workers, who are often reluctant to report claims e.g. for fear of losing their job. Despite these disadvantages, injury claims data is often the best data material available when attempting to assess the extent of any change in claims rate. However, the conclusions drawn from any injury claims analysis should be supported by studies that identify why claims rates are rising or falling. That is why my analysis of the claims data is followed by a realist approach to identify how the MHPG worked and why.

Therefore study 1 established injury claims rates and claims cost of MHP related injuries following the introduction of the MHPG based on injury claims data analysis. It had the following objectives:

i. establish the accepted claims rates, costs, and causes for MHP related injuries in the healthcare sector of New Zealand for the period 2005-2016
ii. determine if there were any temporal changes in claims rates, costs and causes following the launch of the MHPG in 2012.

Study 2 - Programme Theory Underlying the MHPG

In order to identify the intended users of the MHPG, to understand why they should use it, and how it was intended to be implemented in healthcare organisations, study 2 identified the programme theory of the MHPG. The programme theory was identified through document analysis of the MHPG as well as by interviewing a selected group of the MHPG developers. This is an approach previously used when attempting to identify a programme theory (Millar et al., 2012; Mumtaz et al., 2015). The MHPG developers that were interviewed in the present study were selected on the basis of their role within the MHPG development group. The selection process aimed at including the people who were most influential in the development process. The combination of document analysis and interviews was chosen as it provided different perspectives on the intended programme theory of the MHPG. Such a perspective included communication format (the level of details and focus differed between the rigid, written document and the more lenient, oral interviews) and an aspect of time with respect to the launch of the MHPG (the MHPG document was written prior to the launch, whereas the interviews were conducted three years following the introduction of the MHPG), and level of agreement (the MHPG was created as a consensus document, whereas the interviews provided the opportunity for the developers to present individual standpoints). These different perspectives contributed to the creation of a comprehensive picture of how the MHPG was intended to work. This served as an onset for a more profound examination of the impact of the MHPG.

Therefore study 2 established the programme theory underlying the MHPG through document review and semi-structured interviews with key MHPG developers and deliverers. It had the following objectives:

i. identify contextual factors at the supra-macro, macro, meso, and micro levels that would support (facilitate) or work against (hinder) implementation of the MHPG
ii. identify intended users and their role in implementing the MHPG, and how they should be reached
iii. identify the implementation process of the MHPG in the organisation
iv. identify mechanisms that should make the users implement the MHPG
v. identify the intended outcomes.

Study 3 - Awareness and Use of the MHPG and Study 4 - Familiarity of intended users with the MHPG sections, - their use and change after use

To identify if any effect or missing effect of the MHPG could be related to failure in the dissemination strategy or in the programme theory (Study 2), study 3 assessed the intended users' awareness and use of the MHPG. The awareness of the MHPG was assessed because if the indented users of the MHPG were not aware of the existence of the MHPG, then no logical effect could be expected. Hence, looking at awareness identified if any dissemination failure existed. Also, to identify if all sections of the MHPG were being used and implemented, which the programme theory identified as a precondition for developing an effective MHP programme (Study 2), study 4 assessed the familiarity, use of, and change after use of the individual sections of the MHPG. For both studies 3 and 4, this was done using the same questionnaire survey distributed to the healthcare sector. The questionnaire was developed in collaboration with an industry advisory group, which provided help in ensuring that the questionnaire was tailored to the healthcare sector. Also, the industry advisory group assisted in developing a dissemination strategy for the questionnaire survey that would optimise reaching/accessing the intended users of the MHPG. In order to reach the largest proportion of potential users of the MHPG, the questionnaire was widely distributed through several third parties, e.g. professional organisations.

The use of third parties allowed for multiple entry-points into the healthcare sector and at the same time served as a seal of approval of the questionnaire that potentially could increase the number of respondents.

Questionnaire surveys, such as used in the present thesis, provide overviews of an extended group and is often used when the researcher has a certain level of knowledge of the topic being assessed (Creswell, 2009; Tashakkori and Teddlie, 2003). In contrast, interviews are more commonly used to explore and identify reasoning behind the answers originating from questionnaires. Also, questionnaire surveys are more suited to provide an understanding of what has happened on a group basis. Furthermore, the questionnaire approach was used to identify particular areas and differences between subsectors of the New Zealand healthcare sector that needed to be investigated further through personal interviews or focus groups, as were used in the case studies as part of the chronicle workshops.

Therefore study 3 established the awareness and use of the MHPG using a questionnaire survey of intended MHPG users. It had the following objectives:

i. identify to what extent intended users were aware of the MHPG
ii. identify how they became aware of them
iii. identify if they were aware of them, whether they had read and used sections of them.

While study 4 established differences in familiarity with, use of, and change after use of the individual sections in the MHPG using the same questionnaire survey as study 3. It had the following objectives:

i. identify differences in familiarity with the different sections of the MHPG amongst the intended users
ii. if familiar, identify differences in use of the different sections of the MHPG amongst the intended users
iii. if used, identify differences in change after use of the different sections of the MHPG amongst the intended users.

Study 5 - How are MHP programmes implemented?

To understand what hindered or facilitated the implementation of a MHP programme, study 5 assessed which parts of a MHP guideline worked for whom and under which circumstances. This was done using a case study design, which as a methodology draws on the experiences of the participants, thus providing a diversity of views (Baungård Rasmussen, 2011; Patton, 2002). The case studies were conducted at three hospitals, which were affected by different contextual factors and consisted of interviews and focus groups, conducted as chronicle workshops. The interviewees were employed in job roles that had been identified through study 2 as key roles in implementation of MHP programmes, e.g. MHP coordinators or H&S managers. The composition of the focus group was designed to ensure that as wide a range of work roles were included, so that all - to some extent - had been involved in the implementation of the hospital's MHP programme. The chronicle workshop was chosen as a method as it provided a historical overview of factors that influenced implementation from different perspectives in the organisation (Baungård Rasmussen, 2011; Gensby, 2014). Together the use of multiple methods allowed for the possibility to supplement and triangulate information found in the interviews and focus groups. This allowed for a more comprehensive picture of how a MHP programme had been implemented at the different hospitals. Further, it helped to explain the trends in MHP related injury rates as well as in understanding mechanisms that were/are in play under different contextual circumstances when parts of a MHP programme are being implemented.

The main limitation when conducting case studies relates to the organisations' willingness to participate and to what extent they are representative of rest of the industry. Most often there is selection bias. This is commonly a consequence of only involving organisations that already focus on the topic of interest i.e. MHP in the present study. Hence, organisations not focusing on the topic of interest are not motivated to participate. As a result, the generalizability of the case study findings is limited to highly motivated organisations that see the importance of the topic of interest. Hospitals were only chosen as case study organisations because the programme theory of the MHPG (Study 2) identified public hospitals as drivers of change within the healthcare sector, resulting in the MHPG partially being tailored to public hospitals. Also, one of

the hospitals had been involved in the development of the MHPG, thus this particular hospital was perceived as the most advanced with respect to MHP. Despite the lack of generalizability, the use of case studies is a solid methodological approach that through its very detailed nature, could pursue topics, challenges, and issues that were identified in studies 1-4. Thus, use of the case study design could help in explaining the findings from studies 1-4 and 'opening the black box'.

Therefore study 5 identified how a MHP programme was implemented in healthcare organisations through case studies involving document reviews, semi-structured interviews, and focus groups with key stakeholders in three healthcare organisations. It had the following objectives:

i. identify for whom the MHPG worked (or to what extent)
ii. identify under which circumstances it worked
iii. identify why it worked.

How the five studies contribute to answering the aims of the thesis

The five aims of the thesis are answered by the findings from the five studies. However, each aim is not answered by the contributions from one study only, as each aim requires information from several of the five studies in order to establish a comprehensive answer. Hence each aim, with the exception of aim ii, is answered by using more than one of the five studies. Therefore the studies underpin each other, thereby creating a foundation that assists in the interpretation of the findings from the individual studies. Table 1.2 shows the way in which each of the five studies contribute to answering the five aims.

Table 1.2 *Overview of how each of the five studies contributes to answering each aim*

Thesis aims		Studies contributing to answering the aim
i	Assess the impact of a MHP guideline on injury claims rate	• Study 1 (Objectives i and ii) • Study 2 (Objectives i, ii, iv, and v) • Study 3 (Objectives i and iii) • Study 4 (Objectives ii and iii) • Study 5 (Objectives i-iii)
ii	Understand how a MHP guideline was intended to work	• Study 2 (Objectives i-v)
iii	Assess the awareness and use of a MHP guideline, among the intended users	• Study 2 (Objective ii) • Study 3 (Objectives i-iii) • Study 5 (Objectives i-ii)
iv	Assess the familiarity and use of the specific components of a MHP guideline, among intended users	• Study 2 (Objectives ii) • Study 4 (Objectives i and ii) • Study 5 (Objectives i-iii)
v	Establish how a MHP programme is implemented	• Study 2 (Objectives i-v) • Study 5 (Objectives i-iii)

Chapter 2. Impact of the MHPG on MHP related injury claims

This chapter is the basis for Paper 1 – *'The impact of national guidelines covering moving and handling of people on injury rates and related costs'* by Lidegaard, M., Olsen, KB, Legg, SJ, and Douwes, J (See Appendix 1) (Lidegaard et al., 2019a).

The specific objectives of this study were to:

i. establish the accepted claims rates, costs, and causes for MHP related injuries in the healthcare sector of New Zealand for the period 2005-2016
ii. determine if there were any temporal changes in claims rates, costs and causes following the launch of the MHPG in 2012.

Methods

The study examined injury data from the ACC's injury claims database, which contains information about accepted work-related injury claims for all employers in New Zealand and uses 40 different injury causes. The injury reporting forms have an 'accident description' field to describe how the injury occurred, which is the only way to relate an injury claim to MHP. However, it is not compulsory for all employers to fill in this field. In particular, ACC has different incentives to encourage employers to prevent injuries. One is the Accredited Employers Scheme, where large employers can substantially reduce ACC levies by maintaining a high H&S management standard, which is assessed annually by an external auditor. These accredited employers are not required to fill in the 'accident description' field.

Data collection

Injury claims data

We included all accepted injury claims recorded in the ACC injury claims database between 2005-2016 for 15 Australian and New Zealand Standard Industrial Classification (ANZSIC) Codes (2006; level 4), which were assumed to involve MHP: Labour supply services (N7212); Hospitals (except psychiatric hospitals) (Q8401); Psychiatric hospitals (Q8402); General practice medical services (Q8511); Specialist medical services (Q8512); Pathology and diagnostic imaging services (Q8520); Physiotherapy services (Q8533); Chiropractic and osteopathic services

(Q8534); Other allied health services (Q8539); Ambulance services (Q8591); Other healthcare services (Q8599); Aged care residential services (Q8601); Other residential care services (Q8609); Child care services (Q8710); and Other social assistance services (Q8790).

Industry employment data

ACC's database does not include number of employees in each of the 15 ANZSIC groups. For this, we retrieved number of full-time equivalent employees for the period 2005-2016 from Statistics New Zealand's 'Business demography statistics', 'Enterprises by institutional sector and employee count size 2000-16' (http://nzdotstat.stats.govt.nz/wbos/Index.aspx) (Accessed June 2017).

Data analysis

The 'accident descriptions' of all included injury claims were assessed by one researcher (ML) and discussed with the research group to obtain consensus. Only claims "Related to MHP" were included. However, very few claims from accredited employers included an 'accident description'. Instead, we used an estimate of the number of claims related to MHP for accredited employers. For this, we developed adjustment factors, which were calculated on the assumption that the proportion of MHP-related claims is the same for accredited employers and non-accredited employers. The relationship was expressed by the following equation:

$$\frac{Totalclaims_{Accredited\ employers}}{MHP\ related_{\ Accredited\ employers}} = \frac{Total\ claims_{Non-accredited\ employers}}{MHPrelated_{\ Non-accredited\ employers}} = \frac{Total_{All}}{MHPrelated_{\ All}}$$

From this equation, the total number of MHP related injury claims was calculated as:

$$MHP\ related_{All} = \frac{MHP\ related_{Non-accredited\ employers} \times Total_{All}}{Total_{Non-accredited\ employers}}$$

The adjustment factor (A_{MHP}) was expressed by:

$$A_{MHP} = \frac{Total\ claims_{All}}{Total\ Claims_{Non-accreditetd\ employers}}$$

This adjustment factor was used to estimate both claims numbers, claims rates, claims costs, and claims cause. The adjustment factors were calculated for each year and are shown in appendix 6 for ANZSIC code and injury.

Claims rate

Claims rates were expressed per 1,000 employees and were calculated by dividing claims number by employee count. When claims rates for the individual ANZSIC were calculated, 'Psychiatric hospitals' had an unrealistic high incident rate ranging between 380.0 to 897.5 claims per 1,000 employees. This may be due to inaccurate employee counts for this particular industry and as a result claims from 'Psychiatric hospitals' were excluded.

Claims cost

In order to assess claims costs for a specific point in time, the total costs for each claim were allocated to the year in which the claim was lodged regardless of the length of the claim. For example, a claim with a total cost of $4,500 for the period 2007-2009 would have the entire cost of the claim allocated to 2007.

Claims causes

Twelve claims causes possibly related to MHP were considered: 'Lifting/ Carrying/ Strain'; 'Loss Balance/Personal Control'; 'Loss of Hold'; 'Misjudgement of Support'; 'Other or Unclear Cause'; 'Pushed or Pulled'; 'Slipping, Skidding on Foot'; 'Something Giving way Underfoot'; 'Struck by Person/ Animal'; 'Tripping or Stumbling'; 'Twisting Movement'; and 'Undefined Cause'.

Statistical analysis

All statistical analyses were performed using SPSS (SPSS version 25.1, IBM, Armonk, NY, USA). An interrupted time series analysis using an AMIRA model (Bernal et al., 2017; Cochrane Effective Practice and Organisation of Care (EPOC), 2017) was used to analyse the data for claims rates and costs stratified by industry as well as for claims causes. The analysis provided the yearly changes and 95% confidence intervals for the period before and after the introduction of the MHPG, as well as the difference in slope. Further, the analysis examined changes at one, two, three, and four years following the introduction of the guidelines by comparing the actual

values for these four time points with values predicted by extrapolation of the of the linear regression line for the period before the introduction. Statistical significance was defined as $p<0.05$.

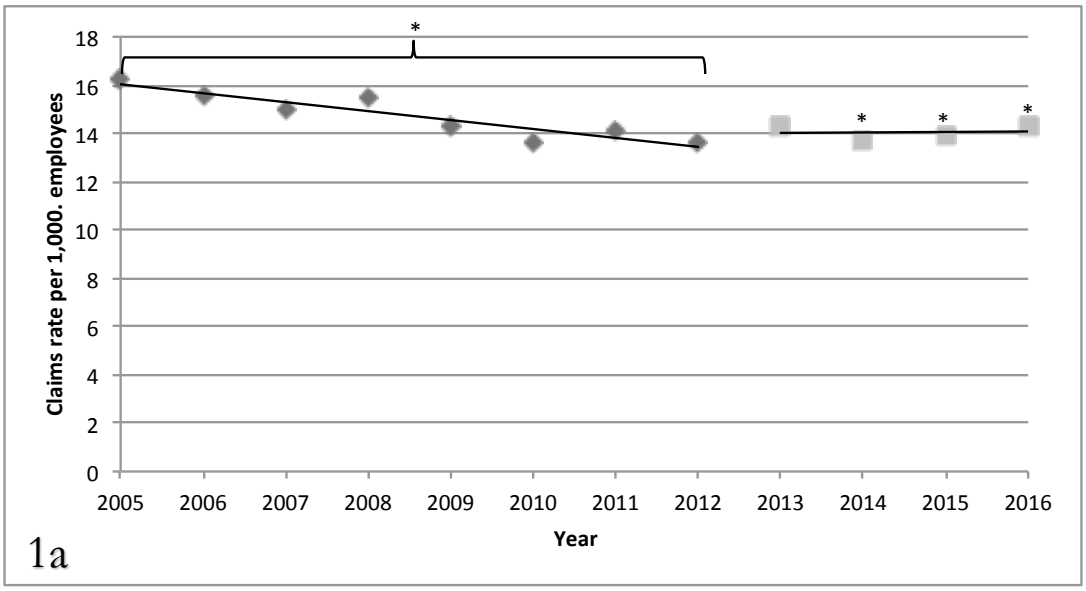
Results

Claims rates and claims costs for all industries

A total of 118,755 injury claims for the period 2005-2016, with a total cost of $NZ 225,356,400, were included. Of these, 68,662 (58%) originated from non-accredited employers. Based on 'accident descriptions' of claims originating from non-accredited employers, 22,900 (33.0% of all claims from non-accredited employers) were related to MHP. Using correction factors, it was estimated that in total (including those from accredited employers) 39,209 claims were related to MHP i.e. 3,267 claims/year. The two industries contributing most to the total number of MHP-related claims were 'Aged care residential services' and 'Hospitals' with 14,707 and 13,134 claims, respectively (Table 2.1). Total costs for injury claims related to MHP was estimated to be $NZ 93,756,789, with an average cost of NZ$ 7,813,066/ year.

There was a significant decrease in claims rates of 0.37 claims/ 1,000 employees per year (95%CI -0.47, -0.22) before the introduction of the MHPG, but no change was seen following the introduction (0.01 claims/ 1,000 PA; 95%CI -0.40, 0.43) (Figure 2.1a). However, compared to predicted claims rates, there were significant increases in claims rates after two years (1.27; 95%CI 0.39, 2.16), three years (1.63; 95%CI 0.69, 2.57), and four years (1.99; 95%CI 0.83, 3.15) following the introduction of the MHPG (Table 2.2).

There was a significant yearly decrease in mean claims costs of NZ$ 230.02 (95%CI -324.13, -136.02) before the introduction of the MHPG, but no significant yearly change for the period following the introduction (NZ 23.72; 95%CI -300.53, 347.96) (Figure 2.1b). However, similar to claims rates, there were significant yearly increases compared to predicted costs after three years (NZ$ 724.31; 95%CI -2.00, 1,450.61) and four years (NZ$ 987.09; 95%CI 87.77, 1,886.42) following the introduction of the MHPG (Table 2.3).



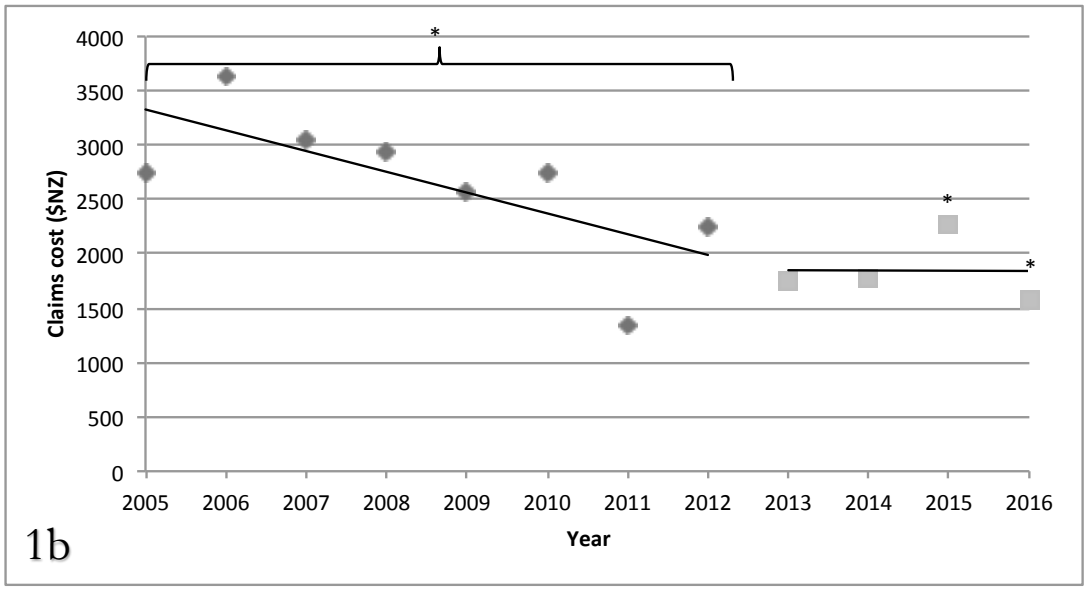


Figure 2.1 *MHP related injury claims rates (1**a**) and costs (**1 b**) per year for the period before (2005-2012) and after (2013-2016) the introduction of the MHPG and associated regressions lines. ♦ indicates yearly costs before (2005-2012) and ▪ after (2013-2016) the introduction of the MHPG. * represents a significant p value of at least 0.05.*

Claims rates per industry

Table 2.1 shows claims rates stratified by industry per year for the period 2005 to 2016. The highest mean claims rates were found for 'Ambulance services' (50.8) and 'Aged care residential' services' (36.9). Prior to the introduction of the MHPG, there were decreases in claims rates for four industries: 'Labour supply services', -0.23/1,000 (95%CI -0.38, -0.08); 'Hospitals', -0.44 /1,000 (95%CI -0.90, -0.02); 'Specialist medical services', -3.24/1,000 (95%CI -3.48, -3.00); and 'Aged care residential services', -1.48/1,000 (95%CI -2.14, -0.82) (Table 2.2). There were

increases for two industries: 'Pathology and diagnostic imaging services', 0.40/1,000 (95%CI 0.00, 0.79), and 'Other healthcare services', 0.97 /1,000 (95%CI 0.12, 1.82). In the period following the introduction of the MHPG, there was only one industry with a significant yearly change in claims rate i.e. 'Labour supply services', 0.40/1,000 (95% CI -0.09, 0.88). In contrast to the overall decrease before the introduction of the MHPG, there were increases in claims rates compared to the predicted claims rate for several industries following the introduction (Table 2.2).

Claims costs per industry

Table 2.1 shows the average claims costs per claim stratified by industry per year for the period 2005 to 2016. The highest mean claims cost between 2005 and 2016 were found for 'Pathology and diagnostic imaging services' (NZ$ 4,317.7), 'Ambulance services' (NZ$ 3,349.9), and 'Labour supply services' (NZ$ 3,157.3). In the period before the introduction of the MHPG, three industries had a decrease in claims costs: 'Pathology and diagnostic imaging services', NZ$ -3,795.23 (95%CI -7,523.71, -66.74); 'Aged care residential services', NZ$ -299.55 (95%CI -547.48, -51.62); and 'Other Social assistance services', NZ$ -625.83 (95%CI -817.08, -434.57) (Table 2.3). In the period following the introduction of the MHPG, only 'Other health care services' had a significant change, with an increase in yearly change in claims costs of NZ$ 322.71 (95%CI 178.69, 466.74). Following the introduction of the MHPG there was a significant increase in claims costs compared to the predicted costs for one industry i.e. 'Other Social assistance', and a significant decrease in claims costs compared to the predicted costs for another industry i.e. 'Other healthcare services'.

Table 2.1 *Claims numbers, claims rate, and claims cost stratified by industries from 2005 to 2016. CN = Claims number; CR = Claims rate/ 1,000 employees; CC = Average claims costs; * Average claims cost for all industries*

Subsector	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
						Claim numbers (Claims rate) Claims costs							CN (Mean CR) Mean CC
Labour Supply Services	128 (4.9) 3,753.3	109 (3.9) 5,182.1	107 (3.3) 6,072.9	120 (3.5) 4,200.0	102 (3.5) 2,914.1	101 (3.6) 4,798.9	89 (2.8) 5,097.5	87 (2.6) 995.0	104 (3.3) 1,526.0	116 (3.7) 1,968.8	115(3.5) 878.9	168 (4.8) 1,930.4	1,344 (3.6) 3,157.3
Hospitals (except psychiatric hospitals)	1,083 (16.7) 2,305.6	1,034 (15.6) 4,119.4	1,113 (16.7) 1,734.8	1,209 (17.5) 1,898.1	1,187 (16.5) 3,396.7	1,034 (14.1) 4,026.1	1,060 (14.3) 1,152.1	1,028 (13.7) 3,620.3	1,102 (14.5) 1,716.9	1,039 (13.5) 743.4	1,071 (13.3) 2,858.2	1,174 (14.4) 1,542.3	13,134 (15.0) 2,430.2
General practice medical services	25 (2.5) 176.0	22 (2.1) 827.3	25 (2.4) 776.0	33 (3.1) 12,839.4	34 (3.1) 367.6	24 (2.2) 854.2	22 (2.0) 286.4	16 (1.4) 450.0	26 (2.3) 950.0	31 (2.7) 1,525.8	45 (3.8) 1,082.2	31 (2.5) 1,183.9	334 (25.1) 2,004.8
Specialist medical services	7 (2.98) 100.0	12 (5.0) 225.0	10 (3.9) 850.0	8 (2.9) 1,525.0	7 (2.3) 9,857.1	6 (2.0) 383.3	7 (2.2) 914.3	10 (3.1) 220.0	9 (2.8) 300.0	15 (4.6) 320.0	8 (2.4) 762.5	10 (2.9) 340.0	109 (3.0) 1,110.1
Pathology and diagnostic imaging services	4 (0.9) 30,375.0	9 (2.2) 19,877.8	15 (3.6) 413.3	11 (2.7) 2,781.8	13 (3.3) 776.9	9 (2.0) 5,100.0	14 (3.3) 428.6	23 (5.4) 947.8	17 (4.0) 14,882.4	15 (3.5) 813.3	16 (4.0) 950.0	18 (4.2) 372.2	164 (3.2) 4,317.7
Physiotherapy services	13 (9.6) 500.0	7 (4.8) 328.6	9 (5.6) 577.8	18 (9.8) 1,929.4	8 (4.2) 375.0	13 (7.0) 384.6	6 (3.6) 2,983.3	10 (5.9) 340.0	16 (9.4) 1,287.5	12 (6.7) 491.7	14 (7.2) 1,985.7	10 (4.6) 530.0	136 (6.5) 1,004.1
Chiropractic and osteopathic services	4 (7.1) 1,025.0	3 (5.5) 133.3	2 (3.3) 2,650.0	5 (7.9) 280.0	9 (14.1) 855.6	7 (10.8) 542.9	2 (3.2) 300.0	3 (4.6) 133.3	5 (7.6) 320.0	5 (7.3) 220.0	8 (11.4) 225.0	8 (11.1) 2,175.0	61 (7.9) 747.5
Other allied health services	35 (1.8) 1,174.3	32 (1.6) 603.1	30 (1.5) 520.0	23 (1.1) 3,443.5	39 (1.7) 974.4	37 (1.4) 1,475.7	40 (1.9) 1,240.0	46 (2.2) 1,400.0	48 (2.2) 985.4	48 (1.9) 366.7	57 (2.4) 1,071.9	60 (2.5) 915.0	496 (1.9) 1,096.3
Ambulance services	123 (61.5) 3,669.5	108 (50.0) 1,178.4	89 (40.5) 3,747.2	91 (40.4) 4,339.6	106 (44.9) 1,936.5	119 (50.6) 1,797.5	130 (52.0) 3,338.5	153 (62.5) 2,723.5	125 (49.0) 2,614.4	141 (54.2) 6,161.7	156 (53.8) 4,709.6	151 (49.5) 3,217.9	1,491 (50.8) 3,349.9
Other healthcare services	15 (5.2) 592.3	13 (4.1) 227.3	8 (2.2) 300.0	6 (1.4) 240.0	35 (8.3) 2,180.0	18 (4.4) 312.5	37 (9.2) 3,063.6	51 (11.0) 1,689.6	44 (9.3) 925.6	45 (8.3) 1,345.5	50 (9.0) 832.0	30 (5.2) 1,080.0	351 (6.8) 1,338.8
Aged care residential services	1,279 (41.0) 2,947.6	1,329 (43.2) 2,591.1	1,351 (42.6) 3,067.6	1,293 (40.9) 3,734.2	1,095 (33.8) 1,803.9	1,119 (36.9) 1,538.8	1,190 (35.2) 970.8	1,152 (32.9) 1,401.1	1,232 (34.8) 1,869.5	1,157 (32.6) 2,064.8	1,263 (35.8) 2,055.0	1,247 (34.5) 1,471.1	14,707 (36.9) 2,175.3
Other residential care services	308 (25.5) 3,144.5	309 (25.8) 3,617.8	217 (17.6) 9,655.1	344 (27.3) 1,255.8	282 (21.1) 1,880.2	293 (20.9) 3,707.1	335 (24.6) 1,400.0	316 (22.1) 1,607.9	331 (23.7) 1,064.2	318 (22.5) 1,961.9	276 (17.6) 1,702.1	358 (23.9) 1,951.7	3,688 (22.6) 2,440.2
Child Care Services	2 (0.3) 7,950.0	4 (0.5) 125.0	2 (0.2) 250.0	8 (1.0) 1,125.0	3 (0.3) 100.0	2 (0.2) 150.0	8 (0.8) 1,287.5	5 (0.5) 160.0	2 (0.2) 5,000.0	2 (0.2) 350.0	7 (0.5) 471.4	3 (0.2) 700.0	48 (0.4) 1,118.8
Other Social Assistance Services	196 (11.3) 2,987.4	193 (9.8) 7,935.3	186 (10.8) 2,475.5	176 (9.7) 5,406.9	265 (13.7) 3,563.7	296 (14.8) 2,534.8	277 (13.9) 1,499.1	284 (14.4) 2,316.9	280 (14.6) 1,525.8	334 (18.9) 1,987.3	326 (18.7) 1,940.1	332 (19.2) 1,033.3	3,146 (14.1) 2,816.3
Total for all industries*	3,223 (15.9) 2,779.5	3,184 (15.2) 3,539.2	3,164 (14.7) 3,058.4	3,344 (15.1) 2,989.6	3,186 (14.1) 2,574.5	3,078 (13.4) 2,780.0	3,218 (13.8) 1,354.7	3,183 (13.4) 2,258.7	3,341 (14.1) 1,754.3	3,277 (13.5) 1,737.9	3,413 (13.7) 2,285.9	3,601 (14.1) 1,571.0	39,209 (14.2) 2,377.5

Table 2.2 *Interrupted time series analysis of claims rates from 2005 to 2016. 95% CI = 95 Confidence intervals; P = p-value; Δ= Change in claims rate compared to predicted level.*

Subsectors		Regression lines before and after the introduction of the MHPG				Difference in slope	Level change after introduction of the MHPG											
							Year 1			Year 2			Year 3			Year 4		
		Slope	Intercept	95% CI	P	P	Δ	95% CI	P	Δ	95% CI	P	Δ	95% CI	P	Δ	95% CI	P
Labour Supply Services	Before	-0.23	483.76	-0.38 to -0.08	**0.007**	**0.016**	0.72	-0.43 to 1.87	0.168	1.35	0.30 to 2.39	**0.016**	1.97	0.82 to 3.13	**0.004**	2.60	1.16 to 4.03	**0.003**
	After	0.40	-825.02	-0.09 to 0.88	0.180													
Hospitals (except psychiatric hospitals)	Before	-0.44	885.57	-0.90 to 0.02	**0.050**	0.526	0.55	-2.53 to 3.62	0.677	0.91	-2.16 to 3.99	0.491	1.28	-2.33 to 4.89	0.415	1.64	-2.85 to 6.14	0.401
	After	-0.08	119.05	-1.42 to 1.26	0.889													
General practice medical services	Before	-0.11	215.58	-0.39 to 0.17	0.371	0.525	0.75	-1.55 to 3.05	0.454	1.00	-0.99 to 2.99	0.258	1.25	-0.83 to 3.34	0.185	1.51	-1.04 to 4.05	0.190
	After	0.15	-376.49	-0.78 to 1.08	0.644													
Specialist medical services	Before	-3.24	462.10	-3.48 to -3.00	**0.014**	0.714	2.43	0.43 to 4.42	**0.021**	2.30	0.55 to 4.04	**0.015**	2.17	0.31 to 4.03	**0.025**	2.04	-0.25 to 4.33	0.066
	After	-3.37	366.84	-4.19 to -2.54	0.760													
Pathology and diagnostic imaging services	Before	0.40	-775.68	0.00 to 0.79	**0.043**	0.619	-1.02	-4.22 to 2.18	0.462	-1.26	-4.19 to 1.66	0.326	-1.51	-4.60 to 1.58	0.271	-1.75	-5.38 to 1.87	0.276
	After	0.15	-269.46	-1.00 to 1.30	0.957													
Physiotherapy services	Before	-0.33	810.35	-0.77 to 0.12	0.115	0.143	4.31	0.66 to 7.96	**0.023**	3.29	0.09 to 6.49	**0.040**	2.27	-1.16 to 5.70	0.149	1.25	-2.97 to 5.47	0.492
	After	-1.35	2,844.60	-2.86 to 0.16	0.090													
Chiropractic and osteopathic services	Before	-0.10	34.50	-1.82 to 1.61	0.888	0.535	1.29	-10.29 to 12.87	0.793	2.58	-8.87 to 14.03	0.598	3.87	-9.35 to 17.09	0.497	5.16	-11.14 to 21.46	0.464
	After	1.19	-2,969.75	-3.65 to 6.03	0.146													
Other allied health services	Before	0.06	-109.65	-0.08 to 0.19	0.364	0.726	0.17	-0.93 to 1.27	0.714	0.23	-0.78 to 1.25	0.592	0.29	-0.79 to 1.37	0.530	0.35	-0.93 to 1.64	0.523
	After	0.12	-222.21	-0.29 to 0.52	0.356													
Ambulance services	Before	0.43	-1,190.68	-5.95 to 6.81	0.874	0.892	-10.75	-39.34 to 17.84	0.388	-9.75	-47.73 to 28.23	0.550	-8.91	-59.44 to 41.61	0.679	-7.81	-71.70 to 56.08	0.774
	After	1.32	-155.47	-14.20 to 16.84	0.952													
Other healthcare services	Before	0.97	-1,901.50	0.12 to 1.82	**0.027**	0.090	-0.03	-6.77 to 6.71	0.992	-2.20	-8.33 to 3.92	0.408	-4.38	-11.03 to 2.28	0.151	-6.55	-14.66 to 1.55	0.088
	After	-1.21	2,345.47	-3.91 to 1.50	0.199													
Aged care residential services	Before	-1.48	2,918.74	-2.14 to -0.82	**0.001**	0.070	2.00	-3.28 to 7.27	0.385	3.88	-0.83 to 8.60	0.084	5.77	0.68 to 10.86	**0.028**	7.66	1.41 to 13.90	**0.020**
	After	0.41	-446.31	-1.75 to 2.57	0.769													
Other residential care services	Before	-0.23	645.21	-0.98 to 0.52	0.480	0.518	0.90	-5.30 to 7.11	0.732	0.17	-5.22 to 5.55	0.942	-0.57	-6.37 to 5.22	0.816	-1.31	-8.54 to 5.92	0.671
	After	-0.97	892.97	-3.62 to 1.69	0.810													
Child Care Services	Before	0.02	-50.91	-0.05 to 0.09	0.438	0.533	-0.42	-0.99 to 0.14	0.109	-0.36	-0.85 to 0.13	0.117	-0.30	-0.83 to 0.23	0.211	-0.23	-0.89 to 0.42	0.409
	After	0.09	-98.89	-0.15 to 0.32	0.631													
Other Social Assistance Services	Before	0.71	-1,383.22	0.19 to 1.22	**0.012**	0.375	0.38	-3.69 to 4.44	0.827	1.02	-2.64 to 4.68	0.516	1.67	-2.31 to 5.64	0.339	2.31	-2.56 to 7.19	0.284
	After	1.35	-2,744.11	-0.32 to 3.02	0.188													
Total for all industries	Before	-0.37	717.43	-0.47 to -0.22	**<0.001**	0.073	0.92	-0.09 to 1.92	0.062	1.27	0.39 to 2.16	**0.010**	1.63	0.69 to 2.57	**0.004**	1.99	0.83 to 3.15	**0.004**
	After	0.01	-26.44	-0.40 to 0.43	0.914													

Table 2.3 *Interrupted time series analysis of claims costs from 2005 to 2016. 95% CI = 95 Confidence intervals; P = p-value; Δ= Change in claims costs compared to predicted level.*

Subsectors		Regression lines before and after the introduction of the MHPG				Difference in slope	Level change after introduction of the MHPG											
							Year 1			Year 2			Year 3			Year 4		
		Slope	Intercept	95% CI	P	P	Δ	95% CI	P	Δ	95% CI	P	Δ	95% CI	P	Δ	95% CI	P
Labour Supply Services	Before	-283.98	598,040,13	-746.28 to 178.31	0.177	0.520	-1,683.87	-5,589.03 to 2,221.29	0.326	-1,277.33	-4,741.13 to 2,186.46	0.397	-870.79	-4,481.51 to 2,739.94	0.574	-464.24	-4,750.10 to 3,821.63	0.799
	After	122.15	-23,293.67	-1343.23 to 1587.54	0.969													
Hospitals (except psychiatric hospitals)	Before	2.00	-62,704.49	-310.61 to 314.61	0.988	0.636	-1,318.06	-3,868.95 to 1,232.82	0.247	1,107.60	-1,155.38 to 3,370.57	0.270	-897.12	-3,325.22 to 1,530.98	0.396	-686.65	-3,658.33 to 2,285.04	0.589
	After	212.30	-318,800.55	-827.03 to 1251.62	0.764													
General practice medical services	Before	-181.22	313,480.28	-1641.21 to 1278.77	0.770	0.901	-252.04	-11,628.73 to 11,124.66	0.958	-8.63	-10,369.85 to 10,352.60	0.998	234.78	-11,088.77 to 11,558.33	0.961	478.19	-13,379.39 to 14,335.77	0.935
	After	62.20	-50,794.40	-4571.49 to 4695.89	0.193													
Specialist medical services	Before	140.82	-266,484.71	-1038.84 to 1320.47	0.779	0.989	-2,213.36	-11,418.67 to 6,991.94	0.575	-2,235.05	-10,643.38 to 6,173.28	0.536	-2,256.74	-11,409.82 to 6,896.34	0.565	-2,278.44	-13,412.81 to 8,855.93	0.632
	After	118.88	-112,885.00	-3563.27 to 3801.04	0.490													
Pathology and diagnostic imaging services	Before	-3795.23	6,969,936.80	-7523.71 to -66.74	**0.042**	0.955	19,134.09	-5,472.82 to 43,740.99	0.099	18,888.23	-5,495.22 to 43,271.67	0.100	18,642.02	-9,543.70 to 46,827.74	0.150	18,395.51	-16,319.81 to 53,110.82	0.236
	After	-4041.34	8,745,920.48	-14311.04 to 6228.36	0.210													
Physiotherapy services	Before	166.45	-238,655.88	-35.19 to 368.08	0.830	0.847	-1,010.63	-2,712.54 to 691.27	0.190	-951.42	-2,407.27 to 504.44	0.154	-892.19	-2,431.44 to 647.06	0.199	-832.96	-2,742.36 to 1,076.44	0.321
	After	225.29	-452,318.77	-491.59 to 942.17	0.858													
Chiropractic and osteopathic services	Before	-126.13	267,445.05	-322.96 to 70.71	0.161	0.062	-317.05	-1,938.11 to 1,304.01	0.647	304.75	-1,109.28 to 1,718.78	0.614	926.55	-594.53 to 2,447.63	0.161	1,548.37	-341.36 to 3,438.09	0.085
	After	495.94	-1,121,341.50	-190.73 to 1182.61	0.252													
Other allied health services	Before	72.90	-122,080.00	-189.36 to 335.16	0.518	0.944	-1,029.16	-3,133.67 to 1,075.34	0.270	-1,003.64	-2,883.19 to 875.92	0.233	-978.11	-3,006.78 to 1,050.57	0.277	-952.58	-3,438.00 to 1,532.85	0.380
	After	98.41	-98,684,20	-761.52 to 958.34	0.289													
Ambulance services	Before	-62.19	100,252.82	-501.48 to 377.10	0.739	0.940	1,868.42	-1,714.44 to 54,51.28	0.243	1,915.94	-1,238.41 to 5,070.29	0.181	1,963.42	-1,429.06 to 5,355.89	0.200	2,010.88	-2,174.08 to 6,195.83	0.278
	After	-14.39	33,088.94	-1505.19 to 1476.41	0.971													
Other healthcare services	Before	322.71	-568,961.69	178.69 to 466.74	**0.001**	0.173	-1,514.00	-2,701.54 to -326.46	**0.017**	-1,820.88	-2,856.88 to -784.88	**0.004**	-2,127.75	-3,234.74 to -1,020.76	**0.002**	-2,434.61	-3,800.86 to -1,068.37	**0.003**
	After	15.85	11,158.29	-478.65 to 510.36	0.971													
Aged care residential services	Before	-299.55	610,652.77	-547.48 to -51.62	**0.021**	0.575	1,127.53	-680.38 to 2,935.44	0.171	1,308.41	-406.58 to 3,023.41	0.104	1,489.30	-446.59 to 3,425.18	0.102	1,670.18	-714.74 to 4,055.10	0.693
	After	-118.67	244,615.52	-871.58 to 634.24	0.440													
Other residential care services	Before	-527.60	937,348.58	-1241.52 to 186.32	0.113	0.467	413.55	-5,318.86 to 6,145.95	0.865	1,150.63	-3,966.22 to 6,267.48	0.599	1,887.71	-3,634.20 to 7,409.62	0.431	2,624.78	-4,141.94 to 9,391.50	0.374
	After	209.50	-482,352.83	-2134.40 to 2553.40	0.264													
Child Care Services	Before	-415.82	1,197,945.36	-1116.20 to 284.56	0.190	0.394	4,061.30	-1,672.35 to 9,794.95	0.127	3,186.90	-1,856.43 to 8,230.23	0.166	2,312.50	-3,083.46 to 7,708.47	0.329	1,438.11	-5,189.01 to 8,065.22	0.612
	After	-1290.22	2,575,873.57	-3648.29 to 1067.85	0.267													
Other Social Assistance Services	Before	-625.83	925,103.93	-817.08 to -434.57	**<0.001**	0.155	1,130.02	-440.65 to 2,700.69	0.122	1,565.85	201.40 to 2,930.31	**0.026**	2,001.68	534.96 to 3,468.39	**0.012**	2,437.50	611.15 to 4,263.86	**0.014**
	After	-190.00	308,765.51	-858.88 to 478.88	0.556													
Total for all industries	Before	-230.07	380,896.07	-324.13 to -136.02	**0.001**	0.097	216.72	-555.14 to 988.58	0.514	470.51	-205.14 to 1,146.17	0.132	724.31	-2.00 to 1,450.61	**0.045**	987.09	87.77 to 1,886.42	**0.032**
	After	23.72	-45,910.83	-300.53 to 347.96	0.999													

Claims causes

Table 2.4 shows claims numbers stratified by claims causes for the years 2005-2016. The largest single cause of injury related to MHP was 'Lifting/ carrying/ strain' (65.3%). In combination with 'Loss balance/ personal control' (6.8%), 'Twisting movement' (4.5%), 'Struck by person/animal' (3.5%), and 'Pushed or pulled' (3.3%), these five causes accounted for more than 83% of all claims. A substantial proportion of claims were caused by 'Other or Unclear Cause' (13.2%).

Prior to the introduction of the MHPG, the claims numbers decreased for one cause, 'Lifting/ carrying/ strain' i.e. -34.69 claims/year (95%CI -65.47, -3.91) (table 2.5). In contrast the claims numbers increased for four causes: 'Misjudgement of Support', (6.35/year; 95%CI 1.71, 10.99); 'Pushed or Pulled', (10.45/year; 95%CI 2.85, 18.06); 'Tripping or Stumbling', (0.93/year; 95%CI 0.07, 1.79), and 'Twisting Movement', (14.59/year; 95%CI 0.43, 28.75). There were no statistically significant differences in the period following the introduction of the MHPG.

One year following the introduction of the MHPG there was a significant increase in claims number for 'Lifting/ carrying/ strain' (431.69/year; 95%CI 147.39, 715.99). Further, two, three, and four years following the introduction of the MHPG there was a significant increase in claims number for two causes: 'Lifting/ carrying/ strain' of 485.81 (95%CI 247.58, 724.04), 539.93 (95%CI 306.86, 772.99), and 594.04 (95%CI 322.88, 865.21), respectively, and 'Something Giving way Underfoot' of 2.03 (95%CI 0.46, 3.60), 3.32 (95%CI 1.18, 5.46), and 4.63 (95%CI 0.61, 8.64), respectively. In contrast, two, three, and four years following the introduction of the MHPG there was a significant decrease in claims number for two causes: 'Misjudgement of Support' of 34.09 (95%CI -67.92, -0.25), 39.52 (95%CI -74.97, -4.06;), and 44.95 (95%CI -87.43, -2.47), respectively, and 'Other or Unclear Cause' of 140.29 (95%CI -264.51, -16.07), 156.06 (95%CI -289.52, -22.60), and 171.83 (95%CI -337.39, -6.27), respectively.

Table 2.4 *Claims numbers stratified by claims causes from 2005 to 2016.*

Cause category	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
	Number of MHP related injury claims												
Lifting/ Carrying/ Strain	2,006	1,961	1,866	1,985	1,769	1,713	1,731	1,870	2,130	2,158	2,120	2,239	23,662
Loss Balance/ Personal Control	281	248	173	126	148	184	151	196	190	237	261	208	2,448
Loss of Hold	2	3	3	3	5	1	3	0	1	0	1	1	23
Misjudgement of Support	31	31	32	33	49	66	76	58	36	64	49	44	576
Other or Unclear Cause	290	531	425	513	454	458	375	429	396	170	375	187	4,799
Pushed or Pulled	30	53	43	101	99	105	108	90	131	144	143	150	1,197
Slipping, Skidding on Foot	43	25	31	47	27	28	44	47	37	42	35	31	437
Something Giving way Underfoot	0	0	0	0	0	0	0	0	0	2	5	2	8
Struck by Person/Animal	129	119	97	104	104	92	154	124	95	90	76	102	1,286
Tripping or Stumbling	15	7	11	6	14	7	21	12	15	11	13	10	142
Twisting Movement	21	104	145	130	148	168	158	142	142	139	178	168	1,643
Undefined Cause	1	0	2	1	2	1	0	2	1	1	2	1	14
Total	2,850	3,082	2,828	3,049	2,820	2,822	2,821	2,969	3,174	3,058	3,259	3,142	36,234

Table 2.5 *Interrupted time series analysis of claims causes from 2005 to 2016. 95% CI = 95 Confidence intervals; P = p-value; Δ= Change in claims number compared to predicted level.*

Causes		Regression lines before and after the introduction of the MHPG				Difference in slope	Level change after introduction of the MHPG											
							Year 1			Year 2			Year 3			Year 4		
		Slope	Intercept	95% CI	P	P	Δ	95% CI	P	Δ	95% CI	P	Δ	95% CI	P	Δ	95% CI	P
Lifting/ Carrying/ Strain	Before	-34.69	68,303.71	-65.47 to -3.91	**0.028**	0.244	431.69	147.39 to 715.99	**0.008**	485.81	247.58 to 724.04	**0.002**	539.93	306.86 to 772.99	**0.001**	594.04	322.88 to 865.21	**0.001**
	After	19.32	-55,751.64	-84.61 to 123.25	0.308													
Loss Balance/ Personal Control	Before	-11.34	24,878.78	-36.58 to 13.89	0.308	0.420	49.62	-111.95 to 211.20	0.477	72.95	-105.53 to 251.43	0.351	96.28	-119.32 to 311.87	0.311	119.60	-144.94 to 384.14	0.305
	After	11.98	-15,578.08	-54.64 to 78.60	0.679													
Loss of Hold	Before	-0.19	432,89	-0.55 to 0.17	0.227	0.302	-1.70	-4.69 to 1.29	0.207	-1,148.00	-1,150.61 to -1,145.39	0.318	-0.60	-3.36 to 2.16	0.612	-0.05	-3.41 to 3.32	0.973
	After	0.36	-200,70	-0.85 to 1.56	0.742													
Misjudge-ment of Support	Before	6.35	-12,507.96	1.71 to 10.99	**0.012**	0.397	-28.65	-66.97 to 9.66	0.110	-34.09	-67.92 to -0.25	**0.043**	-39.52	-74.97 to -4.06	**0.029**	-44.95	-87.43 to -2.47	**0.036**
	After	0.91	-1,912.35	-13.84 to 15.66	0.894													
Other or Unclear Cause	Before	-2.39	-5,194.81	-19.72 to 14.94	0.746	0.541	-124.52	-266.89 to 17.85	0.070	-140.29	-264.51 to -16.07	**0.028**	-156.06	-289.52 to -22.60	**0.024**	-171.83	-337.39 to -6.27	**0.039**
	After	-18.16	85,613.24	-78.24 to 41.92	0.545													
Pushed or Pulled	Before	10.45	-20,938.89	2.85 to 18.06	**0.012**	0.603	8.06	-56.09 to 72.21	0.767	3.16	-54.97 to 61.30	0.898	-1.73	-61.79 to 58.33	0.946	-6.63	-75.91 to 62.64	0.821
	After	5.56	-11,139.20	-16.39 to 27.52	0.092													
Slipping. Skidding on Foot	Before	1.19	-2,211,11	-1.61 to 3.99	0.333	0.276	0.44	-22.14 to 23.01	0.964	-3.96	-24.15 to 16.22	0.646	-8.36	-30.08 to 13.36	0.378	-12.76	-39.27 to 13.75	0.277
	After	-3.21	5,072.50	-12.33 to 5.91	0.294													
Something Giving way Underfoot	Before	-0.17	0.00	-0.39 to 0.05	0.851	0.152	0.72	-2.50 to 3.95	0.601	2.03	0.46 to 3.60	**0.016**	3.32	1.18 to 5.46	**0.007**	4.63	0.61 to 8.64	**0.026**
	After	1.20	-1,632.75	-0.89 to 3.29	0.515													
Struck by Person or Animal	Before	1.69	-2,873.46	-5.83 to 9.21	0.599	0.895	-32.84	-90.93 to 25.26	0.209	-34.19	-87.14 to 18.77	0.158	-35.54	-93.83 to 22.76	0.179	-36.88	-108.70 to 34.93	0.249
	After	0.34	-1,319.40	-23.79 to 24.47	0.918													
Tripping or Stumbling	Before	0.93	-1,064.36	0.07 to 1.79	**0.033**	0.225	-2.49	-9.55 to 4.58	0.418	-4.10	-10.25 to 2.06	0.147	-5.71	-12.31 to 0.88	0.072	-7.33	-15.49 to 0.84	0.064
	After	-0.68	2,631.10	-3.65 to 2.28	0.243													
Twisting Movement	Before	14.59	-28,661,50	0.43 to 28.75	**0.040**	0.773	-47.44	-158.64 to 63.77	0.331	-52.36	-155.77 to 51.05	0.255	-57.29	-167.90 to 53.33	0.246	-62.21	-192.57 to 68.15	0.281
	After	9.67	-23,412.90	-30.43 to 49.76	0.215													
Undefined Cause	Before	0.04	-118.43	-0.19 to 0.27	0.682	0.861	-0.08	-1.93 to 1.77	0.917	-0.03	-1.67 to 1.62	0.971	0.03	-1.74 to 1.80	0.967	0.09	-2.08 to 2.25	0.925
	After	0.10	-200.20	-0.66 to 0.85	0.742													
Total for all causes	Before	-15.18	20,096.93	-40.35 to 9.99	0.184	0.449	309.28	101.05 to 517.52	**0.008**	337.17	154.45 to 519.89	**0.003**	365.06	170.44 to 559.68	**0.003**	392.95	154.56 to 631.34	**0.005**
	After	12.71	-17,994.00	-72.33 to 97.75	0.837													

Discussion

Study 1 found no reduction in claims rates and costs of MHP-related injuries following the introduction of the MHPG in 2012; in contrast, claims rates and costs increased. Approximately one-third of all injury claims in the healthcare sector in New Zealand for the period 2005-2016 was related to MHP, which is consistent with a recent study showing that more than one-third of all injury claims in large American nursing homes were related to MHP (Kurowski et al., 2017). Further, on average, our study estimated that 3,267 injuries per year were related to MHP contributing to a cost of nearly NZ$ 8 million per year.

Claims rates and costs before the introduction of the MHPG

Prior to the introduction of the MHPG, overall claims rates and costs significantly declined, which was largely driven by industries with the largest number of MHP related injury claims: 'Aged care residential services' and 'Hospitals', as well as 'Labour supply services', and 'Specialist medical services'. In contrast, a significant increase was observed for some of the smaller industries ('Pathology and diagnostic imaging services', 'Other healthcare services', and 'Other social assistance services'). Possible explanations for the decrease in claims and costs, especially seen within 'Aged care residential services' and 'Hospitals', include: i) the healthcare sector being on track with reducing the magnitude and costs of MHP related injuries; ii) a decline in reporting of MHP related injuries, and/or iii) a change in what ACC accepted as a work-related claim. The claims rate of 15.0 per 1,000 employees for hospitals found in this study is comparable to an American study that reported an injury rate of 2.1 per 100 FTE, equivalent to 21 injuries per 1,000 FTE, prior to the introduction of minimal patient lifting policy in a tertiary hospital (Pompeii et al., 2009).

The effect of the introduction of the MHPG

Following the introduction of a national MHP guideline, no overall change was observed for claims rate or costs. However, from the second year, claim rates gradually increased across all industries, and in the third and fourth year claims costs increased across all industries. According

to the programme theory of the MHPG (Study 2), public hospitals were the target industry. Hence 'Hospitals' were expected to experience the greatest impact from the MHPG. However, no decline in claims rates occurred for 'Hospitals'. In contrast, 'Aged care residential services' as well as 'Labour supply services', 'Specialist medical services', and 'Physiotherapy' had increasing claims rates in the years following the introduction. In addition, no change was observed in claims costs for 'Hospitals' or any other industries, with the exception of 'Other healthcare services'.

One potential explanation for why an increase in claims and cost, rather than a decrease, was observed may be the increased awareness of MHP amongst MHPG users. This may have resulted in greater acceptance of MHP as a risk factor for injuries, increasing the likelihood, both at an individual and an organisational level, to lodge MHP related injury claims. This may have led to an increase in accepted claims, even if the actual level of MHP related injuries may not have changed. Alternatively, other national events and interventions related to occupational H&S may have influenced reporting of injuries. In 2010, New Zealand experienced a mine explosion that killed 29 men, which initiated a review of how occupational H&S was regulated in New Zealand (Independent Taskforce on Workplace Health and Safety, 2013; Royal Commission on the Pike River Coal Mine Tragedy, 2012). As a result, in 2015 a new H&S legislation was passed, which increased the focus on management's liability. This may have affected claims rates, possibly masking a potential positive effect of the MHPG. Another explanation could be that potential positive effects of the MHPG have been counteracted by other factors. In particular, the population is getting increasingly heavy (Utter et al., 2015) and the proportion of bariatric patients is increasing (Gounder et al., 2016). At the same time, the healthcare sector has a workforce that is ageing. This may increase the risk of injuries related to MHP. Furthermore, there have been several budget cuts in the healthcare sector in New Zealand in the period 2009-15 (Keene et al., 2016) increasing the workload on the remaining staff. Finally, the lack of improvement in MHP related injury rates following the introduction of the MHPG could be the consequence of both poor implementation, e.g. the MHPG not reaching the intended users or

the industry not able to implement the MHPG, and programme failure, e.g. the MHPG not working as expected.

Comparisons with similar studies

The finding of an increase in claims rates following the introduction of the MHPG differs from that of an evaluation of a No-Lift policy intervention combined with funding opportunities for equipment in the Australia state of Victoria by Martin et al (Martin et al., 2009). This study reported a decrease in MHP related back injury claim rates of 0.79 per 1,000 employees following implementation of the intervention (Martin et al., 2009). The discrepancy between both studies may be due to the availability of dedicated funding for the health care industry in the Australian state-level intervention (Martin et al., 2009). In contrast, the MHPG had no such supplementary funding, which may have been a barrier for effective implementation.

Kurowski et al also found a reduction in MHP related claims rate in large nursing homes following the introduction of a safe MHP programme (Kurowski et al., 2017). A commercial risk management company administered this programme, which consisted of risk assessment of residents, purchase of lifting equipment, and staff training. In the first three years following the introduction, claims rates were reduced from 93.0 to 63.3/ 1,000 employees, and a further reduction to 57.4 was reported after six years(Kurowski et al., 2017). Powell-Cope and colleagues have also reported reductions in claims rate from 34.3 to 24.8/ 1,000 employees five years following the implementation of a MHP programme in a hospital network (Powell-Cope et al., 2014). The discrepancy with our study may be explained by the substantially higher initial claims rates of 93.0 compared to 36.9/ 1,000 employees reported for 'Aged care residential services' in our study, indicating a smaller potential for improvement. Support from a commercial company for implementing the programme and as well as purchasing equipment is another difference that may explain the different findings.

Our findings were more consistent with an evaluation by Schoenfisch and colleagues, following the introduction of a 'minimal patient lifting policy' consisting of lifting equipment purchases and training of MHP 'champions' in a tertiary hospital (Schoenfisch et al., 2013). They found no change in MHP related injury claim rates following the introduction of a minimal patient lifting policy in a community hospital, but a 44% reduction in claims rate was observed following the introduction of lifting equipment in the hospital. This suggests that the availability of equipment plays a more critical role than an MHP policy. In addition, the economic evaluation of the same minimal patient lifting policy reported an immediate drop in mean cost of MHP related injuries following the introduction of the minimal patient lifting policy (Lipscomb et al., 2012). However, the authors speculated that this is due to a shift in budget responsibilities (towards unit managers holder responsibility) and not the introduction of the policy itself.

Claims causes

The majority of claims causes for MHP related injuries were due to activities related to 'Lifting/carrying/strain', 'Loss balance/personal control', 'Twisting movement', 'Struck by person/animal', and 'Pushed or pulled'. This finding is consistent with previous studies that have shown that lifting and carrying, pushing and pulling, and twisting are the main causes of MHP related injuries (Burdorf et al., 2013; Kim et al., 2012; Retsas and Pinikahana, 2000). Of the five causes identified to be the main contributors to MHP related injuries, 'Lifting/ carrying/ strain' was the only cause that had a significant, gradual increase in claims numbers in the four years following the introduction of the MHPG. Together, these findings suggest that prevention of MHP claims should have a dedicated focus on these types of activities, especially activities related to lifting and carrying.

Summary of the findings

Almost 40,000 MHP related injury claims were accepted in the period between 2005-2016. This corresponded to a claims rate of 14.2 per 1,000 employees across the entire healthcare sector in New Zealand and was associated with a total cost of more $NZ 95 million. Before the introduction of the MHPG, MHP related claims rates and claims costs declined. In contrast, in

the four years after the introduction of the MHPG claims rates and costs increased. The single largest cause of MHP related injuries was 'Lifting/ carrying/ strain'. This accounted for 65.3 % of all MHP related claims. Together with 'Loss balance/ personal control', 'Twisting movement', 'Struck by person/animal', and 'Pushed or pulled', these five causes were responsible for 83 % of MHP related claims. In the four years after the introduction of the MHPG, claims caused by 'Lifting/ carrying/ strain' increased.

Limitations and strengths

The employee counts from Statistics New Zealand included all people in the specific industries and were not specific to people engaged in MHP. The proportion of people engaged in MHP can vary between industries. This might have influenced the claims rates so that an industry with a higher proportion of employees engaged in MHP might have a higher MHP related injury claims rate, simply because more people are engaged in MHP. However, we assessed the change in claims rate over time for each specific industry, so the temporal changes were not likely to be affected by that.

The difference in the injury reporting scheme between accredited and non- accredited employers introduced uncertainty about the extent of injuries related to MHP. Because the 'accident description' is not compulsory for the accredited employers, the relationship to MHP for claims originating from accredited employers cannot be assessed. However, we consider that the estimation of the number of ACC's Accredited Employers Scheme based on the assumption of similar ratios of MHP related claims between accredited and non- accredited employers provides a valid estimate of the total magnitude of MHP injuries and gives a full picture of the extent of MHP related injuries. However, we were not able to test this.

The use of injury claims data may, as previously shown, underestimate the actual number of claims (Quinlan et al., 2010). One of the reasons for this is related to the criteria for deciding if a claim is included or not, e.g. length of time away from work. As a consequence, injuries resulting in only short or no time away from work are not included (Quinlan et al., 2010). Further, vulnerable groups, such as unskilled, casual, or foreign workers, are less likely to lodge a claim

due to the fear of losing their work (Quinlan et al., 2010). However, in this study, we have used the same source of data for the comparison before and after the introduction of the MHPG. Consequently, any underreporting of claims is unlikely to affect the before and after comparisons.

A particular strength of the present study was the narrative analysis of the 'accident description' included in the claims from non-ACC accredited employers. This approach afforded a detailed assessment of the individual claims in order to determine whether they were related to MHP.

Link to next study

Despite expecting the opposite, the introduction of the MHPG led to an increase in MHP related claims rates and claims cost across the New Zealand healthcare sector four years after the introduction of the MHPG. This unexpected outcome could be explained by a number of reasons. It may be due to an implementation failure, i.e. the MHPG did not reach the intended users, or they did not use it. Another reason could be that the intended users had difficulties implementing the content. Yet again, it could also be due to a programme failure in the MHPG, i.e. that the content of MHPG did not work as intended. However, in order to examine this, we first need to know how the MHPG was intended to work, hence we need to identify the programme theory.

Chapter 3. Programme Theory Underlying the MHPG

This chapter is the basis for Paper 2 – *" How was a national moving and handling people guideline intended to work? The underlying programme theory'* by Lidegaard, M., Olsen, KB, and Legg, SJ (See appendix 2) (Lidegaard et al., 2019b).

The specific objectives of this study were to identify:

i. contextual factors at the supra-macro, macro, meso, and micro levels that would support (facilitate) or work against (hinder) implementation of the MHPG
ii. intended users and their role in implementing the MHPG, and how they should be reached
iii. the implementation process of the MHPG in the organisation
iv. mechanisms that should make the users implement the MHPG
v. the intended outcomes.

Methods

Study 2 identified the programme theory for the MHPG by thematic content analyses (Braun and Clarke, 2006) of the MHPG document itself, three unpublished internal ACC documents (two business cases and a meeting memorandum) used to justify the revision of the previous guidelines and to suggest resources and activities for the promotion, dissemination and implementation of the MHPG, and semi-structured interviews (Denzin, 1973; Treece and Treece Jr, 1977) with three members of the MHPG development group. The interviewees were: i) the project manager of the MHPG development group (also responsible for ACC activities in the healthcare sector); ii) the expert in policy evaluations who led the MHPG development process; and iii) a MHP practitioner with experience in implementation of MHP programmes from a large public hospital.

The interview schedule was based on the content analyses of the MHPG and the ACC documents as well as additional information obtained from three published reports (Thomas et al., 2009a; Thomas et al., 2009b; Thomas and Thomas, 2010) reviewing the preceding guidelines

and used to develop the MHPG. The interviews enquired about who the intended users were, how the MHPG should reach the users, what would make them use the guidelines, how that would work in different contexts, how the MHPG was intended to be used and how it would work in the organisation to produce the desired outcomes. The interviews were transcribed by the interviewer and sent to each interviewee for approval. See appendix 7 for an example of an interview schedule.

The MHPG itself, the internal ACC documents and the approved interview transcripts were entered into NVivo (NVivo qualitative data analysis Software; QSR International Pty Ltd. Version 10, 2012) for analysis. An initial coding framework was deductively (Crabtree and Miller, 1999) developed, based on the theoretical framework for programme theory (Pawson and Tilley, 1997a). It contained the categories: *'Context'*, *'Mechanisms'*, *'Outcome'*, *'User'*, *'Background'*, and *'Aim'*. The three authors trialled this coding framework by independently coding four sections of the MHPG. Their codings were discussed to establish consensus about definition and content of the coding categories. This resulted in a new coding framework, which was tested on two sections by each of the authors. This identified some differences in codings, which were discussed to establish a consensual final coding framework presented in Table 3.1. The division of reasoning into ethical, economic and legal illustrates the arguments used in the MHPG. They are related to the basic mechanisms for implementation of programmes: incentives - economic, information provision - ethical and punishment - legal.

Table 3.1 *The final coding framework for the content analyses of documents, interviews, and MHPG.*

Coding category	Description of the category
Context	Context is the characteristics of the 'setting' in which a programme works Context can influence whether a programme is successful
– **Micro level**	Contextual factors present at an individual level, e.g. personal beliefs
– **Meso level**	Contextual factors present at a team/ department level, e.g. ward procedures
– **Macro level**	Contextual factors present at an organisation level, e.g. organisational policies
– **Supra-macro level**	Contextual factors present above the organisation level, e.g. national programmes or legislation
User	Users are defined as the person(s) (individuals or groups), who would use or act upon the content of either the entire guidelines or sections of the guideline
Mechanisms	Mechanisms are the 'agents of change' that interact within a specific context to create an outcome. Mechanisms can be either related to the use of entire guidelines or sections of the guideline. Mechanisms can be categorised as either resource or reasoning.
– **Resource**	Resources are defined as the 'inputs' that provide the interaction with the context, which enables a change in reasoning, e.g. an organisational programme
– **Reasoning**	Arguments or reasons designed to convince the users to use and implement the MHPG or sections of the MHPG
• **Ethical**	Ethical arguments or reasons that relate to what a 'socially' responsible' organisation should do, or what would motivate an organisation that wanted to be a good employer
• **Economic**	Economic arguments or reasons
• **Legal**	Legal arguments or reasons, that relate to legislation or legal requirements
Outcome	Outcomes are the results of the interactions between mechanisms in a specific context. Outcomes can be either related to the use of entire guidelines or sections of the guideline
– **Ethical**	Outcomes related to the organisations 'social' responsibilities to be a good employer
– **Economic**	Outcomes related to, or which result in, an economic benefit
– **Legal**	Outcomes related to legislation and/or legal regulations

The MHPG itself, the documents and the interview transcripts were finally coded using the framework in table 3.1 by one researcher (ML). These codings were discussed by all three researchers to secure agreement. When differences in interpretation occurred, all three researchers re-read the material and discussed until consensus was reached. The most common

differences in interpretations related to whether content should be allocated to 'context' or 'mechanisms'. Using an inductive approach (Boyatzis, 1998), all final codes for '*Users*', '*Context*', *'Mechanisms'* and *'Outcome'* were grouped to identify themes. Codes for *Context*, *Mechanisms* and *Outcome*, were organised in three CMO diagrams (one each for ethical, economic and legal mechanisms).

Some contextual factors were identified as having a positive influence and hence facilitating the implementation of the MHPG. Others were identified as having a negative influence and hence hindering implementation. Yet others were identified as both facilitating and hindering, depending on how they would be used. For example, if workplace culture was indicated as a positive influence (e.g. a culture of trust) it would be a facilitator, but if it was indicated as a negative influence (e.g. a culture of blame) it would be a hindrance.

Since the MHPG recommended the implementation of a multifaceted programme, consisting of both the OSC and the FCC, a CMO diagram was also generated for each of the OSC and FCC.

Results

The results are shown in Figures 3.1 – 3.6. Figure 3.1 shows the contextual factors that the guideline developers identified would influence the implementation of the guidelines at supra-macro, macro and micro levels. No factors were identified at meso level. The factors at Supra-macro level were grouped into four themes: Society, Parallel programmes, Industry related, and MHP related. At the Macro level, the factors were grouped into two themes: Organisational, and Related to MHP programme. At the Micro level, the factors were under one theme: Individual. The figure also indicates whether the contextual factors influence implementation positively (+) (facilitating factors) or negatively (-) (hindering factors). Figure 3.2 shows intended users and their intended actions. Six intended users/ user groups were identified (presented in squares in the middle): 'everybody in healthcare', 'senior managers', 'MHP coordinators', 'H&S staff/managers', 'managers/supervisors', and 'the people in charge of MHP'. The users' intended actions in relation to the implementation of the guidelines are presented in circles connected to the users by lines. Figures 3.3 – 3.5 show the CMO relationships for MHPG for ethical,

economic, and legal mechanisms. Figures 3.6 shows the CMOs for the OSC and Figure 3.7 the CMOs for the FCC. All three types of mechanisms (ethical, economic and legal) are included in both figures. Some of the contextual factors for OSC and FCC are not included in Figure 3.1 because they do not relate to the whole guideline. For example, for the FCC to be effective, they need to be implemented in a context where the OSC are present or are being implemented.

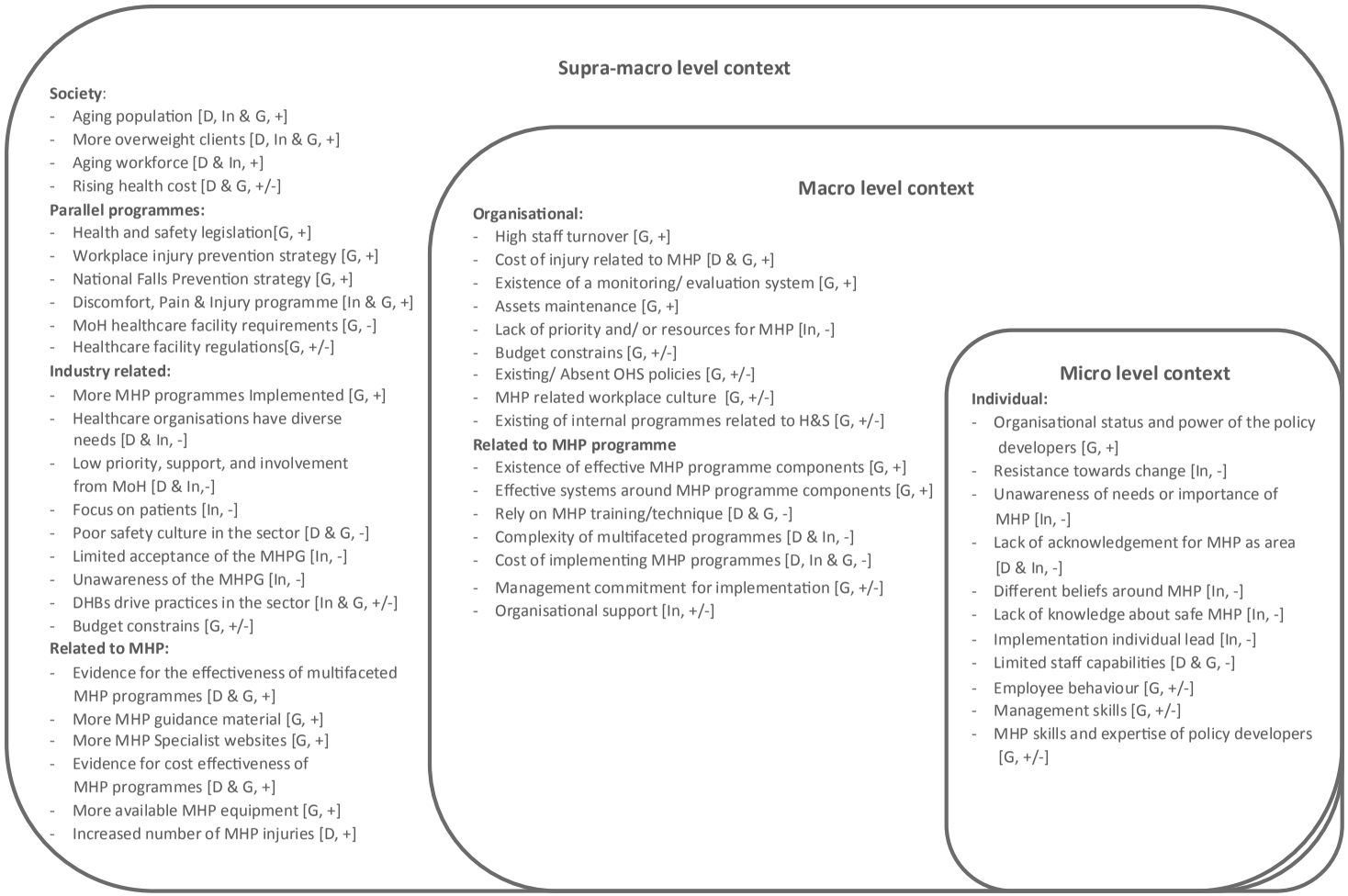


Figure 3.1 *Contextual factors influencing the implementation of the MHPG. (+) and (-) indicates positive (facilitating) or negative (hindering) influences. Source of the themes are indicated as: MHPG (G); ACC documents (D); and interviews (In).*

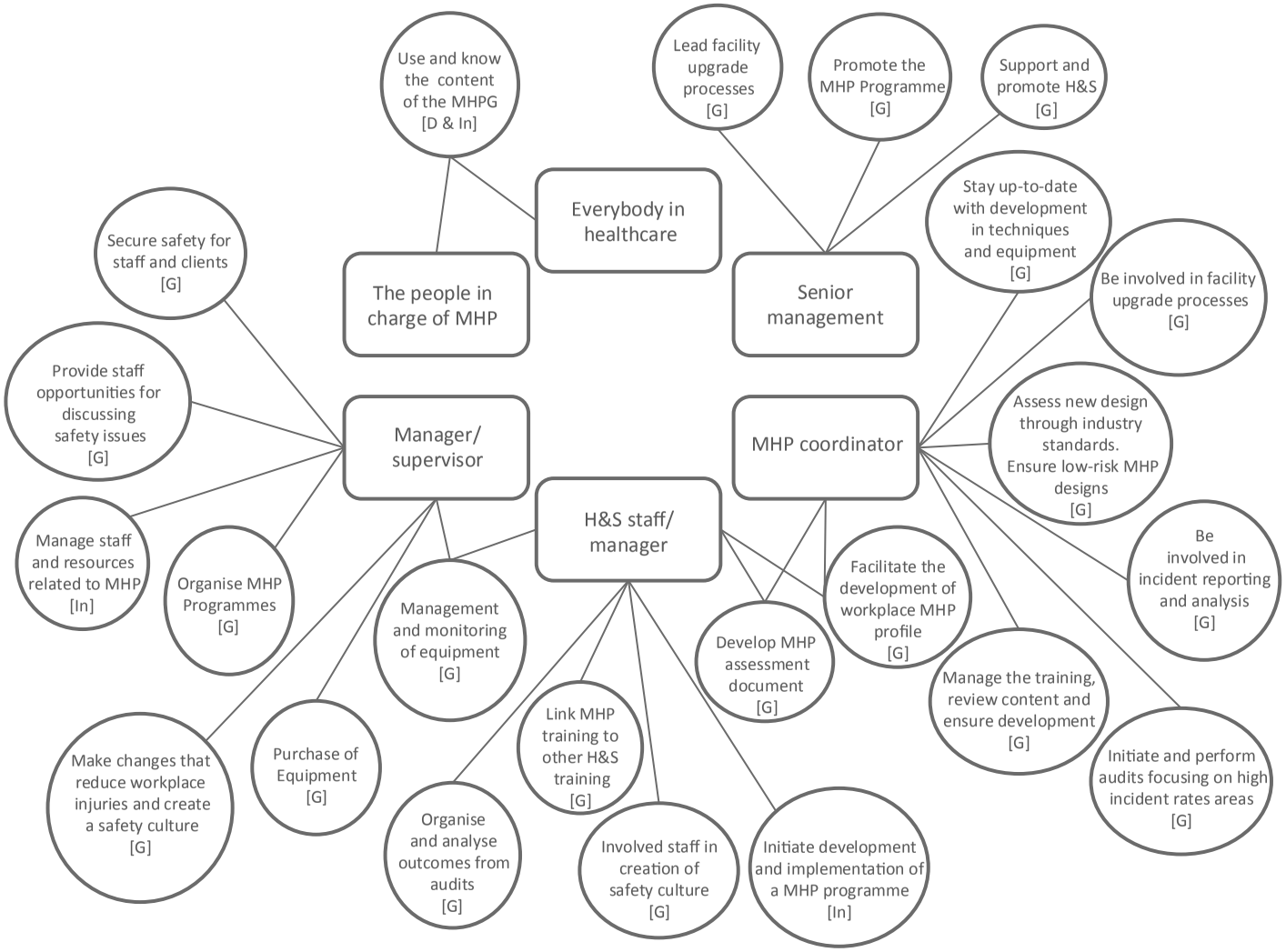


Figure 3.2 *Identified users intended to act (in squares) and associated actions (in circles). Source of the users' actions are indicated as: MHPG (G); ACC documents (D); and interviews (In).*

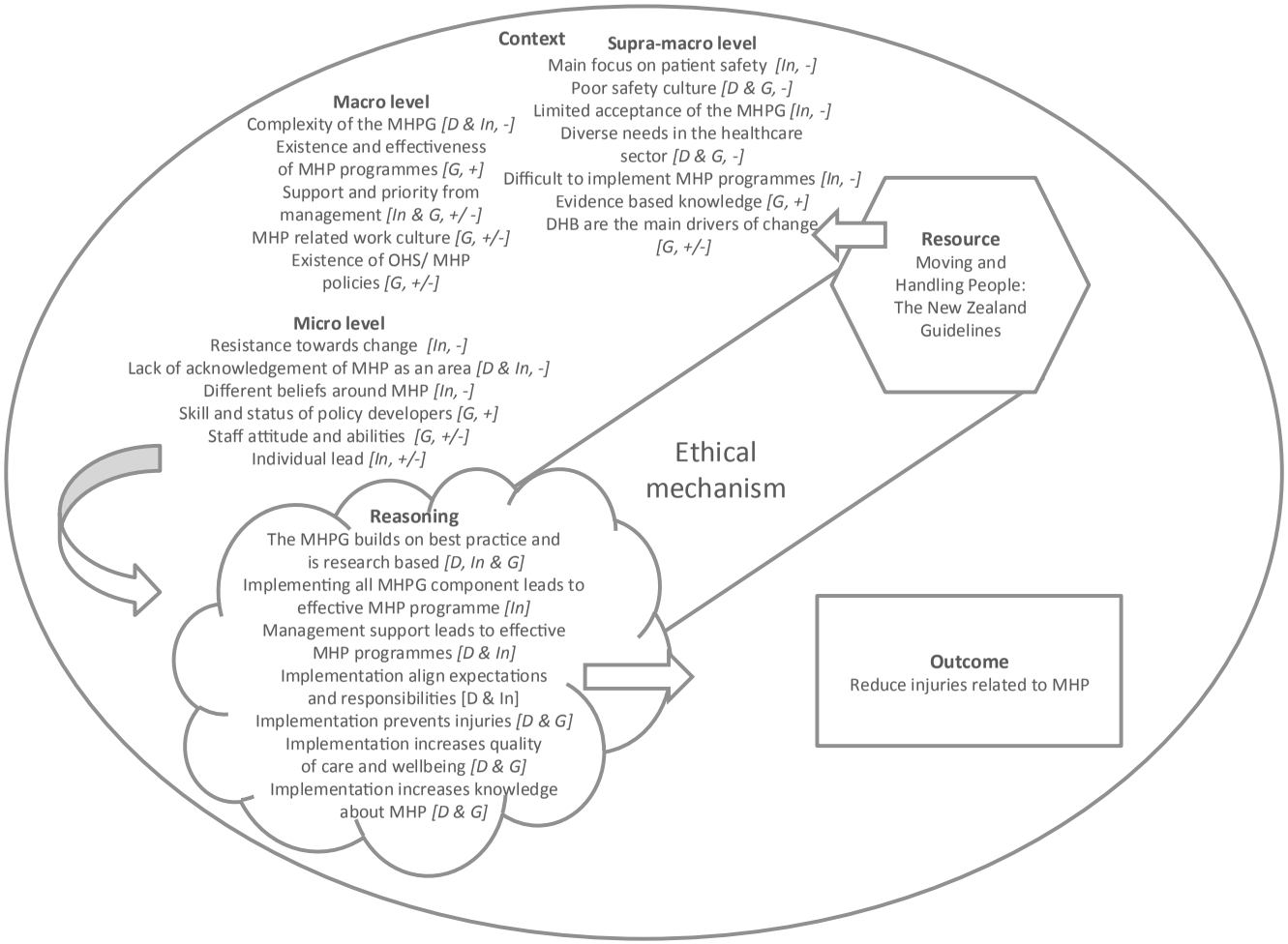


Figure 3.3 The ethical *CMO relationship for the MHPG. Contextual factors marked with (+) facilitate ethical reasoning and with (-) hinder ethical reasoning. Source of the themes are indicated as: MHPG (G); ACC documents (D); and interviews (In).*

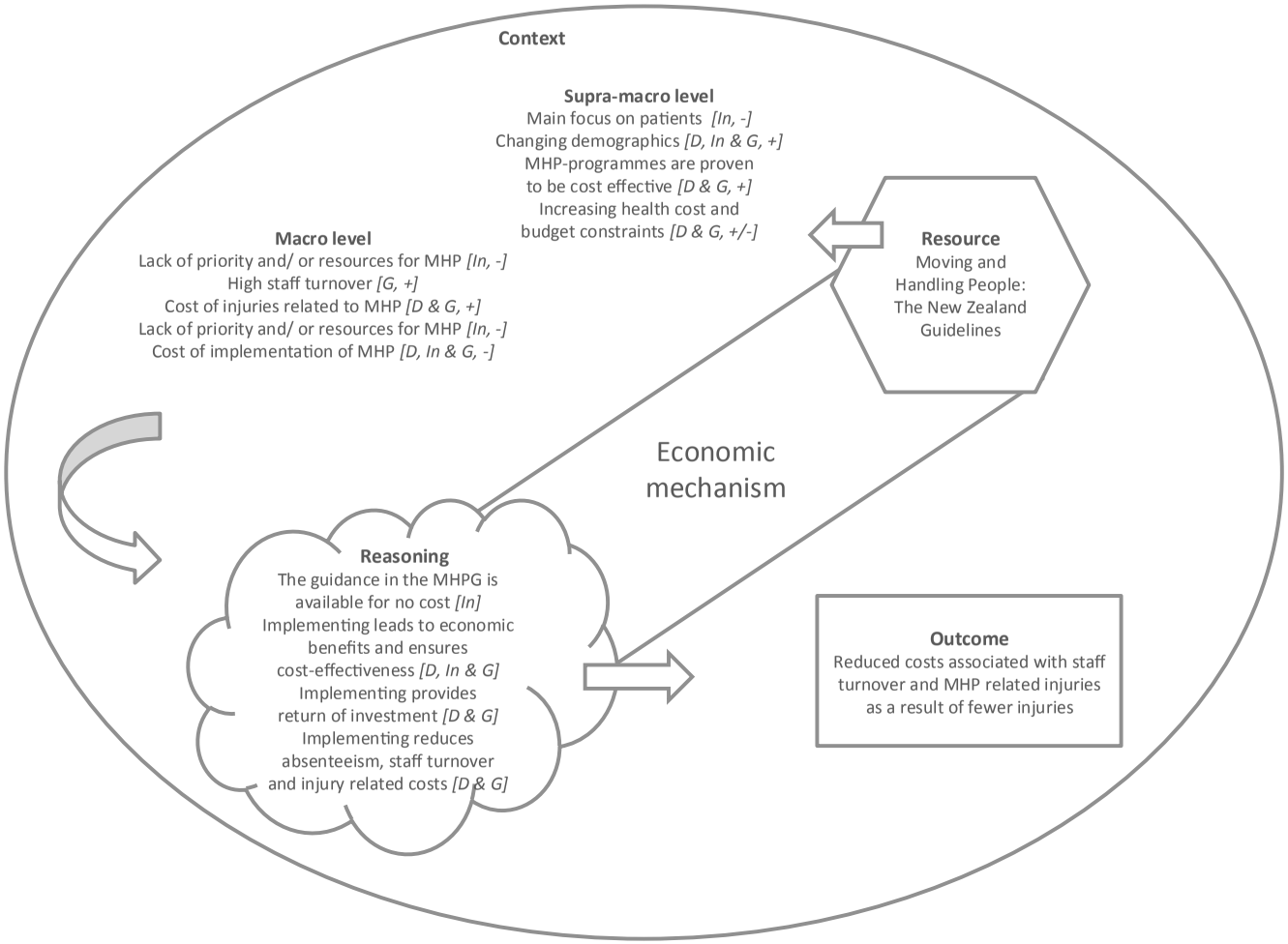


Figure 3.4 The economic *CMO relationship for the MHPG. Contextual factors were found at supra-macro and, macro level, with (+) indicating facilitating context and (-) indicating hindering context. Source of the themes are indicated as: MHPG (G); ACC documents (D); and interviews (In).*

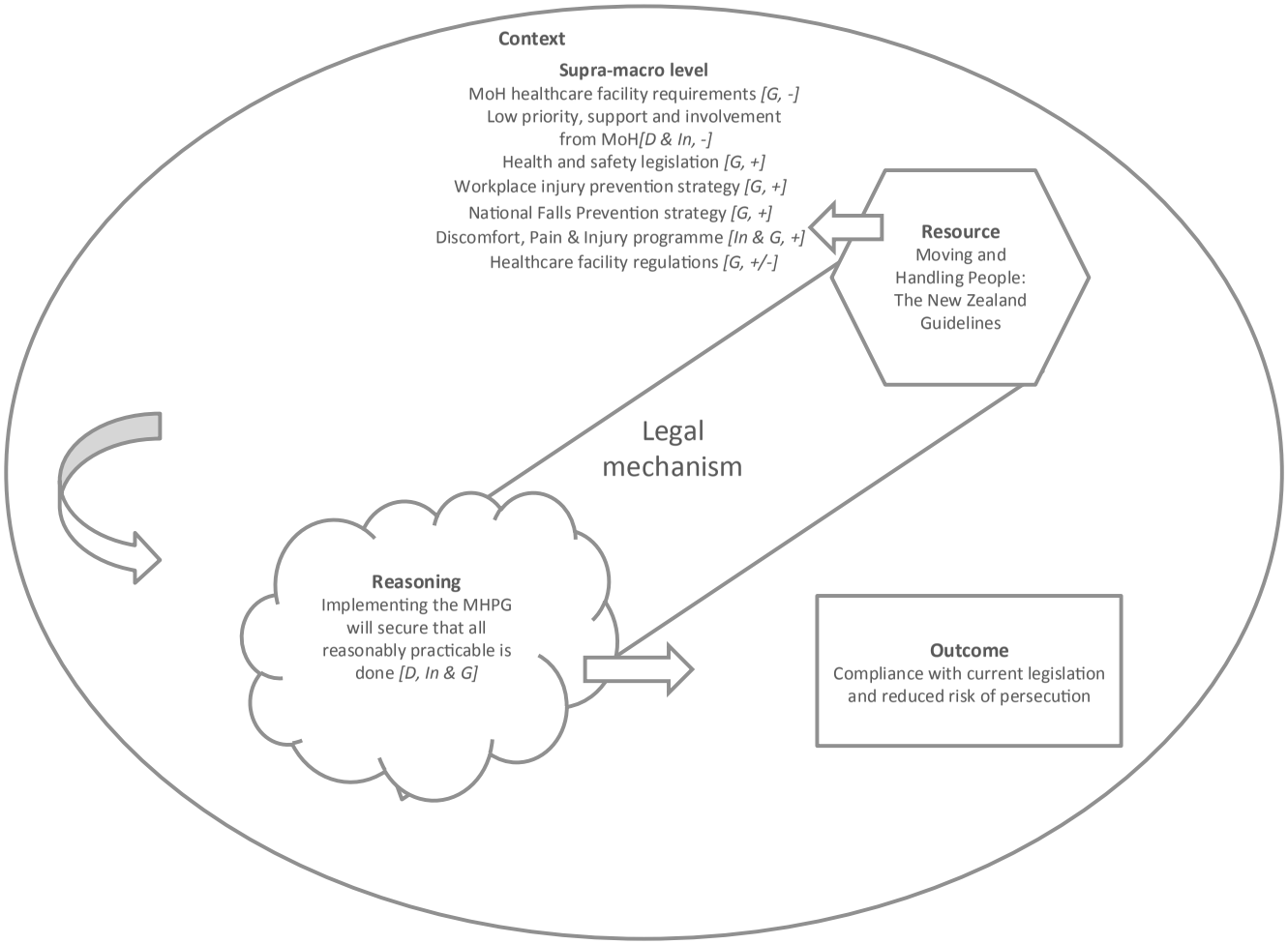


Figure 3.5 The legal *CMO relationship for the MHPG. Contextual factors were found at supra-macro level, with (+) indicating facilitating context and (-) indicating hindering context.*

Source of themes are indicated as: MHPG (G); ACC documents (D); and interviews (In).

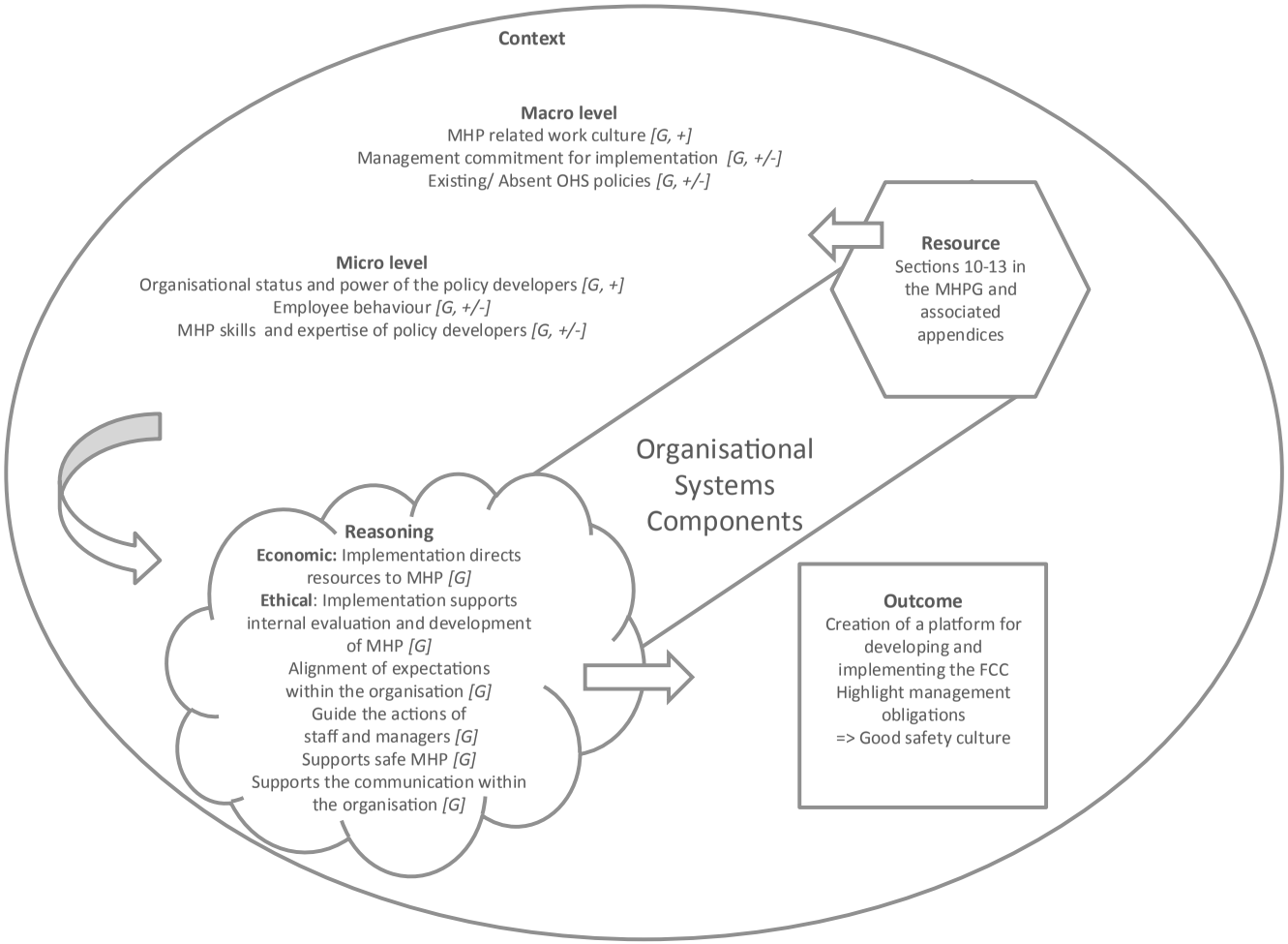


Figure 3.6 *CMO relationship for the organisational systems. Contextual factors were found at macro level, with (+) indicating facilitating context and (-) indicating hindering context. Reasoning is shown in economic and ethical categories. Source of the themes are indicated as: MHPG (G); ACC documents (D); and interviews (In)*

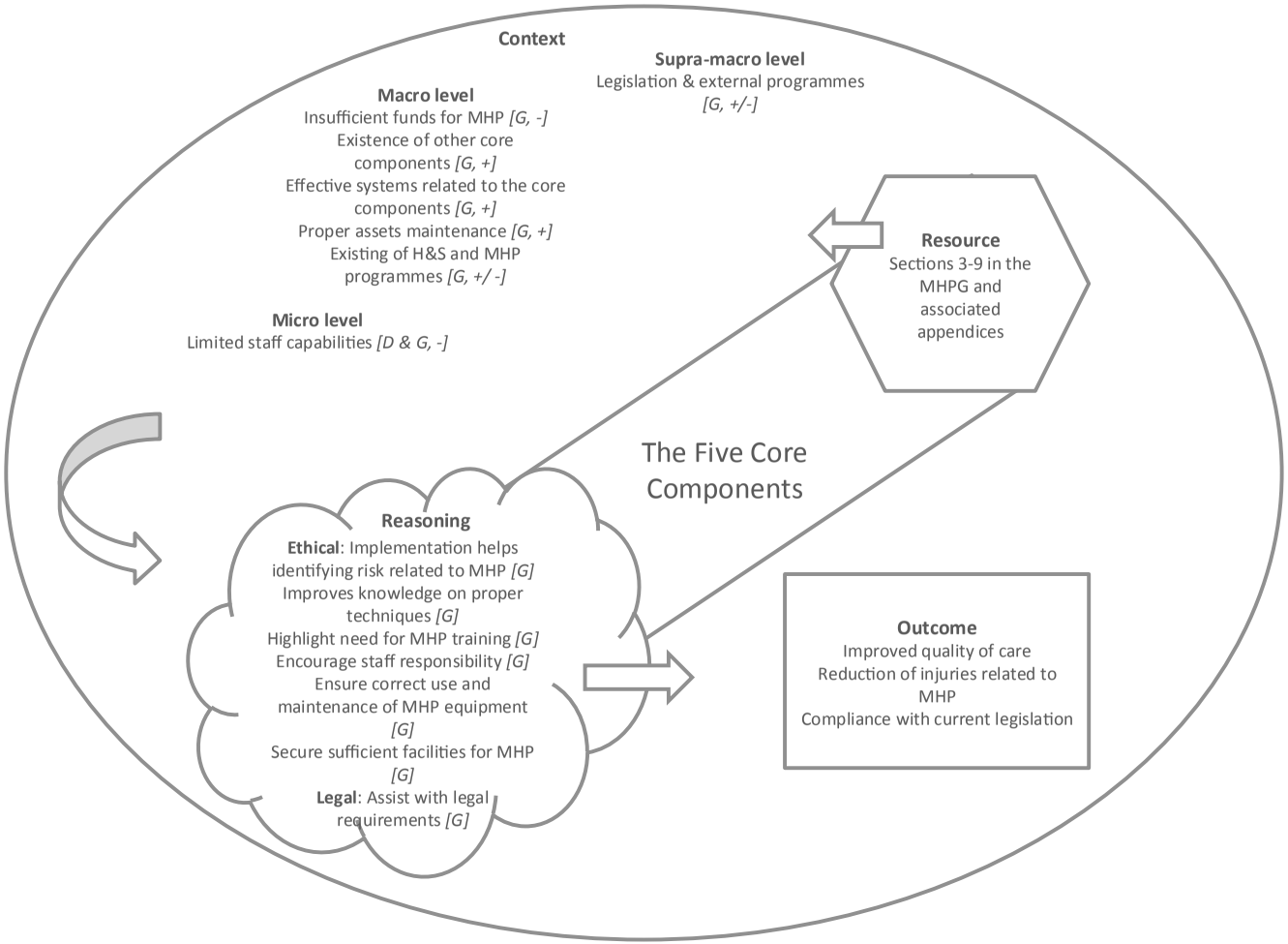


Figure 3.7 *CMO relationship for the five core components. Contextual factors were found at supra-macro, macro, and micro level, with (+) indicating facilitating context and (-) indicating hindering context. Reasoning is shown in legal and ethical categories. Source of the themes are indicated as: MHPG (G); ACC documents (D); and interviews (In).*

Discussion

Study 2 provides insight into how the MHPG was intended to work. The results identified contextual factors at the supra-macro level related to society, other parallel national programmes, MHP, and to the healthcare industry. At the macro level, they related to the organisation and to MHP programmes. At the micro level, they related only to individuals. Some of these factors should facilitate, whereas others would hinder, implementation of the MHPG. Further, the results identify that the MHPG was designed to fit with already existing parallel programmes such as the national H&S legislation, incentive programmes and ACC's 'discomfort pain and injury' programme. However, some parallel programmes, e.g. the building regulations and MoH facility requirements, were seen to become barriers for implementation.

Contextual factors

The facilitating and hindering contextual factors identified were found in different sources. The MHPG document tended to highlight facilitating contextual factors whereas the interviews tended to emphasise factors that served as barriers. This might be explained by a difference in focus between the MHPG and the interviews. The MHPG aims to persuade the intended user to implement the MHPG and therefore presents the contextual factors that are likely to facilitate implementation. In contrast, the interviewees might have sought to explain why the MHPG has not been implemented to the anticipated extent.

Facilitating contextual factors

The facilitating factors identified at supra-macro and macro level were, to a large extent, interlinked. The supra-macro factors related to society (ageing population and workforce and increasing number of overweight patients) were anticipated to work alongside the macro level factors related to the organisation (high staff turnover, increasing number of MHP related injuries and associated costs) and facilitate implementation. As the H&S risks related to MHP and the consequences (staff turnover and injury) were increasing, these factors highlight the need to address issues related to MHP and were also anticipated to facilitate implementation. Furthermore, parallel national prevention programmes, such as falls prevention and discomfort

and injury programmes, addressed management of risks including risks related to MHP, and were seen to make it easier to implement the MHPG. This was because the MHPG was designed to fit the terminology in these programmes. The parallel incentive programmes encouraging organisations to implement a risk management system, would make organisations better prepared to develop management of risks related to MHP and thus to implement the MHPG. These programmes, including the MHPG, were also designed to help organisations comply with the national H&S legislation's requirements of employers to have a risk management system. Implementation was also anticipated to be facilitated by a greater availability of MHP material, equipment, and specialist websites, together with more MHP programme components being implemented in the healthcare sector, and available evidence of MHP programmes being effective in reducing injuries and being cost-effective.

At the supra macro level, relevant regulations have previously identified as a facilitator for implementation of programmes (Brugha and Zwi, 1998). Whereas support from professional associations and collaboration across the industry would facilitate implementation (Ploeg et al., 2007). The developers have not taken this into account when they developed the MHPG and support structures.

At the macro level, implementation was anticipated to be facilitated if the organisation already had effective MHP programme components, other effective systems such as assets and equipment management systems and if the organisation had high staff turnover and high cost related to MHP injuries. However, it was acknowledged that organisations were different and that these factors might not be present.

At the micro level, an implementation group consisting of people with power and MHP expertise and a person with a passion for safe MHP were seen as necessary to initiate and complete implementation and would be a facilitator. A meta-review has previously identified that involving target users from the beginning of the development of a programme facilitated implementation of the programme (Francke et al., 2008). Change management theory also supports that it is essential to establish a group containing people with influence to secure

successful implementation of change (Kotter, 2012). Thus, the MHPG programme theory had already identified and included some of the contextual factors for implementing a MHP programme in the healthcare sector.

Hindering contextual factors

A major hindering barrier at the supra-macro level was that the diverse needs of the sub-sectors in healthcare would make it difficult for the MHPG to cover all sub-sectors. This introduced the risk that certain subsectors would not perceive the MHPG as relevant for them. Further barriers to implementation were the perceived general poor safety culture in the healthcare sector, which could be related to the industry's focus on patient safety rather than staff safety. Resistance towards change and a lack of knowledge and acknowledgement of the needs for MHP programmes were anticipated to become barriers for implementation. Further, the main influencer in the healthcare industry i.e. MoH, did not show interest – and did not participate - in the development of the MHPG, but instead implemented budget cuts. The MHPG developers saw this as sending a signal to the healthcare sector that MHP was not a priority area in relation to staff safety. Thus, giving senior management reasons to justify not prioritising and implementing the MHPG. As a result, the level of management support for implementing the MHPG was expected to be low. Finally, the facility standards used by the MoH and building regulations did not require sufficient space to be made available for the use of MHP equipment. This would act as a hindrance to use of MHP equipment and safe MHP.

A barrier at the macro level was that healthcare organisations were not used to implementing multifaceted MHP programmes, as they are complex to implement. Further barriers were the associated costs of implementation and that the healthcare organisations mainly relied on training and techniques rather than a holistic approach to MHP. Barriers to implementation at the micro level were staff with limited MHP capabilities, strong and diverse personal beliefs around MHP, and a negative attitude towards change. Furthermore, individuals would lead implementation, which would be a barrier, as this required one person to drive the entire organisational change.

Previous research on implementation of guidelines in the healthcare sector (Brugha and Zwi, 1998; Francke et al., 2008; Schünemann et al., 2006) have shown that implementation of a health guideline was hindered by: barriers in the organisational structures (lack of priority and resources); insufficient involvement of stakeholders; the behaviour and tradition of healthcare professionals; competing interests (resistance to change and different believes); lack of ownership of the changes, and; insufficient training in the use of the guideline (unawareness of the importance). All of the barriers to MHPG implementation that were identified in the present study are consistent with the findings of the previous research.

Contextual factors that could either facilitate or hinder implementation

Some contextual factors were expected to work as a facilitator or a barrier depending on the organisation. For example at the supra-macro level, rising health cost and budget constraints could hinder implementation because there would be no money to spend. On the other hand, these could be facilitators for implementation of the MHPG if the organisation believed that the reduction in costs associated with MHP related injuries and staff turnover was greater than the implementation costs. Further, public hospitals were considered to be the main driver of change and new practices in the healthcare sector. Hence, the MHPG was modelled to suit public hospitals, and this would be expected to facilitate implementation in public hospitals. However, this could result in other subsectors perceiving that the MHPG might not adequately address their needs and conditions, thereby hindering implementation in these subsectors.

At the macro level, factors that could facilitate or hinder implementation, depending on the organisation, were MHP related workplace culture, management commitment and organisational support. Existing H&S policies and programmes could be facilitating as the MHP programme could be integrated into those. However, they could also be a barrier, if the existing programme was not compatible with the MHP policies and programmes. At the micro level, a facilitating or hindering factors were employee behaviour and management skills.

A systematic review of MHP interventions in the healthcare sector by Koppelar et al, 2009, found that supra-macro and macro level, rather than micro level factors, accounted for the

majority of the contextual factors that could facilitate or hinder implementation (Koppelaar et al., 2009). The most frequently reported contextual factors at the supra-macro and macro levels were the availability of resources (time to transfer, equipment, and trained staff), and a supporting management climate. The most frequently reported micro level factors were motivation (willingness to change) and individual capability (skills, knowledge, and experience). In the present study, the developers of the MHPG also identified the factors mentioned by Koppelar et al, 2009, but they recognised that the healthcare sector was diverse and that these factors might be present in some sub-sectors or organisations, but not in others. Furthermore, Ploeg et al, 2007, highlighted the importance of management support (Ploeg et al., 2007). However, it is important to note that no single factor acts alone and that the factors at the supra-level influences the factors at the macro level, which in turn influences the factors at the micro level. Hence, implementation is commonly dependent on several facilitating or hindering factors.

Users

The six different intended MHPG user groups (Figure 3.2) each had associated actions related to the implementation of MHPG. Organisations were expected to consider the contents of the MHPG and then modify it to fit their organisation. Carers would then become aware of the content of the guidelines without actively realising that it came from the MHPG because it would have been integrated into the organisations' own guidelines. Thus, everybody in the healthcare sector involved with MHP should be familiar with the content of the MHPG. This applied particularly to the person in charge of MHP. Who this person should be was not specified, but the H&S manager, the MHP coordinator, and the manager and supervisor were seen as the primary actors initiating implementation and in maintaining the MHP programme.

The H&S manager should be responsible for initiating the development and implementation of the MHP programme and link MHP to H&S training. Involving staff in implementation was expected to create a sustainable safety culture. The H&S manager and the MHP coordinator should develop workplace profiles (type of clients and MHP risks) and MHP assessment documents.

The MHP coordinator should manage the content of MHP training, be responsible for continuously developing the MHP programme and stay up-to-date with the development of MHP techniques and equipment. However, the manager and supervisor should be responsible for purchasing new equipment, and managing and monitoring the equipment in collaboration with the H&S manager. The MHP coordinator should be responsible for incident reporting and analysis as well as initiating and performing audits in areas with high incident rates. The results of these audits should be analysed by the H&S manager. The MHP coordinator should be involved in facility upgrade and assess new designs to ensure low-risk MHP designs, but the senior management should lead this process.

The manager and supervisor should be responsible for staff and resources related to MHP and should organise the MHP programme. Further, the manager and supervisor should make changes that reduce the risk of injuries and creates and secures a sustainable safety culture for staff and clients by providing opportunities for discussion of safety issues. Senior management should support and promote H&S and the MHP programme. Overall, multiple actors should be involved in the implementation process, however, their interactions were not clearly described. It was identified that the H&S manager and the MHP coordinator should drive the process to secure support from senior management and involve workers. How this could or should happen was not identified.

How the MHPG was intended to reach the users

The MHPG was made available on the internet, as a hardcopy ring binder, and as a CD-Rom. It was launched at the first conference organised by the Moving and Handling Association of New Zealand and promoted at subsequent regional seminars. These events targeted MHP coordinators, H&S managers, MHP trainers, and managers responsible for MHP and H&S. Furthermore, the MHPG was promoted through letters and emails to ACC's mailing list to reach managers, H&S managers and other actors in the healthcare sector. In addition, ACC would train its own injury prevention consultants and account managers so that they could become intermediaries that could promote the MHPG through personal and professional contacts in the

healthcare sector. ACC also relied on training institutions to train carers, using the content of the MHPG, and on internal communication within ACC and MHP specific training in the healthcare sector.

ACC recognised that their dissemination strategy did not reach senior managers and facility managers in the healthcare sector, architects or engineers involved with design of healthcare facilities. As a result, the implementation of the MHPG would be based on individuals in advisory roles (H&S managers, MHP coordinators and trainers), with little decision power leaving it up to H&S managers or MHP coordinators to inform and persuade managers to act. This would require that the H&S managers and MHP coordinators to become aware of the guidelines, decide to read and implement them then develop an implementation strategy, which should involve management, topic specialists and employees. In essence, the implementation of the MHPG would, to a large extent, be driven by individuals and through a bottom-up process.

Olsen (2012) found that 10 H&S managers had difficulties becoming involved in change processes and that they were sidelined in the organisation. They had difficulties convincing management to spend money on improving the working condition to a level beyond minimum legislative levels (Olsen, 2012). Further, one studies found that work environment practitioners have to do organisational work, such as influencing other stakeholders in the organisation, before they can start implementing changes (Theberge and Neumann, 2010). In the context of the present study, it, therefore, it seems unlikely that only relying on MHP coordinators and H&S managers to implement the MHPG will be the best strategy.

In order to assist the H&S managers and MHP coordinators in the implementation process, the MPGH document points out that the MHPG was aligned with ACC's incentive programmes and the national legislation, hence the H&S managers and MHP coordinators were provided with information to help facilitate the implementation of the MHPG.

CMO relationships of the MHPG

The CMO relationships in figures 3.4-3.6 show the programme theory underpinning the MHPG. They present the mechanisms that, in specific contexts, should motivate the intended users to

start the implementation process that should lead to the desired outcome. The envisaged mechanisms/reasoning for each perspective are described below, together with their related contextual factors and intended outcomes.

The intended outcome for all CMO-relations was also anticipated to work as reasoning. An example of this could be that an economic outcome of implementing the MHPG was expected to be a reduction in the costs associated with MHP related injuries. At the same time, this intended outcome should also work as an argument by itself for implementing the MHPG.

Ethical perspective

At least seven different ethical arguments for implementing the MHPG were identified. First, because the MHPG builds on best practice and is evidence-based, a responsible employer should implement the MHPG. Second, as a MHP programme only would be effective if all components were implemented, a responsible employer should implement all components. Third, implementation would only be effective if management supported the programme, hence management should support the programme. Fourth, implementation of the MHPG will align expectations and responsibilities, creating an effective organisation. Fifth, implementation will prevent injuries related to MHP. Sixth, implementing the MHPG will enhance quality of care and staff wellbeing. Seventh, implementation will increase knowledge about safe MHP.

These arguments especially address a number of contextual factors expected to hinder the implementation of the MHPG. The healthcare sector mainly focuses on patient safety as opposed to staff safety and has a poor safety culture. Further, there is limited knowledge and acceptance of the importance of MHP programmes as well as diverse needs across the healthcare sector. Moreover, implementing a complex comprehensive multifaceted MHP programme is difficult and healthcare staff have a widespread resistance to change, a lack of acknowledgement of MHP as a discipline, and strong personal views on MHP.

Most people in the sector should be persuaded to implement the MHPG and secure management support because of the following facilitating contextual factors: the MHPG is evidence-based; and H&S policies and MHP programmes exist in more healthcare organisations.

However, neither the MHPG nor the developers fully addressed how to overcome the barriers, or how the main users should secure management support and overcome resistance to change.

The ethical arguments should help overcome the difficulty of implementing a complex comprehensive multifaceted MHP programme. Addressing patient care and safety is common across the subsectors of the healthcare sector. This should help to overcome their different needs.

The ethical arguments add increased quality of care and patient safety as additional outcomes to the implementation of the MHPG. Finally, the developers saw the healthcare sector's focus on patient safety as opposed to staff safety as a barrier that made ethical reasoning insufficient in itself thus the need to prove that implementing the MHPG would be of economic benefit and not just reduce injuries to staff.

Economic perspective

At least four types of economic arguments were identified. First, because the MHPG is available for no cost there should be no economic barrier for obtaining the guidelines. Second, the guidelines present evidence for that implementation leads to economic benefits and ensures a cost-effective MHP programme by reducing costs from MHP related injuries. Third, implementation provides a return on investment to the organisation by reducing the prevalence of injuries related to MHP. Fourth, implementation reduces absenteeism, staff turnover, and MHP related injuries and the associated costs. All these arguments should provide an economic incentive to implement the MHPG.

The healthcare sector is experiencing the effects of an ageing population, an increased number of overweight clients, and an ageing workforce, which all increase the risk of MHP related injuries as well as the health costs. Further, the healthcare sector has a high staff turnover combined with budget constraints. Together these factors reduced the money available for MHP, hence making it difficult to address the insufficient resources available for safe MHP. These economic arguments add economic benefit as additional outcomes to the implementation of the MHPG, which should help H&S managers and MHP coordinators persuade management to invest in

MHP programmes. This could help H&S managers overcome the difficulties H&S managers have in persuading management to invest in health and safety (Olsen, 2012).

Legal perspective

Only one type of legal argument was used: implementation will secure that all reasonably practicable steps are taken to fulfil the legislative requirements of eliminating or minimising the risk to workers H&S in the area of MHP. Linking the MHPG to requirements in legislation would appeal to organisations that only implement programme elements required by legislation in order to avoid prosecution and minimise expenditure. However, MoH's low priority for MHP was seen as a factor that could reduce the effect of this argument. The legal argument adds two additional outcomes of implementing the MHPG; compliance with the H&S at work legislation, and; reduced risk of prosecution. Olsen (2012) found that H&S managers only used the legal strategy as the last resort, thus, it could be a good support for the stakeholders that wanted to implement the MHPG that it was linked to the H&S legislation.

Implementation process and CMO for the Organisational System Components and the Five Core Components

The CMO relationships in figures 3.6 and 3.7 show the programme theory underpinning the implementation process of the OSC and FCC. First, the organisation should establish a MHP policy including statements of continuous improvements, assessment, evaluation and audits of the programmes and its elements' effectiveness. Following acceptance of a MHP policy in an organisation, the FCC should be implemented and integrated with any existing parts of the H&S management system and MHP components.

The CMO relationships for the OSC are shown in Figure 3.6. First, the 'H&S manager' or another person committed to MHP (e.g. a MHP coordinator or a manager) should initiate the implementation process (see also Figure 3.2) of the OSC by gaining support from top management to develop a MHP policy. After securing top management support, the person should assemble an implementation group consisting of powerful people with good and diverse knowledge about MHP. They should draft a policy in a process that allows employees and top

management to provide input to the policy. This should create organisational buy-in, hereby overcoming the barriers of resistance towards change and lack of organisational support. Management should be responsible for implementing a positive MHP safety culture amongst staff, by communicating with staff and giving opportunities for staff input. Each of the OSC sections should result in a specific outcome. The policy section would facilitate a good MHP culture. The workplace culture section would improve attitude toward MHP. The monitoring and evaluation, and the Audit sections would develop adequate evaluation and assessments of the MHP programme. The outcome of implementing all four OSC would be a foundation for an effective and sustainable MHP programme and implementation of the FCC.

One economic and five ethical arguments for implementing the OSC were identified. The economic argument is that implementing the OSC would direct resources towards MHP. The first of the ethical arguments is that implementation would support internal evaluation and development of the MHP programme. Second, implementation would align expectation related to MHP throughout the organisation. Third, implementation would guide the action of staff and managers with respect to MHP. Fourth, implementation supports safe MHP and fifth, implementation supports communication in the organisation.

Contextual factors facilitating implementation and determining the outcomes were identified as a good MHP related work culture, and organisational status and power of the policy developers. Further, factors that could be either facilitating or hindering were management commitment, existing policies, employee behaviour, and the MHP skills and power of the policy developers. Once the OSC has improved the context at a macro and micro level, it should be easier to implement the FCC as the contextual changes should provide a foundation for the creation of the FCC.

The CMO relationships for the FCC are shown in Figure 3.7. The MHPG applies a mix of six ethical arguments and one legal argument for implementing the FCC. The first ethical argument is that implementation of the FCC would assist in identifying risks related to MHP (outcome of the Risk assessment component). Second, implementation will improve knowledge of correct

techniques (outcome of the Technique component). Third, implementation highlights the need for MHP training (outcome of the Training components). Fourth, implantation encourages staff responsibility for safe MHP (all FCC). Fifth, implementation ensures correct use and maintenance of equipment (outcome of Equipment components). Sixth, implementation secures sufficient facilities for MHP (outcome of Facility component). The legal argument is that implementation assists with compliance with legal requirements because the FCC secure that all reasonably practicable steps are taken to prevent ill-health and injuries (all FCC).

The outcomes of implementing each of the FCC were used as the arguments that should persuade the actors to reason to implement all the FCC because if one were missing the organisation would not be able to achieve the outcome.

Insufficient funds for MHP were a contextual factor that would serve as a barrier for implementation of the FCC. Contextual factors that were facilitators for implementation of the FCC were the H&S legislation and its requirement for risk management, the organisations existing MHP programme components particularly training and technique, and existence of effective occupational H&S management systems around these as well as assets management. Finally, the developers recognised that lack of staff capabilities would be a barrier for implementation and had thus recommended development of training standards. The influence of insufficient funds for MHP, existing MHP programme components, and lack of staff capabilities was also identified in the review by Koppelaar et al, 2009. The current study echoes the importance of these factors when implementing MHP programmes.

Summary of the findings

The developers' perception for the ways in which the MHPG would work – the programme theory - identified contextual factors at supra-macro, macro, and micro level, but no contextual factors were seen at the meso level. Supra-macro level contextual factors were grouped into: Society, e.g. changing demographics; Parallel programmes, e.g. H&S legislation and incentive programmes; Industry related, e.g. budget constraints and low involvement from MoH; and MHP related, e.g. increased number of MHP injuries. Macro level contextual factors were

grouped into: Organisational, e.g. lack of priority for MHP; and MHP programme, e.g. complexity of multifaceted programmes. The contextual factors at the Micro level contextual factors formed a single group: Individual, e.g. resistance towards change. The contextual factors also related to three themes: ethical, e.g. main focus on patient safety; economic, e.g. cost of implementation of MHP; and legal, e.g. MoH healthcare facility guidelines. The ethical theme had contextual factors at all three levels. The economic theme had contextual factors at supra-macro and macro levels. In contrast, the legal theme only had contextual factors at the supra-macro level.

The main users and the key people for implementation of the MHPG were MHP coordinators, H&S managers, and managers in charge of H&S. All in the healthcare sector involved with MHP would be expected to know the content of the sections in the guideline. However, the dissemination strategy would mainly reach the MHP coordinators, H&S managers, and other people committed to MHP, but not senior management, facility managers and designers or architects, and engineers. This changed the programme theory from targeting multiple actors to only targeting or reaching a group already committed to H&S and MHP. Further, the public hospitals were expected to be the driver of change, thus the programme theory did not make it clear how the guidelines would be aligned to the needs of other sectors. The developers imagined the MHPG should reach the users through mail, email, conferences, and the internet.

The implementation process of the MHPG relied on the abilities of the H&S managers and the MHP coordinators to drive the process. This included becoming aware of and choosing to use the MHPG as well as persuading the people with organisational power to support and be involved in the implementation. Further, they would also have to engage and involve front-line staff. However, the MHPG did not provide specific guidance on how to do this.

The MHPG predominately used mechanisms/ arguments that were based on ethical and economic reasoning and to a smaller extent legal reasoning. The ethical reasoning focused on quality of care and highlighted that the MHPG was evidence-based and built on best practice. The economic reasoning focused on reducing the cost of MHP and that implementation

provided return on investment. These arguments could be used to help persuade managers to support implementation.

The main intended outcome of the MHPG was a reduction of injuries caused by MHP, i.e. the safe management of risks related to MHP. Further, the guidelines promise ethical (improved patient care and safety), economic (return on investment, and reduced cost related to MHP injuries, sick leave, and staff turnover), and legal outcomes (compliance with H&S legislation). However, the outcomes would not be achieved unless the organisation implements all components of the MHPG.

Limitations and strengths

A limitation of the study was that there was a substantial time difference between the information originating from the different sources. The MHPG was published in 2012, whereas the interviews were conducted at the end of 2015. This allowed the developers to look retrospectively at the MHPG, which potentially altered their perception of how they had imagined the MHPG would work when they developed it.

However, a strength was the use of a methodology that allowed for the inclusion of information from a range of different sources. Including different data sources (Document analysis and developer interviews) gives a more comprehensive view of the programme theory of the MHPG. The interviews provided additional information about the intentions of the MHPG that was not documented in the background document or in the MHPG itself.

Another strength of the study was the difference in format of the data sources. The MHPG and ACC documents were in a written, to some extent rigid, format that was used to guide potential users, yet at the same time create consensus among all of the contributing parties. In contrast, the interviews were verbal, much less structured and the interviewees only had to account for their own, personal, views. As a result, the interviews enabled the developers to more freely present their personal interpretation of the process of creating the MHPG.

Link to next study

Solely identifying the programme theory of the MHPG does not explain the increased MHP related injury claims rates and claims costs following the introduction of the MHPG. However, knowing the programme theory creates a foundation for assessing the potential reasons for the observed increase. Hence, we are now in a position that allows us to examine if the intended users of the MHPG are actually aware of the existence of the MHPG and whether they use it.

Chapter 4. Awareness and Use of the MHPG

This chapter is the basis for Paper 3 – *" Awareness and use of a national moving and handling people guideline'* by Lidegaard, M., Olsen, KB, Legg, SJ, and Douwes, J (See appendix 3).

The specific objectives of this study were to identify:

i. to what extent intended users were aware of the MHPG
ii. how they became aware of them
iii. if they were aware of them, whether they had read and used sections of them.

The study also assessed the relationship between organisational size and awareness of the MHPG.

Methods

Study 3 is based on a questionnaire survey that was conducted from April to October 2016 among healthcare professionals in New Zealand.

Data Collection and Participants

The questionnaire was administered using an internet-based platform and distributed by email as an open survey (Eysenbach, 2005) through professional associations (Moving and Handling Association of New Zealand; Human Factors and Ergonomics Society of New Zealand), networks (Public hospital MHP coordinators network; Network of OHS managers in residential care), MHP equipment suppliers, a trade union (New Zealand Nurses Organisation), employers' associations (Home & Community Health Association; Care Association New Zealand), an industry training organisation (Careerforce), and ACC mailing lists (a list of H&S managers and recipients of the MHPG). These were selected in order to reach the target organisations and intended users, which were identified as users by the MHPG programme theory (Study 2).

The questionnaire was distributed to 3,025 people, of which 689 (22.6%) replied. Questionnaire responses were compared across subsectors (public hospitals, private hospitals, residential aged care, training and education, and multiple subsectors; n=495) and work roles (H&S managers,

MHP coordinators, H&S representatives, managers, therapists, and carers; n=463) with 407 respondents included in both (sector and job title/role) comparisons. Respondents who did not work in the selected subsectors and work roles were excluded, so the final study population included 552 respondents.

Questionnaire

The development of the questionnaire was guided by the programme theory for the MHPG (Study 2) and an earlier survey of the New Zealand healthcare sector (Thomas and Thomas, 2010). An initial draft of the questionnaire was trialled by an industry advisory group and a H&S management group at a New Zealand District Health Board and revised based on their feedback.

The questionnaire contained open-ended and closed questions with answer categories: *'Yes'; 'No';* and *'Do not know/unsure'*. The specific questions analysed in this study asked about awareness of the MHPG, and whether sections of the MHPG had been read and used: *'Are you aware of the 'Moving and Handling People: The New Zealand Guidelines (2012)?'*. If the answer was 'yes', the next question was: *'Have you, at any time read any sections of the 'Moving and Handling People: The New Zealand Guidelines (2012)?'* and they were also asked: *'Have you, at any time used any sections of the 'Moving and Handling People: The New Zealand Guidelines (2012)'?'* This was followed by: *'How did you become aware of the 'Moving and Handling People: The New Zealand Guidelines (2012)?'*. The answer category for this last question was an open-ended narrative description.

Statistical analysis

Statistical analyses were performed using SPSS (SPSS version 25.0, IBM, Armonk, NY, USA) and the SAS statistical software for Windows (version 9.3) (Cary, NC, USA).

As noted above, all analyses were carried out separately for subsector and work role. For analyses comparing responses across subsectors, respondents working in more than one subsector were allocated to a new category, "multiple sectors". For comparisons comparing work roles, a hierarchy was created as follows: H&S manager; MHP coordinator; H&S representative; manager; therapists; carer. This meant that if a respondent had identified as being both a therapist and MHP coordinator, then they were analysed as MHP coordinator. The hierarchy

was based on the MHPG programme theory that identified these roles as critical for the implementation of a MHP programme (Study 2).

The proportions of 'Do not know/ Unsure' responses for questions on awareness, having read the guideline, and having used it were consistently small (6.3-15.1%). We therefore merged the 'No and Do not know/ Unsure' categories into a single "No" category. Binomial logistics regression estimating odds ratio and 95% confidence intervals (95%CI) was applied to assess differences between different subsectors and work roles, respectively. Public hospitals and H&S managers acted as the reference category, respectively. Statistical significance was defined as $p<0.05$. Bonferroni adjustment was applied for multiple comparisons.

The responses to the question about how the respondents became aware of the MHPG were analysed thematically (Braun and Clarke, 2006). In addition, an analysis assessing the influence of organisational size (<50; 50 to 99; >99) on awareness of the MHPG was conducted using binomial logistics regression. Organisation with more than 99 employees acted as the reference group.

Since carers were not the main target group of the MHPG (Study 2) and a low proportion of carers were aware of the MHPG (see below) and the distribution of respondents working as carers across the different subsectors was uneven (the majority of carers worked in public hospitals), a sensitivity analysis was undertaken excluding all carers.

Results

The largest group of respondents from the sector cohort worked within public hospitals (44.8%; Table 4.1). Carers made up the majority of respondents from public and private hospitals i.e. 76.1% and 50.0%, respectively. MHP coordinators made up 25.8 % of the respondents working in multiple sectors. Of those working in public hospitals, 95% were in organisations with >100 employees. In contrast, this was the case for only 32.3% of those working in residential aged care. The majority of respondents from the work role cohort were carers (58.5%) and 80.4% employed as carers were in organisations with >100 employees (Table 4.1).

Table 4.1a *Distribution of respondents stratified by subsector, work role, and organisation size. MHP = moving and handling people; H&S = health and safety*

Role	H&S manager	MHP coordinator	H&S representative	Manager	Therapist	Carer	Other	Total	Employees in organisation (%)		
Subsector	**Number of respondents (% of subsector/% of Work role)**								**<49**	**50-99**	**>100**
Public hospital	7 (3.2/21.2)	7 (3.2/14.9)	7 (3.2/25.0)	9 (4.1/15.3)	1 (0.5/4.0)	169 (76.1/62.4)	22 (9.9/24.7)	222 (40.2)	4 (1.8)	7 (3.2)	211 (95.0)
Private hospital	3 (8.8/9.1)	5 (14.7/10.6)	1 (2.9/3.6)	4 (11.8/6.8)	2 (5.9/8.0)	17 (50.0/6.3)	2 (5.9/2.2)	34 (6.2)	4 (11.8)	9 (26.5)	21 (61.8)
Residential aged care	6 (6.3/18.2)	4 (4.2/8.5)	13 (13.5/46.4)	26 (27.1/44.1)	3 (3.1/12.0)	31 (32.3/ 11.4)	13 (13.5/14.6)	96 (17.4)	37 (38.5)	28 (29.2)	31 (32.3)
Home care	3 (15.0/9.1)	3 (15.0/6.4)	0 (0.0/0.0)	4 (20.0/6.8)	1 (5.0/4.0)	7 (35.0/2.6)	2 (10.0/2.2)	20 (3.6)	4 (20.0)	2 (10.0)	14 (70.0)
Training/ Education	1 (2.9/3.0)	2 (5.7/4.3)	1 (2.9/3.6)	2 (5.7/3.4)	5 (14.3/20.0)	2 (5.7/0.7)	22 (62.9/24.7)	35 (6.3)	5 (14.3)	4 (11.4)	26 (74.3)
Multiple subsectors	7 (7.9/21.2)	23 (25.8/48.9)	2 (2.2/7.1)	6 (6.7/10.2)	8 (9.0/32.0)	15 (16.9/5.5)	28 (31.5/31.5)	89 (16.1)	33 (37.1)	13 (14.6)	43 (48.3)
Other	6 (10.7/ 18.2)	3 (5.4/6.4)	4 (7.1/14.3)	8 (14.3/13.6)	5 (8.9/20.0)	30 (53.6/11.1)	0 (0.0/0.0)	56 (10.1)	20 (35.7)	9 (16.1)	27 (48.2)
Total	33 (5.4)	47 (8.9)	28 (4.8)	59 (10.3)	25 (4.0)	271 (48.6)	89 (17.9)	522 (100)	107 (19.4)	72 (13.0)	373 (67.6)
<49	11 (33.3)	13 (27.7)	10 (35.7)	21 (35.6)	9 (36.0)	25 (9.2)	18 (20.2)	107 (19.4)	-	-	-
50-99	2 (6.1)	9 (19.1)	4 (14.3)	14 (23.7)	4 (16.0)	28 (10.3)	11 (12.4)	72 (13.0)	-	-	-
>100	20 (60.6)	25 (53.2)	14 (50.0)	24 (40.7)	12 (48.0)	218 (80.4)	60 (67.4)	373 (67.6)	-	-	-

Analysis by subsectors

Respondents working in residential aged care, training/education, and multiple subsectors were 3.13 (95%CI 1.89, 5.26), 6.21 (95%CI 2.50, 16.67), and 5.08 (95%CI 2.86, 9.09) times more likely to be aware of the MHPG than those working in public hospitals, respectively (Table 4.2). Sensitivity analyses excluding carers showed similar results (Table 4.3). Respondents working in residential aged care, home care, training/education, and multiple subsectors were 12.35 (95%CI 4.17, 33.33), 9.90 (95%CI 1.27, 100.00), 7.41 (95%CI 2.13, 25.00), and 6.99 (95%CI 2.94, 16.67) times more likely to read any section of the MHPG than respondents working in public hospitals, respectively (Table 4.2). Although sensitivity analyses resulted in increased ORs for residential aged care and multiple subsectors, the overall pattern was very similar (Table 4.3). Finally, those working in residential aged care, training/education, and multiple subsectors were 5.81 (95%CI 2.70, 12.50), 2.95 (95%CI 1.23, 7.14), and 4.39 (95%CI 2.17, 9.09) times more likely to use any section of the MHPG (Table 4.2), with only small changes observed for analyses excluding carers (Table 4.3).

The majority of respondents became aware of the MHPG through 'Multiple distribution channels' (35.2 %), 'Training' (15.1 %), and 'At work' (13.2 %) (Table 4.4). The largest contributions to 'Multiple distribution channels' came from 'Search/ research' (21.2 %), 'Other' (17.9 %), 'At work' (13.7 %) and 'Training' (13.7 %). More respondents from public hospitals (25.4 %) and private hospitals (25.0 %) became aware of the MHPG through training compared to the remaining subsector (0.0 to 13.5 %).

Table 4.2 *Frequency of respondents in the sector cohort being aware of the MHPG, having read, and used any section of the MHPG stratified by subsector.* OR = *Odds ration for 'Yes' vs. 'No/ Unsure' for being aware of the MHPG, having read, and used any section of the MHPG, respectively, compared to Public hospitals; 95%CI = 95% confidence intervals; P=Bonferroni adjusted p-values.*

Subsector	Awareness					Read any section					Used any section				
	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P
Public hospital	97 (43.7)	89 (40.1)	36 (16.2)	1		72 (56.7)	39 (30.7)	16 (12.6)	1		64 (50.4)	45 (35.4)	18 (14.2)	1	
Private hospital	17 (50.0)	10 (29.4)	7 (20.6)	1.29 (0.63, 2.63)	0.492	12 (66.7)	5 (27.8)	1 (5.6)	1.53 (0.54,4.35)	0.425	9 (50.0)	7 (38.9)	2 (11.1)	0.98 (0.37, 2.63)	0.975
Residential aged care	68 (70.8)	14 (14.6)	14 (14.6)	3.13 (1.89, 5.26)	<0.001	65 (94.2)	2 (2.9)	2 (2.9)	12.35 (4.17, 33.33)	<0.001	59 (85.5)	6 (8.7)	4 (5.8)	5.81 (2.70/ 12.50)	<0.001
Home care	13 (65.0)	6 (30.0)	1 (5.0)	2.39 (0.92, 6.25)	0.074	13 (92.9)	1 (7.1)	0 (0.0)	9.90 (1.27, 100.00)	0.029	11 (78.6)	3 (21.4)	0 (0.0)	3.61 (0.96/ 14.29)	0.057
Training/ Education	29 (82.9)	6 (17.1)	0 (0.0)	6.21 (2.50, 16.67)	<0.001	29 (90.6)	2 (6.3)	1 (3.1)	7.41 (2.13, 25.00)	0.002	24 (75.0)	7 (21.9)	1 (3.1)	2.95 (1.23/ 7.14)	0.015
Multiple subsectors	71 (79.8)	12 (13.5)	6 (6.7)	5.08 (2.86, 9.09)	<0.001	64 (90.1)	6 (8.5)	1 (1.4)	6.99 (2.94, 16.67)	<0.001	58 (81.7)	11 (15.5)	2 (2.8)	4.39 (2.17/ 9.09)	<0.001
Total	295 (59.5)	137 (27.6)	64 (12.9)		<0.001	255 (77.0)	55 (16.6)	21 (6.3)		<0.001	225 (68.0)	79 (23.9)	27 (8.2)		<0.001

Table 4.3 *Sensitivity analysis of the sector cohort without including carers. Frequency of respondents being aware of the MHPG, having read, and used any section of the MHPG stratified on subsector. OR = Odds ration for 'Yes' vs. 'No/ Unsure' for being aware of the MHPG, having read, and used any section of the MHPG, respectively, compared to Public hospitals; 95%CI = 95% confidence intervals; P=Bonferroni adjusted p-values.*

Subsector	Awareness					Read any section					Used any section				
	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P
Public hospital	29 (61.7)	15 (31.9)	3 (6.4)	1		23 (65.7)	9 (25.7)	3 (8.6)	1		19 (54.3)	12 (30.0)	4 (11.8)	1	
Private hospital	12 (75.0)	2 (12.5)	2 (12.5)	1.86 (0.52, 66.67)	0.537	9 (75.0)	3 (25.0)	0 (0.0)	1.56 (0.36, 6.67)	0.553	7 (58.3)	4 (33.3)	1 (8.3)	1.18 (0.31, 4.35)	0.808
Residential aged care	50 (83.3)	4 (6.7)	6 (10.0)	3.11 (1.27, 7.69)	0.013	48 (98.0)	1 (2.0)	0 (0.0)	25.00 (3.03, 100.00)	0.003	44 (89.8)	5 (10.2)	0 (0.0)	7.41 (2.38, 25.00)	0.001
Home care	11 (78.6)	2 (14.3)	1 (7.1)	2.28 (0.56, 9.09)	0.251	11 (84.6)	2 (15.4)	0 (0.0)	2.87 (0.55, 14.29)	0.213	9 (69.2)	4 (30.8)	0 (0.0)	1.89 (0.49, 7.14)	0.354
Training/ Education	28 (84.8)	5 (15.2)	0 (0.0)	3.47 (1.14, 11.11)	0.029	28 (90.3)	2 (6.5)	1 (3.2)	4.88 (1.22, 20.00)	0.025	23 (74.2)	7 (22.6)	1 (3.2)	2.42 (0.85, 6.67)	0.097
Multiple subsectors	62 (87.3)	8 (11.3)	1 (1.4)	4.27 (1.72, 11.11)	0.002	58 (95.1)	2 (3.3)	1 (1.6)	10.10 (2.63, 33.33)	0.001	51 (83.6)	8 (13.1)	2 (3.3)	4.29 (1.67, 11.11)	0.003
Total	192 (79.7)	36 (14.9)	13 (5.4)		0.033	177 (88.1)	19 (9.5)	5 (2.5)		<0.001	153 (76.1)	40 (19.9)	8 (4.0)		0.003

Table 4.4 *How respondents became aware of the MHPG stratified by subsector and work role, respectively. MHP = moving and handling people; AAC = Accident Compensation Corporation; MHANZ = Moving and Handling Association of New Zealand; MHPG = 'Moving and Handling People: The New Zealand Guidelines' (2012)*

Awareness Channel	Subsector							Work role						
	Public hospital	Private hospital	Residential aged care	Home care	Training/ Education	Multiple subsectors	Total	H&S manager	MHP coordinator	H&S representative	Manager	Therapist	Carer	Total
	Frequency (%)							Frequency (%)						
ACC	3 (4.8)	1 (8.3)	7 (13.5)	0 (0.0)	3 (13.0)	4 (6.8)	18 (8.2)	5 (20.0)	2 (4.9)	0 (0.0)	6 (20.7)	3 (12.5)	1 (1.5)	17 (8.6)
At work	10 (15.9)	2 (16.7)	8 (15.4)	0 (0.0)	4 (17.4)	5 (8.5)	29 (13.3)	2 (8.0)	3 (7.3)	0 (0.0)	2 (6.9)	2 (8.3)	12 (17.9)	21 (10.6)
Training	16 (25.4)	3 (25.0)	7 (13.5)	0 (0.0)	2 (8.7)	5 (8.5)	33 (15.1)	2 (8.0)	3 (7.3)	1 (8.3)	3 (10.3)	4 (16.7)	20 (29.9)	33 (16.7)
Via colleague	5 (7.9)	2 (16.7)	1 (1.9)	0 (0.0)	3 (13.0)	1 (1.7)	12 (5.5)	2 (8.0)	1 (2.4)	1 (8.3)	0 (0.0)	2 (8.3)	3 (4.5)	9 (4.6)
General awareness/ knowledge	0 (0.0)	0 (0.0)	1 (1.9)	2 (20.0)	0 (0.0)	2 (3.4)	5 (2.3)	0 (0.0)	2 (4.9)	1 (8.3)	2 (6.9)	0 (0.0)	2 (3.0)	7 (3.5)
The launch of MHPG	1 (1.6)	1 (8.3)	1 (1.9)	0 (0.0)	0 (0.0)	6 (10.2)	9 (4.1)	2 (8.0)	5 (12.2)	0 (0.0)	2 (6.9)	1 (4.2)	0 (0.0)	10 (5.1)
Involved in MHPG revision/ development	1 (1.6)	0 (0.0)	0 (0.0)	1 (10.0)	2 (8.7)	4 (6.8)	8 (3.7)	2 (8.0)	3 (7.3)	0 (0.0)	1 (3.5)	1 (4.2)	1 (1.5)	8 (4.0)
Search/ research	3 (4.8)	0 (0.0)	4 (7.7)	1 (10.0)	0 (0.0)	4 (6.8)	12 (5.5)	2 (8.0)	3 (7.3)	1 (8.3)	1 (3.5)	1 (4.2)	3 (4.5)	11 (5.6)
Other	6 (9.5)	0 (0.0)	4 (7.7)	1 (10.0)	1 (4.4)	4 (6.8)	16 (7.3)	0 (0.0)	2 (4.9)	0 (0.0)	1 (3.5)	2 (8.3)	6 (9.0)	11 (5.6)
Multiple channels	18 (28.6)	3 (25.0)	19 (36.5)	5 (50.0)	8 (34.8)	24 (40.7)	77 (35.2)	8 (32.0)	17 (41.5)	8 (66.7)	11 (37.9)	8 (33.3)	19 (28.4)	71 (35.9)
Total	63 (100.0)	12 (100.0)	52 (100.0)	10 (100.0)	23 (100.0)	59 (100.0)	219 (100.0)	25 (100.0)	41 (100.0)	12 (100.0)	29 (100.0)	24 (100.0)	67 (100.0)	198 (100.0)

Analysis by work role

Respondents working as carer were less likely to be aware (OR 0.12, 95%CI 0.04, 0.30) of, or to have read (OR 0.09, 95%CI 0.02, 0.40), the MHPG than respondents working as H&S managers (Table 4.5). Respondents working as MHP coordinator, and therapist were 3.73 (95%CI 1.00, 1.37), and 8.70 (95%CI 1.01, 100.) times more likely to use any section of the MHPG than respondents working as H&S managers.

The majority became aware of the MHPG through 'Multiple distribution channels' (35.9%), 'Training' (16.7%), 'At work' (10.6%), and 'ACC (8.6%) (Table 4.4). The largest contributions to 'Multiple distribution channels' came from 'Search/research' (21.2%), 'Other' (17.9%), 'At work' (13.7%) and 'Training' (13.7%). More H&S managers (20.0%) and managers (20.7%) became aware through ACC compared to the other work roles (0.0-12.5%). More carers (29.9%) became aware through training compared to remaining work roles (7.3-16.7%). More H&S representatives (66.7%) and fewer carers (28.4 %) became aware through multiple channels compared to the remaining work roles (32.0-41.5%). Carers (17.9%) were more often reached through work than the other work roles (0.0-8.3%). The launch of the MHPG mostly reached MHP coordinators (12.2%) compared to the other work roles (0.0-0.9%).

Table 4.5 *Frequency of respondents in the work role cohort being aware of the MHPG, having read, and used any section of the MHPG stratified on work role. ; MHP = moving and handling people; OR = Odds ration for 'Yes' vs. 'No/ Unsure' for being aware of the MHPG, having read, and used any section of the MHPG, respectively, compared to H&S manager; 95%CI = 95% confidence intervals; P=Bonferroni adjusted p-values.*

Work role	Awareness					Read any section					Used any section				
	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P
H&S manager	28 (84.8)	3 (9.1)	2 (6.1)	1		28 (93.3)	2 (6.7)	0 (0.0)	1		22 (73.3)	8 (26.7)	0 (0.0)	1	
MHP coordinator	44 (93.6)	2 (4.3)	1 (2.1)	3.53 (0.58, 11.11)	0.211	42 (93.3)	2 (4.4)	1 (2.2)	1.00 (0.16, 6.25)	1.000	41 (91.1)	3 (6.7)	1 (2.2)	3.73 (1.00, 1.37)	0.049
H&S representative	18 (64.3)	6 (21.4)	4 (14.3)	0.32 (0.09, 1.10)	0.070	17 (89.5)	2 (10.5)	0 (0.0)	0.61 (0.08, 4.76)	0.633	13 (68.4)	4 (21.1)	2 (10.5)	0.79 (0.22, 2.78)	0.711
Manager	41 (69.5)	10 (16.9)	8 (13.6)	0.41 (0.14, 1.22)	0.109	36 (85.7)	5 (11.9)	1 (2.4)	0.43 (0.08, 2.27)	0.321	30 (71.4)	10 (23.8)	2 (4.8)	0.91 (0.32, 2.56)	0.859
Therapist	25 (100.0)	0 (0.0)	0 (0.0)	-	0.063	25 (100.0)	0 (0.0)	0 (0.0)	-	0.495	24 (96.0)	1 (4.0)	0 (0.0)	8.70 (1.01, 100.00)	0.049
Carer	107 (39.5)	109 (40.2)	55 (20.3)	0.12 (0.04, 0.30)	<0.001	76 (56.3)	41 (30.4)	18 (13.3)	0.09 (0.02, 0.40)	0.002	76 (56.3)	39 (28.9)	20 (14.8)	0.47 (0.19, 1.12)	0.090
Total	263 (56.8)	130 (28.1)	70 (15.1)		<0.001	224 (75.7)	52 (17.6)	20 (6.8)		<0.001	206 (69.6)	65 (22.0)	25 (8.4)		<0.001

Organisational size and awareness of the MHPG

Table 4.6 shows the distribution of respondents' awareness of the MHPG stratified by organisational size for the sector and work role cohorts. In this table carers have been excluded because the distribution of respondents working as carers was uneven across the different subsectors. Respondents working in organisations with 49 or less employees were 2.36 (95%CI 1.06, 5.26) times more likely to be aware of the MHPG than respondents working in organisations with 100 or more employees.

Table 4.6 *Sensitivity analysis (i.e. excluding carers) of the sector cohort. Frequency of respondents from the sector cohort and the work role cohort being aware of the MHPG stratified by organisation size. OR = odds ratio for 'Yes' vs. 'No/ Unsure' for being aware of the MHPG; P=Bonferroni adjusted p-values*

Organisations size	Subsector					Work role				
	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P
100 or more employees	99 (73.9)	28 (20.9)	7 (5.2)	1		75 (78.9)	13 (13.7)	7 (7.4)	1	
50-99 employees	33 (86.8)	3 (7.9)	2 (5.3)	2.33 (0.85, 6.25)	0.102	28 (84.8)	3 (9.1)	2 (6.1)	1.49 (0.51, 4.35)	0.463
49 or less employees	60 (87.0)	5 (7.2)	4 (5.8)	2.36 (1.06, 5.26)	0.036	53 (82.2)	5 (7.8)	6 (9.4)	1.29 (0.57, 2.94)	0.547
Total	192 (79.7)	36 (14.9)	13 (5.4)		0.040	156 (81.3)	21 (10.9)	15 (7.8)		0.772

Discussion

Overall awareness of the MHPG for the work role cohort was 56.8 %. High proportions of MHP coordinators (93.6 %) and therapists (100 %) were aware of the MHPG. The main intended user groups (Study 2) were H&S managers, MHP coordinators, therapists, and managers with responsibility for MHP. Thus it would be expected that more respondents in these roles were aware of the MHPG. The overall level of awareness amongst the main intended user groups was similar to findings of a literature review on clinical guidelines by Cabana et al, 1999, where awareness was at least 80 % in 23 of the 46 included studies. It is also similar to that reported by Hendrick et al, 2013, in which 82 % of physiotherapists were aware of a low back pain guideline (Hendrick et al., 2013). The respondents in the present study had a diverse pattern of becoming aware, including via ACC and the launch of the MHPG. This may explain why such a high percentage of the MHP coordinators and therapists were aware of the MHPG.

In contrast, few carers (39.5%) were aware of the MHPG. Carers conduct MHP and would be expected to follow the organisation's MHP programme and procedures and attend MHP training but they might not know or be aware of the MHPG whether or not the programmes and training were based on the MHPG. The results showed that carers mostly became aware of the guidelines through training. Hence, lower awareness of the MHPG seems a logical consequence of how the content of the MHPG was expected to be implemented. However, more carers in the present study were aware of the MHPG than findings of awareness reported in a study of nurses. Rose and colleagues reported that 29% of intensive care unit nurses were aware of guidelines for pain assessment and management developed by a professional society (Rose et al., 2012). On the other hand, Rodgers reported a substantially higher awareness as, on average, 77.3 % of nurses in medical and surgical wards at hospitals were aware of 14 specific evidence-based practices (Rodgers, 2000). The level of awareness reported in the present study might be affected by the way carers were approached. The main distribution channel of the questionnaire to carers (the New Zealand Nurses Organisation) specifically targeted workplace representatives and nurse managers, who were expected to have higher awareness than the rest of the carers. As a result, workplace representatives might be overrepresented and thereby skewing the level of

awareness amongst carers, hence the awareness amongst carers, in general, might be lower than reported.

Guidelines in the healthcare sector are often targeted at specialist work roles, most often the physician (Gagliardi et al., 2011). Although the MHPG was thought to be relevant to all work roles in the healthcare sector, H&S managers, MHP coordinators and managers (with responsibility for MHP) were identified as the main people who would implement the MHPG (Study 2). This distinction in targeted work role could explain why more MHP coordinators and H&S managers (borderline significant, p =0.060) were aware of the MHPG. However, the higher proportion of respondents being aware could also be explained by ACC having distribution channels that directly targeted these work roles. ACC used a suite of passive distribution channels and many of the respondents were reached by more than one as well as a higher proportion of different target user groups were reached by different channels. A higher proportion of MHP coordinators were reached by the Launch of the MHPG, more H&S managers and managers were reached through contact with ACC, and more carers were reached through training and at work. This emphasises the importance of having multiple distribution channels when aiming at reaching multiple user groups.

Overall awareness of the MHPG for the sector cohort was 59.5 %. It was 79.7% when the carers were removed from this cohort in the sensitivity analysis. Fewer respondents within public hospitals than the other subsectors were aware of the MHPG before (43.7 %) and after removal of carers (61.7 %). Similarly, fewer respondents (including carers) from private hospitals than the rest of the subsectors were aware of the MHPG (50.0 %). In contrast, more respondents (including carers) working within multiple subsectors were aware of the MHPG (79.8 %). However, the results from the sensitivity analysis showed that there were no differences between respondents from subsectors. This indicates that the pattern seen for the public and private hospitals to some extent can be explained by fewer carers being aware of the MHPG. Based on the programme theory underlying the MHPG, more respondents from public hospitals were expected to be aware of the MHPG because the sector was seen as a leader in implementing the

MHPG. A possible explanation for the difference between respondents employed in public and private hospitals, and respondents working in multiple subsectors may be that people that work in multiple subsectors are commonly consultants, who provide specialised knowledge and advice about MHP to organisations. They might more actively search for information on MHP and participate in meetings and conferences. This is supported by the fact that a higher proportion of respondents from multiple subsectors were MHP coordinators, and therapists compared to other subsectors. In addition, working within multiple subsectors might increase the likelihood of being introduced to the MHPG.

Fewer respondents from larger organisations were aware of the MHPG, whereas more respondents from smaller organisations were aware. No previous studies have looked at awareness of guidelines in relation to subsectors in the healthcare sector or in relation to organisational size. However, Rodgers (2000) reported that there was no difference in the awareness of research-based practices among nurses employed in different size of hospitals. Because of the more hierarchical structure of large organisations, their employees may be less likely to know staff in specialist functions, such as MHP coordinators and H&S managers. This could result in poorer dissemination across the organisation due to impaired communication. However, data from Study 3 do not fully support this argument, as there were no major differences with respect to how respondents became aware of the MHPG between respondents working in public hospitals (large organisations) and residential aged care (smaller organisations).

Overall, 75.7 % of respondents in the work role cohort, who indicated that they were aware of the MHPG, had read sections of the MHPG and 69.6 % had used them. A higher proportion of respondents working as therapists (96.0 %), as MHP coordinators (91.1 %) and as H&S managers (73.3 %) had used the MHPG, whilst fewer carers had read (56.3 %) and used (56.3 %) them, compared to other work roles. These findings are consistent with the programme theory (Study 2), in which, H&S managers, MHP coordinators, and therapists were expected to use the MHPG to develop and design the organisation's MHP programme, whereas carers were expected to follow the organisation's programmes and maybe not use the MHPG directly. In

comparison, Kotzeva and colleagues reported that 90.2 % of hospital physicians used a suite of clinical guidelines within a national database of healthcare guidelines (Kotzeva et al., 2014). A direct comparison is difficult as the physicians report on use of clinical guidelines in general, whereas the present study assessed use of one specific guideline. Nevertheless, the overall use reported by Kotzeva et al, are higher than the present study. However, when looking at the main users of the MHPG, the numbers are quite similar.

The percentage of carers that had used the MHPG when they were aware of them was lower than reported in previous studies that looked at nurses. Rodgers (2000) found that 66.8 % of nurses in medical and surgical wards at hospitals used research-based evidence. Another study reported that 65 % of nurses in an intensive care unit used clinical guidelines, especially guidelines endorsed by nurses' professional organizations (Sinuff et al., 2007). One reason for the lower use in Study 3 could be due to our selection criteria. We aimed for a 'clean' carers category where respondents would not have any other work roles or responsibilities, e.g. H&S representatives. Thus, these respondents were moved to other categories. By doing so, we removed the respondents most likely to use the MHPG from the carers' category, hence lowering use among the carers. Further, it could be argued that it is unrealistic to expect carers to use a MHP guideline as much as nurses are expected to use clinical guidelines, especially since clinical guidelines are directly linked to core business. In that light, having a slightly lower use among the carers seems predictable.

In previous studies, barriers for use of clinical guidelines by occupational therapists were primarily associated with the expectation of the patient, lack of knowledge from colleagues' as well as their attitudes and behaviours towards the clinical guidelines, and how work was organised (Poitras et al., 2011). For physiotherapists, barriers mostly related to how clinicians' understood the guidelines, the level of compatibility between own practice and the guidelines, how relevant the clinicians perceived the guidelines to be, and how much they agreed with the guidelines (Côté et al., 2009). The proportion of therapists using the MHPG in the present study suggests that the barriers identified by Poitras et al. and Côté et al. did not impact therapists' use

of the MHPG. Alternatively, the barriers identified for clinical guidelines do not apply to MHPG maybe because they do not relate to core business or are legally required, so may receive different attention, or it could be that the MHPG were designed to fit the environment that the therapists worked in. Whilst the barriers for the use of clinical guidelines has previously been studied (Francke et al., 2008; Grimshaw et al., 2004), barriers for the use of MHP guidelines is still rather unknown and should, therefore, be explored in future studies.

Within the sector cohort, 77.0 % of the respondents who were aware of the MHPG had read sections of them and 68.0 % had used them. Fewer respondents within public hospitals had read (56.7 %) and had used (50.4 %) them. Similarly, fewer respondents from private hospitals than other subsectors had read (66.7 %) and used (50.0 %) the MHPG. In contrast, more respondents (94.2 %) working in residential aged care had read sections of the MHPG. The differences between public hospitals and residential aged care could be explained by more respondents working in hospitals being carers. When carers were excluded from the analysis still fewer respondents from the public hospitals had read sections of the MHPG. In contrast, exclusion of carers resulted in no differences between sectors with respect to use of the MHPG. This suggests that fewer from public hospitals read the MHPG despite being aware of it. This finding suggests that public hospitals might not be the subsector that drives the implementation of the MHPG as it was expected to be (Study 2).

The overall findings suggest that a high proportion of the main intended user groups were aware of the MHPG and a lower proportion of carers were aware. More respondents from public hospitals were expected to be aware of the MHPG as this sector was seen as the leader in this area, but the findings of the present study did not support this. The respondents became aware of the MHPG through several dissemination channels included in ACC's dissemination strategy. A very high proportion of the respondents had read and used the MHPG when they were aware of them, particularly respondents from the main intended user groups. However, a lower proportion of respondents from public hospitals had read the MHPG.

Summary of the findings

Whilst overall awareness and use of the MHPG by intended users was modest, it was very high for most of the work roles that were important for the implementation of the MHPG (MHP coordinators, therapists, and H&S managers). Very few carers were aware of or used the MHPG. Whilst more respondents working in multiple sectors, probably advisors and consultants, were aware of the MHPG, fewer employees in large public hospitals were aware of or used the MHPG, despite public hospitals being identified as the main target subsector. Thus, organisational size seems to influence the awareness of the MHPG. Intended users became aware of the MHPG in different ways: H&S managers via ACC: MHP coordinators via guideline launch: carers via their work. These findings indicate that dissemination of a MHP guideline needs to build on a variety of channels in order to reach all intended users.

Limitations and strengths

A potential limitation of the study was that the overall response rate in the survey was 22.5 %. This is similar to other questionnaire surveys in the healthcare sector (Rose et al., 2012), but – as for all such studies - begs the question about it being representative of the entire New Zealand healthcare sector. The distribution strategy was tailored so that it would capture a large proportion of relevant work roles responsible for implementing the MHPG. However, this approach may overestimate the awareness and use of the MHPG due to participation bias - where an increased proportion of people passionate about MHP chose to answers the questionnaire. If this were true for our study then the real situation in the healthcare sector may be worse than we have reported. This should not be an issue for MHP coordinators or therapists, who have very high awareness and use. However, an overestimation of awareness and use of the MHPG by managers, who only reported moderate awareness and use, yet have high levels of organisational authority, is of specific concern - especially for ACC and the MoH, as they are the main stakeholders for the healthcare sector.

A strength of the study was how the questionnaire was developed; using the knowledge of the industry advisory group to secure wording of questions suited the target respondents and pilot

testing the questionnaire in the industry. This decreased the likelihood of the respondents misinterpreting the questions.

The approach chosen to distribute the questionnaire served as both a strength and a weakness. On one hand, by using healthcare specific third-parties the probability of reaching the intended users of the MHPG was increased, thereby maximising the number of relevant respondents. On the other hand, this approach could potentially be too non-specific, which would increase the risk of approaching a large group of respondents unrelated to MHP, thus most likely lowering the response rate. In order to address this issue, we specifically targeted specific groups of respondents within the third-parties' member group, e.g. only distributing the survey to nurse managers and workplace representatives in the Nurses' union. By doing so, we increased the likelihood of reaching the largest number of respondents relevant to MHP. The distribution strategy introduced a risk of reaching individuals twice due to the possibility of being included on multiple lists. In the invitation and the questionnaire introduction, respondents were instructed to only answer the questionnaire once, no matter the number of invitations, hence reducing the response rate for some distribution channels. This approach was chosen as it allowed us to interact with a suite of third-parties that had various entry-points towards MHP, thereby not excluding a large number of potential respondents from a particular third-party due to the relatively small risk of an overlap with another third-party.

Link to next study

The findings from Study 3 show that the main intended users were fully aware of the existence of the MHPG, hence a lack of awareness cannot be the reason for the increase in MHP-related injury claims rate and claims costs following the introduction of the MHPG. However, we are still unaware of which exact components of the MHPG are being used or whether the use leads to any change. Consequently, we need to assess if there are differences in the familiarity and use of the different components in the MHPG as well as whether there are differences in change following the use of these components.

Chapter 5. Familiarity of intended users with the MHPG sections, - their use and change after use

This chapter is the basis for Paper 4 – *'Familiarity, use, and change after use of the components of a national moving and handling people guideline'* by Lidegaard, M., Olsen, KB, and Legg, SJ (See appendix 4).

The specific objectives of this study were to:

i. identify differences in familiarity with the different sections of the MHPG amongst the intended users
ii. if familiar, identify differences in use of the different sections of the MHPG amongst the intended users
iii. if used, identify differences in change after use of the different sections of the MHPG amongst the intended users.

Methods

Study 4 is based on the same questionnaire survey as study 3, hence the survey was conducted from April to October 2016 among healthcare professionals in New Zealand.

Data Collection and Participants

The data collection and selection of participants are described in detail in study 3. In this study, only the work roles cohort was included. Hence the study only includes respondents who had the following work roles: H&S manager; MHP coordinator; H&S representative; manager; therapists; and carer were included. In this study, the work role cohort consisted of 281 respondents.

Questionnaire

The development of the questionnaire is described in detail in study 3. The specific questions analysed in this study asked about familiarity with the different sections in MHPG, use of the different sections in MHPG, and whether the change had occurred following the use of the sections in MHPG. The question about familiarity of the MHPG was: *'How familiar you are with*

each of the different sections of the 'Moving and Handling People: The New Zealand Guidelines (2012)'(Please give an answer for each section)?' with answer categories: *'Very familiar'; 'Familiar'; 'Somewhat familiar';* and *'Not familiar'*. If the answer was 'Not familiar', the question about use of the different section was skipped. If the answer was 'Very familiar'; 'Familiar'; or 'Somewhat familiar', the next question was: *'Which of the following sections of the 'Moving and Handling People: The New Zealand Guidelines (2012)' have you used (Please give an answer for each section)?'* with answer categories *'Yes'; 'No';* and *'Do not know unsure'*. If the answer was 'no 'or 'do not know/unsure', the question about change after use was skipped. If the answer was 'yes', the next question was: *'Has the use of this/ these section(s) led to any change(s) in your organisation? (Please give an answer for each section)?'* with answer categories *'Yes'; 'No';* and *'Do not know unsure'*.

Statistical analysis

The overall statistical approach is described in detail in study 3. To perform the statistical comparisons for the response categories were dichotomised. For the familiarity question the answer categories 'Very familiar'; 'Familiar'; and 'Somewhat familiar' were merged into a single category: 'Familiar' that was statistically compared against 'Not familiar'. For the questions regarding of use and change after use, the answer categories 'No' and 'Do not know/ Unsure' were merged into a single category: 'No' that was statistically compared against 'Use' and 'Change after use'. Pearson Chi-square test was applied to identify statistically significant differences between the dichotomised categories (within-group difference). Chi-square splitting based on Chi-square contribution analysis was used to identify differences between different work roles (between-group difference), respectively.

Results

Tables 5.1-5.3 show the familiarity with, use of, and change after use for the different work roles stratified on sections (sections 3-13) of the MHPG.

H&S manager

For H&S manager, there was no relationship for familiarity with (X^2 (10, n= 319) = 11.95, p = 0.288.), use of (X^2 (10, n= 268) = 12.83, p = 0.233), and change after use of (X^2 (10, n= 123) = 5.49, p = 0.856) the sections of the MHPG.

Manager

For managers, there was no relationship between familiarity with the sections of the MHPG (X^2 (10, n= 451) = 11.77, p = 0.301). However, there was a significant relationship for use of the sections (X^2 (10, n= 379) = 39.28, p < 0.001). Facility design constituted the largest contribution to the X^2-score. Removing facility design from the analysis resulted in a X^2 (9, n= 349) = 25.20, p = 0.003. The sequential additional removal of techniques (X^2 (8, n= 313) = 16.82, p = 0.032), and risk assessment resulted in a X^2 (7, n= 275) = 8.23, p = 0.313. This indicates that fewer managers used the facility design, while more used the techniques and risk assessment sections compared to the remaining sections.

Further, there was no relationship for change after use the sections (X^2 (10, n= 195) = 3.94, p = 0.950.)

MHP coordinator

For MHP coordinators, there was no relationship between familiarity with the sections of the MHPG (X^2 (10, n= 495) = 16.20, p = 0.094). However, there was a significant relationship for use of the sections (X^2 (10, n= 430) = 67.82, p < 0.001). Facility design constituted the largest contribution to the X^2-score. Removing facility design from the analysis resulted in a X^2 (9, n= 393) = 52.67, p < 0.001. The sequential additional removal of risk assessment (X^2 (8, n= 351) = 39.32, p < 0.001), training (X^2 (7, n= 351) = 25.57, p = 0.001), techniques (X^2 (6, n= 267) = 12.90, p = 0.045), and equipment resulted in a X^2 (5, n= 226) = 3.76, p = 0.59. This indicates that fewer MHP coordinators used the facility design, while more used the risk assessment, training, techniques, and equipment sections compared to the remaining sections.

Further, there was a significant relationship for change after use of the sections (X^2 (10, n= 303) = 18.97, p = 0.041). Techniques constituted the largest contribution to the X^2-score. Removing

techniques from the analysis resulted in a X^2 (9, n= 264) = 12.04, p = 0.211, indicating that more MHP coordinators experienced change after the use of the techniques section compared to the remaining sections.

Therapist

For therapist there was a significant relationship for familiarity with the sections (X^2 (10, n= 275) = 44.28, p < 0.001). Facility design constituted the largest contribution to the X^2-score. Removing facility design from the analysis resulted in a X^2 (9, n= 250) = 34.68, p < 0.001. The sequential additional removal of audit (X^2 (8, n= 225) = 17.02, p = 0.030), and policy development resulted in a X^2 (7, n= 200) = 10.45, p = 0.165. This indicates that fewer therapists were familiar with the facility design, audit, and policy development sections compared to the remaining sections.

Also, there was a significant relationship for use of the sections (X^2 (10, n= 236) = 76.72, p < 0.001). Techniques constituted the largest contribution to the X^2-score. Removing techniques from the analysis resulted in a X^2 (9, n= 211) = 57.59, p < 0.001. The sequential additional removal of risk assessment (X^2 (8, n= 186) = 43.11, p < 0.001), equipment (X^2 (7, n= 168) = 24.11, p = 0.001), and training resulted in a X^2 (6, n= 139) = 9.09, p = 0.169. This indicates that more therapists used the techniques, risk assessment, equipment, and training sections more compared to the remaining sections.

There was no relationship for change after use of the sections (X^2 (10, n= 147) = 10.88, p = 0.367).

H&S representative

For H&S representatives, there was no relationship for familiarity with the sections (X^2 (10, n= 187) = 2.03, p = 0.094). However, there was a significant relationship for use of the sections (X^2 (10, n= 172) = 33.20, p < 0.001). Facility design constituted the largest contribution to the X^2-score. Removing facility design from the analysis resulted in a X^2 (9, n= 157) = 22.05, p = 0.009. The additional removal of techniques resulted in a X^2 (8, n= 141) = 12.95, p = 0.114. This

indicates that fewer H&S representatives used the facility design, while more used the techniques section compared to the remaining sections.

Further, there was no relationship for change after use of the sections (X^2 (10, n= 86) = 4.84, p = 0.901).

Carer

For carers, there was a significant relationship for familiarity with the sections (X^2 (10, n= 1364) = 85.28, p < 0.001). Policy development constituted the largest contribution to the X^2-score. Removing policy development from the analysis resulted in a X^2 (9, n= 1240) = 68.16, p < 0.001. The sequential additional removal of facility design (X^2 (8, n= 1116) = 51.45, p < 0.001), audit (X^2 (7, n= 992) = 34.58, p < 0.001), monitoring and evaluation (X^2 (6, n= 868) = 24.05, p = 0.001), and organising training resulted in a X^2 (5, n= 744) = 7.85, p = 0.165. This indicates that fewer carers were familiar with the policy development, facility design, audit, monitoring and evaluation, and organising training sections compared to the remaining sections.

Further, there was a significant relationship for use of the sections (X^2 (10, n= 991) = 126.48, p < 0.001). Techniques constituted the largest contribution to the X^2-score. Removing techniques from the analysis resulted in a X^2 (9, n= 883) = 95.78, p < 0.001. The sequential additional removal of equipment (X^2 (8, n= 776) = 58.96, p < 0.001), risk assessment (X^2 (7, n= 672) = 34.03, p < 0.001), training (X^2 (6, n= 584) = 13.57, p = 0.035), and facility design resulted in a X^2 (5, n= 503) = 3.22, p = 0.666. This indicates that more carers used the techniques, equipment, risk assessment, and training sections, while fewer used the facility design compared to the remaining sections.

In contrast, there was no relationship for change after use of the sections (X^2 (10, n= 475) = 1.54, p = 0.999).

Table 5.1 *Familiarity with, use of, and change after use for H&S managers and managers stratified on sections (sections 3-13) of the MHPG.*

	Subsector	Familiarity				Use				Change after use			
		Familiar (%)	Not familiar (%)	Total	X^2 ('Familiar vs 'Not familiar')	Use (%)	No use (%)	Total	X^2 ('Use vs 'No use')	Change (%)	No change (%)	Total	X^2 ('Change vs 'No change)
H&S manager	Risk assessment	26 (89.7)	3 (10.3)	29	0.69 (0.11/ 0.58)	12 (46.2)	14 (53.8)	26	0.00 (0.00/ 0.00)	9 (75.0)	3 (25.0)	12	0.51 (0.22/ 0.39)
	Techniques	28 (96.6)	1 (3.4)	29	3.39 (0.54/ 2.85)	18 (64.3)	10 (35.7)	28	3.50 (1.87/ 1.63)	12 (70.6)	5 (29.4)	17	0.30 (0.11/ 0.19)
	Training	26 (89.7)	3 (10.3)	29	0.69 (0.11/ 0.58)	14 (53.8)	12 (46.2)	26	0.54 (0.29/ 0.25)	10 (76.9)	3 (23.1)	13	0.92 (0.33/ 0.59)
	Organising training	24 (82.8)	5 (17.2)	29	0.04 (0.01/ 0.03)	7 (29.2)	17 (70.8)	24	2.94 (1.57/ 1.37)	5 (71.4)	2 (28.6)	7	0.16 (0.06/ 0.10)
	Equipment	27 (83.1)	2 (6.9)	29	1.79 (0.29/ 1.50)	16 (59.3)	11 (40.7)	27	1.73 (0.92/ 0.81)	11 (68.8)	5 (31.2)	16	0.14 (0.05/ 0.09)
	Equipment management	24 (82.8)	5 (17.2)	29	0.04 (0.01/ 0.03)	12 (50.0)	12 (50.0)	24	0.11 (0.06/ 0.05)	7 (58.3)	5 (41.7)	12	0.18 (0.06/ 0.12)
	Facility design	21 (72.4)	8 (27.6)	29	2.90 (0.46/ 2.44)	9 (42.9)	12 (57.1)	21	0.12 (0.06/ 0.06)	5 (55.6)	4 (44.4)	9	0.30 (0.11/ 0.19)
	Policy development	22 (75.9)	7 (24.1)	29	1.44 (0.23/ 1.21)	8 (36.4)	14 (63.6)	22	0.94 (0.50/ 0.44)	3 (37.5)	5 (62.5)	8	2.49 (0.89/ 1.60)
	Workplace culture	24 (82.8)	5 (17.2)	29	0.04 (0.01/ 0.03)	10 (41.7)	14 (58.3)	24	0.24 (0.13/ 0.11)	6 (60.0)	4 (40.0)	10	0.08 (0.03/ 0.05)
	Monitoring & evaluation	23 (79.3)	6 (20.7)	29	0.48 (0.08/ 0.40)	12 (52.2)	11 (44.8)	23	0.28 (0.15/ 0.13)	7 (58.3)	5 (41.7)	12	0.18 (0.06/ 0.12)
	Audits	23 (79.3)	6 (20.7)	29	0.48 (0.08/ 0.40)	7 (30.4)	16 (69.6)	23	2.43 (1.30/ 1.13)	4 (57.1)	3 (32.9)	7	0.15 (0.05/ 0.10)
	Total				11.95				12.83				5.49
Manager	Risk assessment	38 (92.7)	3 (7.3)	41	2.28 (0.36/ 1.92)	33 (86.8)	5 (13.2)	38	7.54 (2.89/ 4.95)	16 (59.3)	11 (40.7)	27	0.49 (0.17/ 0.32)
	Techniques	36 (87.8)	5 (12.2)	41	0.43 (0.07/ 0.36)	32 (88.9)	4 (11.1)	36	8.59 (2.95/ 5.64)	17 (68.0)	8 (32.0)	25	0.06 (0.02/ 0.04)
	Training	36 (87.8)	5 (12.2)	41	0.43 (0.07/ 0.36)	26 (72.2)	10 (27.8)	36	0.68 (0.23/ 0.45)	14 (70.0)	6 (30.0)	20	0.17 (0.06/ 0.11)
	Organising training	34 (82.9)	7 (17.1)	41	0.04 (0.01/ 0.03)	21 (61.8)	13 (38.2)	34	0.23 (0.08/ 0.15)	11 (73.3)	4 (26.7)	15	0.40 (0.14/ 0.26)
	Equipment	37 (90.2)	4 (9.8)	41	1.18 (0.19/ 0.99)	27 (73.0)	10 (27.0)	37	0.87 (0.30/ 0.57)	16 (69.6)	7 (30.4)	23	0.15 (0.05/ 0.10)
	Equipment management	34 (82.9)	7 (17.1)	41	0.04 (0.01/ 0.03)	19 (55.9)	15 (44.1)	34	1.46 (0.50/ 0.96)	11 (68.8)	5 (31.3)	16	0.07 (0.02/ 0.05)
	Facility design	30 (73.2)	11 (26.8)	41	3.61 (0.58/ 3.03)	10 (33.3)	20 (66.7)	30	13.94 (4.78/ 9.16)	3 (42.9)	4 (57.1)	7	1.61 (0.55/ 1.06)
	Policy development	32 (78.0)	9 (22.0)	41	1.09 (0.17/ 0.92)	15 (46.9)	17 (53.1	32	5.04 (1.73/ 3.31)	8 (72.7)	3 (27.3)	11	0.24 (0.08/ 0.16)
	Workplace culture	36 (87.8)	5 (12.2)	41	0.43 (0.07/ 0.36)	23 (63.9)	13 (36.2)	36	0.05 (0.02/ 0.03)	12 (63.2)	7 (36.9)	19	0.05 (0.02/ 0.03)
	Monitoring & evaluation	35 (85.4)	6 (14.6)	41	0.06 (0.01/ 0.05)	21 (60.0)	14 (40.0)	35	0.50 (0.17/ 0.33)	9 (56.3)	7 (44.7)	16	0.63 (0.22/ 0.41)
	Audits	31 (74.6)	10 (24.4)	41	2.17 (0.34/ 1.82)	22 (71.0)	9 (29.0)	31	0.38 (0.13/ 0.25)	11 (68.8)	5 (31.2)	16	0.07 (0.02/ 0.05)
	Total				11.77				39.28				3.94

Table 5.2 *Familiarity with, use of, and change after use for MHP coordinators and therapists stratified on sections (sections 3-13) of the MHPG.*

	Subsector	Familiarity				Use				Change after use			
		Familiar (%)	Not familiar (%)	Total	X^2 ('Familiar vs 'Not familiar')	Use (%)	No use (%)	Total	X^2 ('Use vs 'No use')	Change (%)	No change (%)	Total	X^2 ('Change vs 'No change)
MHP coordinator	Risk assessment	43 (95.6)	2 (4.4)	45	2.03 (0.23/ 1.80)	40 (95.2)	2 (4.8)	42	11.86 (3.42/ 8.44)	24 (61.5)	15 (38.5)	39	0.46 (0.15/ 0.31)
	Techniques	45 (100.0)	0 (0.0)	45	5.63 (0.63/ 5.00)	40 (90.9)	4 (9.1)	44	8.36 (2.41/ 5.95)	33 (84.6)	6 (15.4)	39	4.65 (1.88/ 3.77)
	Training	41 (91.1)	4 (8.9)	45	0.23 (0.03/ 0.20)	38 (95.0)	2 (5.0)	40	11.07 (3.19/ 7.88)	30 (81.1)	7 (17.9)	37	3.46 (1.15/ 2.31)
	Organising training	41 (91.1)	4 (8.9)	45	0.23 (0.03/ 0.20)	28 (70.0)	12 (30.0)	40	0.03 (0.01/ 0.02)	21 (75.0)	7 (25.0)	28	0.87 (0.29/ 0.58)
	Equipment	42 (83.3)	3 (6.7)	45	0.90 (0.10/ 0.80)	35 (85.4)	6 (14.6)	41	4.03 (1.16/ 2.87)	24 (68.6)	11 (31.4)	35	0.06 (0.02/ 0.04)
	Equipment management	40 (88.9)	5 (11.1)	45	0.00 (0.00/ 0.00)	22 (56.4)	17 (43.6)	39	4.13 (1.19/ 2.94)	10 (45.5)	12 (56.5)	22	4.45 (1.48/ 2.97)
	Facility design	37 (82.2)	8 (17.8)	45	2.03 (0.23/ 1.80)	15 (40.5)	22 (59.5)	37	16.91 (4.88/ 12.03)	8 (53.3)	7 (46.6)	15	1.20 (0.40/ 0.80)
	Policy development	37 (82.2)	8 (17.8)	45	2.03 (0.23/ 1.80)	21 (58.3)	15 (41.7)	36	2.88 (0.83/ 2.05)	13 (61.9)	8 (38.1)	21	0.21 (0.07/ 0.14)
	Workplace culture	38 (84.4)	7 (15.6)	45	0.90 (0.10/ 0.80)	22 (59.5)	15 (40.5)	37	2.47 (0.71/ 1.76)	13 (59.1)	9 (40.9)	22	0.57 (0.19/ 0.38)
	Monitoring & evaluation	39 (86.7)	6 (13.3)	45	0.23 (0.03/ 0.20)	26 (68.4)	12 (31.6)	38	0.14 (0.04/ 0.10)	14 (53.8)	12 (46.2)	26	1.92 (0.64/ 1.28)
	Audits	37 (82.2)	8 (17.8)	45	2.03 (0.23/ 1.80)	19 (52.8)	17 (47.2)	36	5.93 (1.71/ 4.22)	12 (63.2)	7 (36.8)	19	0.11 (0.04/ 0.07)
	Total				16.20				67.82				18.97
Therapist	Risk assessment	25 (100.0)	0 (0.0)	25	4.13 (0.59/ 3.55)	23 (92.0)	2 (8.0)	25	9.39 (3.54/ 5.85)	12 (52.2)	11 (47.8)	23	0.05 (0.02/ 0.03)
	Techniques	25 (100.0)	0 (0.0)	25	4.13 (0.59/ 3.55)	25 (100.0)	0 (0.0)	25	15.14 (5.71/ 9.43)	15 (60.0)	10 (40.0)	25	0.31 (0.14/ 0.17)
	Training	23 (92.0)	2 (8.0)	25	0.78 (0.11/ 0.67)	20 (87.0)	3 (13.0)	23	5.96 (2.25/ 3.71)	13 (65.0)	7 (35.0)	20	0.90 (0.41/ 0.49)
	Organising training	23 (92.0)	2 (8.0)	25	0.78 (0.11/ 0.67)	15 (65.2)	8 (34.8)	23	0.08 (0.03/ 0.05)	10 (66.7)	5 (33.3)	15	0.90 (0.41/ 0.49)
	Equipment	25 (100.0)	0 (0.0)	25	4.13 (0.59/ 3.55)	23 (92.0)	2 (8.0)	25	9.39 (3.54/ 5.85)	10 (43.5)	13 (56.5)	23	1.11 (0.51/ 0.60)
	Equipment management	22 (88.0)	3 (12.0)	25	0.09 (0.01/ 0.08)	8 (36.4)	14 (63.6)	22	6.29 (2.37/ 3.92)	6 (75.0)	2 (25.0)	8	1.36 (.062/ 0.74)
	Facility design	15 (60.0)	10 (40.0)	25	13.69 (1.94/ 11.75)	4 (26.7)	11 (73.3)	15	8.11 (3.06/ 5.05)	0 (0.0)	4 (100.0)	4	4.88 (2.18/ 2.60)
	Policy development	19 (76.0)	6 (24.0)	25	1.98 (0.28/ 1.70)	8 (42.1)	11 (57.9)	19	3.29 (1.24/ 2.05)	5 (62.5)	3 (37.5)	8	0.21 (0.10/ 0.11)
	Workplace culture	23 (92.0)	2 (8.0)	25	0.78 (0.11/ 0.67)	10 (43.5)	13 (56.5)	23	3.47 (1.31/ 2.16)	4 (40.0)	6 (60.0)	10	0.84 (0.38/ 0.46)
	Monitoring & evaluation	21 (84.0)	4 (16.0)	25	0.07 (0.01/ 0.06)	7 (33.3)	14 (66.7)	21	7.50 (2.83/ 4.67)	3 (42.9)	4 (57.1)	7	0.38 (0.17/ 0.21)
	Audits	15 (60.0)	10 (40.0)	25	13.69 (1.94/ 11.75)	4 (26.7)	11 (73.3)	15	8.11 (3.06/ 5.05)	2 (50.0)	2 (50.0)	4	0.03 (0.01/ 0.02)
	Total				44.28				76.72				10.88

Table 5.3 *Familiarity with, use of, and change after use for H&S representatives and carers stratified on sections (sections 3-13) of the MHPG.*

	Subsector	Familiarity				Use				Change after use			
		Familiar (%)	Not familiar (%)	Total	X^2 ('Familiar vs 'Not familiar')	Use (%)	No use (%)	Total	X^2 ('Use vs 'No use')	Change (%)	No change (%)	Total	X^2 ('Change vs 'No change)
H&S representative	Risk assessment	16 (93.1)	1 (5.9)	17	0.11 (0.01/ 0.10)	13 (81.3)	3 (18.8)	16	4.38 (1.96/ 2.42)	8 (66.7)	4 (33.3)	12	0.02 (0.01/ 0.01)
	Techniques	16 (93.1)	1 (5.9)	17	0.11 (0.01/ 0.10)	15 (93.8)	1 (6.3)	16	9.60 (4.30/ 5.30)	12 (85.7)	2 (14.3)	14	1.90 (0.60/ 1.30)
	Training	15 (88.2)	2 (11.8)	17	0.33 (0.03/ 0.30)	11 (73.3)	4 (26.7)	15	1.99 (0.89/ 1.10)	7 (70.0)	3 (30.0)	10	0.01 (0.00/ 0.01)
	Organising training	15 (88.2	2 (11.8)	17	0.33 (0.03/ 0.30)	7 (46.7)	8 (53.3)	15	0.45 (0.20/ 0.25)	3 (50.0)	3 (50.0)	6	0.96 (0.30/ 0.66)
	Equipment	16 (94.1)	1 (5.9)	17	0.11 (0.01/ 0.10)	11 (68.8)	5 (31.2)	16	1.18 (0.53/ 0.65)	6 (60.0)	4. (40.0)	10	0.35 (0.11/ 0.24)
	Equipment management	16 (94.1)	1 (5.9)	17	0.11 (0.01/ 0.10)	6 (37.5)	10 (62.5)	16	2.03 (0.91/ 1.12)	3 (60.0)	2 (40.0)	5	0.17 (0.05/ 0.12)
	Facility design	15 (88.2)	2 (11.8)	17	0.33 (0.03/ 0.30)	2 (13.3)	13 (86.7)	15	10.65 (4.77/ 5.88)	1 (50.0)	1 (50.0)	2	0.32 (0.10/ 0.22)
	Policy development	15 (88.2)	2 (11.8)	17	0.33 (0.03/ 0.30)	8 (53.3)	7 (46.7)	15	0.02 (0.01/0.01)	6 (85.7)	1 (14.3)	7	0.95 (0.30/ 0.65)
	Workplace culture	16 (94.1)	1 (5.9)	17	0.11 (0.01/ 0.10)	9 (56.3)	7 (43.8)	16	0.00 (0.00/ 0.00)	5 (62.5)	3 (37.5)	8	0.14 (0.04/ 0.10)
	Monitoring & evaluation	16 (94.1)	1 (5.9)	17	0.11 (0.01/ 0.10)	7 (43.8)	9 (56.2)	16	0.85 (0.38/ 0.47)	4 (66.7)	2 (33.3)	6	0.01 (0.00/ 0.01)
	Audits	16 (94.1)	1 (5.9)	17	0.11 (0.01/ 0.10)	6 (37.5)	10 (62.5)	16	2.03 (0.91/ 1.12)	4 (66.7)	2 (33.3)	6	0.01 (0.00/ 0.01)
	Total				0.996				33.20				4.84
Carer	Risk assessment	104 (83.9)	20 (16.1)	124	7.86 (2.15/ 5.71)	75 (72.1)	29 (27.9)	104	10.96 (4.82/ 6.14)	46 (71.9)	18 (28.1)	64	0.00 (0.00/ 0.00)
	Techniques	108 (87.1)	16 (12.9)	124	13.02 (3.56/ 9.46)	87 (80.6)	21 (19.4)	108	26.42 (11.62/ 14.80)	57 (75.0)	19 (25.0)	76	0.34 (0.10/ 0.24)
	Training	97 (78.2)	27 (21.8)	124	1.94 (0.53/ 1.41)	66 (68.0)	31 (32.0)	97	5.70 (2.51/ 3.19)	40 (71.4)	16 (28.6)	56	0.01 (0.00/ 0.01)
	Organising training	82 (66.1)	42 (33.9)	124	2.66 (0.73/ 1.93)	34 (41.5)	48 (58.5)	82	7.04 (3.10/ 3.94)	21 (72.4)	8 (27.6)	29	0.00 (0.00/ 0.00)
	Equipment	107 (86.3)	17 (13.7)	124	11.60 (3.17/ 8.43)	86 (80.4)	21 (19.6)	107	25.79 (11.35/ 14.44)	53 (70.7)	22 (29.3)	75	0.07 (0.02/ 0.05)
	Equipment management	100 (80.6)	24 (19.4)	124	3.99 (1.09/ 2.90)	48 (48.0)	52 (52.0)	100	2.60 (1.14/ 1.46)	29 (70.7)	12 (29.3)	41	0.03 (0.01/ 0.02)
	Facility design	72 (58.1)	52 (41.9)	124	13.28 (3.63/ 9.65)	19 (26.4)	53 (73.6)	72	25.63 (11.28/ 14.35)	12 (80.0)	3 (20.0)	15	0.47 (0.13/ 0.34)
	Policy development	69 (55.6)	55 (44.4)	124	18.06 (4.94/ 13.12)	25 (36.2)	44 (63.8)	69	10.95 (4.82/ 6.13)	16 (76.2)	5 (23.8)	21	0.18 (0.05/ 0.13)
	Workplace culture	95 (76.6)	29 (23.4)	124	0.98 (0.27/ 0.71)	45 (47.4)	50 (52.6)	95	2.88 (1.27/ 1.61)	27 (69.2)	12 (30.8)	39	0.15 (0.04/ 0.11)
	Monitoring & evaluation	82 (66.1)	42 (33.9)	124	2.66 (0.73/ 1.93)	38 (46.3)	44 (53.7)	82	3.11 (1.37/ 1.74)	21 (67.7)	10 (32.3)	31	0.28 (0.08/ 0.20)
	Audits	75 (60.5)	49 (39.5)	124	9.25 (2.53/ 6.72)	32 (42.7)	43 (57.3)	75	5.41 (2.38/ 3.03)	20 (71.4)	8 (28.6)	28	0.00 (0.00/ 0.00)
	Total				85.28				126.48				1.54

Discussion

The findings from the present study showed that there were limited differences in familiarity between the different sections of the MHPG amongst the key actors. In contrast, more key actors used the FCC, especially the techniques section, with the exception of the section on facility design, which fewer used, compared to the OSC. However, despite the extensive use of the FCC, there were hardly any differences in change after use of the sections.

Looking at the familiarity with the different sections of the MHPG revealed that there in general were no difference in the mean proportion of respondents being familiar with the different sections of the MHPG between the key actors (83.1-91.8%), despite carers having a tendency to a lower proportion being familiar (72.6%). This is to some extent to be expected as we previously have reported that fewer carers were aware of the MHPG in general (Study 3), hence fewer carers would likely be familiar with the detailed content of the MHPG. Looking in detail disclosed that both fewer therapists and carers were familiar with the facility design section and parts of the OSC, in particular, policy development and audit. This is in disagreement with the programme theory that expects an equal familiarity with the different sections in the MHPG (Study 2). However, it can be argued whether carers can be expected to be just as familiar as the other key actors due to the differences in responsibilities in related to the implementation of a MHP programme.

Several previous studies have reported that familiarity with components of medical guidelines affects adherence (Marcy et al., 2005; Perez et al., 2012; Wisnivesky et al., 2008). Wisnievsky et al (2008) reported that familiarity with components of an asthma guideline, in combination with training, predicted adherence among primary care providers. Perez et al (2012) found that low familiarity with components of a medical guideline among clinicians in general medical practices led to low adherence. Finally, Marcy et al (2005) showed that lack of familiarity with specific components of a tobacco use treatment guideline among physicians resulted in low adherence (Marcy et al., 2005). Further, Cabana and colleagues have multiple times stated that a barrier for physicians adhering to guidelines relates to their knowledge of the guideline and the familiarity with

its elements (Cabana et al., 1999, 2002). If these findings are transferable to a MHP guideline, then this would predict a lower use of the facility design, policy development, and audit sections.

The level of use of the different components of the MHPG varied between the different key actors. The average use was highest amongst H&S representatives (72.1%) and MHP coordinators (70.2%), while it was lowest amongst H&S managers (46.0%) and carers (53.6%). Some of these findings can be explained through the programme theory of the MHPG (Study 2). Carers are not likely to involved in the implementation of a MHP programme, hence their low level of use is expected. On the other hand, MHP coordinators and H&S managers are expected to be the prime drives when implementing a MHP programme (Study 2). Thus, the high use seen among MHP coordinators is in accordance with the programme theory, whereas the low use for H&S managers seems to discord. This finding could perhaps indicate that the H&S managers are delegating the work associated with implementing a MHP programme to other work roles, in this case, the MHP coordinator in collaboration with the H&S representatives.

When looking at the specific components used, there was a clear pattern that more of the key actors used the technique, and to some extent, the risk assessment sections. In contrast, the facility design component was used by fewer of the key actors. This is reinforced by a tendency across all key actors of a higher proportion of use of the FCC compared to the OSC. This contradicts with the programme theory, which highlights the importance of implementing the OSC as a foundation before implementing the FCC (Study 2). Further, as fewer key actors used the facility design section, this implies that this particular section probably is harder to use than the reaming FCC. This could be related to difficulties in influencing the process associated with changing facilities in the healthcare sectors.

Previous studies of clinical guidelines have shown various levels of use of guideline components among intended users (Jiang et al., 2001; Rushton et al., 2004). Rushton et al (2004) reported on use of components of an ADHD guideline among physicians and found that 25.8 % used the components regularly (Rushton et al., 2004). This is substantially lower the findings from the present study, however, a direct comparison is difficult as the physicians reported on regular use,

whereas the present study assessed if the section was ever used. Jiang et al (2001) showed that less than 50% of CEOs in hospitals had implemented programmes containing all components of a pain management practice guideline. If the lack of implementation is considered to be equivalent to lack of use, the proportion of managers using components of the MHPG (64.9%) is relatively higher in the present study. This can probably be explained by that manager are more likely to be involved in the process of implementing a MHP programme compared to CEOs.

The overall level of change after use of a section in the MHPG was fairly similar across the key actor (62.7-72.4), with the exception of a lower proportion of therapists (50.7) experiencing any change after use. As the only key actor, more MHP coordinators experienced change after the use of a single section, the techniques section. To some extent, this seems logical as more MHP coordinator used the techniques section compared to the remaining sections of the MHPG, with the exception of the sections on training and equipment.

Solely looking at the proportion of respondents reporting change after use would indicate that a relatively high proportion of key actors in the healthcare sector experience change after use of the sections in the MHPG. However, due to the design of the questionnaire, which filtered out respondent not familiar or using sections of the MHPG, there was a low proportion of the respondents in the survey, who actually answered the question related to change after use. Therefore it is reasonable to consider whether the proportion of respondents experiencing change is representative of the entire healthcare sector.

No previous studies have reported on the changes following the use of specific components of a MHP or clinical guideline, however, studies have shown changes after use clinical guidelines in general (Dean et al., 2006; Halm et al., 1999). Halm et al (1999) reported that 71% of physicians in a hospital setting changed practice follow the use of a Pneumonia guideline (Not specific to the individual components) (Halm et al., 1999). Further, Dean et al (2006) found improved clinical outcomes in a hospital following the use of a pneumonia guideline.

Summary of the findings

Familiarity with the sections of the MHPG was high for the key actors expected to drive the implementation of a MHP programme and no differences seem to exist in the familiarity between the sections. Amongst the respondents being familiar with the individual sections, a higher proportion used the FCC compared to the OSC, in particular, more key actors used the techniques and risk assessment sections, while fewer used the facility design section. A relatively high proportion of change after use was seen for key actors using the specific sections, however, compared to the overall number of key actors familiar with the sections, rather few experienced change after use of a section.

Limitations and strengths

As the present study is based on the same questionnaire survey as study 3, the limitations and strengths related to the questionnaire are the same as previously described (Chapter 4). In addition, the limitations and strengths already identified, the small number of people reporting on change after use is another limitation. Due to the use of adaptive questioning, the number of respondents gradually decreases as the questions become more specific. This introduces a risk of a low reliability with respect to the answers to this specific question.

Link to next study

The findings from study 4 showed that key actors in the process of implementing a MHP programme where both familiar with the different components of the MHPG and used them, even though the FCC seemed to be used more than the OSC. However, we do not know how each of the MHPG components is being used and why this use does not seem to result in any changes. Consequently, we must investigate how the intended users deal with the process of implementing a MHP programme, which is based on the components identified in the MHPG, in a healthcare organisation.

Chapter 6. How are MHP programmes implemented

This chapter is the basis for Paper 5 – *" How are moving and handling people programmes implemented – learnings from three case studies'* by Lidegaard, M., Olsen, KB, Legg, SJ, and Trevelyan, F. (See appendix 5)

The specific objectives of this study were to:

i. identify for whom the MHPG worked (or to what extent)
ii. identify under which circumstances it worked
iii. identify why it worked

More specifically for each case, the process of implementation of eight MHPG components.

Methods

Three case studies of healthcare organisations (a private hospital, and two public hospitals the frontrunner hospital and the public hospital) in New Zealand were conducted between March 2017 and March 2018. All case studies were hospitals because the MHPG developers saw hospitals, particularly public hospitals, as drivers of change in the healthcare sector and therefore had them as the main target sector (Study 2). Further, the frontrunner hospital was involved in the development of the MHPG, had received funding to develop MHP training and was considered to be the leading national hospital with respect to MHP.

Data collection

Data were collected in each case study organisation through semi-structured interviews, document review, and a chronicle workshop.

Interviews

Within each case organisation, three initial semi-structured interviews (Denzin, 1973; Treece and Treece Jr, 1977) were conducted with key stakeholders: the MHP coordinator, the H&S manager, and a representative from senior management. These work roles were identified in the MHPG as key actors that should lead implementation of a MHP programme (Study 2). The purpose of these

interviews was to obtain an overview of the organisation, its use of the MHPG, implementation of MHP programmes, and identification of people that could be appropriate to involve in the chronicle workshops or additional interviews. Additional people were interviewed on the basis of the initial interviews or the Chronicle workshop to get a more complete understanding of the implementation process. Table 6.1 gives an overview of the people selected for interviews in each organisation. Interview schedules were specific to each work role. An example of an interview schedule can be seen in appendix 9.

Table 6.1 *Overview of the work roles selected for interview and participation in the chronicle workshop. Years of being in the role indicated in brackets.*

Case study 1- The private hospital	**Case study 2- The public hospital**	**Case study 3- The frontrunner hospital**
	Interviewees	
Local MHP coordinator Local H&S and facility manager Theatre services manager National H&S manager	Current MHP advisor H&S manager Executive director of nursing and midwifery Former MHP advisor	MHP coordinator Current H&S manager Organisational Development manager Human resources director Former H&S manager
	Chronicle workshop participants	
Hospital general manager *(2 years)* Contracted radiographer *(+10 years)* H&S representative for the theatre staff *(+25 years)* Quality Development Manager *(+10 years)* Theatre manager *(14 years)* H&S representative for administrative staff *(+10 years)*	Physiotherapist in a ward *(4 years)* Physiotherapist in community service *(+10 years)* Clinical nurse educator *(+15 years)* Safe handling representative, emergency department *(7 years)* Safe handling representative in a ward *(7 years)* H&S and safe handling representative, neonatal unit *(+10 years)* Moving and handling advisor *(3 years)* Nurse, employee representative *(+20 years)*	Charge Nurse in rehabilitation ward *(10 years)* Senior physiotherapist, rehabilitation ward, MHP Trainer *(8 years)* Nurse, rehabilitation ward, MHP Trainer *(6 years)* Medical Engineer, Department of Clinical Engineering, *(3 years)* Senior manager, Facilities services *(7 years)* Inventory and Supply Chain Manager *(4 years)*

Document review

Internal organisational diagrams and MHP related procedures were used to help identify participants for the chronicle workshops and supplemented the information collected through the interviews about the MHP programme.

Chronicle workshops

Doing an evaluation of an implementation retrospectively, without having the opportunity to follow the implementation over time makes it difficult to assess what effect the particular implementation had and what other changes in the organisation affected the outcome. Thus, a chronicle workshop was conducted in each case organisation to identify MHP events and other events influencing MHP, key stakeholders involved and driving implementation of MHP programme elements, the initiatives and debates that had arisen during development and implementation, and factors that had supported or hindered the implementation of MHP initiatives.

Chronicle Workshop is a methodology that uses a group-based approach to gain knowledge about important events related to a specific topic (Gensby, 2014). It creates a shared history of the group's understanding or perception of the topic and what has influenced the topic over a predefined, specific time period (Hansen and Pedersen, 2014). The outcome is a historical description of the development of the topic, events that influenced the topic, people or organisations that were instrumental in the development, issues or discussions that emerged, and barriers and ways to overcome the barriers identified during the time period (Baungård Rasmussen, 2011; Gensby, 2014; Hagedorn-Rasmussen and Mac, 2007).

Participants

The participants in the workshops are presented in table 6.1. They were purposively selected to create maximum variation (Patton, 2002) covering differences in knowledge and expertise about MHP, length of service and position in the organisation. They should have been involved with MHP, or directly with planning and implementation of MHP initiatives. Including participants with

a range of experience would enhance diversity of views and perspectives on implementation of MHP initiatives (Baungård Rasmussen, 2011).

The workshop

The workshops were held in a room with a wall big enough to display a timeline covering ten years. The participants sat in a half-moon facing the wall. Three researchers facilitated the workshops: leading the process, operating voice recorder, writing notes, photographing the timeline, and assisting by identifying themes as they emerged from discussions. Each workshop lasted four hours, covered the period between 2007 and 2017, and was divided into an exploration, and an interpretation phase.

The exploration phase had three sessions with the following three topics:

i) *What significant events have marked MHP as a priority at the hospital, and when?*

ii) *Which stakeholders, entities or institutions have characterised and driven the development and implementation of MHP efforts/programmes at the hospital, and when?*

iii) *What kind of initiatives and debate have arisen during the development and implementation of the MHP programme at the hospital, and when?*

The interpretation phase consisted of a plenum and a group work session.

iv) *Participants interpreted key trends in the history of MHP at the hospital and divided it into chapters (Plenum session).*

v) *Participants identified factors that had supported or hindered the process of implementing MHP initiatives (Group work session)*

The participants were provided sticky notes in particular colours for each session in order to link the notes to the specific session. Each exploration session was structured as follows: presentation of the topic; clarifying questions; participants wrote personal inputs on the notes (one issue per note) for five to ten minutes; one participant at a time placed notes on the wall and explained what

it was about; clarifying questions, brief comment on the notes from other participants; and additional notes were placed on the wall if necessary.

In the first interpretation session, participants identified distinct periods on the timeline and created headings reflecting the events and placed them on the wall. These were discussed in plenum and mutually agreed headings were developed for each period. In the second interpretation session, participants were divided into groups of people with similar background and experience. These groups analysed and interpreted the timeline and identified factors that had supported or hindered implementation MHP initiatives. The notes generated by each group were placed on the wall and explained. At the end of the workshop, participants were invited to share reflections on the workshop and contribute with additional comments. See appendix 10 for the chronicle workshop agenda.

Data analysis

All interviews were voice recorded, transcribed by the interviewer, and subsequently sent to the interviewee for approval.

The photographs of the chronicle workshop timeline were converted to a digital timeline in Prezi (www.prezi.com). The written notes were transcribed to a Microsoft Word document. The first author wrote the story chapter by chapter by listening to voice recordings of the chronicle workshop and consulting the notes and digital timeline. The story was discussed between the researchers and revised. Subsequently, it was sent to the participants with further clarifying questions. The first author conducted telephone conversations with those who wanted to answer the clarifying questions. These answers were incorporated into the story. See Olsen et al. (2017) for an example of a story (Olsen et al., 2017).

The stories and the interviews were analysed thematically in order to identify how each of the eight components (OSC and FCC) of a MHP programme were implemented, specifically looking for facilitating and hindering contextual factors, resources introduced, reasoning used, and the outcomes implementation of each component contributed to.

Results

This section presents the three case studies. Each case includes a description of the organisation, followed by descriptions of how each of the eight MHP components (OSC and FCC) were implemented and a table summarising facilitating and hindering contextual factors, resources introduced, reasoning used, and the outcomes. As the case studies cover a ten-year period, outcomes from the implementation of a component can subsequently act as either a context or a resource. Hence, certain outcomes may be mentioned as context, resource, and outcome within the implementation of the same component.

Case study 1 – 'The Private hospital'

Description

The private hospital was a small hospital within a national hospital chain owned by a charity trust. Profit was reinvested in development of facilities, workforce, technology, and patient safety. A national office developed and was responsible for strategies, policies, and procedures, to which each hospital had to adhere. However, each hospital worked independently and was responsible for its operations and implementation of the strategies and policies. The national office distributed money between the hospitals, hence the more profitable hospitals supported the less profitable ones from which the private hospital benefitted. A national H&S manager worked at the national office. She was contracted to work 0.4 full-time equivalent (FTE) and was responsible for the H&S department, which included MHP. She coordinated H&S in the chain and received H&S information from each hospital through communication with the local H&S managers and MHP coordinators. The national H&S manager reported to the senior leadership team of the chain.

The private hospital, established in 1987, was merged with another local private hospital in 2007. The hospital provided short-stay surgical care for around 6,000 patients a year, with freedom to select its own patients. It was audited to MoH's Health and Disability Service Standard to comply with the Health and Disability Services (Safety) Act 2001 (Parliament of New Zealand, 2001), which focused on patient safety. The hospital was led by a general manager and a senior management team consisting of five area managers in a relatively flat hierarchy structure, with easy access from

all levels of the organisation to the general manager. The hospital employed around 50 FTE permanent staff, including nurses, administrators, facilities service, and a small number of casual and part-time staff. Medical doctors were self-employed and the private hospital provided its facilities and care to them and their patients. Due to the small size of the hospital, most managers and employees had more than one job role. Staff turnover was very low, only three staff had left in nine years. The average age of nurses was substantially higher compared to the average in the entire hospital chain. The hospital had a 0.5 FTE H&S manager who also managed facilities, and a part-time MHP coordinator (0.8 FTE) responsible for implementing and running the hospital's MHP programme, based on the MHP programme developed by the National office. H&S and MHP issues were considered in the executive H&S committee, which consisted of the quality and development manager, the H&S manager, and the MHP coordinator. The hospital's H&S committee consisted of the executive H&S committee and four H&S representatives. The work around the MHP programme was supposed to be supported by MHP assistants. However, no other staff were interested in acting as MHP assistants as most staff work at the hospital because it allowed them to prioritised family (there were limited requirements to work night shifts).

Implementation of the MHP programme

Factors influencing implementation of the MHP components at the private hospital are summarised in table 6.2.

The interviews and chronicle workshop identified implementation of aspects of all three of the MHPG OSC components: policy development, workplace culture, and monitoring, evaluation, and audit. However, they only uncovered information on the four of the FCCs: techniques, training, equipment, and facility design. There was no information on implementation of risk assessment.

The national H&S manager initiated implementation of **MHP policies** in the hospital chain, which facilitated implementation at the private hospital. The National H&S Manager conducted a cost-benefit analysis identifying MHP associated costs and that a MHP programme would reduce these. This persuaded the national board to prioritise MHP and provide resources to a MHP programme including purchase of equipment. The national H&S manager gained information on MHP policies

from the old ACC MHP guidelines and an expert in MHP programme development. When the MHPG was launched, the national H&S manager assessed the existing MHP programme against it and found it followed its guidance. The private hospital received a report identifying gaps related to MHP and was required to develop an action plan and implement it. The private hospital perceived the national policies as wordy and unmanageable. Therefore, the local H&S manager, who led the implementation, adjusted them to local needs hoping this would increase compliance with the policies. The H&S representatives were involved in the process, which was also influenced by the merger of two hospitals' policies. The process resulted in more applicable H&S and MHP policies, creation of a MHP coordinator role, and a spread of H&S and MHP responsibilities. The local H&S manager and the quality development manager introduced a policy for pushing beds after re-occurrence of injuries. However, the local policies were difficult to audit, or it might have been difficult to show they were followed, which contributed to a poor audit result when audited to the MoH's Health and Disability Service Standard. This resulted in a revision so that policies became easier to audit. It also increased management focus on H&S and MHP. Following this, the H&S committee discussed how a focus on safe MHP practice as opposed to merely a good audit result could be maintained.

Workplace culture was influenced by different perspectives on the priority of staff safety and MHP seen in relation to patient safety. The National H&S manager perceived the National senior manages as supportive of safe MHP whereas the private hospital's managers working with staff perceived them to prioritise patient safety over staff safety. Staff at the private hospital lacked interest in MHP and had resistance to change in relation to MHP. The MHP coordinator felt that staff prioritised their private life, hence not being willing to take extra MHP responsibilities. The MHP coordinator first worked on gaining support from selected local managers, who showed an interest in MHP, in order to form a coalition that could help change staff attitude. In order to change staff's resistance, the MHP coordinator established trust by working with staff on the floor and having a team approach to implementing MHP. The MHP coordinator and the quality development manager perceived this to have made staff feel respected, having influence, and being part of a team resulting in the application of safe MHP practice. The MHP coordinator felt

supported by the training the National H&S manager organised for the local MHP coordinators and H&S managers. This training aimed to create leaders in implementation of MHP programmes by preparing participants to meet resistance to change and provide opportunities for experience exchange. Preparation and introduction of the new H&S at Work act during 2014 to 2016 increased focus on senior management liability in relation to H&S, which was discussed at local workshops arranged by the national H&S manager. This increased management support for and involvement in H&S and MHP resulting in more H&S and MHP information, higher recognition and involvement of H&S representatives, consolidation of H&S policies and procedures, and an increased focus on incident reporting. This combined with communication of the organisation's core values: Responsibility, Respect, Teamwork, and Aspiration and employment of a new local CEO were perceived to help staff take responsibility for H&S and MHP.

The private hospital used formal and informal ways to **monitor and evaluate** part of the MHP programme. The MHP coordinator, H&S representatives and managers observed staff behaviour through working closely with staff. Formal monitoring was particularly related to injury reporting and **audit**. Reoccurrence of injuries at the private hospital led to implementation of policies and equipment early in the period, however not all injuries were reported, recorded and analysed. The MHP coordinator and H&S representatives used the poor audit result, increased communication between the national H&S manager and ACC, and the new H&S at Work Act to argue for a more systematic incident reporting and monitoring. Furthermore, the H&S manager and MHP coordinator used analysis of injuries to identify areas for improvement. They felt this increased staff's readiness for change and recognition of MHP as a risk.

The hospital was regularly externally **audited** to the Health and Disability Service Standard and as part of ACC's Accredited Employer Programme (focused on H&S and injury management). The national H&S manager oversaw the audits and in order to identify improvements and spread learnings amongst the hospitals. The management team supported the H&S manager to initiate implementation of H&S and MHP audit tools, which resulted in identification of the need for and implementation of MHP equipment. Following the poor audit result, the private hospital developed

policies, procedures, and practices that complied with the standard, in order to stay in business. The MHP coordinator and the H&S committee communicated audit results through staff meetings and the internal newsletter increasing awareness of MHP and needs for improvements. This assisted the process of creating a more robust and less vulnerable organisation that was driven by the decentralisation of H&S responsibility as a result of the new H&S at work Act.

New (safer) MHP **techniques** were introduced at the private hospital through the development of MHP training initiated by the MHP coordinator. However, there was resistance towards change (new techniques) among staff. The national H&S manager explained this with staff feeling they were corrected and told they had performed MHP incorrectly despite not experiencing any problems. To overcome this resistance, the MHP coordinator engaged and worked with staff on the floor demonstrating safe MHP and she used material developed by the national office and the MHPG technique section to show the evidence for the appropriateness of the techniques. This became the new approach to MHP training. The MHP coordinator felt this created buy-in from staff. However, the MHP coordinator recognised that the same few staff did not follow the new techniques.

The MHP coordinator conducted and developed MHP **training**. The MHP coordinator mainly used the material developed by the national office, supplemented with the MHPG when specific supplementary knowledge was needed. Management felt that providing MHP training supported staff in meeting their best potential and enhance knowledge of MHP. MHP training was first made compulsory for all ward staff and later included in induction for all staff including administrators to spread knowledge about safe MHP. Yearly MHP refresher training was integrated into in-ward training, which all staff attended. This training promoted experience and knowledge exchange. The MHP coordinator further used every opportunity offered by equipment suppliers to provide training in use of MHP equipment. There was not a particularly high workload at the hospital, which might have facilitated high attendance to training. Training was perceived to have facilitated communication and reduced resistance towards new equipment.

The national senior management team assigned resources for **equipment** purchase following the cost-benefit analysis conducted by the National H&S manager. The availability of MHP equipment was restricted but gradually increased during the period. The local H&S manager and the MHP coordination used analysis of injuries to argue that use of MHP equipment would improve patient safety as well as staff safety if staff were provided sufficient equipment and training. This resulted in the purchase of hover mattresses and electrical beds. However, the chronicle workshop identified resistance from surgeons towards the use of hover mattresses in theatre. To overcome this, the national H&S manager encouraged staff at training days to be so proficient in the use that they could use it before the surgeons could object. The hover mattress was mainly used in theatre, not in the wards as they were not available there.

The private hospital had out-dated **facilities** and needed to rebuild. This opportunity was used by the H&S manager and the MHP coordinator to influence the new design resulting in wider corridors and doors, and bigger rooms facilitating use of equipment and reduction of MHP related injury risks. The hospital's economic situation did not support a rebuild without funding from national office. The national H&S manager worked closely with the national facilities team to make sure she was involved in new facilities design. However, she was not always involved from the beginning. She described that they still made mistakes, which hindered safe MHP and that architects, engineers and builders were reluctant to involve workers like nurses. She saw this as a barrier to achieve a design that facilitated safe MHP. She used the MHPG's facility design section to convince the designers that the MoH facilities standard did not facilitate use of MHP equipment. She also described that most local MHP coordinators and H&S managers did not have the skills and power to influence facility designers.

Table 6.2 *How the private hospital implemented the different organisational system components and core components of a MHP programme. Contextual levels are indicated as: Supra-Macro (SM); Macro (Ma); Meso (Me); and Micro (Mi).*

Component	Facilitating contextual factor	Hindering contextual factor	Mechanisms (Resource & Reasoning)	Outcomes
Organisational System Components (OSC)				
Policy development	• Hospital chain core values (Ma) • National H&S and MHP policies (Ma) • Merge of two hospitals with two different sets of policies (Ma) • A poor audit results (Ma) • Reoccurrence of injuries from pushing beds (Ma)	• National policies perceived as wordy and unmanageable (Ma) • Loss of local knowledge (Ma)	Resource: • National H&S manager conducted cost-benefit analysis • Old ACC guideline • MHP programme expert developer • Analysis of injuries Reasoning: National senior management • Realising the cost of MHP injuries and benefit of MHP programme Middle management • Want to avoid injuries • Focus on local needs/ issues will result in usage	• National office develop MHP policies and allocate resources • Increased awareness and recognition of MHP risks • More applicable H&S and MHP policies, however harder to audit • Creation of specialist roles, MHP coordinator • Spreading responsibilities for H&S and MHP • Local 'Pushing beds' policy •Electrical bed movers •Increased management focus on MHP
Workplace culture	• Preparation and enactment of H&S at Work Act (SM) • Organisational values are directed by National Office (Ma) • Merge of two hospitals with two different cultures (Ma) • National H&S manager organise training and workshops for H&S managers, MHP coordinators (Ma) • Local theatre manager focus on staff safety (Mi)	• The healthcare sector's core value: patient care and safety first (SM) • Lack of senior management support (Ma) • Loss of organisational knowledge as a result of the merger (Ma) • Resistance towards change from staff (Mi) • Lack of interest in MHP practices from staff (Mi) • Staff prioritising private life, not wanting to take on extra MHP tasks (Mi)	Resource: • National Office values • Local MHP coordinator with participatory approach • Workshops about the new H&S at work act • Workshops for MHP coordinators and H&S managers Reasoning: National and local senior management • Fulfilling legal requirements • Preparing MHP coordinator will ease changes Middle management • Communicating values will increase awareness of H&S For staff involved in MHP • MHP coordinator: forming a coalition/ gaining management support will change staff attitude • Working with staff show recognition, will engage them and create buy-in • Feeling respected, influential, and being part of a team	• Focus on senior management responsibilities • More H&S and MHP information • Higher recognition of H&S representatives • Consolidation of H&S policies • Less hierarchical structure • Greater awareness for MHP • Greater responsibility towards own safety
Monitoring, evaluation, and audits	• New H&S at Work Act (SM) • ACC Accredited Employer Programme (SM) •Audited to MoH's Health and Disability Service Standard (SM) • National office oversee audits (Ma) • A poor audit results (Ma) • Re-occurring injuries (Ma) • Frequent staff meeting (Me)	• Local policies hard to audit (Ma) • Staff reluctant to report injuries (Mi)	Resource: • Communication with ACC on risk assessment • Communicating importance of reporting incidents and injuries at staff meetings • Audit standards (ACC and MoH) •Audit report with poor results & requirements for improvements • Communication of audit results to staff Reasoning: National senior management • Engaging the local MHP coordinators will facilitate spread of knowledge Senior management and the board • Needing to know how well the hospital performed • Staying in business • Complying with the national policies and procedures Middle management • Constantly identifying areas of improvement will assist continuous development; For staff involved in MHP • Decentralising of responsibilities would provide an opportunity to improve awareness of and support for MHP	• Systematic reporting of injuries • Local 'Pushing beds' policy • Electrical bed movers • Higher readiness for change • Recognition of MHP as a risk factor • Policies and procedures easier to audit • Recognising need for more MHP equipment • more robust and less vulnerable organisation • Increased spread of knowledge across staff • Decentralising of responsibilities

Table 6.2, continued *How the private hospital implemented the different organisational system components and core components of a MHP programme. Contextual levels are indicated as: Supra-Macro (SM); Macro (Ma); Meso (Me); and Micro (Mi).*

Component	Facilitating contextual factor	Hindering contextual factor	Mechanisms (Resource & Reasoning)	Outcomes
			Five Core Components (FCC)	
Risk assessment				
Techniques	• Heavier clients (SM) • Appointment of a dedicated MHP coordinator (Ma)	Resistance towards change from staff (Mi)	Resource: • National Office MHP programme • MHPG techniques section • MHP coordinator work with staff on the floor Reasoning: For staff involved in MHP • New technique is possible and safe • Wanting to become more efficient • There is evidence for the new technique	• Increased knowledge of safe MHP techniques among staff • Mandatory MHP training at orientation •New technique and equipment used
Training	• Equipment supplier offer free training (SM) • Staff do not have a high workload (Ma) • Annual training day (Ma) National office focus on training and upskilling;		Resource: • National Office MHP programme • Dedicated MHP coordinator • MHPG training section • Equipment supplier training Reasoning: For management • Providing training will result in staff meeting their best potential • Having up-to-date MHP coordinators ensures proper training; • Training staff ensure safe MHP; For staff involved in MHP • Wanting to become more efficient • Knowing how to perform safe MHP • Being involved	• Mandatory MHP training at orientation • Staff capable of correct equipment use • Increased readiness to change • Application of safe MHP and equipment use
Equipment	• National H&S manager conducted cost-benefit analysis (Ma)	• The Private hospitals' poor financial situation (Ma) • Low availability of equipment (Ma) • Surgeons' resistant towards the use of MHP equipment in theatres (Mi)	Resource: • Financial support from National Office • Injury analysis • National training days Reasoning: National senior management • Realising the cost of MHP injuries and benefit of MHP programme Middle management • Wanting to become more efficient • It improves patient safety and care For staff involved in MHP • Be efficient in equipment use • Correct use of equipment improve safety for me and the patient	• Equipment funding allocated by National Office • Hover mattresses • Electrical beds • Highlighting MHP as an important issue; • Efficient use of hover mattresses in theatre
Facility design	• Facilities needed upgrading (Ma) • National H&S manager competent in facility design	• MoH facility standards (SM) • Architects, engineers, and builders are reluctant to involve frontline staff (SM) • Facility upgrade was economical driven (Ma) • National H&S manager was not always informed of new builds (Me) • Local' H&S manager does not have the power to influence facility designers (Mi)	Resource: • MHPG facility design section • Funding from national office Reasoning: National facility team • Involvement of National H&S manager will assist facility updates Local management • applying MHPG standards that does not increase cost too much	• Wider doors and corridors and larger rooms • Reduces MHP related injuries

Case study 2 – 'The Public hospital'

Description

Case study 2 was a public hospital within one of 20 district health boards (DHB) in New Zealand. The DHB structure was introduced in the 2000s. The DHBs manage public hospitals and other healthcare services. They were funded by the New Zealand Ministry of Health (MoH) that controlled the healthcare section. MoH determined rules and regulations establishing requirements all public healthcare providers should adhere to. MoH had power to impose budget constraint on individual hospitals and decide which services they should prioritise.

The public hospital was founded in 1847 but had several major rebuilds, the latest completed in 2008. The public hospital provided secondary healthcare service to a population of approximately 300,000 and tertiary healthcare services to a population of around 900,000 in New Zealand. The public hospital provided all types of services available in New Zealand, e.g. allied health, emergency services, mental health services, and palliative care. The DHB was led by a chief executive officer and an executive leadership team consisting of 13 managers and directors. The DHB employed around 5,300 full-time equivalent permanent employees where the majority were employed at the public hospital. The public hospital also used a pool of casual staff to supplement if needed. The hospital had a staff turnover of 12.6%. It had a full-time H&S manager, who led the H&S Services department, including a MHP coordinator (0.6 FTE) and an occupational health physician. The MHP coordinator was introduced as a fixed-term position and turned into a permanent, part-time position in 2014. Three different people had served as MHP coordinator from 2007 to 2017. A newly established MHP steering committee, which consisted of the general managers, the executive directors, the professional heads, and the MHP coordinator, coordinated and advised on MHP. The MHP coordinator was in charge of implementing, promoting, and maintaining the MHP programme and for reviewing all MHP related incidents as well as training safe handling representatives.

Implementation of the MHP programme

Table 6.3 shows an overview of the implementation of the individual components of a MHP programme at the public hospital.

The interviews and chronicle workshop identified implementation of aspects of all three of the MHPG OSCs: policy development, workplace culture, and monitoring, evaluation, and audit. As well as all five FCCs: risk assessment, techniques, training, equipment, and facility design.

Implementation of a **MHP policy** began when a part-time, fixed-term MHP coordinator was employed to implement a MHP programme, including developing a MHP policy. Before the employment, MHP was part of H&S without a specific policy or programme. The MHP coordinator worked in isolation with good support from the H&S manager, however, there was not much support from management, which made it difficult to implement the MHP programme. The MHP coordinator identified and involved people that were passionate about MHP to gain support for the programme. The MHP coordinator felt that management had a narrow approach to MHP focusing on MHP training. The assistant director of nursing initiated an update of the policy, which the MHP coordinator revised in collaboration with the safe handling representatives. The aim was to create a more organised approach to MHP. However, there were still large differences in MHP procedures between wards. This was explained by the chronicle workshops to be due to differences in the charge nurses' priority of MHP, which influenced the attitude of the safe handling representatives.

A mining disaster in 2010 (Royal Commission on the Pike River Coal Mine Tragedy, 2012) and the new H&S at Work Act from 2015, increased public attention towards safety in the healthcare sector putting pressure on the sector to improve injury prevention. This raised the awareness in senior management of their responsibilities. This led to an organisational restructure and the employment of the new manager for corporate services, who had a strong focus on H&S, a new H&S manager, and a permanent MHP coordinator. Especially the H&S manager pushed for the introduction of a more robust approach towards MHP, particularly training, by working at a policy level trying to gain top management support. This resulted in the introduction of a policy for competency checks

on staff and the formation of a moving and handling advisory board with the authority to raise problems and issues related to MHP at top management level. Establishing a moving and handling advisory board was the joint effort of the H&S manager and the MHP coordinator. Further, the new H&S at Work Act helped highlight MHP at top management and board level, resulting in more proactive engagement with the H&S manager aimed at reducing risks.

The **Workplace culture** at the public hospital was characterised by the values in the healthcare sector, which prioritised patient rather than staff safety. Staff would subordinate own safety to fulfil preference of patients related to equipment use and MHP techniques. Staff had low buy-in to safe MHP, which they perceived to take more time and be unfeasible in a real-life setting and they were reluctant to attend MHP training because it was not tailored to their specific tasks at individual wards. Management perceived MHP training to be too time-consuming and was reluctant to release staff, as this would remove staff from their core tasks. This was amplified by limited staff resources and high workload. Further, some senior managers were perceived to lack of vision in relation to staff safety. This might have been influenced by the economic situation for the hospital. Several factors helped to raise awareness of MHP among staff. The MHP coordinator attended H&S committee meetings and became more aware of the specific needs of each ward through the H&S representatives, hence providing advice and support that were more accessible to staff. In addition, introduction of H&S representatives in every department together with a focus on H&S and MHP at the monthly ward meetings raised the awareness staff safety and its connection with patient safety.

The public hospital was **audited** to the standard of the Accredited Employer programme. However, this was not mentioned during the interviews or the chronicle workshops. **Monitoring and evaluation** of MHP and H&S seemed to focus on incident and accident reporting. The MHP coordinator was in the process of auditing all wards in relation to MHP for the first time. This was encouraged by the new H&S manager. The MHP coordinator developed her own audit tool; a simplified version of the THROPI audit (Fray and Hignett, 2013) she had learned while studying for a certificate in moving and handling. She gave positive feedback, focused on improvements

rather than faults to try to establish a more positive attitude towards MHP and the MHP coordinator's work. As a reaction to the mine disaster and the new H&S at Work Act, the hospital focused more on incident and injury reporting and implemented a new incident management system in 2012. Staff had some resistance to reporting injuries, which was perceived to be caused by difficulties understanding the new system, not having access to a computer, and not having time to fill in the form. However, the system and the pressure from outside were perceived to have resulted in management taking responsibility and acting on reported incidents and prioritise H&S and MHP higher.

Staff were perceived not to see the need for **risk assessment** of MHP. The MHP coordinator found that staff lost interest during training sessions when they came to risk assessment, in part due to the lack of formal MHP regulations. The permanent MHP coordinator and the safe handling representatives tried to overcome this resistance by taking a more coordinated approach to training staff in risk assessment by making the training more area specific. In addition, the H&S manager attempted to use the new HSW Act 2015 to improve risk assessment of MHP but found that managers did not see the need for it and found it too labour intensive. In order to ease to workload associated with risk assessment, the H&S manager created templates the managers just needed to adjust to their wards.

Many staff were not aware of correct MHP **techniques**. Further, some staff perceived safe MHP to take too much time and increase their workload. To change this attitude, the MHP coordinator introduced correct, evidence-based techniques through training. The MHP coordinator used the MHPG and other resources made available by ACC, e.g. the former MHP guidelines, along with knowledge gained from the postgraduate certificate in MHP to modify the information to staff.

The public hospital implemented and developed MHP **training** during the 10-year period. Initially, it was initiated by two serious MHP related injuries to staff, which resulted in the public hospital being fined. Firstly, MHP training was based on general MHP techniques, equipment, and risk management conducted by the MHP coordinator. Subsequently, the MHP coordinator managed to persuade management to establish ward trainers and 'Train the trainers', who were responsible for

conducting on-ward training. The former MHP coordinator used a draft version of the MHPG to change the training from generic MHP training to more ward specific training. In addition, the MHP coordinator arranged meetings for the ward trainers, which facilitated discussion and experience exchange and she supported the trainers by recognising them and helping them as much as possible. The later change of training to focus on the need of the profession and the ward were perceived to have increased staff attendance at training sessions. Still, the training at the wards varied both because resources were not specifically allocated to MHP training and it was difficult to persuade staff to become ward trainers.

Later, study days for safe handling representatives were introduced by the nurse educators on the wards. They aimed at keeping safe handling representatives up to date with procedures and equipment related to MHP. This improved dissemination of safe MHP knowledge during ward training. Dissemination of MHP knowledge was further assisted through the availability of online educational material and face-to-face sessions with low staff-to-trainer ratio on the wards developed by the H&S manager, MHP coordinator, and ACC. Attendance at refresher training was initially low, which was perceived to be due to high workload, unsupportive management, and that refresher training was not tailored to the needs of staff. However, due to the online module and focus on practical face-to-face sessions, the time required for refresher training was reduced. This increased attendance to refresher training. Still, the awareness of safe MHP varied across the hospital, mainly because doctors and non-clinical staff did not receive MHP training. Hence, doctors had a lower awareness of MHP. The chronicle workshop described that some doctors and ward managers had a negative attitude toward MHP, which were perceived to influence staff attitude towards MHP trainers and training. The new H&S manager conducted a gap analysis of the MHP programme to improve senior and middle management attitude and MHP training. The H&S manager used the MHPG to argue for more time for MHP training. However, this was not yet approved. The MHP coordinator attempted to create frontline management support by involving them in implementation of MHP training, through supporting and talking to them.

Implementation of MHP **equipment** happened throughout the period. MHP equipment was first purchased as a result of the two serious injuries. Later equipment maintenance was improved after a serious injury at another hospital caused by poorly maintained equipment. This increased availability of MHP equipment introduced new procedures related to MHP, and new MHP training focusing on equipment use. Implementation of equipment was restricted by the focus on patient safety rather than staff safety, lack of buy-in amongst staff, and lack of safety visions from senior management. People involved in implementing the MHP programme perceived the availability of MHP equipment to be low, however senior management and many managers perceived it to be sufficient. Media attention to the cost associated with broken MHP equipment and the MHP coordinator's support of MHP equipment purchase improved the understanding of the importance of availability and use of equipment.

The hospital experienced an increased number of bariatric patients. There were not enough resources to purchase enough bariatric equipment to make sure it was available when needed. The assistant director of nursing and the MHP coordinator implemented a bariatric-bundle where they rented bariatric equipment from a supplier who maintained it. This resulted in a reduction in incidents related to MHP. The equipment advisory board introduced a computer-based system aiming at optimising the equipment purchase process. At the same time, they restricted equipment purchase to be able to follow the budget and implemented a new procurement policy transferring the authority for procurement from the charge nurse to the equipment advisory board. Further, staff found the procurement process difficult to understand, hence making it harder to purchase new equipment. The challenges associated with acquiring new equipment resulted in a formal letter - initiated by the occupational therapist in the medical assessment unit - arguing for the need for additional equipment. Further, the MHP coordinator tried to overcome this challenge as well as a being involved in procurement by involving the H&S manager. Both contributed in making management aware of the problem.

The **facilities** at the public hospital were old and did not facilitate safe MHP. However, the public hospital had limited funding available to facility updates due to the tight regulation from MoH. As a

result, MHP was often not prioritised in facility updates and new builds. To some extent this was amplified by that the MHP coordinator was not automatically included in the processes around facility updates and new builds. In order to be involved and influence the facility design process, the MHP coordinator used the information in the MHPG to argue for a prioritisation of MHP. This often happened by the MHP coordinator showing up at building meetings with a tape measure and the MHPG facility section in order to physically illustrate what it would require to incorporate MHP into the design. Overall, this resulted in the creation of facilities that, to the extent possible, accommodated safer MHP, hence became more MHP friendly.

Table 6.3 *How the public hospital implemented the different organisational system components and core components of a MHP programme. Contextual levels are indicated as: Supra-Macro (SM); Macro (Ma); Meso (Me); and Micro (Mi).*

Component	Facilitating contextual factor	Hindering contextual factor	Mechanisms (Resource & Reasoning)	Outcomes
Organisational System Components (OSC)				
Policy development	• Mining disaster and inquiry (SM) • H&S at Work Act (SM) • Serious MHP injuries investigated by Department of Labour (Ma) • New corporate services manager focus on H&S (Ma)	• Differences in MHP procedures between wards (Me) • High workload (Ma) • Low priority of MHP among certain charge nurses (Mi) • MHP coordinator worked in isolation (Mi)	Resource: • Draft version of the MHPG • Previous H&S and MHP policies • International MHP guidelines • Discussion of the new H&S at work Act • Gap analysis by H&S manager • Employment of MHP coordinator Reasoning: For senior management and the board • Complying with legislation (recognition of accountability, fear of prosecution) • Being a good employer (policy statements shows we care) For middle management • Re-writing the MHP policies will re-emphasise the importance of MHP	• Policy for competency check for staff, - not implemented because of conflicting views on who should conduct them • MHP advisory board established • H&S and MHP policies updated • New manager for corporate services with focus on H&S • New H&S manager with focus on MHP • A permanent MHP coordinator
Workplace culture	• Mining disaster and inquiry (SM) • Press releases highlighted importance of MHP (SM) • Preparation and enactment of the new H&S at Work Act (SM)	• The healthcare sector has patient care and safety as first priority (SM) • Younger generations emphasis a good work-life balance (SM) • High workload and restricted staff resources (Ma) • Management does not promote safe MHP (Ma) • Senior management lack vision of safe MHP work culture (Ma) • Low staff buy-in to the MHP programme (Mi)	Resource: • Discussion of the new H&S at work Act • H&S representatives in all departments • Training days for safe MHP representatives • H&S on monthly ward meetings • Tailoring training to the needs of the job and ward • Reducing time needed for refresher training Reasoning: For senior management and the board • Complying with legislation and being a good employer (recognition of accountability, improved worker involvement) • Fear of being liable for injuries Management • What makes management change attitude Staff • What makes staff change attitude?	• Introduction of H&S representatives in each area • H&S at monthly staff meetings • Increased awareness of staff and patient safety
Monitoring, evaluation, and audits	• H&S at Work Act (SM) • Focus on reporting of incidents (Ma) • New H&S manager supports auditing and focuses on MHP (Mi) • Appointment of permanent part-time MHP coordinator (Ma)	• High workload (Ma) • Incidents reporting system was difficult to understand (Ma) • The hospital had no MHP audit system (Ma) • Lack of evaluation of the MHP programme (Ma)	Resource: • Introduction of computer-based incidents reporting • MHP postgraduate certificate • Audit tool (TROPHI) Reasoning: For senior management and the board • The hospital is responsible for incidents and injuries • Fulfil legal requirement to minimise injuries For middle management • The desire to minimise injuries should lead to increasing appliance with the audits For staff involved in MHP • Providing positive feedback to the wards will increase buy-in among charge nurses and staff	• Management more responsible for injury prevention • Better reporting and investigation of injuries including MHP • Simplified informal MHP audit • Suggested improvements of MHP in wards

Table 6.3, continued *How the public hospital implemented the different organisational system components and core components of a MHP programme. Contextual levels are indicated as: Supra-Macro (SM); Macro (Ma); Meso (Me); and Micro (Mi).*

Component	Facilitating contextual factor	Hindering contextual factor	Mechanisms (Resource & Reasoning)	Outcomes
Five Core Components (FCC)				
Risk assessment	• New H&S manager with focus on MHP (Ma) • Appointment of permanent part-time MHP coordinator (Ma) • Safe handling reps in the wards (Mi)	• Lack of formal MHP regulation (SM) • Staff lack interest in risk assessment (Me) • Management find risk assessment of MHP time consuming (Me)	Resource: • Preparation and enactment of the new H&S at Work Act • Templates for implementation Reasoning: For ward management • Templates make it easy to do risk assessment	• Reduced workload for ward management
Techniques	• Preparation and launch of MHPG (SM) • Availability of online MHP material (SM) • Permanent MHP coordinator (Ma)	• Staff unaware of correct techniques (Mi) • Staff attitude to safe MHP ('it takes too long') (Mi)	Resource: • Old ACC guideline • MHPG techniques section • Knowledge from MHP postgraduate certificate Reasoning: MHP coordinator • Using evidence based material will ensure use of correct techniques	• Evidence based training in technique
Training	• Fined for two serious MHP injuries (Ma) • Part-time MHP coordinator (Ma)	• High workloads (Ma) • Low management support for MHP (Me) • Low staff attendance at refresher training (Mi) •High workload limited time for MHP (Mi) • Staff reluctant to be engaged in MHP task (Mi) • Doctors did not see MHP as important (Mi) • Management attitude affect the impact of MHP training (Mi)	Resource: • Old ACC guideline • Draft version of the MHPG • Three yearly MHP trainer meetings • Gap analysis by H&S manager • 'Train the trainer' approach • Introducing ward MHP trainers Reasoning: H&S manager and MHP coordinator • Reduction face to face training time and adjusting refresher training to staff need improve attendance and create positive attitude towards MHP • Gap analysis based on the MHPG will create senior management support and resources to extra training	• Introduction of ward specific training • Safe handling representatives spread knowledge on MHP • Improved attendance at MHP training • More people became involved in promotion of MHP
Equipment	• Incidents in other hospitals due to poor MHP equipment maintenance (SM) • Increased awareness of obese people/ patients (SM) • Two internal serious harm injuries related to MHP, investigated by Department of Labour (Ma)	• The healthcare sector's values: patient care and safety first (SM) • Tighter management of expenses from the MoH (SM) • Lack of senior management vision on MHP work culture (Ma) • Complicated, centralised procurement processes (Ma) • Unsafe MHP in areas with insufficient MHP equipment (Me) • Limited understanding of MHP safety from the Equipment Advisory Board (Ma) • lack of buy-in from staff (Mi) • Charge nurses do not have authority to spend money on equipment (Mi)	Resource: • Preparation and enactment of the new H&S at Work Act • Equipment Advisory Board • Procurement system Reasoning: For middle management • The desire to minimise injuries • Introducing a computer-based system would optimise equipment purchase and implementation of new equipment faster and easier • The desire to stay within budget For staff involved in MHP • New equipment would reduce MHP injuries • Involving H&S manager strengthen the arguments for MHP equipment and increases the chance of purchase • Renting bariatric equipment reduce cost, increase availability when needed and use resulting in reduced injury risk For staff • If it takes too long to access equipment, then I cannot do all my jobs in the time available	• Introduction of MHP equipment – both more equipment and different kinds of equipment • Availability and use of equipment • Introduction of equipment package focused on bariatric patients • Increased difficulties purchasing MHP equipment • Increased use of equipment in some areas • Reduced numbers of incidents • Increased awareness of insufficient levels of MHP equipment among management
Facility design	• Current facilities do not facilitate safe MHP (Ma)	• Tighter management of expenses from the MoH, leading to limited resources (SM) • MHP coordinator not always involved in facility design (Mi)	Resource: • Preparation and launch of the MHPG, especially the facility section Reasoning: MHP coordinator • Using the information in the MHPG would make it possible to engage and influence the facility design process;	• More MHP friendly facilities

Case study 3 – 'The frontrunner'

Description

Case study 3 'The frontrunner' was a large public hospital within one the 20 DHB. It adhered to the same regulations as the public hospital, i.e. MoH's financial restrictions and regulations.

The frontrunner was founded in 1958 and was responsible for the delivery of secondary and tertiary healthcare. Like the public hospital, the frontrunner provided all types of services available in the New Zealand healthcare system, as well as responsibility for forensic care. The frontrunner provided secondary service to a population of 630,000 and tertiary services to a population of 1,700,000, the hospital with the largest client group, which was the fastest growing as well. Due to its geographical locations, this DHB had close collaboration with two other DHB. The three DHB shared the same chairman of their boards. The frontrunner was led by a chief executive and an executive leadership team consisting of nine directors and chief advisors. In addition to the frontrunner, the DHB had two larger and two smaller facilities, as well as community facilities and employed approximately 6,500 full-time equivalent permanent plus up to 1,500 casual staff. The frontrunner had a staff turnover for all staff of 12.5%. The H&S department, which was led by a full-time H&S manager and consisted of 20 people, mainly occupational H&S nurses, was responsible for H&S. MHP was the responsibility of the MHP team led by a full-time employed MHP coordinator, two part-time administrators and 14 educators, who worked as educators at least 0.1 FTE. The current MHP coordinator had been employed for more than 10 years and led the development of the MHP team. The MHP team and H&S department collaborated closely. The MHP coordinator had developed a strong collaboration and relationship with ACC and was involved in the development of the MHPG and secured funding from ACC to trial their MHP programme, which would form the basis for the MHPG.

Implementation of the MHP programme

Table 6.4 shows an overview of the implementation of the individual components of a MHP programme at the frontrunner.

The interviews and chronicle workshop identified implementation of aspects of all three of the MHPG OSC: policy development, workplace culture, and monitoring, evaluation, and audit. As well as all five FCCs: risk assessment, techniques, training, equipment, and facility design.

The process of implementing a MHP **policy** and programme was initiated as a reaction from senior management following a series of serious shoulder injuries caused by MHP. The MHP programme was implemented through several smaller steps led by a newly appointed MHP coordinator in collaboration with the H&S manager, and a consultant from ACC. They used information from international MHP guidance material to develop a 'No-lift' and a 'Do not catch a falling patient' policies. In order to implement these policies, the MHP coordinator needed to challenge doctors and people in high positions in the wards to persuade them of the benefits of the MHP programme. This was done via engaging people, who opposed the MHP programme, and openly arguing that the use of correct techniques and equipment would lower the number of injuries to staff. Through this process, the lack of possibility to consult external MHP experts, who had experience in implementing MHP programmes was a barrier, however, the H&S manager actively supported the work of the MHP coordinator. The implementation of the new MHP policies contributed to a decrease in incidents.

Senior management focused on patient safety, partly due to limited funding. When the new H&S at work act was introduced, management provided funding to H&S in general, which was perceived to draw funding away from MHP. As a result, the MHP coordinator used a bottom-up approach to implement MHP policies, as this did not require senior management support. This was done through engaging the individual ward managers, who believed in the benefits of safe MHP, rather than attempting to change the entire organisation in one go. Further, the MHP coordinator approached the H&S manager in an attempt to influence senior management. The H&S manager implemented a targeted communication strategy for communicating new policies and procedures to the people that need to know, which contributed to an increased awareness of these.

A change in **workplace culture** began after a number of significant shoulder and back injuries caused by MHP, and the introduction of the first ACC MHP guideline. This raised the awareness

and profile of MHP and the H&S manager managed to persuade the CEO that employing a MHP coordinator would improve staff safety. Thus, a full-time MHP coordinator was appointed. This helped MHP becoming a prioritised H&S area.

The frontrunner had economic constraints throughout the period due to low budgets and budget cuts. Further, the organisational vision, *'Best care for everyone',* was ingrained in the workplace culture, which prioritised patient safety above staff safety. It was difficult to implement new initiatives because of resistance towards change among staff and because the healthcare sector was highly regulated by rules and procedures. At the same time, there was no involvement from MoH or support from national level to MHP. This could be interpreted as a lack of priority and contributed to MHP not being prioritised. To overcome the resistance, the MHP coordinator recruited MHP champions by persuading one person at the time. Especially having managers in the specific areas that saw the importance of MHP supported the implementation. In order to assist the supportive managers, the MHP coordinator directly approached them.

The frontrunner had a process of integrating MHP and H&S, despite the MHP team being a part of the H&S department. Allocating staff from the H&S department to specific areas lowered resistance towards MHP, as the H&S staff gained direct access to both management and staff. In addition, the H&S department had the mandate to 'force' areas to improve MHP practices if need, however, this was rarely necessary. The H&S department introduced a rehabilitation programme for staff returning from injury related to MHP. Together with the establishment of WorkSafe, and the preparation and enactment of the new H&S at Work Act, this increased staff awareness of H&S and MHP and increased number of staff attending MHP training.

Monitoring and evaluation of the MHP programme focused on **Audits** and monitoring of MHP related injuries. The frontrunner was **audited** to the standard of ACC's Accredited Employers Programme, which included a yearly internal H&S audit. The H&S manager included MHP in the electronic audit system, which alerted managers automatically when an audit was due. This resulted in more MHP audits and compliance with audits. The H&S department introduced two digital support systems. One system calculated staffing needs based on patient acuity. The other provided

a care plan for patients, including MHP needs. Together they highlighted the workload at the frontrunner, hereby increasing an acceptance among staff and middle management that a high workload can lead to an increased injury reporting. As a consequence of the MHP team not being a part of the H&S department, the monitoring of MHP related injuries was difficult as differences between the H&S department and the MHP team made it hard to see relationships. This was reinforced by the frontrunner focusing more on information on patient safety and patient experience rather than staff experiences.

The two digital systems calculating staffing needs and the care plan including MHP requirements became part of the **risk assessment** process related to patients and MHP. Before this, the hazard register was where the MHP risks were mentioned. However, the register was not visible and the awareness of it was low. When the human resources manager integrated the hazard register with the organisational risk register it increased access to and visibility of hazards related to MHP and resulted in higher awareness of MHP related hazards. In addition, this ensured that staff conducted MHP related risk assessments of new patients.

The Frontrunner implemented many of the **techniques** described in the MHPG before the MHPG was launched because the MHP coordinator was involved in the development of the MHPG. Nevertheless, staff at the frontrunner were perceived to have a poor attitude towards MHP, which affected the appliance of the new techniques. Further, the frontrunner had a high turnover of staff, partly due to its geographical location, which imposed high living expenses on staff. As a result, the frontrunner struggled to maintain a critical mass of staff using safe MHP techniques. The frontrunner was perceived as an exemplar in relation to implementing safe MHP techniques, which senior management found motivating as it promoted the general perception of the frontrunner. This resulted in an increased attention towards MHP from management, in part because senior management expected the improved MHP techniques, through fewer injuries, would lead to a reduced levy.

MHP **training** was initiated after the MHP coordinator established collaboration with ACC that provided funding for piloting mandatory MHP training for all clinical staff. Alongside the

employment of the MHP coordinator, this helped to highlight MHP as an important H&S area. The MHP coordinator and the H&S manager established a MHP team by advertising for staff interested in MHP. This identified potential trainers, who were passionate about MHP after the MHP coordinator had convinced management to appoint MHP trainers on the wards, by arguing that this would increase the quality and consistency of MHP. These trainers became responsible for in-service training on the wards, e.g. in equipment use. The trainers received training on special MHP training days. This supported the subsequent introduction and use of new equipment by the MHP trainers serving as ambassadors for and as an easy accessible expert in safe MHP. Further, the MHP coordinator was able to get MHP included in the general staff orientation by arguing that this would increase attendance of the MHP training, because the individual wards would not have to pay salary to the staff being trained, as salary when being on orientation were covered centrally.

Mainly because of high workloads and understaffing, the MHP training was not prioritised on all wards and staff was not released for training because it was perceived to increase risk for the remaining staff. This hindered implementation of safe MHP. Lack of training facilities and the need for a low trainer to staff ratio reduced the number of MHP training sessions offered so that it could not keep up with the demand for sessions. In order to accommodate the increased need for training, the MHP coordinator was able to push for an upgrade of the training facilities for MHP. This was done trough arguing to senior management that better training facilities would increase attendance, hereby increase number of staff being trained, which would reduce the number of injuries occurring.

The frontrunner gradually implemented more and more advanced MHP **equipment**. Overall, this was assisted by the frontrunner having a more organised approach to the introduction of new equipment. The MHP coordinator established a close relationship with MHP equipment suppliers, which included open discussions about benefits of different equipment and suppliers providing free training in equipment use when purchasing equipment. However, government purchasing rules made this difficult. In order to encourage staff to use the equipment, the MHP coordinator emphasised that staff safety also is patient safety, hence by using the equipment staff would ensure

patient care. Furthermore, the increasing number of bariatric patients served as an argument for introducing and using MHP equipment.

The selection of MHP equipment was led by the director of nursing supported by the H&S manager and the MHP coordinator. They used a participatory process encouraging nurses, physiotherapists, and other staff to participate in finding the best equipment for the whole hospital. Decisions about purchase were often based on a cost-benefit discussion. The budget committee, of which the MHP coordinator was not a member, made the final decision about purchase of equipment including MHP equipment. The decision was mainly made based on how the equipment benefitted patient care and not staff safety, hence creating a barrier for implementation of new MHP equipment. Maintenance of MHP equipment improved after a clinical engineering department was established and introduction of an asset management system.

In addition, the enactment of the new H&S at Work Act assisted to highlight the need for more MHP equipment. This was the case, as the H&S at Work Act emphasised senior management responsibilities with respect to staff safety as well as stating the staff should have appropriate and sufficient equipment. Hereby senior management was obligated to ensure sufficient MHP equipment was being introduced.

Design of facilities was influenced by limited budgets and the frontrunner having out-dated facilities. It often did not include consideration of design that facilitated MHP. The H&S manager wrote to the board of the hospital describing that it would be cheaper to include safe MHP measures, e.g. ceiling hoists, when building rather than adding these later. This led to the MHP coordinator being involved as a consultant when a new unit was built. However, through arguing for the benefits of MHP safe facilities to staff safety and patient care, the MHP coordinator still had to push to be able to consult on facility design, resulting in the MHP team gradually became more involved in the facility design process. When involved, the MHP team often used the MHPG facility section to argue for larger rooms and design for, at least partial, ceiling hoists. As a result, facilities at the frontrunner became more MHP friendly with a reduced workload for staff as patients were easier to handle.

Table 6.4 *How the frontrunner implemented the different organisational system components and core components of a MHP programme. Contextual levels are indicated as: Supra-Macro (SM); Macro (Ma); Meso (Me); and Micro (Mi).*

Component	Facilitating contextual factor	Hindering contextual factor	Mechanisms (Resource & Reasoning)	Outcomes
Organisational System Components (OSC)				
Policy development	• Significant shoulder injuries to staff following MHP (Ma) • Increasing population (Ma) • Full-time employed MHP coordinator (Mi) • Supportive H&S manager (Mi)	• MHP not a priority in healthcare (SM) • Preparation and enactment of the new H&S at Work Act (SM) • Resource restriction (SM) • Lack of access to MHP experts (Ma) • Low senior management support (Ma)	Resource: • International MHP programmes Reasoning: For senior management and the board • Reducing injuries will reduce levy For staff involved in MHP • Through being able to provide evidence for the effect of the MHP programme is a way to be allocated more funds • Involving H&S manager will ensure management support	• Fewer injuries and more equipment • 'No lift' policy introduced • 'Do not catch a falling patient' policy introduced • Partnership with ACC
Workplace culture	• Establishment of WorkSafe (SM) • Significant shoulder injuries caused by MHP (Ma) • H&S department can enforce MHP improvements (Ma) • Supportive frontline managers (Mi)	• Lack of national involvement and support for safe MHP (SM) • Rigid procedures and rules in the healthcare system (SM) • MHP team not part of H&S department (Ma) • Focus on patient safety rather than staff safety (Ma) • Resistance towards change from staff (Mi)	Resource: • Former ACC MHP guideline • New H&S at Work Act • Full-time MHP coordinator • MHP champions Reasoning: For senior management and the board • MHP coordinator will reduce MHP injuries and cost	• Raised awareness of importance of MHP • Full-time employed MHP coordinator • More staff attending MHP training
Monitoring, evaluation, and audits	• Electronic audit system (Ma) • Internal audit related to Accredited Employer Programme (Ma)	• Focus on patient safety rather than staff safety (Ma) • MHP team not part of H&S department (Ma)	Resource: • Electronic system calculation of staffing • Electronic patient care plan • Electronic audit system Reasoning: For senior management and the board • Reducing injuries will reduce levy For middle management • Reduce injuries resulting from MHP • Reminding managers of audits will increase compliance	• Increased acceptance of injury reporting • Increased adherence and compliance with audits

Table 6.4, continued *How the frontrunner implemented the different organisational system components and core components of a MHP programme. Contextual levels are indicated as: Supra-Macro (SM); Macro (Ma); Meso (Me); and Micro (Mi).*

Component	Facilitating contextual factor	Hindering contextual factor	Mechanisms (Resource & Reasoning)	Outcomes
Five Core Components (FCC)				
Risk assessment		• Low visibility of hazard register (Ma) • Focus on patient safety rather than staff safety (Ma)	Resource: • H&S Hazard register integrated into organisational risk register • Electronic system calculation of staffing • Electronic patient care plan Reasoning: H&S manager • Integration of MHP in organisational risks leads to management and staff awareness and to better MHP hazard management For staff involved in MHP • Care plan has to be completed, including MHP risk assessment	• Increased awareness of MHP related hazards • MHP risk assessment performed for new patients
Techniques	• MHP coordinator involved in the development of the MHPG (Ma) • The existence of a MHP team (Me)	• High staff turnover (Ma) • Staff having poor attitude towards MHP	Resource: • Preparation the MHPG, Reasoning: For senior management and the board • Using correct techniques will reduce injuries, hereby lowering the levy MHP coordinator • If staff are aware of best MHP techniques, the risk of injuries will be reduced	• Improved knowledge of safe MHP techniques among staff • Increased attention towards MHP among management
Training	• Partnership with ACC plus financial support (Ma) • Full-time MHP coordinator (Ma) • Dedicated MHP training room (Ma) • MHP trainers (Me)	• Ward management do not consider MHP as important (Ma) • Insufficient number of staff (Ma) • Insufficient resources for training (Ma) • Staff not released for training due to prioritisation on wards (Me) • High staff turnover (Ma)	Resource: • Preparation of the MHPG • MHP in orientation • MHP in ward training Reasoning: For staff involved in MHP • Identifying trainers that have pride in MHP will increase quality of training • Using a group of trained trainer will improve consistency of training Frontline management • Releasing staff for MHP training increase risk of injuries	• MHP incorporated into orientation • Increased use of equipment • More staff trained • Not all clinical staff released for MHP training
Equipment	• More bariatric patients (SM) • Establishment of Clinical Engineering Department (Ma) • Participatory approach to equipment purchase (Me)	• Government purchasing rules (SM) • MHP coordinator not included in procurement (Ma) • Budget committee approved equipment that improved patients safety (Ma)	Resource: • Communication with equipment suppliers • Assets management system • New H&S at Work Act Reasoning: For senior management and the board • Does MHP equipment improve patient care? • We are legally obligated to ensure sufficient MHP equipment For staff involved in MHP • Staff safety is patient safety	• A more systemised and effective approach to equipment maintenance
Facility design	• The MHP team (Me) • Supportive H&S manager (Mi)	• Having out-dated facilities (Ma) • Budget constraints and lack of funding for MHP (Ma) • MHP coordinator not involved in facility design	Resource: • MHPG, facility section Reasoning: For senior management and the board • MHP friendly facilities will lower workload for staff • It is too costly to design for ceiling hoists? For staff involved in MHP • Having sufficient facilities will improve staff safety	• MHP team more involved in facility design • Partially improved facilities for MHP

Discussion

This section will start by summarising the similarities and differences between the three case study organisations followed by a discussion of what motivated each of the case study organisations to implement a MHP programme. Finally, the process of implementing the MHP programme components and contextual factors hindering and facilitating the implementation will be discussed.

The case study organisations

The three hospitals included in this study had a number of similarities. All of them had work within the regulations and legislation outlined by the MoH. Further, the services provided by the hospital were comparable, especially between the public hospital and the frontrunner as they both were public hospitals with tertiary responsibilities. In addition, both the public hospital and the frontrunner were located in larger urban areas, hence both having a large catchment area. Still, the three hospitals were quite different and had unique contextual factors that strongly affected the implementation of the MHP programme and provided them with special opportunities. The private hospital benefited from the merger between two hospitals, which initiated a discussion about how to develop joint practices, policies, and procedures that provided an opportunity to improve the MHP practices as well as highlight the importance of MHP. The public hospital employed a H&S manager, who had a large focus on MHP and pushed for the introduction of a more robust approach towards MHP training, and a new chief operating officer, who had a strong focus on H&S, especially staff safety. Together these two employments raised the importance of MHP at the public hospital. The frontrunner employed a full-time MHP consultant, who was extremely dedicated. Through the initiatives of the MHP coordinator, the frontrunner was able to establish a partnership with ACC within the area of MHP. This resulted in ACC providing financial support to the frontrunner in order to develop and trial a MHP programme. This positioned the frontrunner in a favourable position with respect to implementing a MHP programme.

Motivation for implementing a MHP programme

The initial motivation for initiating the implementation of a MHP programme was initiated by staff experiencing serious injuries related to MHP. The private hospital and the frontrunner started their implementation after analysis of MHP injuries. The public hospital's implementation was initiated after being fined because of two MHP related staff accidents. Thus, for all hospitals, implementation was driven by the burden of MHP related injuries and desire to reduce these injuries and the associated costs. In addition, all three hospitals acknowledged that the increasing number of bariatric patients increased the need for safer patient handling. This finding echoes Stenger et al (2007), which found that the main factor motivating the initiation of a move towards safer MHP was a high number of MHP related injuries to nurses (Stenger et al., 2007).

Later on, all three hospitals were motivated to further develop and support their MHP programmes by the new Health and Safety at Work Act 2015, which emphasised senior management responsibility, worker engagement, and a risk management. The new act was used by H&S managers and MHP coordinators to make top management more aware of their H&S and MHP responsibilities.

The process of implementing a MHP programme

The implementation of the MHP programme in the three hospitals was a gradual process with smaller and larger changes, which continuously improved MHP practices. All case studies had introduced components of a MHP programme, MHP training and equipment before the launch of the MHPG. As a result, the MHPG was primarily used to check and optimise existing MHP programme components rather than developing a programme from scratch. The MHP coordinators and H&S managers particularly used the MHPG as a support when influencing management, staff, architects, and builders.

The implementation process in all hospitals was driven by a passionate individual who saw the need for MHP. At the private hospital and the frontrunner, the H&S managers initiated the development of a MHP programme before passing it on to a dedicated MHP coordinator. In the

public hospital, the MHP coordinator identified the need for a MHP programme. These people worked partially in isolation and were at times the sole person prioritising MHP within the organisation. They had to work on an organisational level to identify supportive persons in the organisations as well as to be accepted, and wanted, as a role and advisor. They particularly found support in H&S managers, trainers and some senior or middle managers that were supportive of MHP. Theberge and Neumann (2010) have previously described that ergonomists, in the same way, need to establish organisational support before initiating ergonomic interventions in workplaces. They state that the person responsible for the implementation needs to get people in the organisation on board, make sure they understand the need for the intervention and assign resources to it (Theberge and Neumann, 2010). Thus, if a person responsible for implementation experiences organisational resistance, they should attempt to created coalitions with committed senior and middle managers in order to facilitate implementation of the programme.

Within all case study organisations, the introduction or change of **policies** relating to MHP, e.g. techniques (e.g. 'Do not catch a falling patient') or use of equipment before introducing training, seemed to have highlighted the importance of MHP, hence helping to create management support and lower staff resistance. Lee et al (2018) reported that following the introduction of a MHP policy, as a part of a MHP programme enforced by safe MHP legislation in California, there was an improvement in nurses perceiving the MHP programme to be very good or excellent (Lee et al., 2018). This support the findings from the current study that introduction of a MHP policy helps improve staff attitude towards MHP. Hence, it can be speculated that the improved staff attitude is related to the process of creating policies, which require organisational work.

In all three hospitals, **workplace culture**, especially management support, greatly influenced how well the different components of the MHP programme were being implemented. Especially ward and area managers, and charge nurses had a large influence on staff's attitude towards MHP training and workplace culture. At the private hospital staff's resistance to change was

perceived to be the biggest challenge for implementation. Staff resistance also affected the public hospital and the frontrunner, however, time constraints and heavy workload seemed to be larger barriers that created the negative attitude amongst staff at the public hospital. These findings correspond with previous studies, as lack of willingness to change has been identified as one the most common barriers when implementing MHP programme components (Koppelaar et al., 2009). Further, lack of management support or interest in a given topic has been shown to be a barrier for the implementation of both evidence based practice (Dogherty et al., 2013) and MHP programmes (Koppelaar et al., 2009; Lahti et al., 2019). In addition, the presence of a poor workplace culture has recently been reported as a barrier for implementation (Kanaskie and Snyder, 2018).

During the process of implementing of initiatives around **monitoring, evaluation, and audits**, all case organisations experienced an increasing focus on incident and injury reporting, which was influenced by the new H&S Act and an increased media focus on H&S in general and on injuries in the healthcare sector in particular. This led to a more systematic injury reporting, better identification of MHP risks, a higher awareness amongst staff, management, and top management, and greater acceptance of MHP initiatives. Combined, this served as a facilitator for the implementation of MHP practices. If the increased focus on injury reporting resulting in more incidents and injuries being reported in all three case studies was a trend throughout the entire healthcare sector, this could potentially have acted as a contributing factor to the increased injury claims rates observed four years after the introduction of the MHPG (Study 1).

At both the public hospital and the frontrunner, staff and management had a low interest and/ or awareness of **risk assessment**, which resulted in an incomplete integration of risk assessment in relation to MHP, which served as a barrier for implementing the risk assessment. To change this, the H&S manager at the public hospital attempted to increase use by linking the new H&S legislation. Another approach was applied by the frontrunner, which integrated MHP related risk assessment into the organisational risk register. This assisted in creating an increased awareness and ensured the risk assessment of new patients was performed. Previous studies have

highlighted the importance of risk assessment in a MHP programme (Hignett, 2003; Nelson et al., 2006). However, neither of these studies provides guidance on how to perform the implementation of risk assessment.

All organisations first introduced general MHP **training and techniques**, which they over time tailored to the local needs. However, all hospital experienced resistance amongst staff towards new techniques and use of equipment. The public hospital and the frontrunner also had difficulties making staff attend MHP training. This was perceived to be caused by staff not having time to attend because of understaffing in certain areas and some ward managers not wanting to release staff for training. Some ward managers even perceived that attending training would increase risk of injuries from MHP to the staff remaining at the ward. Previous studies also found that lack of staff (Dogherty et al., 2013; Engkvist, 2008; Kanaskie and Snyder, 2018; Olkowski and Stolfi, 2014; Silverstein et al., 2012) and insufficient time (Dogherty et al., 2013; Kanaskie and Snyder, 2018; Krill et al., 2012) hindered the implementation of a MHP programme. However, they did not identify the role the ward managers played.

Limited funding for **equipment** purchases, complicated procurement processes, and management's attitude that staff needed to go and get equipment or wait for it to be available were factors that resulted in low availability of MHP equipment in some areas which were identified as barriers for practising safe MHP. Complicated procurement processes particularly affected the two public hospitals. They implemented processes to manage the limited resources available for equipment purchases in general, as they had the tightest budget because they had to apply to MoH budgets. The procurement committees at the two public hospitals focused on following the MoH's procurement rules, cost-benefit analysis and on equipment that increased patient safety. They perceived MHP equipment to only improve staff safety, which led to MHP equipment being placed lower on the list of priority. Previous studies have identified both the availability of equipment (Dogherty et al., 2013; Engkvist, 2008; Koppelaar et al., 2009; Krill et al., 2012; Olkowski and Stolfi, 2014), and budget constraints (Dogherty et al., 2013; Silverstein et al., 2012) as barriers for implementation of MHP programmes. However, they have not

identified how values in the healthcare sector, management attitude towards availability of MHP equipment, the perception of procurement committees and procurement processes can be barriers to purchase and use of MHP equipment, thus promoting unsafe MHP.

The **facilities** at all hospitals were identified as a barrier for safe MHP. All hospitals had facilities that hindered the use of MHP equipment. However, when facilities were updated or renovated, it provided an opportunity to make them more MHP friendly. These opportunities were used by MHP coordinators and H&S managers at all hospitals when they became aware of them. Neither MHP coordinators nor H&S managers were automatically involved at the early stage of the renovation process and had to fight to be involved. When they were involved, they (the MHP coordinator at the public hospital and the frontrunner, and the national H&S manager at the private hospital) used the MHPG to argue for room design that accommodated use of MHP equipment. In some cases, it resulted in standards that exceeded MoH's standards. The MHPG identified that the MoH standard was inadequate. However, architects and engineers were reluctant to involve others and in particular local staff working in the areas. This resulted in other cases in facilities with insufficient space and too narrow doors for use of MHP equipment.

Despite the healthcare sector perceiving the MHP programme at the frontrunner to be an exemplar, the case studies showed that the frontrunner also struggled to implement their MHP programme. In particular, low middle management support, which resulted in fewer staff than expected being released for training, and the rigidity of the procurement process, which resulted in a lack of MHP equipment being available, were barriers for the implementation of the MHP programme.

In order to facilitate organisational changes, all three case studies highlighted the importance of the opportunity for experience exchange between actors seeing the need for a MHP programme. These opportunities happen both inside, e.g. study days for MHP representatives, as well outside the organisation, e.g. cross DHB networks for MHP coordinators. Individually the actor predominantly had no or low organisational power, however, when creating coalitions, where they could synchronise efforts or develop joint strategies, they had greater impact.

Summary of the findings

The case studies showed that the healthcare sector valued patient safety as the highest priority, and staff safety as at least secondary. As a result, the occurrence of serious injuries to staff following MHP was the motivation for initiating the organisational changes needed to implement a MHP programme using components from the MHPG. Hence, senior management attention towards the importance of MHP was a precondition for the MHPG to work. The introduction of a MHP programme in any of the three case study organisations relied on a passionate actor, the MHP coordinators, to drive (design and implement) the programme. The actor responsible for driving the programme needed to gain organisational support from senior managers. Further, the implementation of components from the MHPG was influenced by the presence of parallel programmes, resources, and external attention, e.g. legislation prioritising H&S, and increased media attention towards the healthcare sector.

In all organisation, implementation of a MHP programme happened through an on-going process that improved MHP practices via smaller and larger changes in the organisations. These changes were facilitated by the opportunities for experience exchange, both internal and external to the organisation, between actors supporting a MHP programme. Further, the study showed the all three hospitals, to a various degree, had components of a MHP programme prior to the MHPG being introduced. Hence, the organisations did not need to create an entire MHP programme, thus they used the MHPG to check and optimise their existing MHP programmes.

Within all hospitals, internal contextual factors such as lack of management support, resistance toward change amongst staff, low availability of equipment, and inadequate facilities for safe MHP served as barriers for implementation of a MHP programme. These factors were especially prominent in contexts with limited budgets and staff shortage. In order to overcome the barriers associated with the implementation of a MHP programme, the key actors responsible for the implementation would benefit from having the possibility of having training, which could have taught them how to overcome the resistance in the organisation.

Limitations and strengths

The main limitation of this study relates to the organisations taken part. As all participation was voluntary, only organisations that prioritised MHP and saw the benefits of having a MHP programme were willing to participate. As a result, organisations that did not consider MHP to be important were not possible to include as a case study organisation. Further, the feasibility of the chronicle workshop approach is greater in organisations characterised as being open and willing to investigate own practices and procedures (Gensby, 2014). This results in a selection bias towards organisations focused and motivated towards change, increasing the likelihood of successful outcomes. In addition, only including hospitals in the case studies led to an unbalanced focus on hospitals. However, as the MHPG developers anticipated hospitals, especially public hospitals, to be drivers of change within the healthcare sector, looking at hospitals would be in accordance with the expectations of programme theory of the MHPG. Also, by only investigating one subsector of the healthcare sector made it possible to identify difference or commonalities that might else could have been explained by differences in context due to being in different subsectors. In addition, due to limited resources within the study, it was necessary to limit the numbers of case studies. Thus, limiting the influential contextual factors to one subsector.

A second limitation is that the study did not include observations or interviews with either staff only have a carer role or management that opposed the MHP programme. As a result, we only have opinions from people that were clearly supporting the implementation of a MHP programme.

As a methodology, chronicle workshop has limitations that need to be considered. Some of the limitations exist due to the selection criteria of the participants in the workshop (Hansen and Pedersen, 2014). There is a potential risk of a 'knowledge hierarchy' that position facts above emotions, e.g. statements based on feeling rather than facts are being marginalised (Hansen and Pedersen, 2014). This is primarily due to an explicit focus on events, actors, and specific times throughout the workshop. This potentially positions certain participants more favourably with

respect to definition power. As a result, these individuals have a greater impact on the shared history and have an increased possibility to push through their personal beliefs. However, this was not experienced during any of the workshops in this study, hence the findings are unaffected by this.

A further limitation of the study was that we only were capable of including top management in the chronicle workshop in one of the case studies, whereas the two other case studies had a larger focus on ward than the organisation as a whole. Nevertheless, the same contextual factors were revealed across the three case studies indicating that the lack of top management participation in the chronicle workshop did not affect the outcomes of the workshops.

A strength of the study was the mixed-methods approach using both interviews, document review, and chronicle workshops. This allowed for triangulation as well as for the opportunity to collect supplementary information on issues that was not fully revealed following either the interviews or chronicle workshop.

Using chronicle workshop has distinct advantages as it can i) identify a range of contextual factors affecting how an organisation implements interventions; ii) provide information about historical events that might have influenced the outcome of a specific intervention and help identify how much of the outcome was a result of a particular intervention and how much was influenced by other factors. In some ways this may be considered an alternative for pre and post assessments and case-control studies when it is impossible to do these; and iii) gathering people with different perspectives on the intervention affords an opportunity for to identify and discuss different factors that may have influenced the intervention. This would only have been otherwise possible through multiple interviews and re-interviews when unexpected or alternative factors were identified by some interviewees. Thus, Chronicle workshops are more time efficient in identifying outcomes and factors influencing interventions.

Chapter 7. Discussion

Whilst the five studies in this thesis have each contributed, individually, to an increased understanding of 'What makes a moving and handling people guideline work?', the question has only been partially answered. This is because 'what works' is strongly affected by the context in which it is intended to work. Hence there is no single or easy answer to this question. Nevertheless, the findings of the five studies in this thesis add to our understanding of 'what worked, for whom, under what circumstances, and why they may have worked for some, but not for others' when a specific MHP guideline - the New Zealand MHPG - was introduced.

The first five sections in this chapter discuss how each of the five studies contributed to answering the five aims of the thesis. This is followed by a section that specifically addresses the question in the title of the thesis: 'What makes an MHP guideline work?' The final section discusses limitations and strengths of the thesis.

What was the impact of a MHP guideline on injury claims rate

The analysis of the ACC claims data (Study 1) showed that MHP related claims rates and claims costs declined across the healthcare sector in New Zealand before the introduction of the MHPG and that they increased in the four years after the introduction of the MHPG. However, this finding does not necessarily mean that the MHPG has not helped to reduce MHP injury risk.

Some previous evaluations of the impact of introducing a MHP programme, which included funding of equipment or support from commercial companies, reported reductions in claims rates to various degrees (Dennerlein et al., 2017; Fagerström, 2013; Kurowski et al., 2017; Martin et al., 2009; Michaelis and Hermann, 2010; Nelson et al., 2006; Powell-Cope et al., 2014). Other evaluations have shown no impact (Schoenfisch et al., 2013; Silverstein et al., 2011, 2012). The findings from the ACC claims data (Study 1) support the latter, but add to the uncertainty about the contribution of MHP programmes in reducing claims rates.

The findings from the questionnaire studies (Studies 3 and 4) and the case studies (Study 5) have helped identified reasons why the MHP claims rate might not have declined or even why it increased. The first analysis of the questionnaire (Study 3) showed that the key actors with respect to the MHPG, e.g. H&S managers, MHP coordinators, and therapists, identified by the programme theory (Study 2), were aware of its existence as well as used it. Hence, a lack of awareness of the MHPG amongst the key actors cannot explain the absence of an impact following the introduction of the MHPG. Further, the introduction of the MHPG could have increased awareness of MHP as a risk factor, thus contributing to more people reporting MHP related injuries that they would not earlier have reported. This could lead to increased number of reported MHP related injuries, which could lead to more MHP related injury claims to ACC and to more accepted MHP injury claims. However, comparing the overall awareness between the MHPG and the former ACC MHP guideline did not show any difference in the proportion being aware, with both being around 55% (Olsen et al., 2016). The second analysis of the questionnaire (Study 4) showed that the change resulting from use of the components in the MHPG, in general, was low. If little change after use of the MHPG occurred, then little or no change in the claims rate would be expected, as MHP would happen in the same fashion as before the introduction of the MHPG. However, this cannot explain the increase in claims rates.

The case studies (Study 5) identified that the preparation and enactment of the new H&S legislation; the "Health and Safety at Work Act 2015" together with an increased media focus on top management's liability considerably changed the priority of H&S and MHP within the organisations and led to increased focus on injuries and injury reporting. It can be hypothesised that the effect found in the case study organisations could be found in the entire healthcare sector because the new legislation and the media focus affected the entire healthcare sector in New Zealand. This could also help to explain why the MHP related injury claims rate increased, thus hiding any visible effect of the MHPG.

Another explanation could be that potential positive effects of the MHPG have been counteracted by other factors. From the case studies (Study 5) we know that the New Zealand

population was getting increasingly heavier and the proportion of bariatric patients was constantly increasing, thereby putting an increasingly bigger burden on the healthcare sector. At the same time, the healthcare sector had a workforce that was getting increasingly older. Both of these factors would be expected to increase the risk of injuries related to MHP. Furthermore, there have been several budget cuts in the healthcare sector in New Zealand, thereby increasing the workload on the remaining staff. Taken altogether, these factors could potentially have increased the risks of injuries related to MHP.

Thus, an automatic reduction in injury claims rate cannot necessarily be expected just because a MHP guideline is introduced into the healthcare sector. The reason for this is that the impact of a MHP guideline is affected by several contextual factors, such as i) parallel programmes and legislation that might affect injury reporting, ii) awareness of the MHP guideline amongst intended users together with an increased awareness of risk related to MHP, and iii) that use of the guideline needs to lead to change within organisations in order to reduce injuries. Therefore, in order to better assess the impact of a MHP guideline, it is necessary to monitor injury claims over a longer time period because it is possible that the introduction of the guideline might influence the prevalence of reporting of MHP injuries. Hence, all interventions aimed at reducing injury claims rates might initially increase reporting of injuries due to increased awareness. Further, it is important to look at all kinds of interventions that could affect injury rates. Consequently, changes cannot be expected following the implementation of a single initiative when attempting to change practices within a sector that is being influenced by several other simultaneous interventions.

In conclusion, the potentially positive effects of the introduction of a MHP guideline on injury claims rates and costs may be counteracted by several wider influences/contextual factors and parallel interventions.

How was a MHP guideline intended to work?

The study of the MHPG programme theory (Study 2) showed that the implementation of the MHPG was anticipated to be influenced by contextual factors at micro, macro, and supra-macro

levels. The main users and the key actors for implementing the MHPG were MHP coordinators, H&S managers, therapists, and managers in charge of MHP. Still, the main drivers of the implementation process were expected to be the MHP coordinator and the H&S manager. The MHPG mainly provided arguments for implementation that were based on ethical, economic, and to some extent legal reasoning. Finally, the developers of the MHPG argued for the implementation of a multifaceted MHP programme where the implementation of the OSC should create the foundation for implementing the FCC. By having the OSC implemented, in particular the MHP policy, the organisation could establish how MHP risks were to be assessed, which techniques should be used, the equipment needed, and the facilities required to support the use of techniques and equipment. Subsequently, the training in risk assessment, techniques, and equipment use would ensure that staff were capable of performing safe MHP.

No previous studies have identified how a MHP guideline is intended to work. The study of the MHPG programme theory (Study 2) may, therefore, be considered to be a first attempt to understand how the developers intended a MHP guideline to work. However, solely identifying the theoretical programme theory, e.g. how the developers planned it to work, of any MHP guideline does not tell you how it worked. In order to answer such a question, the programme theory needs to be supplemented by information from subsequent studies.

The findings from the first questionnaire analysis (Study 3) showed that the intended key actors (H&S managers, MHP coordinators, and therapists) were aware of the MHPG. This indicates that the dissemination strategy applied by the MHPG developers was successful in reaching who they believed to be the most important actors with respect to the implementation process. Further, the developers acknowledged that managers were an important user group. In contrast, however, there was no strategy for reaching senior management. This lack of reach is to some extent illustrated by the finding from the first questionnaire analysis (Study 3) in which fewer managers were aware and used the MHPG compared to H&S managers, MHP coordinators, and therapists. As a consequence, all of the key actors that were aware of the MHPG lacked organisational power with respect to influencing senior management and facilitating

organisational changes. Hence, they were not in a position to facilitate change in the organisation without gaining management support. As a result, the MHPG should have been supplemented or combined with other interventions that specifically targeted a different set of users, who possessed sufficient organisational power to facilitate change. A logical alternative could have been to focus more on reaching senior management, medical doctors, and facility designers.

The analysis of the MHPG programme theory (Study 2) showed that the MHPG provided superficial guidance on how to overcome the barriers associated with implementation. The MHPG advised that senior management support should be obtained. It also advised that an implementation group should be assembled and that this group should consist or include people who were able to exert influence (power) within the organisation. However, it did not provide guidance on how to actually do that. This was illustrated by the case studies (Study 5) identifying that lack of management support was a big barrier for implementing a MHP programme. As a result, the implementers in the organisations spent a lot of time and energy trying to secure management support. This indicates that guidance on obtaining senior management support was a missing part of the programme theory. Furthermore, the absence of proper implementation guidance for the different components in the MHPG effectively resulted in the MHPG being positioned unfavourably with respect to being used, as it did not assist the users in practical implementation. Richens et al (2004) reported that implementation from a political perspective receives less attention than the development of the actual guideline, hence focusing on the content of the guideline rather than the implementation. The lack of focus on implementation is the consequence of guideline developers commonly considering the organisations to be responsible for implementing a guideline, as well as believing that the bare existence of a guideline automatically leads to implementation (Gagliardi et al., 2011; Richens et al., 2004). Taken altogether, the combination of influencing factors mentioned above could explain the lack of implementation guidance provided alongside the MHPG.

In addition, the case studies (Study 5) indicate that lack of involvement from stakeholders on a national level, e.g. MoH, was a barrier with respect to establishing MHP as a priority area within

the healthcare sector. By having a low priority, it was difficult for the key actors in the implementation process (H&S managers, MHP coordinators, and therapists) to create an environment that supported the implementation of a MHP programme, Hence, the MHPG developers should have focused more on engaging stakeholders on a national level in order to secure that the entire healthcare sector was aware of the importance of MHP. However, the interviews with the MHPG developers indicated that the MoH did not show interest in the development of the MHPG and did not want to participate, despite being approached by the MHPG developers on several occasions.

In conclusion, the development and design of a MHP guideline need to be so that it embraces the sector as well as its understanding of H&S and the importance of MHP. The guideline should cover a topic that is considered to be important for the sector or create a strategy that outlines how MHP becomes an established topic of importance. As a result, the guideline should at least accommodate the structures and processes already established as well as the legislation within the context where it is intended to work, i.e. it should make sense for the organisation. In addition, parallel programmes should be developed to change the context to support implementation. Otherwise, there is a risk that the intended users will not use it.

What was the awareness and use of a MHP guideline among the intended users?

The first analysis of the questionnaire (Study 3) showed that on an overall level, 57 % of the intended users of the MHPG were aware of its existence and that 70% of these aware used it. The more detailed analysis showed that more MHP coordinators (94%), therapists (100%), and H&S managers (85%) were aware of the MHPG, while, amongst those aware, more therapists (96%) used it. In contrast, fewer carers were aware of (40%) and used (56%) it. Further, the analysis of the questionnaire showed that fewer employees in public hospitals were aware of (62%) or used (54%) the MHPG compared to the other subsectors in the healthcare sector, even when excluding carers from the analysis.

Previous studies that have assessed awareness and use of guidelines in the healthcare sector have mainly focused on clinical guidelines (Brennan et al., 2018; Cabana et al., 1999; Kovacs et al., 2018) and often only looked at the awareness and use amongst either doctors or nurses (Kotzeva et al., 2014; Rodgers, 2000; Rose et al., 2012). Hence, this thesis is the first to assess the awareness and use among a wider group of intended users of a MHP guideline.

The developers of the MHPG (Study 2) anticipated H&S managers, MHP coordinators, and therapists to lead and drive the process of implementing a MHP programme, hence their high awareness is expected. However, awareness does not necessarily lead to use. Even though all of the key actors had high proportions of use when being aware, more therapists used the MHPG than H&S managers and MHP coordinators, or any other work role for that matter. This indicates that not all of the key actors were using the MHPG despite being aware of it.

The case studies (Study 5) showed that staff were resistant towards new techniques, attending training, and using equipment as well as had low recognition of the importance of MHP. This was a barrier for the implementation of a MHP programme. Hence, the low proportion of carers being aware of and using the MHPG potentially constitutes a larger problem than perhaps recognised in the first instance. For obvious reasons, carers are by no means expected to be the main driver of the implementation of a MHP programme. However, they are the ones who will actually perform MHP as an integrated part of their everyday working life. Thus, it could be speculated that if carers knew that the changes introduced were based on national standards, this would lower resistance. Hence, by having a targeted approach that would increase the awareness amongst carers, it would be possible to minimise the barrier associated with poor staff attitude and lack of understanding of the importance, hereby assisting the implementation.

According to the programme theory (Study 2), the public hospitals were identified as leading changes around MHP within the healthcare sector, in part because they were the largest organisations in the healthcare sector. However, the first analysis of the questionnaire (Study 3) showed that fewer people working at public hospitals were aware of or used the MHPG in comparison to the remaining subsectors in the healthcare sector. The findings from the case

studies (Study 5) contribute to understanding the reasons for this. They showed that a major difference between the private and the public hospitals was how much they were affected by the budgets constraints imposed by the MoH. The public hospitals were under tight regulation, whereas the private hospital had a much greater liberty with respect to how money was spent. This resulted in the private hospital having the possibility of allocating funding for the development of a MHP programme.

In conclusion, a high proportion of key actors with respect to the implementation of a MHP guideline were aware of its existence. In addition, a high proportion of some key actor aware of a MHP guideline used it, however, use was not seen from all of the key actors. In contrast, only a relatively small proportion of the people in work roles actually performing MHP as a part of their work was aware of or used a MHP guideline. Furthermore, more people working in more than one sector of the healthcare sector tended to be aware, whereas the public hospitals did not have a higher proportion of people aware of or using a MHP guideline, despite being the largest organisations within the healthcare sector. The different actors became aware through different channels, which reflected their involvement in the implementation process.

What was the familiarity of the specific components of a MHP guideline, - the use and the change after use?

The second analysis of the questionnaire (Study 4) showed no differences in familiarity of the different components of the MHPG amongst the key actors, with the exception of fewer therapists being familiar with the facility design, audit, and policy development. Despite, no difference being identified, there was a pattern seen amongst all key actors that more were familiar with the components on risk assessment, training, techniques, and equipment, and less were familiar with facility design and the OSC. In addition, fewer carers were familiar with the OSC and the facility design components. Looking at use, more of all the work roles assessed used the FCC, with the exception of facility design, which fewer used. In addition, fewer carers used the OSC. As the only work role, more MHP coordinator (85%) experienced change after

the use of the techniques component. Amongst the remaining work roles assessed, the proportion of people experienced change after the use was lower.

No previous studies have looked at the familiarity, use, and change after use of the components of a MHP guideline. Hence, this thesis is the first to assess this among intended users of a MHP guideline.

The programme theory (Study 2) showed that the MHPG was built on previous research, which showed that a MHP programme consisting of multiple components was more effective than a single component programme. Hence, the MHPG argued for the implementation of all components, however, it did not provide guidance with respect to the implementation of the individual components. Consequently, there is no assurance that the intended users familiar with all components of the MHP guideline choose to use them or that use of a component leads to change in the organisation. In part, this is due to there being no guarantee that the person using a component is capable of implementing it. This does not only relate to organisational power, but also to the capabilities and dedication of the individual person. The case studies (Study 5) showed that the presence of a dedicated and highly motivated person, willing to be the prime driver, was a precondition for the implementation of a MHP programme in the healthcare sector. Especially this was the case because the healthcare sector focused on patient safety, had limited management support, and resistance towards change among staff. Thus, the need for a motivated person to drive the implementation may be transferable to other countries as lack of management support (Dogherty et al., 2013; Lahti et al., 2019) and resistance towards change (Koppelaar et al., 2009) previously have been reported as general barriers within the healthcare sector.

Further, the programme theory (Study 2) showed that implementation of the OSC, especially a MHP policy and workplace culture, would create the foundation upon which the FCC were to be implemented. However, the second analysis of the questionnaire (Study 4) showed that components of the MHPG being used the least were the OSC, especially the policy development, and the facility design. This can help explain the low change after the use of FCC

components. Because the OSC were not in place, the full potential from the use of the FCC cannot be utilised, hence the expected changes following the use of the FCC would be minimal.

The case studies (Study 5) showed that the components of the MHPG often were used when the key actors needed arguments to persuade senior management to prioritise MHP, e.g. the need for training in MHP techniques or having facilities that accommodate safe MHP. Most frequently, this related to the FCC, e.g. training, techniques, and equipment, rather than OSC, e.g. policy development, workplace culture, and audits. This is to some extent explained by the case studies (Study 5), which describe the context in which the MHPG was implemented, e.g. the healthcare sector. Organisations in the healthcare sector, in general, have a greater focus on patient safety compared to staff safety. Together with having an externally controlled budget directed by the MoH, organisations could find it hard to allocate sufficient funding to implement a MHP programme.

The findings from the second analysis of the questionnaire (Study 4) indicate that the amount of change happening as a result of use of the sections in the MHPG was rather limited. An explanation could be found in the case studies (Study 5). They showed that all three organisations prior to the introduction of the MHPG had implemented some sort of a MHP programme that focused on training, techniques, and equipment. As a result, the changes following the use of these components would likely be few. Thus, any changes should come from use of the remaining components. However, as mentioned, components like facility design, policy development, or workplace culture would require more organisational support, e.g. management supportive of MHP, and funding, e.g. for improving facilities that facilitate safe MHP, in order to result in any change. Further, the case studies (Study 5) showed that the hospitals had difficulties in establishing the basis for changing workplace culture and facilities that could accommodate equipment use and safe practices.

In conclusion, no difference was seen in the proportion of actors being familiar with the different components of a MHP guideline amongst the key actors, despite a tendency towards more being familiar with components that required less organisational changes to be

implemented, such as risk assessment, techniques, training, and equipment. Further, more used the components related to the FCC, with the exception of facility design. In addition, fewer people in work roles actually performing MHP as a part of their working life were familiar with or use facility design and the OSC. Despite the use of the FCC amongst the key actors, a low proportion of change following the use of FCC components.

How was a MHP programme implemented?

The case studies (Study 5) showed that the implementation of a MHP programme was influenced by the contextual factors within the organisation, e.g. micro, meso, and macro level contexts. Further, overarching sector contextual factor, e.g. supra-macro level, plays an important role. In all case study organisations, the organisational motivation to implement a MHP programme was initiated by the occurrence of serious staff injuries related to MHP. Thus, the organisations appear to be reactive rather than proactive. In addition, the process of implementing a MHP programme was gradual and happened in multiple smaller or large steps that changed practices around MHP. Finally, implementation was dependent on, at least, one dedicated person to be the driver of the implementation.

Previous studies have found that a broad range of contextual factors, at both individual and organisational level influenced the implementation of a MHP programme (Koppelaar et al., 2009). Factors like lack of management support (Dogherty et al., 2013; Lahti et al., 2019), poor workplace culture (Kanaskie and Snyder, 2018), and insufficient equipment being available (Engkvist, 2008; Krill et al., 2012; Olkowski and Stolfi, 2014) served as barriers to implementation. The findings from the case studies (Study 5) support these previous findings and yet they add to them by providing a more detailed explanation about why each of the contextual factors acted as a barrier.

The programme theory (Study 2) argued that in order to create the foundation for implementing a MHP programme, the OSC needed to be in place as a first step. However, the second analysis of the questionnaire (Study 4) showed that the OSC were used less than any of the FCC, except the facility design component (which also was used by few). Nevertheless, the case studies (Study

5) illustrated that the organisations started to change workplace culture following serious injuries to staff. This led to changes in MHP related policies and an altered approach to how MHP techniques were taught, how training was organised, and which equipment was being purchased. Furthermore, these changes help to explain why MHP coordinators were the only work role that experienced change after use of a component, e.g. techniques. An additional explanation to the low change after use could be that all case studies, prior to the launch of the MPG, already had introduced components of a MHP programme, predominately training and equipment.

The case studies (Study 5) showed that the implementation of the individual components was affected by the overarching priority of the healthcare sector being patient safety. Consequently, there were difficulties associated with using and implementing each component, thus not all components were fully implemented. This is illustrated by the all case study organisations not having enough equipment available in order to perform safe MHP, and that the key actors responsible for MHP, e.g. the MHP coordinator, was not always involved in processes around facility design, hence was unable to influence and ensure the creation of MHP supportive facilities.

In addition, the case studies (Study 5) showed that organisational changes related to MHP were facilitated by the formation of coalitions consisting of actors supportive of MHP, both within and between organisations. The actors in these coalitions often had little or no organisational power, still, by getting together, the actors could use experience exchange to orchestrate efforts or develop strategies, which would facilitate the implementation of a MHP programme. Across the case studies (Study 5), actors highlighted the importance of the 'small victories' that were a result of establishing these types of supportive coalitions.

In conclusion, in a healthcare sector where patient safety is the main focus, a MHP programme was implemented over a prolonged time period. Due to the emphasis on patient safety, implementation can be initiated by the occurrence of MHP related injuries rather than a desire to improve staff safety. Because of MHP being a low priority in the healthcare sector, implementation is driven by the presence of a dedicated key actor, most often a H&S manager or

a MHP coordinator, who is able to persuade senior management of the importance of MHP and the potential benefits of a MHP programme. Still, the key actor needs to be prepared in order to overcome resistance towards the MHP programme. One way to overcome resistance is by forming a cross-organisational team of people supportive towards MHP.

What makes a moving and handling people guideline work?

The findings from the five studies in this thesis have shown that the MHPG would work if it were implemented into a sector that recognised the importance of MHP. In addition, it would require the individual organisation to see the advantages in implementing a MHP programme, which in the case studies (Study 5) primarily was based on an economic cost-benefit analysis and secondarily, the desire to avoid being prosecuted for not complying with the H&S legislation. A facilitator for highlighting the importance of MHP was the introduction of new H&S legislation and the media focus it created on senior management's liability, which helped support implementation. Still, implementation was affected by contextual factors both inside and outside the organisation.

The most common internal contextual factors identified through the case studies (Study 5) were that management did not support and see the need for a MHP programme and that insufficient funding was available for MHP related initiatives such as equipment purchases or facility upgrades. The most common contextual factors outside the organisation were the existence of parallel programmes, the increasing number of bariatric patients, and an older workforce. Further, external contextual factors can also determine internal contextual factors, such as budget constraints imposed by government agencies, in this case, MoH. As a result, MHP, as an area, had to compete for resources that otherwise would be allocated to support areas more directly related to patient safety. The government imposed budget constraints contributed to shortage of staff, hence making it harder for staff to be released for MHP training, thus contributing to the resistance towards change. In addition, for the MHPG to work in an organisation it depended on a dedicated actor, who needed to establish support within the

organisation from both management and staff as well as to gain equipment, and funding, to be the prime driver of the development and implementation of the components in the MHPG.

Several of the findings from the five studies about what makes the MHPG work are generalizable to MHP guidelines in general as well as other countries than New Zealand. In particular, the supra-macro level contextual factors of the New Zealand healthcare sector are comparable to other western countries. On a worldwide level, healthcare sectors are affected by budget cuts (Reeves et al., 2014), there is a continuously increasing number of bariatric patients (Finucane et al., 2011; Gulliford et al., 2017; Tchernof and Weisnagel, 2017), and the workforce is steadily getting older (Nicholson and Sharp, 2016). Furthermore, MHP relevant legislation has been introduced in both Europe and the United States (Humrickhouse and Knibbe, 2016; Lee et al., 2015; Silverstein et al., 2011, 2012). As a consequence, the supra-macro contextual barriers (Lack of government involvement, Focus on patients rather than staff, and Budget constraints) and facilitators (Presence of relevant legislation, Increased media attention towards the healthcare sector, and Changing demographics) for the implementation of the MHPG identified through the five studies in this thesis are likely to exist when implementing a MHP guideline in any other western country. In addition, macro level contextual factors such as lack of management support (Dogherty et al., 2013; Lahti et al., 2019), low availability of equipment (Dogherty et al., 2013; Engkvist, 2008; Krill et al., 2012; Olkowski and Stolfi, 2014), and unsupportive workplace culture (Kanaskie and Snyder, 2018) are also reported within the healthcare sector in numerous other countries. Thus, these factors, which affect the implementation of a MHP guideline, are also likely to be comparable to other healthcare settings.

Overall, this thesis has shown that making a MHP Guideline work is a complex process. In order for a MHP guideline to work, a dedicated actor, who has or gains management support, is required in order to drive organisational changes that facilitate implementation and use of the guideline. Gaining management support takes up a lot of time and effort and could be facilitated by a concerted effort at a national level to gain support from the Ministry of Health and top management. Organisational changes were often initiated by actors with limited organisational

power, however, if provided with support and training as well as having the opportunity for creating coalitions, both internal and external to the organisation, the actors could develop greater impact on the MHP programme. Still, implementation of a MHP guideline is influenced by contextual factors that span from national legislation and governmental priority to the perception of the importance of MHP within the individual carers who routinely move and handle people.

Limitations and strengths of the thesis

The thesis has both limitations and strengths. A potential limitation was the focus on a single national MHP guideline, hence only giving a picture of implementation in a single country, e.g. New Zealand. However, the healthcare sector in New Zealand is highly comparable to the many western countries. Therefore the context in which a MHP guideline is going to be implemented can be expected to be very similar. Hence, the findings from the thesis are likely to be applicable to western countries other than New Zealand.

Another limitation relates the persons/ organisations available for investigation. Regardless whether it being the questionnaire survey (Studies 3 and 4) or the case studies (Study 5), there was a potential bias of only people who considered MHP to be an important issue were willing to participate. Hence, the results are potentially skewed, thus potentially overestimating the effect of the MHPG.

A third limitation was that only three organisations were included in the case studies. Because the case studies were used to explain the findings from the other studies it could be argued that having three case study organisations were insufficient in order to use the findings as a basis for 'opening the black box'. However, the findings across the three organisations were consistent, hence it can be argued that the number of case study organisation did not influence those findings. Thus, the number of case study organisation included did not limit the ability to assist in 'opening the black box'.

Using realist analysis as a method served both as a limitation and a strength. The practical application of the realist analysis frame was difficult and at times felt too theoretical, especially as the developers of the MHPG in many instances had not considered aspects of how they intended the MHPG to work. On the other hand, realist analysis served as a strength as it allowed identification of the contextual factors and mechanisms of the MHPG, which directed the design and analysis of the subsequent studies in the thesis.

A particular strength of the thesis was the application of the mixed-methods design. This allowed for the inclusion of both quantitative and qualitative data from multiple sources, e.g. developers of the MHPG, key actors from different organisations, as well as carers conducting MHP. As a consequence, it was possible to triangulate information obtained from one source with information from another, thereby adding to the explanations of the findings from each study. In particular, the case studies complemented and explained the statistical findings from the other studies, thus assisting in 'opening the black box'.

Another strength of the thesis was that it assessed the effect of a national guideline in 'real life' rather than through a more classic before-and-after intervention study design. This allowed an assessment of how the MHPG worked, or not worked, without introducing or creating an artificial context, e.g. supporting organisations with extra resources during the implementation process, that would affect the implementation of the MHPG.

Original contributions of the thesis

The thesis has made a number of original contributions and has applied some novel approaches.

Identifying the extent of MHP related injuries based on the analysis of the injury descriptions narrative of the individual injury claim was a novel approach. Estimating the number of MHP related injuries based on injury claims has previously been done, however, no other studies have build their analysis of injury descriptions but solely used claims categories. The use of these injury descriptions in this thesis provided an additional level of detail, which made it possible to

identify injuries related to MHP that had been misclassified and therefore increased the likelihood of ensuring that all MHP related injuries were included in the analysis.

The use of realist analysis within an occupational H&S perspective is a novel approach that has not previously been applied in this context. As a result, the thesis has made an original contribution by identifying key parameters for how a MHP guideline was intended to work, which have then been used to structure an empirical analysis. In particular, the identification of the MHPG programme theory and an understanding of how the developers intended a MHP guideline to work have not previously been reported. This thesis may therefore be considered to be the first ever attempt to identify the programme theory of a MHP guideline.

Another original contribution is that the questionnaire provided an insight into the overall awareness and use of a MHP guideline. Whilst questionnaires have earlier been used to assess the overall awareness of clinical guidelines, and despite the existence of numerous MHP guidelines worldwide, users' awareness of a MHP guideline has not previously been assessed. In addition, the questionnaire also identified how the specific components of a MHP guideline were used and the changes resulting from the use. As this information was stratified on the wide range of intended users, the questionnaire has provided a unique opportunity to complement the understanding provided by the programme theory (Study 2) and the case studies (Study 5).

A final original contribution of the thesis is the use of case studies, which provided detailed explanations for why previously identified barriers when implementing a MHP guideline, actually served as barriers. A particular novel approach has been the application of chronicle workshop as a data collection method. This served as a useful method to obtain a retrospective overview of the iterative process of implementing a MHP programme in a healthcare organisation. Further, by having a focus on tangible events, the chronicle workshop facilitated the possibility to give a condensed overview of the context and parallel programmes that facilitated or hindered the implementation of a MHP guideline.

Chapter 8. Conclusions

This thesis contributes to our understanding of what makes a MHP guideline work by evaluating the uptake, use and impact of a national MHP guideline - the MHPG - in the healthcare sector in New Zealand through a multi-study, mixed-methods approach.

The analysis of the ACC claims data (Study 1, described in Chapter 2) showed that the potentially positive effects of the introduction of a MHP guideline on injury claims rates and costs, may be counteracted by several wider influences/contextual factors and parallel interventions.

The study of the MHPG programme theory (Study 2, described in Chapter 3) showed that in order to create an effective MHP guideline, the development and design of a MHP guideline need to be so that it embraces the sector as well as its understanding of H&S and the importance of MHP. The guideline should cover a topic that is considered to be important for the sector or create a strategy that outlines how MHP becomes an established topic of importance. As a result, the guideline should at least accommodate the structures and processes already established as well as the legislation within the context where it is intended to work, i.e. it should make sense for the organisation. In addition, parallel programmes should be developed to change the context to support implementation. Otherwise, there is a risk that the intended users will not use it.

The first analysis of the questionnaire (Study 3, described in Chapter 4) showed that a high proportion of key actors with respect to the implementation of a MHP guideline were aware of its existence. In addition, a high proportion of some key actor aware of a MHP guideline used it, however, use was not seen from all of the key actors. In contrast, only a relatively small proportion of the people in work roles actually performing MHP as a part of their working life was aware of or used a MHP guideline. Furthermore, more people working in more than one sector of the healthcare sector tended to be aware, whereas the public hospitals did not have a higher proportion of people aware of or using a MHP guideline, despite being the largest

organisations within the healthcare sector. The different actors became aware through different channels, which reflected their involvement in the implementation process.

The second analysis of the questionnaire (Study 4, described in Chapter 5) showed that no difference was seen in the proportion of actors being familiar with the different components of a MHP guideline amongst the key actors, despite a tendency towards more being familiar with components that required less organisational changes to be implemented, such as risk assessment, techniques, training, and equipment. Further, more used the components related to the FCC, with the exception of facility design. In addition, fewer people in work roles actually performing MHP as a part of their working life were familiar with or use facility design and the OSC. Despite the use of the FCC amongst the key actors, a low proportion of change following the use of FCC components.

The case studies (Study 5, described in Chapter 6) showed that, in a healthcare sector where patient safety was the main focus, a MHP programme was implemented over a prolonged time period. Due to the emphasis on patient safety, implementation can be initiated by the occurrence of MHP related injuries rather than a desire to improve staff safety. Because of MHP being a low priority area in the healthcare sector, implementation is driven by the presence of a dedicated key actor, most often a H&S manager or a MHP coordinator, who is able to persuade senior management of the importance of MHP and the potential benefits of a MHP programme. Still, the key actor needs to be prepared in order to overcome resistance towards the MHP programme. One way to overcome resistance is by forming a cross-organisational team of people supportive towards MHP.

Overall, this thesis has shown that making a MHP Guideline work is a complex process. In order for a MHP guideline to work, a dedicated actor, who has or gains management support, is required in order to drive organisational changes that facilitate implementation and use of the guideline. Gaining management support takes up a lot of time and effort and could be facilitated by a concerted effort at a national level to gain support from the Ministry of Health and top management. Organisational changes were often initiated by actors with limited organisational

power, however, if provided with support and training as well as having the opportunity for creating coalitions, both internal and external to the organisation, the actors could develop greater impact on the MHP programme. Still, implementation of a MHP guideline is influenced by contextual factors that span from national legislation and governmental priority to the perception of the importance of MHP within the individual carers who routinely move and handle people.

Implications and suggestions for future work

Implications

The findings from this thesis may have implications for the development and implementation of a MHP programme on micro, macro, and supra-macro level.

On a micro level, the findings could have implications for how the key actors involved in the implementation of a MHP programme establish organisational support. The thesis showed that seeking coalitions with fellow supporters and creating forums for experience exchange were perceived to be beneficial. Therefore key actors may be encouraged to pursue these types of activities in order to establish the organisational support needed to initiate the implantation of a MHP programme.

On a macro level, the findings can potentially inform senior management about the importance of ensuring that the organisational infrastructure is in place before initiating the implementation of the more practical components of MHP programme. In the case of the MHPG, this would have been to ensure the implementation of the OSC before initiating the implementation of the FCC. The thesis showed that there was an unbalanced focus towards the implementation of the FCC, thereby neglecting the OSC, which were among the barriers for having suboptimal MHP programmes. Hence, the findings can maybe motivate senior management to establish the organisational foundation for a MHP programme before starting to implement one.

Further, the findings could possibly affect the level of support from senior management towards the development and implementation of a MHP programme. The thesis showed that lack of senior management support was perceived to be a major barrier for implementation of a MHP

programme. Implementing a MHP programme is a process that requires a lot of resources with respect to time and money. Hence having senior management that strongly supported the implementation seems to be a potential way of reducing the resources needed to implement an effective MHP programme.

On a supra-macro level, the findings may have implications for the level of government involvement when developing a MHP guideline. The thesis showed that users of a MHP guideline perceived a low level of government involvement in the development as a sign of low priority towards the area. Therefore government agencies with an interest in the development of MHP guidelines might consider increasing their level of involvement in order to show that they prioritise the topic of the guideline.

Suggestions for future work

This section provides suggestions for future work that could follow from the findings of this thesis. These suggestions are presented in the following bullet points:

- Further analysis of the questionnaire data that looks at whether differences exist in the level of familiarity with the MHPG components within the different work roles
- Further analysis of the questionnaire data that focus on the open-ended questions, such as '*Please describe for what purposes you have used this/ these section(s)?*' and '*Please describe the/ these change(s)? (Please describe for each section used)*', as well as questions related to other peoples use of MHPG, such as '*Have you ever recommended the MHPG to anyone?*' and '*Do any of the following in your organisation use the MHPG in relation to moving and handling people?*'
- New study conducting focus groups with MHP coordinator and H&S managers from all New Zealand DHBs in order to identify whether the contextual factors affecting the implementation of a MHP programme established in the three case studies are present throughout hospitals in New Zealand
- New study conducting case studies based on chronicle workshops in other subsectors of the healthcare sector, e.g. residential aged care or home care, in order to identify whether

the contextual factors affecting the implementation of a MHP programme in hospitals also influence other subsectors.

- New study following the proposed case studies in other subsectors e.g. residential aged care or home care. This study would conduct focus groups with MHP coordinator and H&S managers from different subsectors in order to establish if the finding from the case studies were transferable to other organisations in the chosen subsector.

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Appendices

1. Manuscript 1: Lidegaard, M., Olsen, KB, Legg, SJ, and Douwes, J. The impact of national guidelines covering moving and handling of people on injury rates and related costs.
2. Manuscript 2: Lidegaard, M., Olsen, KB, and Legg, SJ. How was a national moving and handling people guideline intended to work? The underlying programme theory.
3. Manuscript 3: Lidegaard, M., Olsen, KB, Legg, SJ, and Douwes, J. Awareness and use of a national moving and handling people guideline.
4. Manuscript 4: Lidegaard, M., Olsen, KB, and Legg, SJ. Familiarity, use, and change after use of the components of a national moving and handling people guideline
5. Manuscript 5: Lidegaard, M., Olsen, KB, Legg, SJ, and Trevelyan, F. How are moving and handling people programmes implemented – learnings from three case studies.
6. Adjustment factors used in Study 1
7. Example of interview schedule for developer interview used in Study 2
8. Questionnaire used in Study 3 and Study 4
9. Example of interview schedule for stakeholder interview used in Study 5
10. Chronicle workshop agenda used in Study 5
11. Statement of contribution forms (DRC16)

Appendix 1: The impact of national guidelines covering moving and handling of people on injury rates and related costs

Original article

Scand J Work Environ Health Online-first -article

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The impact of national guidelines covering moving and handling of people on injury rates and related costs

by Lidegaard M, Olsen KB, Legg SJ, Douwes J

The study showed that the introduction of a national guideline on moving and handling of people did not lead to the expected decrease in related injuries. On the contrary, in the four years following the introduction of the guideline, moving- and handling-people-related injury claims rates and costs increased within the healthcare sector of New Zealand.

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Key terms: cost; guideline; handling of people; healthcare sector; injury; injury cause; injury claim cost; injury claim rate; injury rate; injury statistic; moving and handling of people; national guideline; patient handling

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Original article

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The impact of national guidelines covering moving and handling of people on injury rates and related costs

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Lidegaard M, Olsen KB, Legg SJ, Douwes J. The impact of national guidelines covering moving and handling of people on injury rates and related costs. *Scand J Work Environ Health* – online first. doi:10.5271/sjweh.3818

Objective National guidelines for moving and handling of people (MHP) were introduced in New Zealand in 2012 to reduce MHP-related injuries in the healthcare sector. This study assessed the effectiveness of this on MHP-related injury claims.

Methods MHP-related injury claims were identified from the national injury claims database, which included 118 755 accepted claims for 2005–2016 across 14 industries. Interrupted time-series analysis was used to assess temporal changes in MHP-related claims rates, costs, and causes for the period before (2005–2012) and following (2013–2016) the introduction of the national guidelines.

Results Prior to the introduction of the guidelines, MHP-related claims were estimated to be 39 209 (33.0% of all accepted injury claims), with claims rates and associated costs for the 14 industries decreasing by 0.4 [95% confidence interval (CI) -0.5– -0.2, P<0.001] and NZ$ 230 per claim (95% CI -324– -136, P=0.001) respectively. In the year following the introduction of the guidelines, there were no overall changes in claim rates or costs. However, significant increases in claim rates [ranging from 1.27–1.99 (P=0.004–0.010)] and claim costs [ranging from NZ$ 724–987 per claim (P=0.032–0.045)] were found 2–4 years later. More than 65% of all MHP-related claims were caused by lifting/carrying/strain, and there was a significant increase in claim numbers due to this cause, ranging from 431.7–594.0 (P=0.001–0.008) in the four years following the introduction of the guidelines.

Conclusions The introduction of national MHP-guidelines in 2012 in New Zealand did not reduce MHP-related injury rates and costs. On the contrary, there were statistically significant increases 2–4 years after introduction of the guidelines.

Key terms healthcare sector; injury cause; injury claim cost; injury claim rate; injury statistic; patient handling.

Injuries and musculoskeletal disorders (especially low-back pain and neck/shoulder pain) due to moving and handling of people (MHP) are a long-term concern in the healthcare sector (1–7). Providing the healthcare sector with comprehensive information on MHP in the form of guidelines is a strategy widely applied globally, with multiple state or federal MPH guidelines existing in Europe, the US, and Australasia (4, 8, 9). It is assumed that this strategy may reduce MHP-related injuries and musculoskeletal disorders (10–13). However, it is unclear how effective MHP guidelines are, with some studies showing reduced injury rates (14–16), and others showing no difference (17).

In New Zealand, a national MHP guideline was launched by the Accident Compensation Corporation (ACC) in 2012: the *Moving and Handling People: The New Zealand Guidelines* (MHPG) (18). The MHPG provides guidance on implementing a multifaceted intervention program comprising two focus areas: (i) organization of the MHP program, consisting of MHP policy, workplace culture, monitoring, evaluation and audit, and; (ii) key elements of the MHP program, consisting of risk assessment, MHP techniques, MHP training, MHP equipment and management, and facility design (19).

The MHPG replaced earlier guidelines published in 2003 (20), which had a single focus on MHP techniques and training. The purpose of the new 2012 MHPG was to reduce health and safety risks related to MHP resulting in fewer injuries and a reduction in claims rates and costs (19). The MHPG targeted all sub-sectors of the

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healthcare sector, but with a specific focus on public hospitals, as they were seen as the main drivers of change in the healthcare sector (19).

The study presented in this paper is nested in a larger project that evaluated the uptake, use, and impact of the MHPG, through a mixed-methods approach. The specific aims of the present study were to: (i) establish the accepted claims rates, costs, and causes for MHP-related injuries in the healthcare sector of New Zealand for the period 2005–2016; and (ii) assess temporal changes in claims rates, costs, and causes following the launch of the MHPG in 2012. We tested the hypothesis that the introduction of the MHGP would result in a decrease in injury claims rates and costs related to MHP. Injury claims in this paper are covered by the definitions in the New Zealand Accident Compensation Act 2001 (21). Accepted claims cover personal injuries caused by an accident to the person and personal injury caused by a work-related gradual process (Accident Compensation Act 2001, section 20). The definition of a personal injury includes: the death of a person; or physical injuries suffered by a person, including, for example, a strain or a sprain (Accident Compensation Act 2001, section 26).

Methods

Design

The study examined injury data from the ACC's injury claims database, which contains information about accepted work-related injury claims for all employers in New Zealand and uses 40 different injury causes. The injury reporting forms have an 'accident description' field to describe how the injury occurred, which is the only way to relate an injury claim to MHP. However, it is not compulsory for all employers to fill in this field. In particular, ACC accredited employers are not required to do so because they manage and pay compensation related to their own claims. Accredited employers are part of an ACC scheme in which large employers can substantially reduce ACC levies by maintaining a high health and safety management standard, which an external auditor assesses annually.

The Massey University Human Ethics Committee approved the study (SOB 15/78), which was performed in accordance with the Helsinki Declaration.

Data collection

We included all accepted injury claims recorded in the ACC injury claims database between 2005–2016 for 14 Australian and New Zealand standard industrial classification (ANZSIC) codes (2006; level 4), which were assumed to involve MHP. The 14 ANZSIC codes were: labor supply services (N7212); hospitals (except psychiatric hospitals) (Q8401); general practice medical services (Q8511); specialist medical services (Q8512); pathology and diagnostic imaging services (Q8520); physiotherapy services (Q8533); chiropractic and osteopathic services (Q8534); other allied health services (Q8539); ambulance services (Q8591); other healthcare services (Q8599); aged care residential services (Q8601); other residential care services (Q8609); child care services (Q8710); and other social assistance services (Q8790).

ACC's database does not include number of employees. For this, we retrieved number of fulltime equivalent employees for the period 2005–2016 from Statistics New Zealand's 'Business demography statistics', 'Enterprises by institutional sector and employee count size 2000–16' (nzdotstat.stats.govt.nz/wbos/Index.aspx) (accessed June 2017).

Data analysis

One researcher assessed the accident description field of all included injury claims to identify if a claim was related to MHP and then discussed with the research group to obtain consensus. All claims related to MHP were included. However, very few claims from accredited employers included an accident description. Thus, we used an estimate for the MHP-related claims for accredited employers. For this, we developed adjustment factors, which were calculated on the assumption that the proportion of MHP-related claims is the same for accredited and non-accredited employers. Hence assuming that if the proportion of MHP claims, compared to all claims, goes up for the non-accredited employers, the same would happen for the accredited employers, in relation to the total claims for the accredited employers, thereby creating a more realistic claims rate. The relationship was expressed by the following equation:

$$\frac{Totalclaims_{Accredited\ employers}}{MHP\ related_{Accredited\ employers}} = \frac{Total\ claims_{Non-accredited\ employers}}{MHPrelated_{Non-accredited\ employers}} = \frac{Total_{All}}{MHPrelated_{All}}$$

From this equation the total number of MHP-related injury claims was calculated as:

$$MHP\ related_{All} = \frac{MHP\ related_{Non-accredited\ employers} \times Total_{All}}{Total_{Non-accredited\ employers}}$$

The adjustment factor (A_{MHP}) was expressed by:

$$A_{MHP} = \frac{Total\ claims_{All}}{Total\ Claims_{Non-accreditetd\ employers}}$$

This adjustment factor was used to estimate both claims numbers, claims rates, claims costs, and claims cause. The adjustment factors were calculated for each year and are shown in supplementary tables S1a and S1b for ANZSIC code and injury (www.sjweh.fi/show_abstract.php?abstract_id=3818).

Claims rates were expressed per 1000 employees and were calculated by dividing claim numbers by employee count.

In order to assess claim costs for a specific point in time, the total costs for each claim was allocated to the year in which the claim was lodged regardless of the length of the claim. For example, a claim with a total cost of NZ$4500 for the period 2007–2009 would have the entire cost of the claim allocated to 2007.

Causes of claims were identified from the ACC database. Any cause that appeared to have even a remote likelihood of being related to MHP was included. Thus 12 claims causes possibly related to MHP were considered: lifting/carrying/strain; loss of balance/personal control; loss of hold; misjudgment of support; other or unclear cause; pushed or pulled; slipping, skidding on foot; something giving way underfoot; struck by person/animal; tripping or stumbling; twisting movement; undefined cause.

Statistical analysis

All statistical analyses were performed using SPSS (SPSS version 25.1, IBM, Armonk, NY, USA). An interrupted time series analysis using an AMIRA model (22, 23) was used to analyze the data for claims rates and costs stratified by industry as well as for claims causes. The analysis provided the yearly changes and 95% confidence intervals (CI) for the period before and after the introduction of the MHPG, as well as the difference in slope. Further, the analysis examined changes at one, two, three, and four years following the introduction of the guidelines by comparing the actual values for these four time points with values predicted by extrapolation of the of the linear regression line for the period before the introduction. Statistical significance was defined as $P<0.05$.

Results

Claims rates and claims costs for all industries

A total of 118 755 injury claims for the period 2005–2016, with a total cost of NZ$ 225 356 400, were included. Of these, 68 662 (58%) originated from non-accredited employers. Based on accident descriptions of claims originating from non-accredited employers, 22 900 (33.0% of all claims from non-accredited employers) were related to MHP. Using correction factors, it was estimated that in total (including those from accredited employers) 39 209 claims were related to MHP ie, an average of 3267 claims/year. The two industries contributing most to the total number of MHP-related claims were 'aged care residential services' and 'hospitals' with 14 707 and 13 134 claims respectively (supplementary tables S1a and S1b). Total cost for injury claims related to MHP was estimated to be NZ$ 93 756 789, with an average cost of NZ$ 7 813 066/ year.

There was a significant decrease in claims rates of 0.4 claims/ 1000 employees per year (95% CI -0.5– -0.2) before the introduction of the MHPG, but no change was seen following the introduction (0.0 claims/1000 employees per year; 95% CI -0.4–0.4) (figure 1a). However, compared to predicted claims rates, there were significant increases in claims rates after two years (1.3; 95% CI 0.4–2.2), three years (1.6; 95% CI 0.7– 2.8), and four years (2.0; 95% CI 0.8– 3.1) following the introduction of the MHPG (tables 1a and 1b).

There was a significant yearly decrease in mean claims costs of NZ$ 230 (95% CI -324.1– -136.0) before the introduction of the MHPG, but no significant yearly change for the period following the introduction (NZ$ 23.7; 95% CI -300.5–348.0) (figure 1b). However, similar to claims rates, there were significant yearly increases compared to predicted costs after three years (NZ$ 724; 95% CI -2–1451) and four years (NZ$ 987; 95% CI 88–1886) following the introduction of the MHPG (tables 2a and 2b).

Claims rates per industry

Supplementary tables S1a and S1b show claims rates stratified by industry per year for 2005–2016.The highest mean claims rates were found for 'ambulance services' (50.8) and 'aged care residential services' (36.9). Prior to the introduction of the MHPG, there were decreases in claims rates for four industries: 'labor supply services', -0.2/1000 (95% CI -0.4– -0.1); 'hospitals', -0.4/1000 (95% CI -0.9– -0.0); 'specialist medical services', -3.2/1000 (95% CI -3.5– -3.0); and 'aged care residential services', -1.5/1000 (95% CI -2.1– -0.8) (tables 1a and 1b, and supplementary figure S1, www.sjweh.fi/show_abstract.php?abstract_id=3818). There were increases for two industries: 'pathology and diagnostic imaging services', 0.4/1000 (95% CI 0.0–0.8), and 'other healthcare services', 1.0 /1000 (95% CI 0.1–1.8). In the period following the introduction of the MHPG, there was only one industry with a significant yearly change in claims rate ie, 'labor supply services', 0.4/1000 (95% CI -0.1–0.9). In contrast to the overall decrease before the introduction of the MHPG, there were increases in claims rates compared to the predicted

claims rate for several industries following the introduction (tables 1a and 1b).

Claims costs per industry

Supplementary tables S1a and S1b show the average claims cost per claim stratified by industry per year for 2005–2016. The highest mean claims cost during this period were found for 'pathology and diagnostic imaging services' (NZ$ 4318), 'ambulance services' (NZ$ 3350), and 'labor supply services' (NZ$ 3157). In the period before the introduction of the MHPG, three industries had a decrease in claims costs: 'pathology and diagnostic imaging services', NZ$ -3795 (95% CI -7524– -67); 'aged care residential services', NZ$ -300 (95% CI -547– -52); and 'other social assistance services', NZ$ -626 (95% CI -817– -435) (tables 2a and 2b, and supplementary figure S2). In the period following the introduction of the MHPG, only 'other health care services' had a significant change, with an increase in yearly change in claims costs of NZ$ 323 (95% CI 179–467). Following the introduction of the MHPG, there was a significant increase in claims costs compared to the predicted costs for one industry, ie, 'other social assistance', and a significant decrease in claims costs compared to the predicted costs for another industry, ie, 'other healthcare services'.

Table 1a. Interrupted time series analysis of claims rates (2005–2016). [CI=confidence interval; MHP=moving and handling of people.]

	Regression lines before and after introduction of MHP guidelines				Difference in slope
	Slope	Intercept	95% CI	P-value	P-value
Labor supply Services					
Before	-0.2	483.8	-0.4– -0.1	0.007	0.016
After	0.4	-825.0	-0.1– 0.9	0.180	
Hospitals (except psychiatric hospitals)					
Before	-0.4	885.6	-0.9– 0.0	0.050	0.526
After	-0.1	119.1	-1.4– 1.3	0.889	
General practice medical services					
Before	-0.1	215.6	-0.4– 0.2	0.371	0.525
After	0.2	-376.5	-0.8– 1.1	0.644	
Specialist medical services					
Before	-3.2	462.1	-3.5– -3.0	0.014	0.714
After	-3.3	366.8	-4.2– -2.5	0.760	
Pathology and diagnostic imaging services					
Before	0.4	-775.7	0.0– 0.8	0.043	0.619
After	0.2	-269.5	1.0– 1.3	0.957	
Physiotherapy services					
Before	-0.3	810.4	-0.8– 0.1	0.115	0.143
After	-1.3	2844.6	-2.9– 0.2	0.090	
Chiropractic and osteopathic services					
Before	-0.1	34.5	-1.8– 1.6	0.888	0.535
After	1.2	-2969.8	-3.7– 6.0	0.146	
Other allied health services					
Before	0.1	-109.7	-0.1– 0.2	0.364	0.726
After	0.1	-222.2	-0.3– 0.5	0.356	
Ambulance services					
Before	0.4	-1190.7	-6.0– 6.8	0.874	0.892
After	1.3	-155.5	-14.2– 16.8	0.952	
Other healthcare services					
Before	1.0	-1901.5	0.1– 1.8	0.027	0.090
After	-1.2	2345.5	-3.9– 1.5	0.199	
Aged care residential services					
Before	-1.4	2918.7	-2.1– -0.8	0.001	0.070
After	0.4	-446.3	-1.8– 2.6	0.769	
Other residential care services					
Before	-0.2	645.2	-1.0– 0.5	0.480	0.518
After	-1.0	893.0	-3.6– 1.7	0.810	
Child care services					
Before	0.0	-50.9	-0.1– 0.1	0.438	0.533
After	0.1	-98.9	-0.2– 0.3	0.631	
Other social assistance services					
Before	0.7	-1383.2	0.2– 1.2	0.012	0.375
After	1.4	-2744.1	-0.3– 3.0	0.188	
All industries					
Before	-0.4	717.4	-0.5– -0.2	<0.001	0.073
After	0.0	-26.4	-0.4– 0.4	0.914	

Claims causes

Supplementary table S2 shows claims numbers stratified by claims causes for 2005–2016. The largest single cause of injury related to MHP was lifting/carrying/strain (65.3%). In combination with loss of balance/ personal control (6.8%), twisting movement (4.5%), struck by person/animal (3.5%), and pushed or pulled (3.3%), these five causes accounted for >83% of all claims. A substantial proportion of claims were caused by other or unclear cause (13.2%).

Prior to the introduction of the MHPG, the claims numbers decreased for one cause: lifting/carrying/strain, ie, -347 claims/year (95% CI -65.5– -3.9) (tables 3a and 3b, and supplementary figure S3, www.sjweh.fi/show_abstract.php?abstract_id=3818). In contrast, the claims numbers increased for four causes: misjudgment of support (6.4/year; 95% CI 1.7–11.0); pushed or pulled (10.5/year; 95% CI 2.9–18.1); tripping or stumbling (0.9/year; 95% CI 0.1–1.8), and twisting movement (14.6/year; 95% CI 0.4–28.8). There were no statistically significant differences in the period following the introduction of the MHPG.

One year following the introduction of the MHPG, there was a significant increase in claims number for lifting/carrying/strain (431.7/year; 95% CI 147.4–716.0). Further, two, three, and four years following the introduction of the MHPG there were significant increases in claims number for two causes: lifting/carrying/strain of 485.8 (95% CI 247.6–724.0), 539.9 (95% CI 306.9–773.0), and 594.0 (95% CI 322.9–865.2), respectively, and something giving way underfoot of 2.0 (95% CI 0.5–3.6), 3.3 (95% CI 1.2–5.5), and 4.6 (95% CI 0.6–8.6), respectively. In contrast, two, three,

Table 1b. Interrupted time series analysis of claims rates (2005–2016) continued. [Δ=change in claims rate compared to predicted level; CI=confidence interval; MHP=moving and handling of people.]

Subsectors	Level change after introduction of the MHP guidelines											
	Year 1			Year 2			Year 3			Year 4		
	Δ	95% CI	P-value	Δ	95% CI	P-value	Δ	95% CI	P-value	Δ	95% CI	P-value
Labor supply services	0.7	-0.4–1.9	0.168	1.4	0.3–2.4	0.016	2.0	0.8–3.1	0.004	2.6	1.2–4.0	0.003
Hospitals (except psychiatric hospitals)	0.6	-2.5–3.6	0.677	0.9	-2.2–4.0	0.491	1.3	-2.3–4.9	0.415	1.6	-2.9–6.1	0.401
General practice medical services	0.8	-1.6–3.1	0.454	1.0	-1.0–3.0	0.258	1.3	-0.8–3.3	0.185	1.5	-1.0–4.1	0.190
Specialist medical services	2.4	0.4–4.4	0.021	2.3	0.6–4.0	0.015	2.2	0.3–4.0	0.025	2.0	-0.3–4.3	0.066
Pathology and diagnostic imaging services	-1.0	-4.2–2.2	0.462	-1.3	-4.2–1.7	0.326	-1.5	-4.6–1.6	0.271	-1.8	-5.4–1.9	0.276
Physiotherapy services	4.3	0.7–8.0	0.023	3.3	0.1–6.5	0.040	2.3	-1.2–5.7	0.149	1.3	-3.0–5.5	0.492
Chiropractic and osteopathic services	1.3	-10.3–12.9	0.793	2.6	-8.9–14.0	0.598	3.9	-9.4–17.1	0.497	5.2	-11.1–21.5	0.464
Other allied health services	0.3	-0.9–1.3	0.714	0.2	-0.8–1.3	0.592	0.3	-0.8–1.4	0.530	0.4	-0.9–1.6	0.523
Ambulance services	-10.8	-39.3–17.8	0.388	-9.8	-47.7–28.2	0.550	-8.9	-59.4–41.6	0.679	-7.8	-71.7–56.1	0.774
Other healthcare services	0.0	-6.8–6.7	0.992	-2.2	-8.3–3.9	0.408	-4.4	-11.0–2.3	0.151	-6.6	-14.7–1.6	0.088
Aged care residential services	2.0	-3.3–7.3	0.385	3.9	-0.8–8.6	0.084	5.8	0.7–10.9	0.028	7.7	1.4–13.9	0.020
Other residential care services	0.9	-5.3–7.1	0.732	0.2	-5.2–5.6	0.942	-0.6	-6.4–5.2	0.816	-1.3	-8.5–5.9	0.671
Child care services	-0.4	-1.0–0.1	0.109	-0.4	-0.9–0.1	0.117	-0.3	-0.8–0.2	0.211	-0.2	-0.9–0.4	0.409
Other social assistance services	0.4	-3.7–4.4	0.827	1.0	-2.6–4.7	0.516	1.7	-2.3–5.6	0.339	2.3	-2.6–7.2	0.284
All industries	0.9	-0.1–1.9	0.062	1.3	0.4–2.2	0.010	1.6	0.7–2.6	0.004	2.0	0.8–3.2	0.004

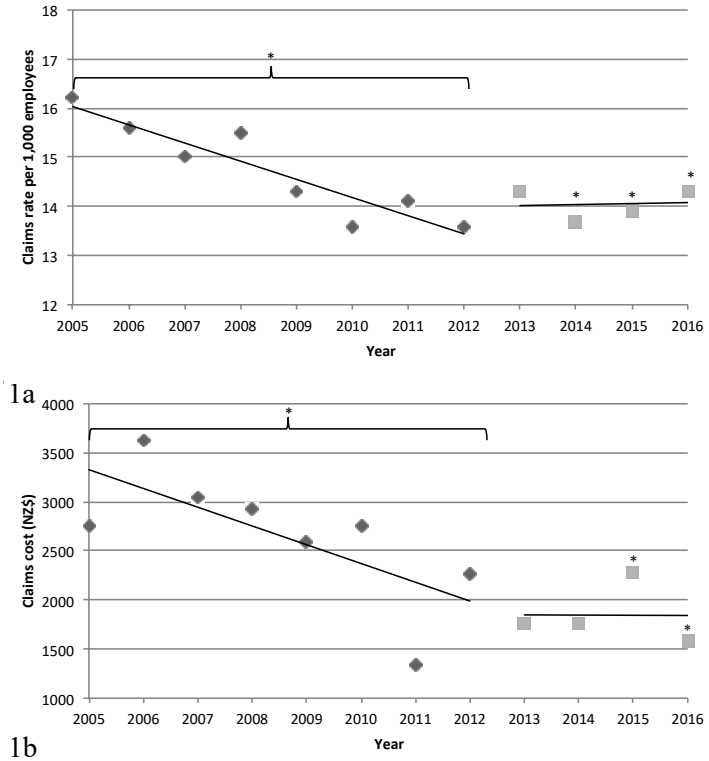

Figure 1. Moving and handling people (MHP)-related injury claims rates (1a) and costs (1b) per year for the period before (2005-2012) and after (2013-2016) the introduction of the MHP guidelines and associated regressions lines. ♦ indicates yearly costs before (2005-2012) and ■ after (2013-2016) the introduction of the MHGP. * represents a significant P-value ≥0.05.

Table 2a. Interrupted time series analysis of claims costs (2005–2016). [CI=confidence interval; MHP=moving and handling of people.]

	Regression lines before and after introduction of MHP guidelines				Difference in slope
	Slope	Intercept	95% CI	P-value	P-value
Labor supply services					
Before	-284.0	598 040.1	-746.3–178.3	0.177	0.520
After	122.2	-23 293.7	-1343.2–1587.5	0.969	
Hospitals (except psychiatric hospitals)					
Before	2.0	-62 704.5	-310.6–314.6	0.988	0.636
After	212.3	-318 800.6	-827.0– 1251.6	0.764	
General practice medical services					
Before	-181.2	313 480.3	-1641.2–1278.8	0.770	0.901
After	62.2	-50 794.4	-4571.5–4695.9	0.193	
Specialist medical services					
Before	140.8	-266 484.7	-1038.8–1320.5	0.779	0.989
After	118.9	-112 885.0	-3563.3–3801.0	0.490	
Pathology and diagnostic imaging services					
Before	-3795.2	6 969 936.8	-7523.7– -66.7	0.042	0.955
After	-4041.3	8 745 920.5	-14 311.0–6228.4	0.210	
Physiotherapy services					
Before	166.5	-238 655.9	-35.2–368.1	0.830	0.847
After	225.3	-452 318.8	-491.6–942.2	0.858	
Chiropractic and osteopathic services					
Before	-126.1	267 445.1	-323.0–70.7	0.161	0.062
After	495.9	-1 121 341.5	-190.7–1182.6	0.252	
Other allied health services					
Before	72.9	-122 080.0	-189.4–335.2	0.518	0.944
After	98.4	-98 684.2	-761.5–958.3	0.289	
Ambulance services					
Before	-62.2	100 252.8	-501.5–377.1	0.739	0.940
After	-14.4	33 088.9	-1505.2–1476.4	0.971	
Other healthcare services					
Before	322.7	-568 961.7	178.7–466.7	0.001	0.173
After	15.9	11 158.3	-478.7–510.4	0.971	
Aged care residential services					
Before	-299.6	610 652.8	-547.5– -51.6	0.021	0.575
After	-118.7	244 615.5	-871.6–634.2	0.440	
Other residential care services					
Before	-527.6	937 348.6	-1241.5– 86.3	0.113	0.467
After	209.5	-482 352.8	-2134.4–2553.4	0.264	
Child care services					
Before	-415.8	1 197 945.4	-1116.2–284.6	0.190	0.394
After	-1290.2	2 575 873.6	-3648.3–1067.9	0.267	
Other social assistance services					
Before	-625.8	925 103.9	-817.1– -434.6	<0.001	0.155
After	-190.0	308 765.5	-858.9–478.9	0.556	
All industries					
Before	-230.1	380 896.1	-324.1– -136.0	0.001	0.097
After	23.7	-45 910.8	-300.5–348.0	0.999	

and four years following the introduction of the MHPG, there were significant decreases in claims number for two causes: misjudgment of support of 34.1 (95% CI -67.9– -0.3), 39.5 (95% CI -75.0– -4.1), and 45.0 (95% CI -87.4– -2.5), respectively, and other or unclear cause of 140.3 (95% CI -264.5– -16.1), 156.1 (95% CI -289.5– -22.6), and 171.8 (95% CI -337.4– -6.3), respectively.

Discussion

This study found no reduction in claim rates and costs of MHP-related injuries following the introduction of the MHPG in 2012. In contrast, there were statistically significant increases in claims rates and costs. Approximately one-third of all injury claims in 2005–2016 in the healthcare sector in New Zealand were related to MHP. This is consistent with a recent study showing that more than one-third of all injury claims in large American nursing homes were related to MHP (14). Further, on average, our study estimated that 3267 injuries per year were related to MHP, contributing to a cost of nearly NZ$8 million per year.

Claim rates and costs before the introduction of the MHPG

Prior to the introduction of the MHPG, overall claim rates and costs significantly declined, which was largely driven by industries with the largest number of MHP-related injury claims: 'aged care residential services' and 'hospitals', as well as 'labor supply services', and 'specialist medical services'. In contrast, a significant increase was observed for some of the smaller industries ('pathology and diagnostic imaging services', 'other healthcare services', and 'other social assistance services'). Possible explanations for the decrease in claims and costs, especially seen within 'aged care residential services' and 'hospitals', include: (i) the healthcare sector implementing MHP programs that have helped reduce MHP and related risks resulting in reduction of MHP-related injury claims and related costs and/or; (ii) a decline in reporting of MHP-related injuries. The claims rate of 15.0 per 1000 employees for hospitals found in this study is comparable to an American study that reported an injury rate of 2.1 per 100 FTE, equivalent to 21 injuries per 1000 FTE, prior to the introduction of a minimal patient lifting policy in a tertiary hospital (24).

The effect of the introduction of the MHP guidelines

Following the introduction of the national MHPG, no overall change was observed for claims rate or costs. However, from the second year, claim rates gradually increased across all industries and, in the third and fourth year, claims costs increased across all industries.

Table 2b. Interrupted time series analysis of claims costs (2005–2016) continued. [Δ=change in claims costs compared to predicted level (NZ$); CI=confidence interval; MHP=moving and handling of people.]

Subsectors	Level change after introduction of the MHP guidelines											
	Year 1			Year 2			Year 3			Year 4		
	Δ	95% CI	P-value	Δ	95% CI	P-value	Δ	95% CI	P-value	Δ	95% CI	P-value
Labor supply services	-1684	-5589–2221	0.326	-1277	-4741–2186	0.397	-871	-4482–2740	0.574	-464	-4750–3822	0.799
Hospitals (except psychiatric hospitals)	-1318	-3869–1233	0.247	1108	-1155–3371	0.270	-897	-3325–1531	0.396	-687	-3658–2285	0.589
General practice medical services	-252	-11 629–11 125	0.958	-9	-10 370–10 353	0.998	235	-11 089–11 558	0.961	478	-13 379–14 336	0.935
Specialist medical services	-2213	-11 419–6992	0.575	-2235	-10 643–6173	0.536	-2257	-11 410–6896	0.565	-2278	-13 379–8856	0.632
Pathology and diagnostic imaging services	19 134	-5473–43 741	0.099	18 888	-5495–43 272	0.100	18 642	-9543–46 828	0.150	18 396	-16 320–53 111	0.236
Physiotherapy services	-1011	-2713–691	0.190	-951	-2407–504	0.154	-892	-2431–647	0.199	-833	-2742–1076	0.321
Chiropractic and osteopathic services	-317	-1938–1304	0.647	305	-1109–1719	0.614	927	-595–2448	0.161	1548	-341–3438	0.085
Other allied health services	-1029	-3134–1075	0.270	-1004	-2883–876	0.233	-978	-3007–1051	0.277	-953	-3438–1533	0.380
Ambulance services	1868	-1714–5451	0.243	1916	-1238–5070	0.181	1963	-1429–5356	0.200	2011	-2174–6196	0.278
Other healthcare services	-1514	-2702–-326	0.017	-1821	-2857–-785	0.004	-2128	-3235–-1021	0.002	-2435	-3801–-1068	0.003
Aged care residential services	1128	-680–2935	0.171	1308	-407–3023	0.104	1489	-447–3425	0.102	1670	-715–4055	0.693
Other residential care services	414	-5319–6146	0.865	1151	-3966–6267	0.599	1888	-3634–7410	0.431	2625	-4142–9392	0.374
Child care services	4061	-1672–9795	0.127	3187	-1856–8230	0.166	2313	-3083–7708	0.329	1438	-5189–8065	0.612
Other social assistance Services	1130	-441– 2701	0.122	1566	201–2930	0.026	2002	535–3468	0.012	2438	611–4264	0.014
All industries	217	-555–989	0.514	471	-205–1146	0.132	724	-2–1451	0.045	987	88–1886	0.032

According to the program theory of the MHPG (19), the public hospitals were the target industry. Hence 'hospitals' were expected to experience the greatest impact from the MHPG. However, no decline in claims rates occurred for 'hospitals'. In contrast, 'aged care residential services' as well as 'labor supply services', 'specialist medical services', and 'physiotherapy' had increasing claims rates in the years following the introduction. In addition, no change was observed in claims costs for 'hospitals' or any other industries, with the exception of 'other healthcare services'.

One potential explanation for why an increase – rather than a decrease – was observed in claims and costs may be the increased awareness of MHP amongst MHPG users. This may have resulted in greater acceptance of MHP as a risk factor for injuries, increasing the likelihood of lodging MPH-related injury claims, both at an individual and at an organizational level. This may have led to an increase in accepted claims, even if the actual level of MHP-related injuries may not have changed. Alternatively, other national events and interventions related to occupational health and safety may have influenced reporting of injuries. In 2010, New Zealand experienced a mine explosion that killed 29 men, which initiated a review of how occupational health and safety was regulated in New Zealand (25, 26). As a result, in 2015 new health and safety legislation was passed that increased the focus on management's liability. This may have affected claims rates, possibly masking a potential positive effect of the MHPG. Another explanation could be that potential positive effects of the MHPG have been counteracted by other factors. In particular, the population is getting increasingly heavy (27) and the proportion of bariatric patients is increasing (28). At the same time, the healthcare sector has an aging workforce. This may increase the risk of injuries related to MHP. Furthermore, there have been several budget cuts in the healthcare sector in New Zealand in the period 2009-2015 (29), increasing the workload on the remaining staff. In addition, the lack of improvement in MHP-related injury rates following the introduction of the MHPG could be the consequence of both

Table 3a. Interrupted time series analysis of claims causes (2005–2016). [CI=confidence interval; MHP=moving and handling of people.]

	Regression lines before and after introduction of MHP guidelines				Difference in slope
	Slope	Intercept	95% CI	P-value	P-value
Lifting / carrying / strain					
Before	-34.7	68 303.7	-65.5– -3.9	0.028	0.244
After	19.3	-55 751.6	-84.6–123.3	0.308	
Loss of balance / personal control					
Before	-11.3	24 878.8	-36.6–13.9	0.308	0.420
After	12.0	-15 578.8	-54.6–78.6	0.679	
Loss of hold					
Before	-0.2	432,9	-0.6– 0.3	0.227	0.302
After	0.4	-200,7	-0.9–1.6	0.742	
Misjudgment of support					
Before	6.4	-12 508.0	1.7–11.0	0.012	0.397
After	0.9	-1912.4	-13.8–15.7	0.894	
Other or unclear cause					
Before	-2.4	-5194.8	-19.7–14.9	0.746	0.541
After	-18.2	85 613.2	-78.2–41.9	0.545	
Pushed or pulled					
Before	10.5	-20 938.9	2.9–18.1	0.012	0.603
After	5.6	-11 139.2	-16.4–27.5	0.092	
Slipping / skidding on foot					
Before	1.2	-2211,1	-1.6–4.0	0.333	0.276
After	-3.2	5072.5	-12.3–5.9	0.294	
Something giving way underfoot					
Before	-0.3	0.0	-0.4–0.1	0.851	0.152
After	1.2	-1632.8	-0.9–3.3	0.515	
Struck by person or animal					
Before	1.7	-2873.5	-5.8– 9.2	0.599	0.895
After	0.3	-1319.4	-23.8–24.5	0.918	
Tripping or stumbling					
Before	0.9	-1064.4	0.1–1.8	0.033	0.225
After	-0.7	2631.1	-3.7–2.3	0.243	
Twisting movement					
Before	14.6	-28 661,5	0.4– 28.8	0.040	0.773
After	9.7	-23 412.9	-30.4– 49.8	0.215	
Undefined cause					
Before	0.0	-118.4	-0.2–0.3	0.682	0.861
After	0.1	-200.2	-0.7–0.9	0.742	
All causes					
Before	-15.2	20 096.9	-40.4–10.0	0.184	0.449
After	12.7	-17 994.0	-72.3–97.8	0.837	

poor implementation, eg, the MHPG not reaching the intended users or the industry not being able to implement the MHPG, and program failure, eg, the MHPG not working as expected. Lastly, the increased claims rates and costs could be completely unrelated to MHP. Previous studies have reported that differences in musculoskeletal disorders across various countries could not be explained by occupational factors, hence indicating that other factors play a prominent role for claims rates and costs (30, 31). However, the present study looked at the same population and only at changes in injury claims related to MHP according to the injury description. It is therefore likely that the above explanation is minimal in relation to our analysis.

Comparisons with similar studies

The finding of an increase in claims rates following the introduction of the MHPG differs from that of an evaluation of a 'No-Lift' policy intervention combined with funding opportunities for equipment in the Australia state of Victoria by Martin et al (15). This study reported a decrease in MHP-related back injury claim rates of 0.79 per 1000 employees following implementation of the intervention (15). The discrepancy between the findings of the studies may be due to the availability of dedicated funding for the healthcare industry in the Australian state-level intervention (15). In contrast, in New Zealand the MHPG had no such supplementary funding, which may have been a barrier for effective implementation.

Kurowski et al (14) also found a reduction in MHP-related claims rate in large nursing homes following the introduction of a safe MHP program. A commercial risk management company administered this program, which consisted of risk assessment of residents, purchase of lifting equipment, and staff training. In the first three years following the introduction, claims rates were reduced from 93.0 to 63.3/1000 employees, and a further reduction to 57.4 was reported after six years (14). Powell-Cope and colleagues (16) also reported reductions in claims rate from 34.3 to 24.8/1000 employees five years following the implementation of a MHP program in a hospital network. The discrepancy with our study may be explained by the substantially higher initial claims rates of 93.0 compared to 36.9/1000 employees reported for ‘aged care residential services’ in our study, indicating a smaller potential for improvement. Additional factors that might help explain the different findings are differences in support from a commercial company for program implementation and assistance with purchase of equipment.

Our findings were more consistent with an evaluation by Schoenfisch and colleagues (17), following the introduction of a ‘minimal patient lifting policy’ consisting of lifting equipment purchases and training of MHP ‘champions’ in a tertiary hospital. They found no change in MHP-related injury claim rates following the introduction of a minimal patient lifting policy in a community hospital, but a 44% reduction in claims rate was observed following the introduction of lifting equipment in the hospital. This suggests that the availability of equipment plays a more critical role than an MHP policy. In addition, the economic evaluation of the same minimal patient lifting policy reported an immediate drop in mean cost of MHP-related injuries following the introduction of the minimal patient lifting policy (32). However, the authors speculated that this is due to a shift in budget responsibilities (towards unit managers holder responsibility) and not the introduction of the policy itself.

Table 3b. Interrupted time series analysis of claims causes (2005–2016) continued. [Δ=change in claims number compared to predicted level; CI=confidence interval; MHP=moving and handling of people.]

Causes	Level change after introduction of the MHP guidelines											
	Year 1			Year 2			Year 3			Year 4		
	Δ	95% CI	P-value	Δ	95% CI	P-value	Δ	95% CI	P-value	Δ	95% CI	P-value
Lifting / carrying / strain	431.7	147.4–716.0	0.008	485.8	247.6–724.0	0.002	539.9	306.9–773.0	0.001	594.0	322.9–865.2	0.001
Loss of balance / personal control	49.6	-112.0–211.2	0.477	73.0	-105.5–251.4	0.351	96.3	-119.3–311.9	0.311	119.6	-144.9–384.1	0.305
Loss of hold	-1.7	-4.7–1.3	0.207	-1148.0	-1150.6–-1145.4	0.318	-0.6	-3.4–2.2	0.612	-0.1	-3.4–3.3	0.973
Misjudgment of support	-28.7	-67.0–9.7	0.110	-34.1	-67.9–-0.3	0.043	-39.5	-75.0–-4.1	0.029	-45.0	-87.4–-2.5	0.036
Other or unclear cause	-124.5	-266.9–17.9	0.070	-140.3	-264.5–-16.1	0.028	-156.1	-289.5–-22.6	0.024	-171.8	-337.4–-6.3	0.039
Pushed or pulled	8.1	-56.1–72.2	0.767	3.2	-55.0–61.3	0.898	-1.7	-61.8–58.3	0.946	-6.6	-75.9–62.6	0.821
Slipping / skidding on foot	0.4	-22.1–23.0	0.964	-4.0	-24.2–16.2	0.646	-8.4	-30.1–13.4	0.378	-12.8	-39.3–13.8	0.277
Something giving way underfoot	0.7	-2.5–4.0	0.601	2.0	0.5–3.6	0.016	3.3	1.2–5.5	0.007	4.6	0.6–8.6	0.026
Struck by person or animal	-32.8	-90.9–25.3	0.209	-34.2	-87.1–18.8	0.158	-35.5	-93.8–22.8	0.179	-36.9	-108.7–34.9	0.249
Tripping or stumbling	-2.5	-9.6–4.6	0.418	-4.1	-10.3–2.1	0.147	-5.7	-12.3–0.9	0.072	-7.3	-15.5–0.8	0.064
Twisting movement	-47.4	-158.6–63.8	0.331	-52.4	-155.8–51.1	0.255	-57.3	-167.9–53.3	0.246	-62.2	-192.6–68.2	0.281
Undefined cause	-0.1	-1.9–1.8	0.917	0.0	-1.7–1.6	0.971	0.0	-1.7–1.8	0.967	0.1	-2.1–2.3	0.925
All causes	309.3	101.1–517.5	0.008	337.2	154.5–519.9	0.003	365.1	170.4–559.7	0.003	393.0	154.6– 631.3	0.005

Claim causes

The majority of claim causes for MHP-related injuries were due to activities related to lifting/carrying/strain, loss of balance/personal control, twisting movement, struck by person/animal, and pushed or pulled. This finding is consistent with previous studies that have shown that lifting and carrying, pushing and pulling, and twisting are the main causes of MHP-related injuries (33–35). Of the five causes identified to be the main contributors to MHP-related injuries, lifting/carrying/strain was the only cause that had a significant, gradual increase in claims numbers in the four years following the introduction of the MHPG. Together, these findings suggest that prevention of MHP claims should have a dedicated focus on these types of activities, especially activities related to lifting and carrying.

Strengths and limitations

The employee counts from Statistics New Zealand included all people in the specific industries and were not specific to people engaged in MHP. This might have influenced the claims rates so that an industry with a higher proportion of employees engaged in MHP might have a higher MHP-related injury claims rate, simply because more people are engaged in MHP. However, the proportion of people engaged in MHP within each of the industries would most likely be similar over time, so the temporal changes were not likely to be affected by that.

We estimated the total numbers of MHP-related claims based on the proportion of the non-accredited employers who fill in the accident description field on the forms submitted to ACC because most accredited employers did not complete this field. This introduced an uncertainty about the total number of injuries related to MHP. However, we consider this the best estimation possible. There has been no independent validation of claims data. To do so would be very difficult and require a separate study. The data in the present study are the best available, and there is no reason *a priori* to doubt them. Since the analysis examined the same dataset over time and only concludes on trends, it is valid to use the present data for this analysis.

The use of injury claim data may, as previously shown, underestimate the actual number of claims (36). One of the reasons for this is related to the criteria for deciding if a claim is included or not, eg, length of time away from work. As a consequence, injuries resulting in only short or no time away from work are not included (36). Further, vulnerable groups, such as unskilled, casual, or foreign workers, are less likely to lodge a claim due to the fear of losing their job (36). However, in this study, we have used the same source of data for the comparison before and after the introduction of the MHPG. Consequently, any underreporting of claims is unlikely to affect the before and after comparisons.

A particular strength of the present study was the narrative analysis of the 'accident description' included in the claims from non-ACC accredited employers. This approach afforded a detailed assessment of the individual claims in order to determine whether they were related to MHP.

Concluding remarks

Before the introduction of the national MHPG in New Zealand in 2012, MHP-related claim rates and costs declined. In contrast, in the four years after the introduction of the national guidelines, there were statistically significant increases in MHP-related claim rates and costs, suggesting that the introduction of the guidelines had not been effective in reducing MHP risks and injuries. The healthcare sector should particularly focus on addressing risk related to lifting/carrying/strain since the MHP injury claims caused by these causes were the only claims that increased after 2012.

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The impact of national guidelines covering moving and handling of people on injury rates and related costs [1]

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Table S1a Adjustment factors for included ANZSIC codes.

Industry	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Labour Supply Services	1.20	1.14	1.11	1.23	1.11	1.14	1.09	1.09	1.04	1.04	1.05	1.04	1.10
Hospitals (except psychiatric hospitals)	8.73	8.34	9.94	7.51	7.81	7.28	7.36	8.71	8.89	9.19	7.33	7.20	8.09
General practice medical services	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Specialist medical services	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pathology and diagnostic imaging services	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Physiotherapy services	1.00	1.00	1.00	1.04	1.02	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01
Chiropractic and osteopathic services	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Other allied health services	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Ambulance services	1.17	1.05	1.00	1.00	1.02	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.02
Other healthcare services	1.16	1.14	1.11	1.11	1.17	1.14	1.13	1.05	1.02	1.02	1.01	1.01	1.07
Aged care residential services	1.17	1.17	1.19	1.10	1.11	1.11	1.09	1.23	1.28	1.28	1.30	1.29	1.19
Other residential care services	2.80	3.44	3.15	3.30	3.10	2.96	2.60	2.50	2.42	2.52	2.94	2.47	2.79
Child Care Services	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Other Social Assistance Services	1.08	1.05	1.01	1.02	1.17	1.34	1.28	1.33	1.31	1.37	1.54	1.48	1.26

Table S1b Adjustment factors for selected incident causes.

Industry	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Lifting/Carrying/Strain	1.37	1.37	1.32	1.31	1.33	1.32	1.29	1.49	1.62	1.66	1.60	1.54	1.44
Loss Balance/Personal Control	1.67	1.84	2.51	2.93	2.35	2.24	2.64	2.48	2.50	2.42	1.91	1.98	2.20
Loss of Hold	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Misjudgement of Support	1.73	1.57	1.54	1.63	1.69	1.43	1.26	1.44	1.63	1.60	1.71	2.58	1.59
Other or Unclear Cause	41.42	33.17	20.23	22.30	25.25	25.42	12.09	11.60	8.09	33.97	34.11	37.35	19.91
Pushed or Pulled	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Slipping, Skidding on Foot	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Something Giving way Underfoot	6.50	1.67	2.80	2.83	1.82	2.25	2.33	3.33	2.54	2.42	5.20	1.78	2.54
Struck by Person/Animal	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Tripping or Stumbling	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Twisting Movement	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Undefined Cause	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table S2a Claims numbers, claims rate (per 1000 employees), and average claims cost (NZ$) stratified by industries from 2005 to 2012.

Subsector	2005	2006	2007	2008	2009	2010	2011	2012
				Claim numbers (Claims rate)				
				Claims costs				
Labour Supply Services	128 (4.9)	109 (3.9)	107 (3.3)	120 (3.5)	102 (3.5)	101 (3.6)	89 (2.8)	87 (2.6)
	3753	5182	6073	4200	2914	4799	5098	995
Hospitals (except psychiatric hospitals)	1083 (16.7)	1034 (15.6)	1113 (16.7)	1209 (17.5)	1187 (16.5)	1034 (14.1)	1060 (14.3)	1028 (13.7)
	2306	4119	1735	1898	3397	4026	1152	3620
General practice medical services	25 (2.5)	22 (2.1)	25 (2.4)	33 (3.1)	34 (3.1)	24 (2.2)	22 (2.0)	16 (1.4)
	176	827	776	12 839	368	854	286	450
Specialist medical services	7 (2.98)	12 (5.0)	10 (3.9)	8 (2.9)	7 (2.3)	6 (2.0)	7 (2.2)	10 (3.1)
	100	225	850	1525	9857	383	914	220
Pathology and diagnostic imaging services	4 (0.9)	9 (2.2)	15 (3.6)	11 (2.7)	13 (3.3)	9 (2.0)	14 (3.3)	23 (5.4)
	30 375	19878	413	2782	777	5100	429	948
Physiotherapy services	13 (9.6)	7 (4.8)	9 (5.6)	18 (9.8)	8 (4.2)	13 (7.0)	6 (3.6)	10 (5.9)
	500	329	578	1929	375	385	2983	340
Chiropractic and osteopathic services	4 (7.1)	3 (5.5)	2 (3.3)	5 (7.9)	9 (14.1)	7 (10.8)	2 (3.2)	3 (4.6)
	1025	133	2650	280	856	543	300	133
Other allied health services	35 (1.8)	32 (1.6)	30 (1.5)	23 (1.1)	39 (1.7)	37 (1.4)	40 (1.9)	46 (2.2)
	1174	603	520	3444	974	1476	1240	1400
Ambulance services	123 (61.5)	108 (50.0)	89 (40.5)	91 (40.4)	106 (44.9)	119 (50.6)	130 (52.0)	153 (62.5)
	3670	1178	3747	4340	1937	1798	3339	2724
Other healthcare services	15 (5.2)	13 (4.1)	8 (2.2)	6 (1.4)	35 (8.3)	18 (4.4)	37 (9.2)	51 (11.0)
	592	227	300	240	2180	313	3,064	1690
Aged care residential services	1279 (41.0)	1329 (43.2)	1351 (42.6)	1293 (40.9)	1095 (33.8)	1119 (36.9)	1190 (35.2)	1152 (32.9)
	2948	2591	3068	3734	1804	1539	971	1401
Other residential care services	308 (25.5)	309 (25.8)	217 (17.6)	344 (27.3)	282 (21.1)	293 (20.9)	335 (24.6)	316 (22.1)
	3145	3618	9655	1256	1880	3707	1400	1608
Child Care Services	2 (0.3)	4 (0.5)	2 (0.2)	8 (1.0)	3 (0.3)	2 (0.2)	8 (0.8)	5 (0.5)
	7,950	125	250	1125	100	150	1288	160
Other Social Assistance Services	196 (11.3)	193 (9.8)	186 (10.8)	176 (9.7)	265 (13.7)	296 (14.8)	277 (13.9)	284 (14.4)
	2987	7935	2476	5407	3564	2535	1499	2317
All industries	3223 (15.9)	3184 (15.2)	3164 (14.7)	3344 (15.1)	3186 (14.1)	3078 (13.4)	3218 (13.8)	3183 (13.4)
	2780	3539	3058	2990	2575	2780	1355	2259

Table S2b Claims numbers, claims rate (per 1000 employees), and average claims cost (NZ$) stratified by industries from 2013 to 2016.

Subsector	2013	2014	2015	2016
	Claim numbers (Claims rate) Claims costs			
Labour Supply Services	104 (3.3) 1526	116 (3.7) 1969	115(3.5) 879	168 (4.8) 1930
Hospitals (except psychiatric hospitals)	1102 (14.5) 1717	1039 (13.5) 743	1071 (13.3) 2858	1174 (14.4) 1542
General practice medical services	26 (2.3) 950	31 (2.7) 1526	45 (3.8) 1082	31 (2.5) 1184
Specialist medical services	9 (2.8) 300	15 (4.6) 320	8 (2.4) 763	10 (2.9) 340
Pathology and diagnostic imaging services	17 (4.0) 14 882	15 (3.5) 813	16 (4.0) 950	18 (4.2) 372
Physiotherapy services	16 (9.4) 1288	12 (6.7) 492	14 (7.2) 1986	10 (4.6) 530
Chiropractic and osteopathic services	5 (7.6) 320	5 (7.3) 220	8 (11.4) 225	8 (11.1) 2175
Other allied health services	48 (2.2) 985	48 (1.9) 367	57 (2.4) 1072	60 (2.5) 915
Ambulance services	125 (49.0) 2614	141 (54.2) 6162	156 (53.8) 4710	151 (49.5) 3218
Other healthcare services	44 (9.3) 926	45 (8.3) 1346	50 (9.0) 832	30 (5.2) 1080
Aged care residential services	1232 (34.8) 1870	1157 (32.6) 2065	1263 (35.8) 2055	1247 (34.5) 1471
Other residential care services	331 (23.7) 1064	318 (22.5) 1962	276 (17.6) 1702	358 (23.9) 1952
Child Care Services	2 (0.2) 5000	2 (0.2) 350	7 (0.5) 471	3 (0.2) 700
Other Social Assistance Services	280 (14.6) 1526	334 (18.9) 1987	326 (18.7) 1940	332 (19.2) 1033
All industries	3341 (14.1) 1754	3277 (13.5) 1738	3413 (13.7) 2286	3601 (14.1) 1571

Table S3 Claims numbers stratified by claims causes from 2005 to 2016.

Cause category	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
						Number of MHP related injury claims							
Lifting/ Carrying/ Strain	2006	1961	1866	1985	1769	1713	1731	1870	2130	2158	2120	2239	23 662
Loss Balance/ Personal Control	281	248	173	126	148	184	151	196	190	237	261	208	2448
Loss of Hold	2	3	3	3	5	1	3	0	1	0	1	1	23
Misjudgement of Support	31	31	32	33	49	66	76	58	36	64	49	44	576
Other or Unclear Cause	290	531	425	513	454	458	375	429	396	170	375	187	4799
Pushed or Pulled	30	53	43	101	99	105	108	90	131	144	143	150	1197
Slipping, Skidding on Foot	43	25	31	47	27	28	44	47	37	42	35	31	437
Something Giving way Underfoot	0	0	0	0	0	0	0	0	0	2	5	2	8
Struck by Person/Animal	129	119	97	104	104	92	154	124	95	90	76	102	1286
Tripping or Stumbling	15	7	11	6	14	7	21	12	15	11	13	10	142
Twisting Movement	21	104	145	130	148	168	158	142	142	139	178	168	1643
Undefined Cause	1	0	2	1	2	1	0	2	1	1	2	1	14
All causes	2850	3082	2828	3049	2820	2822	2821	2969	3174	3058	3259	3142	36 234

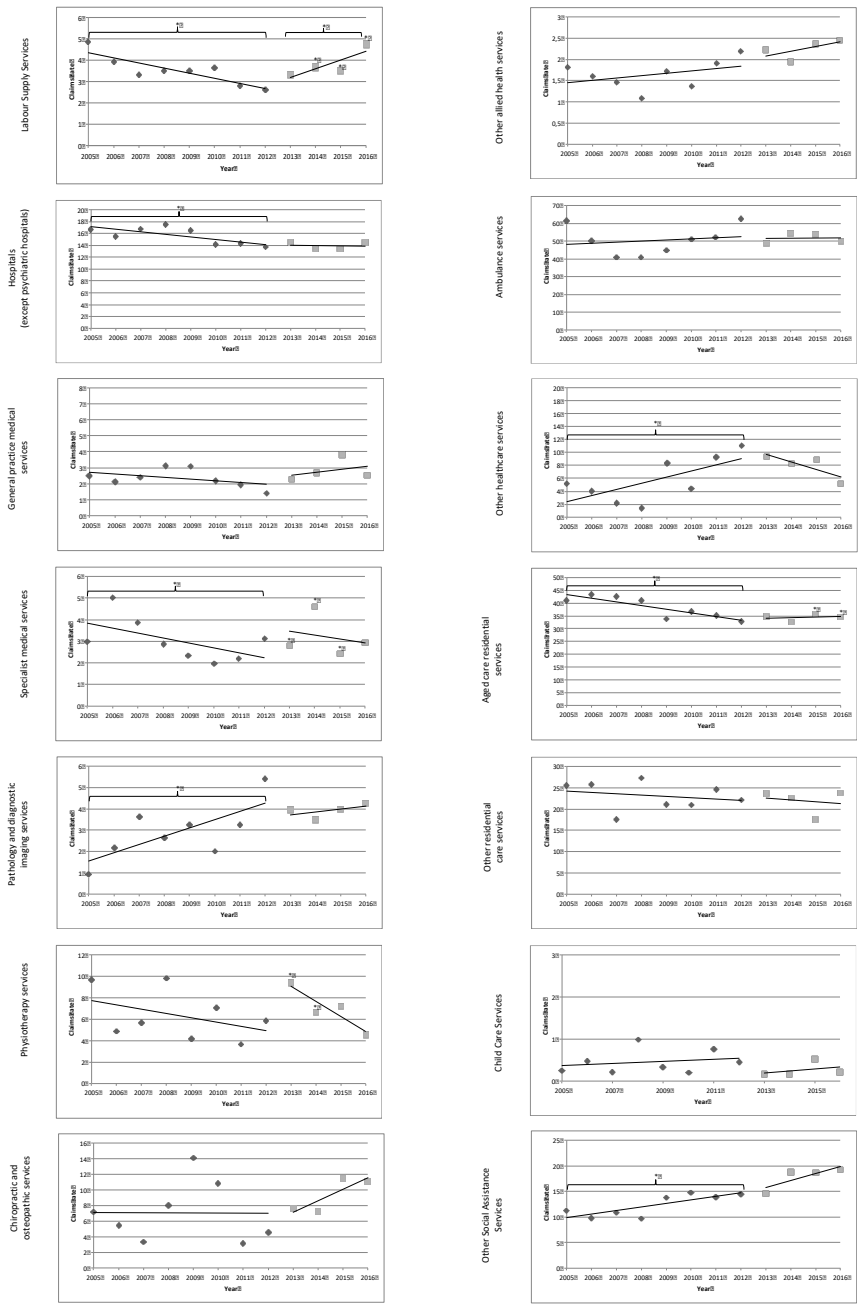

Figure S1 MHP related claims rates per subsector before and after the introduction of the MHPG. ♦ indicates yearly rates before (2005-2012) and ■ after (2013-2016) the introduction of the MHGP.

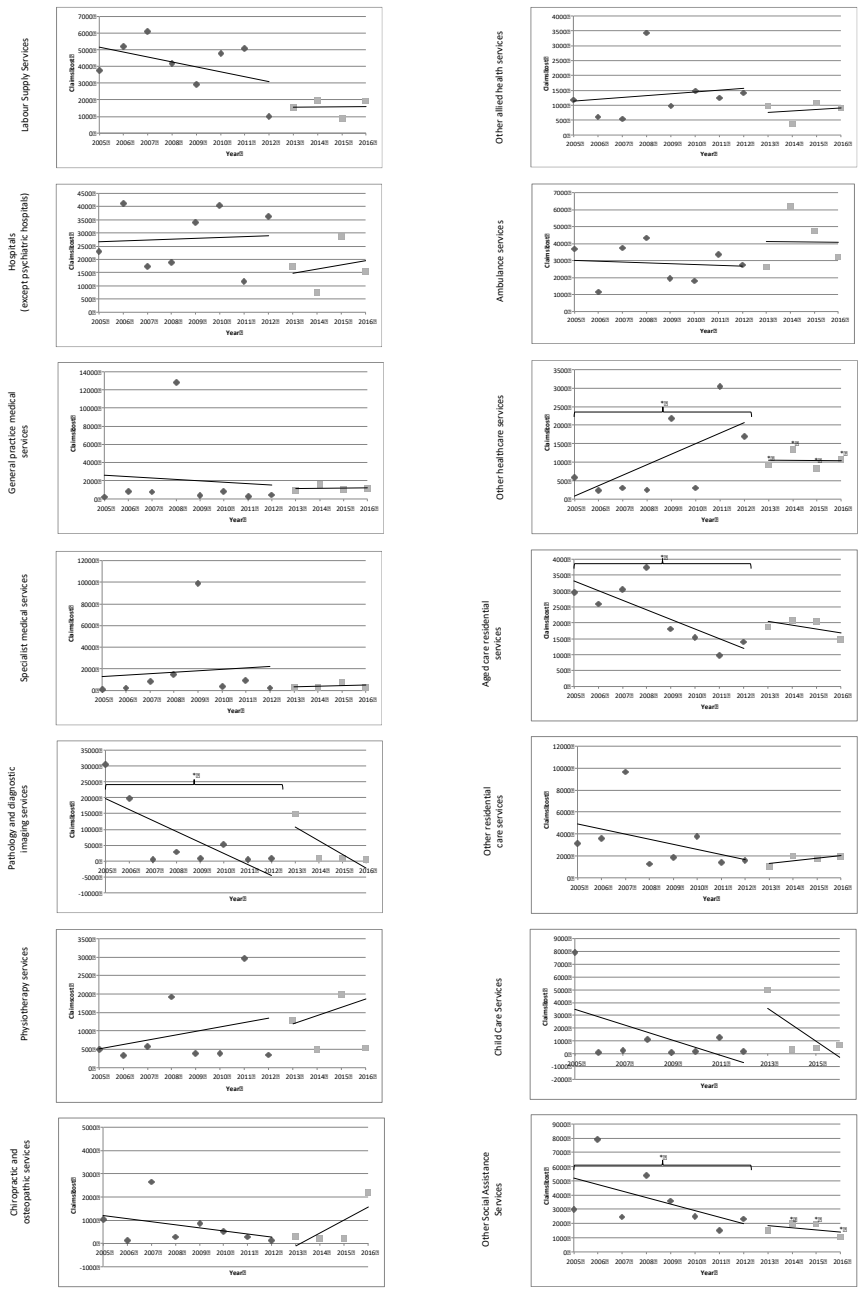

Figure S2 MHP related claims costs per subsector before and after the introduction of the MHPG. ♦ indicates yearly costs before (2005-2012) and ▪ after (2013-2016) the introduction of the MHGP.

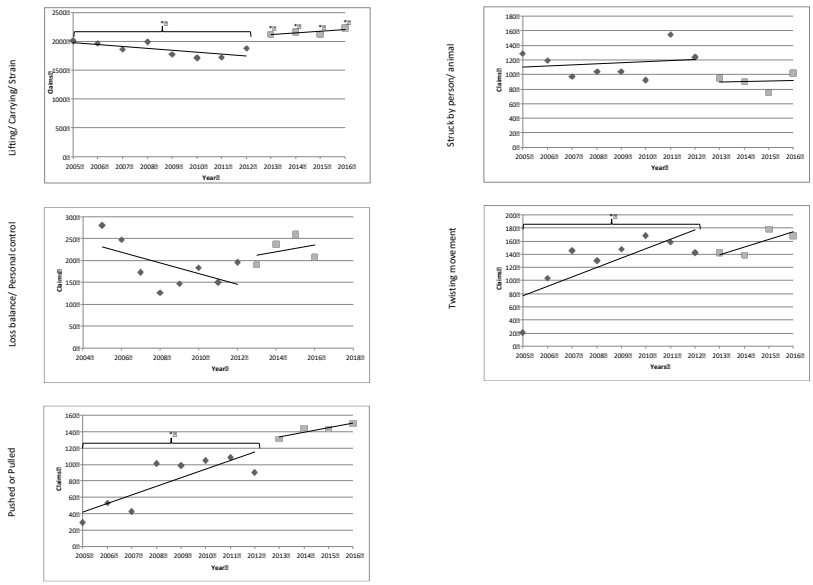

Figure S3 MHP related claims number stratified by the five causes contributing the most to MHP related injuries before and after the introduction of the MHPG. ♦ indicates yearly rates before (2005-2012) and ▪ after (2013-2016) the introduction of the MHGP.

Appendix 3: Healthcare sector awareness and use of a national moving and handling people guideline

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Abstract (316)

Background A moving and handling of people guideline (MHPG) was introduced in New Zealand in 2012 to reduce musculoskeletal disorders in the healthcare sector. This study assessed: i) to what extent intended users were aware of the MHPG; ii) how they became aware of it; iii) whether those who were aware of it had read and used them; and iv) whether organisational size affected awareness.

Methods In 2016 an email questionnaire was sent to 3,025 people in the healthcare sector of whom 689 (22.8%) responded. Questionnaire responses were compared, using logistic regression, across subsectors (public hospitals, private hospitals, residential aged care, training and education, and multiple subsectors; n=495) and work role (H&S managers, MHP coordinators, H&S representatives, managers, therapists, and carers; n=463).

Results Ninety-three percent of MHP coordinators and 100% of therapists were aware of the MHPG, significantly more than for other work roles ($p<0.01$). Fewer carers and hospital workers (39.5% and 43.7%, respectively) were aware of the MHPG ($p<0.01$) whilst those working in multiple subsectors were more aware of the MHPG (79.8 %; $p<0.001$). Of the respondents aware of the MHPG, 96 % of therapists and 91.1 % of MHP coordinators had used it; fewer carers had read (56.3 %) or used (56.3 %) sections of the MHPG ($p=0.049$). Also, fewer respondents from public hospitals had read (56.7 %) or used (50.5 %) sections of it, whilst more residential aged care workers (94.2 %; $p<0.001$) and within multiple subsectors (90.1 %; $p<0.001$) had read sections of the MHPG. Respondents from larger organisations were less aware of the MHPG than those from smaller organisation (73.9% vs 87.0 %; $p=0.040$).

Conclusion Four years after introduction, awareness and use of the MHPG was very high for most of the work roles that were important for its implementation (MHP coordinators, therapists, H&S managers) However, awareness was low for those working in public hospitals, which were expected to lead implementation.

Keywords

- Chronicle workshop
- Healthcare
- Patient handling
- Evaluation
- Intervention

Introduction

Although several countries have developed moving and handling of people (MHP) guidelines (Hignett, 2003; Humrickhouse and Knibbe, 2016; Koppelaar et al., 2009; Lidegaard et al., 2019b), musculoskeletal disorders and injuries caused by MHP remain common in the healthcare sector (Alnaser, 2007; Coman et al., 2018; Davis and Kotowski, 2015; Lidegaard et al., 2019a; Smedley et al., 1995). A possible reason for this could be that the intended users are not aware of the guidelines, and/or do not read or use them.

No previous studies have assessed awareness and/or use of MHP guidelines by the healthcare sector. However, studies examining awareness and use of clinical guidelines (Brennan et al., 2018; Cabana et al., 1999; Kovacs et al., 2018) have shown that these often not reach the intended users (Cabana et al., 1999; Joosen et al., 2015; Kastner et al., 2011) possibly due to over-reliance on passive dissemination (Closs and Cheater, 1997; Graham et al., 2003; Sandström et al., 2015) such as mass mailings, publication of written information, and untargeted presentations to heterogeneous groups (Rabin et al., 2006), resulting in poor awareness and use of these guidelines (Thomson et al. 1995). In contrast to clinical guidelines, MHP guidelines generally have a more diverse target group and factors influencing awareness and use of these guidelines may therefore be different.

In New Zealand, the Accident Compensation Corporation (ACC) developed and introduced a national MHP guideline in 2012, '*Moving and Handling People: The New Zealand Guidelines*' (MHPG) (Accident Compensation Corporation, 2012). The MHPG was developed to reduce MHP-related injuries and contains information on developing and implementing a multifaceted MHP programme. The MHPG was made available on the web, and as hard copy and CDROM. It was launched at a national conference and at subsequent regional seminars targeting MHP coordinators, ergonomists, occupational therapists/physiotherapists (therapists) and others involved in prevention of injuries related to MHP. It was made freely available on the ACC webpage and sent upon request (Lidegaard et al., 2019b). In addition, healthcare organisations and health and safety (H&S) managers, MHP coordinators, and managers on the ACC's mailing list were informed via mail or email. The dissemination strategy for the MHPG therefore mainly relied on passive dissemination (Lidegaard et al., 2019b).

The MHPG targeted subsectors where MHP was prevalent include: i) public and private hospitals; ii) residential and aged care facilities; iii) clinics and surgeries; iv) schools with disabled children; and v) community care services (Accident Compensation Corporation, 2012). The intended users who were expected to be aware of the guidelines were identified in the MHPG as: i) managers; ii) carers; iii) senior management; iv) people involved in facility design, and; v) education and training institutions (Accident Compensation Corporation, 2012).

A previous analysis of the MHPG (the programme theory) (Lidegaard et al., 2019b) indicated that public hospitals were expected to lead and drive implementation. Those working in public hospitals would therefore be more likely to be aware and to have read and used the MHPG (Lidegaard et al., 2019b). Similarly, H&S managers, MHP coordinators, and to some extent managers responsible for MHP were expected to be more likely to use the MHPG and lead implementation in their organisations (Lidegaard et al., 2019b). In addition, trainers and educators were expected to spread the information contained in the MHPG throughout the healthcare sector.

A recent evaluation of MHP-related accepted injury claims in New Zealand showed no reduction following the introduction of the MHPG (Lidegaard et al., 2019a). The reasons for this are unknown, but could be related to poor awareness of the MHPG. The present study aimed to identify: i) to what extent intended users were aware of the MHPG; ii) how they became aware of it; iii) whether those who were aware of it had read and used them; and iv) whether organisational size affected awareness.

Methods

The study described in this paper is based on a questionnaire survey that was conducted from April to October 2016 among healthcare professionals in New Zealand. Ethics approval was obtained from the Massey University Human Ethics Committee (SOB 15/78).

Data collection and participants

The questionnaire was administered using an internet-based platform and distributed by email as an open survey (Eysenbach, 2005) through

professional associations (Moving and Handling Association of New Zealand; Human Factors and Ergonomics Society of New Zealand), networks (Public hospital MHP coordinators network; Network of OHS managers in residential care), MHP equipment suppliers, a trade union (New Zealand Nurses Organisation), employers' associations (Home & Community Health Association; Care Association New Zealand), an industry training organisation (Careerforce), and ACC mailing lists (a list of H&S managers and recipients of the MHPG). These were selected in order to reach the target organisations and intended users, which were identified as users by the MHPG programme theory (Lidegaard et al., 2019b).

The questionnaire was distributed to 3,025 people, of which 689 (22.6%) replied. Questionnaire responses were compared across subsectors (public hospitals, private hospitals, residential aged care, training and education, and multiple subsectors; n=495) and work roles (H&S managers, MHP coordinators, H&S representatives, managers, therapists, and carers; n=463) with 407 respondents included in both (sector and job title/role) comparisons. Respondents who did not work in the selected subsectors and work roles were excluded, so the final study population included 552 respondents.

Questionnaire

The development of the questionnaire was guided by the programme theory for the MHPG (Lidegaard et al., 2019b) and an earlier survey of the New Zealand healthcare sector (Thomas and Thomas, 2010). An initial draft of the questionnaire was trialled by an industry advisory group and a H&S management group at a New Zealand District Health Board and revised based on their feedback.

The questionnaire contained open-ended and closed questions with answer categories: *'Yes'; 'No';* and *'Do not know/unsure'*. The specific questions analysed in this study asked about awareness of the MHPG, and whether sections of the MHPG had been read and used: *'Are you aware of the 'Moving and Handling People: The New Zealand Guidelines (2012)?'*. If the answer was 'yes', the next question was: *'Have you, at any time read any sections of the 'Moving and Handling People: The New Zealand Guidelines (2012)?'* and they were also asked: *'Have you, at any time used any sections of the 'Moving and Handling People: The New Zealand Guidelines (2012)'?'* This was followed by: *'How did you become aware of the 'Moving and Handling People: The New Zealand Guidelines (2012)?'*. The answer category for this last question was an open-ended narrative description.

Statistical analysis

Statistical analyses were performed using SPSS (SPSS version 25.0, IBM, Armonk, NY, USA) and the SAS statistical software for Windows (version 9.3) (Cary, NC, USA).

As noted above, all analyses were carried out separately for subsector and work role. For analyses comparing responses across subsectors, respondents working in more than one subsector were allocated to a new category, "multiple sectors". For comparisons comparing work roles, a hierarchy was created as follows: H&S manager; MHP coordinator; H&S representative; manager; therapists; carer. This meant that if a respondent had identified as being both a therapist and MHP coordinator, then they were analysed as MHP coordinator. The hierarchy was based on the MHPG programme theory that identified these roles as critical for the implementation of a MHP programme (Lidegaard et al., 2019b).

The proportions of 'Do not know/ Unsure' responses for questions on awareness, having read the guideline, and having used it were consistently small (6.3-15.1%). We therefore merged the 'No and Do not know/ Unsure' categories into a single "No" category. Binomial logistics regression estimating odds ratio and 95% confidence intervals (95%CI) was applied to assess differences between different subsectors and work roles, respectively. Public hospitals and H&S managers acted as the reference category, respectively. Statistical significance was defined as $p<0.05$. Bonferroni adjustment was applied for multiple comparisons.

The responses to the question about how the respondents became aware of the MHPG were analysed thematically (Braun and Clarke, 2006). In addition, an analysis assessing the influence of organisational size (<50; 50 to 99; >99) on awareness of the MHPG was conducted using binomial logistics regression. Organisation with more than 99 employees acted as the reference group.

Since carers were not the main target group of the MHPG (Lidegaard et al., 2019b) and a low proportion of carers were aware of the MHPG (see below) and the distribution of respondents working as carers across the different subsectors was uneven (the majority of carers worked in public hospitals), a

sensitivity analysis was undertaken excluding all carers.

Results

The largest group of respondents from the sector cohort worked within public hospitals (44.8%; Table 1). Carers made up the majority of respondents from public and private hospitals i.e. 76.1% and 50.0%, respectively. MHP coordinators made up 25.8 % of the respondents working in multiple sectors. Of those working in public hospitals, 95% were in organisations with >100 employees. In contrast, this was the case for only 32.3% of those working in residential aged care. The majority of respondents from the work role cohort were carers (58.5%) and 80.4% employed as carers were in organisations with >100 employees (Table 1).

[Insert table 1]

Analysis by subsector

Respondents working in residential aged care, training/education, and multiple subsectors were 3.13 (95%CI 1.89, 5.26), 6.21 (95%CI 2.50, 16.67), and 5.08 (95%CI 2.86, 9.09) times more likely to be aware of the MHPG than those working in public hospitals, respectively. Sensitivity analyses excluding carers showed similar results (Table 3). Respondents working in residential aged care, home care, training/education, and multiple subsectors were 12.35 (95%CI 4.17, 33.33), 9.90 (95%CI 1.27, 100.00), 7.41 (95%CI 2.13, 25.00), and 6.99 (95%CI 2.94, 16.67) times more likely to read any section of the MHPG than respondents working in public hospitals, respectively (Table 2). Although sensitivity analyses resulted in increased ORs for residential aged care and multiple subsectors, the overall pattern was very similar (Table 3). Finally, those working in residential aged care, training/education, and multiple subsectors were 5.81 (95%CI 2.70, 12.50), 2.95 (95%CI 1.23, 7.14), and 4.39 (95%CI 2.17, 9.09) times more likely to use any section of the MHPG (Table 2), with only small changes observed for analyses excluding carers (Table 3).

The majority of respondents became aware of the MHPG through 'Multiple distribution channels' (35.2 %), 'Training' (15.1 %), and 'At work' (13.2 %) (Table 4). The largest contributions to 'Multiple distribution channels' came from 'Search/ research' (21.2 %), 'Other' (17.9 %), 'At work' (13.7 %) and 'Training' (13.7 %). More respondents from public hospitals (25.4 %) and private hospitals (25.0 %) became aware of the MHPG through training compared to the remaining subsector (0.0 to 13.5 %).

[Insert table 2 here]

[Insert table 3 here]

[Insert table 4 here]

Analysis by work role

Respondents working as carer were less likely to be aware (OR 0.12, 95%CI 0.04, 0.30) of, or to have read (OR 0.09, 95%CI 0.02, 0.40), the MHPG than respondents working as H&S managers (table 5). Respondents working as MHP coordinator, and therapist were 3.73 (95%CI 1.00, 1.37), and 8.70 (95%CI 1.01, 100.) times more likely to use any section of the MHPG than respondents working as H&S managers.

The majority became aware of the MHPG through 'Multiple distribution channels' (35.9%), 'Training' (16.7%), 'At work' (10.6%), and 'ACC (8.6%) (Table 4). The largest contributions to 'Multiple distribution channels' came from 'Search/research' (21.2%), 'Other' (17.9%), 'At work' (13.7%) and 'Training' (13.7%). More H&S managers (20.0%) and managers (20.7%) became aware through ACC compared to the other work roles (0.0-12.5%). More carers (29.9%) became aware through training compared to remaining work roles (7.3-16.7%). More H&S representatives (66.7%) and fewer carers (28.4 %) became aware through multiple channels compared to the remaining work roles (32.0-41.5%). Carers (17.9%) were more often reached through work than the other work roles (0.0-8.3%). The launch of the MHGP mostly reached MHP coordinators (12.2%) compared to the other work roles (0.0-0.9%).

[Insert table 5 here]

Organisational size and awareness of the MHPG

Table 6 shows the distribution of respondents' awareness of the MHPG stratified by organisational size for the sector and work role cohorts. In this table carers have been excluded because the distribution of respondents working as carers was uneven across the different subsectors. Respondents working in organisations with 49 or less employees were 2.36 (95%CI 1.06, 5.26) times more likely to be aware of the MHPG than

respondents working in organisations with 100 or more employees.

[Insert figure 6 here]

Discussion

Overall awareness of the MHPG for the work role cohort was 56.8 %. High proportions of MHP coordinators (93.6 %) and therapists (100 %) were aware of the MHPG. The main intended user groups (Lidegaard et al., 2019b) were H&S managers, MHP coordinators, therapists, and managers with responsibility for MHP. Thus it would be expected that more respondents in these roles were aware of the MHPG. The overall level of awareness amongst the main intended user groups was similar to findings of a literature review on clinical guidelines by Cabana et al, 1999, where awareness was at least 80 % in 23 of the 46 included studies. It is also similar to that reported by Hendrick et al, 2013, in which 82 % of physiotherapists were aware of a low back pain guideline (Hendrick et al., 2013). The respondents in the present study had a diverse pattern of becoming aware, including via ACC and the launch of the MHPG. This may explain why such a high percentage of the MHP coordinators and therapists were aware of the MHPG.

In contrast, few carers (39.5%) were aware of the MHPG. Carers conduct MHP and would be expected to follow the organisation's MHP programme and procedures and attend MHP training but they might not know or be aware of the MHPG whether or not the programmes and training were based on the MHPG. The results showed that carers mostly became aware of the guidelines through training. Hence, lower awareness of the MHPG seems a logical consequence of how the content of the MHPG was expected to be implemented. However, more carers in our study were aware of the MHPG than findings of awareness reported in a study of nurses. Rose and colleagues reported that 29% of intensive care unit nurses were aware of guidelines for pain assessment and management developed by a professional society (Rose et al., 2012). On the other hand, Rodgers reported a substantially higher awareness as, on average, 77.3 % of nurses in medical and surgical wards at hospitals were aware of 14 specific evidence-based practices (Rodgers, 2000). The level of awareness reported in the present study might be affected by the way carers were approached. The main distribution channel of the questionnaire to carers (the New Zealand Nurses Organisation) specifically targeted workplace representatives and nurse managers, who were expected to have higher awareness than the rest of the carers. As a result, workplace representatives might be overrepresented and thereby skewing the level of awareness amongst carers, hence the awareness amongst carers in general might be lower than reported.

Guidelines in the healthcare sector are often targeted at specialist work roles, most often the physician (Gagliardi et al., 2011). Although the MHPG was thought to be relevant to all work roles in the healthcare sector, H&S managers, MHP coordinators and managers (with responsibility for MHP) were identified as the main people who would implement the MHPG (Lidegaard et al., 2019b). This distinction in targeted work role could explain why more MHP coordinators and H&S managers (borderline significant, $p = 0.060$) were aware of the MHPG. However, the higher proportion of respondents being aware could also be explained by ACC having distribution channels that directly targeted these work roles. ACC used a suite of passive distribution channels and many of the respondents were reached by more than one as well as a higher proportion of different target user groups were reached by different channels. A higher proportion of MHP coordinators were reached by the Launch of the MHPG, more H&S managers and managers were reached through contact with ACC, and more carers were reached through training and at work. This emphasises the importance of having multiple distribution channels when aiming at reaching multiple user groups.

Overall awareness of the MHPG for the sector cohort was 59.5 %. It was 79.7% when the carers were removed from this cohort in the sensitivity analysis. Fewer respondents within public hospitals than the other subsectors were aware of the MHPG before (43.7 %) and after removal of carers (61.7 %). Similarly, fewer respondents (including carers) from private hospitals than the rest of the subsectors were aware of the MHPG (50.0 %). In contrast, more respondents (including carers) working within multiple subsectors were aware of the MHPG (79.8 %). However, the results from the sensitivity analysis showed that there were no differences between respondents from subsectors. This indicates that the pattern seen for the public and private hospitals to some extent can be explained by fewer carers being aware of the MHPG. Based on the programme theory underlying the MHPG, more respondents from public hospitals were expected to be aware of

the MHPG because the sector was seen as a leader in implementing the MHPG. A possible explanation for the difference between respondents employed in public and private hospitals, and respondents working in multiple subsectors may be that people that work in multiple subsectors are commonly consultants, who provide specialised knowledge and advice about MHP to organisations. They might more actively search information on MHP and participate in meetings and conferences. This is supported by the fact that a higher proportion of respondents from multiple subsectors were MHP coordinators, and therapists compared to other subsectors. In addition, working within multiple subsectors might increase the likelihood of being introduced to the MHPG.

Fewer respondents from larger organisations were aware of the MHPG, whereas more respondents from smaller organisations were aware. We have not found any studies that looked at awareness of guidelines in relation to subsectors in the healthcare sector or in relation to organisational size. However, Rogers (2000) reported that there was no difference in the awareness of research-based practices among nurses employed in different size of hospitals. Because of the more hierarchical structure of large organisations, their employees may be less likely to know staff in specialist functions, such as MHP coordinators and H&S managers. This could result in poorer dissemination across the organisation due to impaired communication. However, data from the present study do not fully support this argument, as there were no major differences with respect to how respondents became aware of the MHGP between respondents working in public hospitals (large organisations) and residential aged care (smaller organisations).

Overall, 75.7 % of respondents in the work role cohort, who indicated that they were aware of the MHPG, had read sections of the MHPG and 69.6 % had used them. A higher proportion of respondents working as therapists (96.0 %), as MHP coordinators (91.1 %) and as H&S managers (73.3 %) had used the MHPG, whilst fewer carers had read (56.3 %) and used (56.3 %) them, compared to other work roles. These findings are consistent with the programme theory (Lidegaard et al., 2019b), in which, H&S managers, MHP coordinators, and therapists were expected to use the MHPG to develop and design the organisation's MHP programme, whereas carers were expected to follow the organisations programmes and maybe not use the MHPG directly.

In comparison, Kotzeva and colleagues reported that 90.2 % of hospital physicians used a suite of clinical guidelines within a national database of healthcare guidelines (Kotzeva et al., 2014). A direct comparison is difficult as the physicians report on use of clinical guidelines in general, whereas the present study assessed use of one specific guideline. Nevertheless, the overall use reported by Kotzeva et al, are higher than the present study. However, when looking at the main users of the MHPG, the numbers are quite similar.

The percentage of carers that had used the MHPG when they were aware of them was lower than reported in previous studies that looked at nurses. Rodgers (2000) found that 66.8 % of nurses in medical and surgical wards at hospitals used research-based evidence. Another study reported that 65 % of nurses in an intensive care unit used clinical guidelines, especially guidelines endorsed by nurses' professional organizations (Sinuff et al., 2007). One reason for the lower use in our study could be due to our selection criteria. We aimed for a 'clean' carers category where respondents would not have any other work roles or responsibilities, e.g. H&S representatives. Thus, these respondents were moved to other categories. By doing so, we removed the respondents most likely to use the MHPG from the carers' category, hence lowering use among the carers. Further, it could be argued that it is unrealistic to expect carers to use a MHP guideline as much as nurses are expected to use clinical guidelines, especially since clinical guidelines are directly linked to core business. In that light, having a slightly lower use among the carers seems predictable.

In previous studies, barriers for use of clinical guidelines by occupational therapists were primarily associated with the expectation of the patient, lack of knowledge from colleagues' as well as their attitudes and behaviours towards the clinical guidelines, and how work was organised (Poitras et al., 2011). For physiotherapists, barriers mostly related to how clinicians' understood the guidelines, the level of compatibility between own practice and the guidelines, how relevant the clinicians perceived the guidelines to be, and how much they agreed with the guidelines (Côté et al., 2009). The proportion of therapists using the MHPG in the present study suggests that the barriers identified by Poitras et al. and Côté et al. did not impact therapists' use of the MHPG. Alternatively, the barriers identified for clinical guidelines do not apply to MHPG maybe because they do not relate to core business or are

legally required, so may receive different attention, or it could be that the MHPG were designed to fit the environment that the therapists worked in. Whilst the barriers for the use of clinical guidelines has previously been studied (Francke et al., 2008; Grimshaw et al., 2004), barriers for the use of MHP guidelines is still rather unknown and should therefore be explored in future studies.

Within the sector cohort, 77.0 % of the respondents who were aware of the MHPG had read sections of them and 68.0 % had used them. Fewer respondents within public hospitals had read (56.7 %) and had used (50.4 %) them. Similarly, fewer respondents from private hospital than other subsectors had read (66.7 %) and used (50.0 %) the MHPG. In contrast, more respondents (94.2 %) working in residential aged care had read sections of the MHPG. The differences between public hospitals and residential aged care could be explained by more respondents working in hospitals being carers. When carers were excluded from the analysis still fewer respondents from the public hospitals had read sections of the MHPG. In contrast, exclusion of carers resulted in no differences between sectors with respect to use of the MHPG. This suggests that fewer from public hospitals read the MHPG despite being aware of it. This finding suggests that public hospitals might not be the subsector that drives the implementation of the MHPG as it was expected to be (Lidegaard et al., 2019b).

The overall findings suggest that a high proportion of the main intended user groups were aware of the MHPG and a lower proportion of carers were aware. More respondents from public hospitals were expected to be aware of the MHPG as this sector was seen as the leader in this area, but the findings of the present study did not support this. The respondents became aware of the MHPG through several dissemination channels included in ACC's dissemination strategy. A very high proportion of the respondents had read and used the MHPG when they were aware of them, particularly respondents from the main intended user groups. However, a lower proportion of respondents from public hospitals had read the MHPG. Based on the above, it is difficult to explain why we have seen an increase in MHP related injury claims since the introduction of the MHPG (Lidegaard et al., 2019a). Therefore, future studies should explore how the MHPG have been used, whether use may have resulted in changes, and the influence of different circumstances.

To the best of the authors' knowledge, this is the first study to report on both awareness and use of a national MHP guideline within the healthcare sector. A strength of the study was how the questionnaire was developed; using the knowledge of the industry advisory group to secure wording of questions suited the target respondents and pilot testing the questionnaire in the industry. This decreased the likelihood of the respondents misinterpreting the questions.

The approach chosen to distribute the questionnaire served as both a strength and a weakness. On one hand, by using healthcare specific third-parties the probability of reaching the intended users of the MHPG was increased, hereby maximising the number of relevant respondents. On the other hand, this approach could potentially be too non-specific, which would increase the risk of approaching a large group of respondents unrelated to MHP, thus most likely lowering the response rate. In order to address this issue, we specifically targeted specific groups of respondents within the third-parties' member group, e.g. only distributing the survey to nurse managers and workplace representatives in the Nurses' union. By doing so, we increased the likelihood of reaching the largest number of respondents relevant to MHP. The distribution strategy introduced a risk of reaching individuals twice due to the possibility of being included on multiple lists. In the invitation and the questionnaire introduction respondents were instructed to only answer the questionnaire once, no matter the number of invitations, hence reducing the response rate for some distribution channels. This approach was chosen as it allowed us to interact with a suite of third-parties that had various entry-points towards MHP, thereby not excluding a large number of potential respondents from a particular third-party due to the relatively small risk of an overlap with another third-party.

The overall response rate in the study was 22.5 %. This is similar to other questionnaire surveys in the healthcare sector (Rose et al., 2012), but – as for all such studies - begs the question about it being representative of the entire New Zealand healthcare sector. The distribution strategy was tailored so that it would capture a large proportion of relevant work roles responsible for implementing the MHPG. However, this approach may overestimate the awareness and use of the MHPG due to participation bias - where an increased proportion of people passionate about MHP chose to answers the

questionnaire. If this were true for our study then the real situation in the healthcare sector may be worse than we have reported. This should not be an issue for MHP coordinators or therapists, who have very high awareness and use. However, an overestimation of awareness and use of the MHPG by managers, who only reported moderate awareness and use, yet have high levels of organisational authority, is of specific concern - especially for ACC and the Ministry of Health, as they are the main stakeholders for the healthcare sector.

Conclusion

Whilst overall awareness and use of the MHPG by intended users was modest, it was very high for most of the work roles that were important for the implementation of the MHPG (MHP coordinators, therapists, and H&S managers). Very few carers were aware of or used the MHPG. Whilst more respondents working in multiple sectors, probably advisors and consultants, were aware of the MHPG, fewer employees in large public hospitals were aware of or used the MHPG, despite public hospitals being identified as the main target subsector. Thus, organisational size seems to influence the awareness of the MHPG. Intended users became aware of the MHPG in different ways: H&S managers via ACC: MHP coordinators via guideline launch: carers via their work. These findings indicate that dissemination of a MHP guideline needs to build on a variety of channels in order to reach all intended users. These findings fail to explain why there was no reduction in MHP-related injury claims and claims costs following the introduction of the MHPG. Further research should aim to identify how the MHPG have been used and barriers and facilitators for implementing their content.

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Tables

Table 1 *Distribution of respondents stratified by subsector, work role, and organisation size. MHP = moving and handling people; H&S = health and safety*

Role	H&S manager	MHP coordinator	H&S representative	Manager	Therapist	Carer	Other	Total	Employees in organisation (%)		
Subsector	**Number of respondents (% of subsector/% of Work role)**								**<49**	**50-99**	**>100**
Public hospital	7 (3.2/21.2)	7 (3.2/14.9)	7 (3.2/25.0)	9 (4.1/15.3)	1 (0.5/4.0)	169 (76.1/62.4)	22 (9.9/24.7)	222 (40.2)	4 (1.8)	7 (3.2)	211 (95.0)
Private hospital	3 (8.8/9.1)	5 (14.7/10.6)	1 (2.9/3.6)	4 (11.8/6.8)	2 (5.9/8.0)	17 (50.0/6.3)	2 (5.9/2.2)	34 (6.2)	4 (11.8)	9 (26.5)	21 (61.8)
Residential aged care	6 (6.3/18.2)	4 (4.2/8.5)	13 (13.5/46.4)	26 (27.1/44.1)	3 (3.1/12.0)	31 (32.3/ 11.4)	13 (13.5/14.6)	96 (17.4)	37 (38.5)	28 (29.2)	31 (32.3)
Home care	3 (15.0/9.1)	3 (15.0/6.4)	0 (0.0/0.0)	4 (20.0/6.8)	1 (5.0/4.0)	7 (35.0/2.6)	2 (10.0/2.2)	20 (3.6)	4 (20.0)	2 (10.0)	14 (70.0)
Training/ Education	1 (2.9/3.0)	2 (5.7/4.3)	1 (2.9/3.6)	2 (5.7/3.4)	5 (14.3/20.0)	2 (5.7/0.7)	22 (62.9/24.7)	35 (6.3)	5 (14.3)	4 (11.4)	26 (74.3)
Multiple subsectors	7 (7.9/21.2)	23 (25.8/48.9)	2 (2.2/7.1)	6 (6.7/10.2)	8 (9.0/32.0)	15 (16.9/5.5)	28 (31.5/31.5)	89 (16.1)	33 (37.1)	13 (14.6)	43 (48.3)
Other	6 (10.7/ 18.2)	3 (5.4/6.4)	4 (7.1/14.3)	8 (14.3/13.6)	5 (8.9/20.0)	30 (53.6/11.1)	0 (0.0/0.0)	56 (10.1)	20 (35.7)	9 (16.1)	27 (48.2)
Total	33 (5.4)	47 (8.9)	28 (4.8)	59 (10.3)	25 (4.0)	271 (48.6)	89 (17.9)	522 (100)	107 (19.4)	72 (13.0)	373 (67.6)
<49	11 (33.3)	13 (27.7)	10 (35.7)	21 (35.6)	9 (36.0)	25 (9.2)	18 (20.2)	107 (19.4)	-	-	-
50-99	2 (6.1)	9 (19.1)	4 (14.3)	14 (23.7)	4 (16.0)	28 (10.3)	11 (12.4)	72 (13.0)	-	-	-
>100	20 (60.6)	25 (53.2)	14 (50.0)	24 (40.7)	12 (48.0)	218 (80.4)	60 (67.4)	373 (67.6)	-	-	-

Table 2 *Frequency of respondents in the sector cohort being aware of the MHPG, having read, and used any section of the MHPG stratified by subsector. OR = Odds ration for 'Yes' vs. 'No/ Unsure' for being aware of the MHPG, having read, and used any section of the MHPG, respectively, compared to Public hospitals; 95%CI = 95% confidence intervals; P=Bonferroni adjusted p-values.*

Subsector	Awareness					Read any section					Used any section				
	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P
Public hospital	97 (43.7)	89 (40.1)	36 (16.2)	1		72 (56.7)	39 (30.7)	16 (12.6)	1		64 (50.4)	45 (35.4)	18 (14.2)	1	
Private hospital	17 (50.0)	10 (29.4)	7 (20.6)	1.29 (0.63, 2.63)	0.492	12 (66.7)	5 (27.8)	1 (5.6)	1.53 (0.54,4.35)	0.425	9 (50.0)	7 (38.9)	2 (11.1)	0.98 (0.37, 2.63)	0.975
Residential aged care	68 (70.8)	14 (14.6)	14 (14.6)	3.13 (1.89, 5.26)	<0.001	65 (94.2)	2 (2.9)	2 (2.9)	12.35 (4.17, 33.33)	<0.001	59 (85.5)	6 (8.7)	4 (5.8)	5.81 (2.70/ 12.50)	<0.001
Home care	13 (65.0)	6 (30.0)	1 (5.0)	2.39 (0.92, 6.25)	0.074	13 (92.9)	1 (7.1)	0 (0.0)	9.90 (1.27, 100.00)	0.029	11 (78.6)	3 (21.4)	0 (0.0)	3.61 (0.96/ 14.29)	0.057
Training/ Education	29 (82.9)	6 (17.1)	0 (0.0)	6.21 (2.50, 16.67)	<0.001	29 (90.6)	2 (6.3)	1 (3.1)	7.41 (2.13, 25.00)	0.002	24 (75.0)	7 (21.9)	1 (3.1)	2.95 (1.23/ 7.14)	0.015
Multiple subsectors	71 (79.8)	12 (13.5)	6 (6.7)	5.08 (2.86, 9.09)	<0.001	64 (90.1)	6 (8.5)	1 (1.4)	6.99 (2.94, 16.67)	<0.001	58 (81.7)	11 (15.5)	2 (2.8)	4.39 (2.17/ 9.09)	<0.001
Total	295 (59.5)	137 (27.6)	64 (12.9)		<0.001	255 (77.0)	55 (16.6)	21 (6.3)		<0.001	225 (68.0)	79 (23.9)	27 (8.2)		<0.001

Table 3 *Sensitivity analysis of the sector cohort without including carers. Frequency of respondents being aware of the MHPG, having read, and used any section of the MHPG stratified on subsector. OR = Odds ration for 'Yes' vs. 'No/ Unsure' for being aware of the MHPG, having read, and used any section of the MHPG, respectively, compared to Public hospitals; 95%CI = 95% confidence intervals; P=Bonferroni adjusted p-values.*

Subsector	Awareness					Read any section					Used any section				
	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P
Public hospital	29 (61.7)	15 (31.9)	3 (6.4)	1		23 (65.7)	9 (25.7)	3 (8.6)	1		19 (54.3)	12 (30.0)	4 (11.8)	1	
Private hospital	12 (75.0)	2 (12.5)	2 (12.5)	1.86 (0.52, 66.67)	0.537	9 (75.0)	3 (25.0)	0 (0.0)	1.56 (0.36, 6.67)	0.553	7 (58.3)	4 (33.3)	1 (8.3)	1.18 (0.31, 4.35)	0.808
Residential aged care	50 (83.3)	4 (6.7)	6 (10.0)	3.11 (1.27, 7.69)	0.013	48 (98.0)	1 (2.0)	0 (0.0)	25.00 (3.03, 100.00)	0.003	44 (89.8)	5 (10.2)	0 (0.0)	7.41 (2.38, 25.00)	0.001
Home care	11 (78.6)	2 (14.3)	1 (7.1)	2.28 (0.56, 9.09)	0.251	11 (84.6)	2 (15.4)	0 (0.0)	2.87 (0.55, 14.29)	0.213	9 (69.2)	4 (30.8)	0 (0.0)	1.89 (0.49, 7.14)	0.354
Training/ Education	28 (84.8)	5 (15.2)	0 (0.0)	3.47 (1.14, 11.11)	0.029	28 (90.3)	2 (6.5)	1 (3.2)	4.88 (1.22, 20.00)	0.025	23 (74.2)	7 (22.6)	1 (3.2)	2.42 (0.85, 6.67)	0.097
Multiple subsectors	62 (87.3)	8 (11.3)	1 (1.4)	4.27 (1.72, 11.11)	0.002	58 (95.1)	2 (3.3)	1 (1.6)	10.10 (2.63, 33.33)	0.001	51 (83.6)	8 (13.1)	2 (3.3)	4.29 (1.67, 11.11)	0.003
Total	192 (79.7)	36 (14.9)	13 (5.4)		0.033	177 (88.1)	19 (9.5)	5 (2.5)		<0.001	153 (76.1)	40 (19.9)	8 (4.0)		0.003

Table 4 *How respondents became aware of the MHPG stratified by subsector and work role, respectively. MHP = moving and handling people; AAC = Accident Compensation Corporation; MHANZ = Moving and Handling Association of New Zealand; MHPG = 'Moving and Handling People: The New Zealand Guidelines' (2012)*

Awareness Channel	Subsector							Work role						
	Public hospital	Private hospital	Residential aged care	Home care	Training/ Education	Multiple subsectors	Total	H&S manager	MHP coordinator	H&S representative	Manager	Therapist	Carer	Total
	Frequency (%)							Frequency (%)						
ACC	3 (4.8)	1 (8.3)	7 (13.5)	0 (0.0)	3 (13.0)	4 (6.8)	18 (8.2)	5 (20.0)	2 (4.9)	0 (0.0)	6 (20.7)	3 (12.5)	1 (1.5)	17 (8.6)
At work	10 (15.9)	2 (16.7)	8 (15.4)	0 (0.0)	4 (17.4)	5 (8.5)	29 (13.3)	2 (8.0)	3 (7.3)	0 (0.0)	2 (6.9)	2 (8.3)	12 (17.9)	21 (10.6)
Training	16 (25.4)	3 (25.0)	7 (13.5)	0 (0.0)	2 (8.7)	5 (8.5)	33 (15.1)	2 (8.0)	3 (7.3)	1 (8.3)	3 (10.3)	4 (16.7)	20 (29.9)	33 (16.7)
Via colleague	5 (7.9)	2 (16.7)	1 (1.9)	0 (0.0)	3 (13.0)	1 (1.7)	12 (5.5)	2 (8.0)	1 (2.4)	1 (8.3)	0 (0.0)	2 (8.3)	3 (4.5)	9 (4.6)
General awareness/ knowledge	0 (0.0)	0 (0.0)	1 (1.9)	2 (20.0)	0 (0.0)	2 (3.4)	5 (2.3)	0 (0.0)	2 (4.9)	1 (8.3)	2 (6.9)	0 (0.0)	2 (3.0)	7 (3.5)
The launch of MHPG	1 (1.6)	1 (8.3)	1 (1.9)	0 (0.0)	0 (0.0)	6 (10.2)	9 (4.1)	2 (8.0)	5 (12.2)	0 (0.0)	2 (6.9)	1 (4.2)	0 (0.0)	10 (5.1)
Involved in MHPG revision/ development	1 (1.6)	0 (0.0)	0 (0.0)	1 (10.0)	2 (8.7)	4 (6.8)	8 (3.7)	2 (8.0)	3 (7.3)	0 (0.0)	1 (3.5)	1 (4.2)	1 (1.5)	8 (4.0)
Search/ research	3 (4.8)	0 (0.0)	4 (7.7)	1 (10.0)	0 (0.0)	4 (6.8)	12 (5.5)	2 (8.0)	3 (7.3)	1 (8.3)	1 (3.5)	1 (4.2)	3 (4.5)	11 (5.6)
Other	6 (9.5)	0 (0.0)	4 (7.7)	1 (10.0)	1 (4.4)	4 (6.8)	16 (7.3)	0 (0.0)	2 (4.9)	0 (0.0)	1 (3.5)	2 (8.3)	6 (9.0)	11 (5.6)
Multiple channels	18 (28.6)	3 (25.0)	19 (36.5)	5 (50.0)	8 (34.8)	24 (40.7)	77 (35.2)	8 (32.0)	17 (41.5)	8 (66.7)	11 (37.9)	8 (33.3)	19 (28.4)	71 (35.9)
Total	63 (100.0)	12 (100.0)	52 (100.0)	10 (100.0)	23 (100.0)	59 (100.0)	219 (100.0)	25 (100.0)	41 (100.0)	12 (100.0)	29 (100.0)	24 (100.0)	67 (100.0)	198 (100.0)

Table 5 *Frequency of respondents in the work role cohort being aware of the MHPG, having read, and used any section of the MHPG stratified on work role. MHP = moving and handling people; OR = Odds ration for 'Yes' vs. 'No/ Unsure' for being aware of the MHPG, having read, and used any section of the MHPG, respectively, compared to H&S manager; 95%CI = 95% confidence intervals; P=Bonferroni adjusted p-values.*

Work role	Awareness					Read any section					Used any section				
	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P
H&S manager	28 (84.8)	3 (9.1)	2 (6.1)	1		28 (93.3)	2 (6.7)	0 (0.0)	1		22 (73.3)	8 (26.7)	0 (0.0)	1	
MHP coordinator	44 (93.6)	2 (4.3)	1 (2.1)	3.53 (0.58, 11.11)	0.211	42 (93.3)	2 (4.4)	1 (2.2)	1.00 (0.16, 6.25)	1.000	41 (91.1)	3 (6.7)	1 (2.2)	3.73 (1.00, 1.37)	0.049
H&S representative	18 (64.3)	6 (21.4)	4 (14.3)	0.32 (0.09, 1.10)	0.070	17 (89.5)	2 (10.5)	0 (0.0)	0.61 (0.08, 4.76)	0.633	13 (68.4)	4 (21.1)	2 (10.5)	0.79 (0.22, 2.78)	0.711
Manager	41 (69.5)	10 (16.9)	8 (13.6)	0.41 (0.14, 1.22)	0.109	36 (85.7)	5 (11.9)	1 (2.4)	0.43 (0.08, 2.27)	0.321	30 (71.4)	10 (23.8)	2 (4.8)	0.91 (0.32, 2.56)	0.859
Therapist	25 (100.0)	0 (0.0)	0 (0.0)	-	0.063	25 (100.0)	0 (0.0)	0 (0.0)	-	0.495	24 (96.0)	1 (4.0)	0 (0.0)	8.70 (1.01, 100.00)	0.049
Carer	107 (39.5)	109 (40.2)	55 (20.3)	0.12 (0.04, 0.30)	<0.001	76 (56.3)	41 (30.4)	18 (13.3)	0.09 (0.02, 0.40)	0.002	76 (56.3)	39 (28.9)	20 (14.8)	0.47 (0.19, 1.12)	0.090
Total	263 (56.8)	130 (28.1)	70 (15.1)		<0.001	224 (75.7)	52 (17.6)	20 (6.8)		<0.001	206 (69.6)	65 (22.0)	25 (8.4)		<0.001

Table 6 *Sensitivity analysis (i.e. excluding carers) of the sector cohort. Frequency of respondents from the sector cohort and the work role cohort being aware of the MHPG stratified by organisation size. OR = odds ratio for 'Yes' vs. 'No/ Unsure' for being aware of the MHPG; P=Bonferroni adjusted p-values*

Organisations size	Subsector					Work role				
	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P	Yes (%)	No (%)	Unsure (%)	OR (95% CI)	P
100 or more employees	99 (73.9)	28 (20.9)	7 (5.2)	1		75 (78.9)	13 (13.7)	7 (7.4)	1	
50-99 employees	33 (86.8)	3 (7.9)	2 (5.3)	2.33 (0.85, 6.25)	0.102	28 (84.8)	3 (9.1)	2 (6.1)	1.49 (0.51, 4.35)	0.463
49 or less employees	60 (87.0)	5 (7.2)	4 (5.8)	2.36 (1.06, 5.26)	0.036	53 (82.2)	5 (7.8)	6 (9.4)	1.29 (0.57, 2.94)	0.547
Total	192 (79.7)	36 (14.9)	13 (5.4)		0.040	156 (81.3)	21 (10.9)	15 (7.8)		0.772

Appendix 4: Differences in familiarity, use, and change after use of the components of a national moving and handling people guideline

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Abstract (278)

Background The introduction of a moving and handling of people guideline (MHPG) in New Zealand in 2012 did not reduce injuries related to moving and handling of people (MHP) in the healthcare sector. This study identified: i) differences in familiarity with the different sections of the MHPG amongst the intended users, ii) if familiar, differences in use of the different sections of the MHPG amongst the intended users, and iii) if used, differences in change after use of the different sections of the MHPG amongst the intended users.

Methods An online questionnaire was distributed to 3,025 people in the healthcare sector of whom 689 (22.8%) responded. Questionnaire responses were compared across work roles identified as intended users of the MHPG (H&S managers, MHP coordinators, H&S representatives, managers, therapists, and carers; n=281). Chi-Square tests were used to assess statistical significance.

Results No differences were seen in familiarity with the different components of the MHPG amongst intended user. Still, there was a pattern as more were familiar with the skills and resources related components (FCC), with the exception of facility design, and less being familiar with the organisational system components (OSC). Within all work roles, more used the FCC, with the exception of facility design. Fewer carers were familiar with and used the OSC. More MHP coordinators (85%) experienced change after use of the techniques component. Amongst the remaining work roles, a low proportion experienced change after use.

Conclusion Among the intended user, familiarity was high with all sections of the MHPG. However, a higher proportion used the FCC rather than the OSC. Still, regardless of the widespread use, a relatively low proportion experienced change after use of a section.

Keywords

- Healthcare sector
- Patient handling
- Evaluation of intervention
- Uptake

Introduction

In order to reduce the occurrence of moving and handling of people (MHP) related injuries, the New Zealand Accident Compensation Corporation (ACC) launched the '*Moving and Handling People: The New Zealand Guidelines'* (MHPG) in 2012 (Accident Compensation Corporation, 2012). Nevertheless, in the four years following the introduction of the MHPG, injury claims rates and associated costs increased throughout the healthcare sector (Lidegaard et al., 2019a). In order to assess this apparent lack of impact of the MHPG, we have previously looked at the overall awareness amongst the intended user (Lidegaard et al., 2019b). However, this showed that awareness and use of the MHPG was high amongst the intended users, e.g. MHP coordinators, occupational therapists and Health and Safety (H&S) manager, hence a lack of awareness or low use does not seem to explain the lack of effect of the MHPG (Lidegaard et al., 2019b).

To establish an effective MHP programme, four systematic reviews have argued that multi-component compared to single-component interventions more effectively reduce MHP related injuries (Bos et al., 2006; Dawson et al., 2007; Hignett, 2003; Tullar et al., 2010). Hence, an effective MHP programme should therefore consist of multiple components that each target specific topics, e.g. risk assessment or training.

The MHPG advocates for the implementation of a MHP programme that consists of multiple components (Lidegaard et al., 2019c). According to the programme theory of the MHPG, i.e. how it was intended to work and be implemented, an effective MHP programme should contain four components related to the organisational systems (OSC) - policy development, workplace culture, monitoring and evaluation, and audit, as well as five core components related to skills and resources - (FCC) - risk assessment, techniques, training, equipment, and facility design (Lidegaard et al., 2019c). The programme theory builds on the assumption that the implementation of the OSC should underpin the implementation of the FCC. Further, the MHPG programme theory states that implementation of a MHP programme should be driven by the H&S managers and MHP coordinators (Lidegaard et al., 2019c).

If this assumption is correct, the intended user of the MHPG, and especially the key roles responsible for the implementation process, would be required to be familiar with and use each of the individual components of the MHPG. However, evaluations have often focused on the familiarity or awareness with an entire guideline rather than the individual components of the guideline (Kotzeva et al., 2014; Rodgers, 2000; Rose et al., 2012; Sinuff et al., 2007). Therefore the present study aimed to i) identify differences in familiarity with the different sections of the MHPG amongst the intended users, ii) if familiar, identify differences in use of the different sections of the MHPG amongst the intended users, and iii) if used, identify differences in change after use of the different sections of the MHPG amongst the intended users.

Methods

The study described in this paper is based on a questionnaire survey that was conducted from April to October 2016 among healthcare professionals in New Zealand. The study was approved by Massey University Human Ethics Committee (SOB 15/78).

Data collection and Participants

The data collection and the participants included have previously been described (Lidegaard et al., 2019b). In short, the questionnaire used an internet-based platform (Qualtrics, Prove, UT, USA). Ten third parties related to the healthcare sector or with an interest in MHP distributed the questionnaire. The third parties and how they distributed the questionnaire have previously been described (Lidegaard et al., 2019b). In total, the questionnaire was distributed to 3,025 potential respondents, of which 689 replied, corresponding to a response rate of 22.6 %. Due to the distribution strategy, respondents may have been reached by more than one third-party. Thus, 3,025 was the maximum number of potential respondents. In this study the work roles cohort was included. Hence the study only includes respondents who had the following work roles: H&S manager; MHP coordinator; H&S representative; manager; therapists; and carer were included. In this study, the work role cohort consisted on 281 respondents.

Questionnaire

The development of the questionnaire and the questionnaire itself have previously been described (Lidegaard et al., 2019b). In brief, the development was guided by the programme theory for the MHPG (Lidegaard et al., 2019c) and an earlier survey of the

New Zealand healthcare sector (Thomas and Thomas, 2010). The questionnaire was trialled by an industry advisory group and a H&S management group at a New Zealand District Health Board, both independent of the development of the questionnaire. The questionnaire consisted of open-ended and closed questions. Further, it applied adaptive questioning, hence the inclusion of specific questions was dependent on answers to preceding questions.

The specific questions analysed in this study asked about familiarity with the different sections in MHPG, use of the different sections in MHPG, and whether change had occurred following the use of the sections in MHPG. The question about familiarity of the MHPG was: *'How familiar you are with each of the different sections of the 'Moving and Handling People: The New Zealand Guidelines (2012)'(Please give an answer for each section)?'* with answer categories: *'Very familiar'; 'Familiar'; 'Somewhat familiar';* and *'Not familiar'*. If the answer was 'Not familiar', the question about use of the different section was skipped. If the answer was 'Very familiar'; 'Familiar'; or 'Somewhat familiar', the next question was: *'Which of the following sections of the 'Moving and Handling People: The New Zealand Guidelines (2012)' have you used (Please give an answer for each section)?'* with answer categories *'Yes'; 'No';* and *'Do not know unsure'*. If the answer was 'no 'or 'do not know/unsure', the question about change after use was skipped. If the answer was 'yes', the next question was: *'Has the use of this/ these section(s) led to any change(s) in your organisation? (Please give an answer for each section)?'* with answer categories *'Yes'; 'No';* and *'Do not know unsure'*.

Statistical analysis

All responses were de-personalised and analysed anonymously. Statistical analyses were performed using SPSS (SPSS version 25.0, IBM, Armonk, NY, USA) and the SAS statistical software for Windows (version 9.3) (Cary, NC, USA).

As described in a previous study (Lidegaard et al., 2019b), people employed in the healthcare sector often have more than one work role in relation to MHP. Hence, the questionnaire allowed for multiple entries when respondents were asked about their work role. However, for statistical reasons, respondents were allocated to one work role only. This allocation was conducted using a hierarchy developed on basis of the MHPG programme theory, which identified the work roles that were most important for the implementation of a MHP programme (Lidegaard et al., 2019c). The hierarchy was as follows: H&S manager; MHP coordinator; H&S representative; manager; therapists; carer. As a result, a respondent who reported work as both therapist and MHP coordinator would be analysed as a MHP coordinator.

To perform the statistical comparisons for the response categories were dichotomised. For the familiarity question the answer categories 'Very familiar'; 'Familiar'; and 'Somewhat familiar' were merged into a single category: 'Familiar' that was statistically compared against 'Not familiar'. For the questions regarding of use and change after use, the answer categories 'No' and 'Do not know/ Unsure' were merged into a single category: 'No' that was statistically compared against 'Use' and 'Change after use'. Pearson Chi-square test was applied to identify statistically significant differences between the dichotomised categories (within-group difference). Chi-square splitting based on Chi-square contribution analysis was used to identify differences between different work roles (between-group difference), respectively.

Results

Tables 1-3 show the familiarity with, use of, and change after use for the different work roles stratified on sections (sections 3-13) of the MHPG.

[Insert table 1]

[Insert table 2]

[Insert table 3]

H&S manager

For H&S manager, there was no relationship for familiarity with (X^2 (10, n= 319) = 11.95, p = 0.288.), use of (X^2 (10, n= 268) = 12.83, p = 0.233), and change after use of (X^2 (10, n= 123) = 5.49, p = 0.856) the sections of the MHPG.

Manager

For managers, there was no relationship between familiarity with the sections of the MHPG (X^2 (10, n= 451) = 11.77, p = 0.301). However, there was a significant relationship for use of the sections (X^2 (10, n= 379) = 39.28, p < 0.001). Facility design constituted the largest contribution to the X^2-score. Removing facility design from the analysis resulted in

a X^2 (9, n= 349) = 25.20, p = 0.003. The sequential additional removal of techniques (X^2 (8, n= 313) = 16.82, p = 0.032), and risk assessment resulted in a X^2 (7, n= 275) = 8.23, p = 0.313. This indicates that fewer managers used the facility design, while more used the techniques and risk assessment sections compared to the remaining sections.

Further, there was no relationship for change after use the sections (X^2 (10, n= 195) = 3.94, p = 0.950.)

MHP coordinator

For MHP coordinators, there was no relationship between familiarity with the sections of the MHPG (X^2 (10, n= 495) = 16.20, p = 0.094). However, there was a significant relationship for use of the sections (X^2 (10, n= 430) = 67.82, p < 0.001). Facility design constituted the largest contribution to the X^2-score. Removing facility design from the analysis resulted in a X^2 (9, n= 393) = 52.67, p < 0.001. The sequential additional removal of risk assessment (X^2 (8, n= 351) = 39.32, p < 0.001), training (X^2 (7, n= 351) = 25.57, p = 0.001), techniques (X^2 (6, n= 267) = 12.90, p = 0.045), and equipment resulted in a X^2 (5, n= 226) = 3.76, p = 0.59. This indicates that fewer MHP coordinators used the facility design, while more used the risk assessment, training, techniques, and equipment sections compared to the remaining sections.

Further, there was a significant relationship for change after use of the sections (X^2 (10, n= 303) = 18.97, p = 0.041). Techniques constituted the largest contribution to the X^2-score. Removing techniques from the analysis resulted in a X^2 (9, n= 264) = 12.04, p = 0.211, indicating that more MHP coordinators experienced change after the use of the techniques section compared to the remaining sections.

Therapist

For therapist there was a significant relationship for familiarity with the sections (X^2 (10, n= 275) = 44.28, p < 0.001). Facility design constituted the largest contribution to the X^2-score. Removing facility design from the analysis resulted in a X^2 (9, n= 250) = 34.68, p < 0.001. The sequential additional removal of audit (X^2 (8, n= 225) = 17.02, p = 0.030), and policy development resulted in a X^2 (7, n= 200) = 10.45, p = 0.165. This indicates that fewer therapists were familiar with the facility design, audit, and policy development sections compared to the remaining sections.

Also, there was a significant relationship for use of the sections (X^2 (10, n= 236) = 76.72, p < 0.001). Techniques constituted the largest contribution to the X^2-score. Removing techniques from the analysis resulted in a X^2 (9, n= 211) = 57.59, p < 0.001. The sequential additional removal of risk assessment (X^2 (8, n= 186) = 43.11, p < 0.001), equipment (X^2 (7, n= 168) = 24.11, p = 0.001), and training resulted in a X^2 (6, n= 139) = 9.09, p = 0.169. This indicates that more therapists used the techniques, risk assessment, equipment, and training sections more compared to the remaining sections.

There was no relationship for change after use of the sections (X^2 (10, n= 147) = 10.88, p = 0.367).

H&S representative

For H&S representatives, there was no relationship for familiarity with the sections (X^2 (10, n= 187) = 2.03, p = 0.094). However, there was a significant relationship for use of the sections (X^2 (10, n= 172) = 33.20, p < 0.001). Facility design constituted the largest contribution to the X^2-score. Removing facility design from the analysis resulted in a X^2 (9, n= 157) = 22.05, p = 0.009. The additional removal of techniques resulted in a X^2 (8, n= 141) = 12.95, p = 0.114. This indicates that fewer H&S representatives used the facility design, while more used the techniques section compared to the remaining sections.

Further, there was no relationship for change after use of the sections (X^2 (10, n= 86) = 4.84, p = 0.901).

Carer

For carers, there was a significant relationship for familiarity with the sections (X^2 (10, n= 1364) = 85.28, p < 0.001). Policy development constituted the largest contribution to the X^2-score. Removing policy development from the analysis resulted in a X^2 (9, n= 1240) = 68.16, p < 0.001. The sequential additional removal of facility design (X^2 (8, n= 1116) = 51.45, p < 0.001), audit (X^2 (7, n= 992) = 34.58, p < 0.001), monitoring and evaluation (X^2 (6, n= 868) = 24.05, p = 0.001), and organising training resulted in a X^2 (5, n= 744) = 7.85, p = 0.165. This indicates that fewer carers were familiar with the policy development, facility design, audit, monitoring and evaluation, and organising training sections compared to the remaining sections.

Further, there was a significant relationship for use of the sections (X^2 (10, n= 991) = 126.48, p < 0.001). Techniques constituted the largest contribution to the X^2-score. Removing techniques from the analysis resulted in a X^2 (9, n= 883) = 95.78, p < 0.001. The sequential additional removal of equipment (X^2 (8, n= 776) = 58.96, p < 0.001), risk assessment (X^2 (7, n= 672) = 34.03, p < 0.001), training (X^2 (6, n= 584) = 13.57, p = 0.035), and facility design resulted in a X^2 (5, n= 503) = 3.22, p = 0.666. This indicates that more carers used the techniques, equipment, risk assessment, and training sections, while fewer used the facility design compared to the remaining sections.

In contrast, there was no relationship for change after use of the sections (X^2 (10, n= 475) = 1.54, p = 0.999).

Discussion

The findings from the present study showed that there were limited differences in familiarity between the different sections of the MHPG amongst the key actors. In contrast, more key actors used the FCC, especially the techniques section, with the exception of the section on facility design, which fewer used, compared to the OSC. However, despite the extensive use of the FCC, there were hardly any differences in change after use of the sections.

Looking at the familiarity with the different sections of the MHPG revealed that there in general where no difference in the mean proportion of respondents being familiar with the different sections of the MHPG between the key actors (83.1-91.8%), despite carers having a tendency to a lower proportion being familiar (72.6%). This is to some extent to be expected as we previously have reported that less carers were aware of the MHPG in general (Lidegaard et al., 2019b), hence fewer carers would likely be familiar with the detailed content of the MHGP. Looking in detail disclosed that both fewer therapists and carers were familiar with the facility design section and parts of the OSC, in particular policy development and audit. This is in disagreement with the programme theory that expects an equal familiarity with the different sections in the MHPG (Lidegaard et al., 2019c). However, it can be argued whether carers can be expected to be just as familiar as the other key actors due to the differences in responsibilities in related to the implementation of a MHP programme.

Several previous studies have reported that familiarity with components of medical guidelines affect adherence (Marcy et al., 2005; Perez et al., 2012; Wisnivesky et al., 2008). Wisnievsky et al (2008) reported that familiarity with components of an asthma guideline, in combination with training, predicted adherence among primary care providers. Perez et al (2012) found that low familiarity with components of a medical guideline among clinicians in general medical practices led to low adherence. Finally, Marcy et al (2005) showed that lack of familiarity with specific components of a tobacco use treatment guideline among physicians resulted in low adherence (Marcy et al., 2005). Further, Cabana and colleagues have multiple times stated that a barrier for physicians adhering to guidelines relates to their knowledge of the guideline and the familiarity with its elements (Cabana et al., 1999, 2002). If these finding are transferable to a MHP guideline, then this would predict a lower use of the facility design, policy development, and audit sections.

The level of use of the different components of the MHGP varied between the different key actors. The average use was highest amongst H&S representatives (72.1%) and MHP coordinators (70.2%), while it was lowest amongst H&S managers (46.0%) and carers (53.6%). Some of these findings can be explained through the programme theory of the MHPG (Lidegaard et al., 2019c). Carers are not likely to involved in the implementation of a MHP programme, hence their low level of use is expected. On the other hand, MHP coordinators and H&S managers are expected to be the prime drives when implementing a MHP programme (Lidegaard et al., 2019c). Thus, the high use seen among MHP coordinators is in accordance with the programme theory, whereas the low use for H&S managers seems to discord. This finding could perhaps indicate that the H&S managers are delegating the work associated with implementing a MHP programme to other work roles, in this case the MPH coordinator in collaboration with the H&S representatives.

When looking at the specific components used, there is clear pattern that more of the key actors used the technique, and to some extent, the risk assessment sections. In contrast, the facility design component was used by fewer of the key actors. This is reinforced by a tendency across all key actors of a higher proportion of use of the FCC compared to the OSC. This contradicts with the programme theory, which highlights the importance of implementing the OSC as foundation before

implementing the FCC (Lidegaard et al., 2019c). Further, as fewer key actors using the facility design section this implies that this particular section probably is harder to use than the reaming FCC. This could be related to difficulties in influencing the process associated with changing facilities in the healthcare sectors.

Previous studies of clinical guidelines have shown various levels of use of guideline components among intended users (Jiang et al., 2001; Rushton et al., 2004). Rushton et al (2004) reported on use of components of an ADHD guideline among physicians and found that 25.8 % used the components regularly (Rushton et al., 2004). This is substantially lower the findings from the present study, however, a direct comparison is difficult as the physicians reported on regular use, whereas the present study assessed if the section was ever used. Jiang et al (2001) showed that less than 50% of CEOs in hospitals had implemented programmes containing all components of a pain management practice guideline. If the lack of implementation is considered to be equivalent to lack of use, the proportion of managers using components of the MHPG (64.9%) is relatively higher in the present study. This can probably be explained by that manager are more likely to be involved in the process of implementing a MHP programme compared to CEOs.

The overall level of change after use of a section in the MHPG was fairly similar across the key actor (62.7-72.4), with the exception of a lower proportion of therapists (50.7) experiencing any change after use. As the only key actor, more MHP coordinators experienced change after the use of a single section, the techniques section. To some extent, this seems logical as more MHP coordinator used the techniques section compared to the remaining sections of the MHPG, with the exception of the sections on training and equipment.

Solely looking at the proportion of respondents reporting change after use would indicate that relatively high proportion of key actors in the healthcare sector experience change after use of the sections in the MHGP. However, due to design of the questionnaire, which filtered out respondent not familiar or using sections of the MHPG, there was a low proportion of the respondents in the survey, who actually answered the question related to change after use. Therefore it is reasonable to consider whether the proportion of respondents experiencing change is representative to the entire healthcare sector.

No previous studies have reported on the changes following the use of specific components of a MHP or clinical guideline, however, studies have shown changes after use clinical guidelines in general (Dean et al., 2006; Halm et al., 1999). Halm et al (1999) reported that 71% of physicians in a hospital setting changed practice follow the use of a Pneumonia guideline (Not specific to the individual components) (Halm et al., 1999). Further, Dean et al (2006) found improved clinical outcomes in a hospital following the use of a pneumonia guideline.

A potential limitation of the study relates to whether the findings were representable when the overall response rate of the survey was 22.5%. However, the response rate of the present study is comparable to a previous study in the healthcare sector (Rose et al., 2012). Further, as previously described (Lidegaard et al., 2019b), the distribution strategy aimed at reaching a large proportion of relevant work roles responsible for implementing the MHPG. Thus, potentially reaching a substantial group of people not involved in MHP.

In addition, the small number of people reporting on change after use is another limitation. Due to the use of adaptive questioning, the number of respondents gradually decreases as the questions become more specific. This introduces a risk of a low reliability with respect to the answers to this specific question.

As previously mentioned (Lidegaard et al., 2019b), the involvement of an industry advisory group in the development of the questionnaire was a strength. Another strength of the study relates to the use of third-parties as distributers of the questionnaire. This allowed for a target distribution of the questionnaire, thus ensuring that the questionnaire reached a large number of respondents relevant to MHP.

Conclusion

Familiarity with the sections of the MHPG was high for the key actors expected to drive the implementation of a MHP programme and no differences seem to exist in the familiarity between the sections. Amongst the respondents being familiar with the individual sections, a higher proportion used the FCC compared to the OSC, in particular more key actors used the techniques and risk assessment sections, while fewer used the facility design section. A relatively high proportion of change after use were

seen for key actors using the specific sections, however, compared to the overall number of key actors familiar with the sections, rather few experienced change after use of a section.

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Tables

Table 1 *Familiarity with, use of, and change after use for H&S managers and managers stratified on sections (sections 3-13) of the MHPG.*

	Subsector	Familiarity				Use				Change after use			
		Familiar (%)	Not familiar (%)	Total	X^2 ('Familiar vs 'Not familiar')	Use (%)	No use (%)	Total	X^2 ('Use vs 'No use')	Change (%)	No change (%)	Total	X^2 ('Change vs 'No change)
H&S manager	Risk assessment	26 (89.7)	3 (10.3)	29	0.69 (0.11/ 0.58)	12 (46.2)	14 (53.8)	26	0.00 (0.00/ 0.00)	9 (75.0)	3 (25.0)	12	0.51 (0.22/ 0.39)
	Techniques	28 (96.6)	1 (3.4)	29	3.39 (0.54/ 2.85)	18 (64.3)	10 (35.7)	28	3.50 (1.87/ 1.63)	12 (70.6)	5 (29.4)	17	0.30 (0.11/ 0.19)
	Training	26 (89.7)	3 (10.3)	29	0.69 (0.11/ 0.58)	14 (53.8)	12 (46.2)	26	0.54 (0.29/ 0.25)	10 (76.9)	3 (23.1)	13	0.92 (0.33/ 0.59)
	Organising training	24 (82.8)	5 (17.2)	29	0.04 (0.01/ 0.03)	7 (29.2)	17 (70.8)	24	2.94 (1.57/ 1.37)	5 (71.4)	2 (28.6)	7	0.16 (0.06/ 0.10)
	Equipment	27 (83.1)	2 (6.9)	29	1.79 (0.29/ 1.50)	16 (59.3)	11 (40.7)	27	1.73 (0.92/ 0.81)	11 (68.8)	5 (31.2)	16	0.14 (0.05/ 0.09)
	Equipment management	24 (82.8)	5 (17.2)	29	0.04 (0.01/ 0.03)	12 (50.0)	12 (50.0)	24	0.11 (0.06/ 0.05)	7 (58.3)	5 (41.7)	12	0.18 (0.06/ 0.12)
	Facility design	21 (72.4)	8 (27.6)	29	2.90 (0.46/ 2.44)	9 (42.9)	12 (57.1)	21	0.12 (0.06/ 0.06)	5 (55.6)	4 (44.4)	9	0.30 (0.11/ 0.19)
	Policy development	22 (75.9)	7 (24.1)	29	1.44 (0.23/ 1.21)	8 (36.4)	14 (63.6)	22	0.94 (0.50/ 0.44)	3 (37.5)	5 (62.5)	8	2.49 (0.89/ 1.60)
	Workplace culture	24 (82.8)	5 (17.2)	29	0.04 (0.01/ 0.03)	10 (41.7)	14 (58.3)	24	0.24 (0.13/ 0.11)	6 (60.0)	4 (40.0)	10	0.08 (0.03/ 0.05)
	Monitoring & evaluation	23 (79.3)	6 (20.7)	29	0.48 (0.08/ 0.40)	12 (52.2)	11 (44.8)	23	0.28 (0.15/ 0.13)	7 (58.3)	5 (41.7)	12	0.18 (0.06/ 0.12)
	Audits	23 (79.3)	6 (20.7)	29	0.48 (0.08/ 0.40)	7 (30.4)	16 (69.6)	23	2.43 (1.30/ 1.13)	4 (57.1)	3 (32.9)	7	0.15 (0.05/ 0.10)
	Mean %	83.1	16.9			46.0	54.0			62.7	37.3		
	Total				11.95				12.83				5.49
Manager	Risk assessment	38 (92.7)	3 (7.3)	41	2.28 (0.36/ 1.92)	33 (86.8)	5 (13.2)	38	7.54 (2.89/ 4.95)	16 (59.3)	11 (40.7)	27	0.49 (0.17/ 0.32)
	Techniques	36 (87.8)	5 (12.2)	41	0.43 (0.07/ 0.36)	32 (88.9)	4 (11.1)	36	8.59 (2.95/ 5.64)	17 (68.0)	8 (32.0)	25	0.06 (0.02/ 0.04)
	Training	36 (87.8)	5 (12.2)	41	0.43 (0.07/ 0.36)	26 (72.2)	10 (27.8)	36	0.68 (0.23/ 0.45)	14 (70.0)	6 (30.0)	20	0.17 (0.06/ 0.11)
	Organising training	34 (82.9)	7 (17.1)	41	0.04 (0.01/ 0.03)	21 (61.8)	13 (38.2)	34	0.23 (0.08/ 0.15)	11 (73.3)	4 (26.7)	15	0.40 (0.14/ 0.26)
	Equipment	37 (90.2)	4 (9.8)	41	1.18 (0.19/ 0.99)	27 (73.0)	10 (27.0)	37	0.87 (0.30/ 0.57)	16 (69.6)	7 (30.4)	23	0.15 (0.05/ 0.10)
	Equipment management	34 (82.9)	7 (17.1)	41	0.04 (0.01/ 0.03)	19 (55.9)	15 (44.1)	34	1.46 (0.50/ 0.96)	11 (68.8)	5 (31.3)	16	0.07 (0.02/ 0.05)
	Facility design	30 (73.2)	11 (26.8)	41	3.61 (0.58/ 3.03)	10 (33.3)	20 (66.7)	30	13.94 (4.78/ 9.16)	3 (42.9)	4 (57.1)	7	1.61 (0.55/ 1.06)
	Policy development	32 (78.0)	9 (22.0)	41	1.09 (0.17/ 0.92)	15 (46.9)	17 (53.1	32	5.04 (1.73/ 3.31)	8 (72.7)	3 (27.3)	11	0.24 (0.08/ 0.16)
	Workplace culture	36 (87.8)	5 (12.2)	41	0.43 (0.07/ 0.36)	23 (63.9)	13 (36.2)	36	0.05 (0.02/ 0.03)	12 (63.2)	7 (36.9)	19	0.05 (0.02/ 0.03)
	Monitoring & evaluation	35 (85.4)	6 (14.6)	41	0.06 (0.01/ 0.05)	21 (60.0)	14 (40.0)	35	0.50 (0.17/ 0.33)	9 (56.3)	7 (44.7)	16	0.63 (0.22/ 0.41)
	Audits	31 (74.6)	10 (24.4)	41	2.17 (0.34/ 1.82)	22 (71.0)	9 (29.0)	31	0.38 (0.13/ 0.25)	11 (68.8)	5 (31.2)	16	0.07 (0.02/ 0.05)
	Mean %	83.9	16.1			64.9	35.1			64.8	35.2		
	Total				11.77				39.28				3.94

Table 2 *Familiarity with, use of, and change after use for MHP coordinators and therapists stratified on sections (sections 3-13) of the MHPG.*

	Subsector	Familiarity				Use				Change after use			
		Familiar (%)	Not familiar (%)	Total	X^2 ('Familiar vs 'Not familiar')	Use (%)	No use (%)	Total	X^2 ('Use vs 'No use')	Change (%)	No change (%)	Total	X^2 ('Change vs 'No change)
MHP coordinator	Risk assessment	43 (95.6)	2 (4.4)	45	2.03 (0.23/ 1.80)	40 (95.2)	2 (4.8)	42	11.86 (3.42/ 8.44)	24 (61.5)	15 (38.5)	39	0.46 (0.15/ 0.31)
	Techniques	45 (100.0)	0 (0.0)	45	5.63 (0.63/ 5.00)	40 (90.9)	4 (9.1)	44	8.36 (2.41/ 5.95)	33 (84.6)	6 (15.4)	39	4.65 (1.88/ 3.77)
	Training	41 (91.1)	4 (8.9)	45	0.23 (0.03/ 0.20)	38 (95.0)	2 (5.0)	40	11.07 (3.19/ 7.88)	30 (81.1)	7 (17.9)	37	3.46 (1.15/ 2.31)
	Organising training	41 (91.1)	4 (8.9)	45	0.23 (0.03/ 0.20)	28 (70.0)	12 (30.0)	40	0.03 (0.01/ 0.02)	21 (75.0)	7 (25.0)	28	0.87 (0.29/ 0.58)
	Equipment	42 (83.3)	3 (6.7)	45	0.90 (0.10/ 0.80)	35 (85.4)	6 (14.6)	41	4.03 (1.16/ 2.87)	24 (68.6)	11 (31.4)	35	0.06 (0.02/ 0.04)
	Equipment management	40 (88.9)	5 (11.1)	45	0.00 (0.00/ 0.00)	22 (56.4)	17 (43.6)	39	4.13 (1.19/ 2.94)	10 (45.5)	12 (56.5)	22	4.45 (1.48/ 2.97)
	Facility design	37 (82.2)	8 (17.8)	45	2.03 (0.23/ 1.80)	15 (40.5)	22 (59.5)	37	16.91 (4.88/ 12.03)	8 (53.3)	7 (46.6)	15	1.20 (0.40/ 0.80)
	Policy development	37 (82.2)	8 (17.8)	45	2.03 (0.23/ 1.80)	21 (58.3)	15 (41.7)	36	2.88 (0.83/ 2.05)	13 (61.9)	8 (38.1)	21	0.21 (0.07/ 0.14)
	Workplace culture	38 (84.4)	7 (15.6)	45	0.90 (0.10/ 0.80)	22 (59.5)	15 (40.5)	37	2.47 (0.71/ 1.76)	13 (59.1)	9 (40.9)	22	0.57 (0.19/ 0.38)
	Monitoring & evaluation	39 (86.7)	6 (13.3)	45	0.23 (0.03/ 0.20)	26 (68.4)	12 (31.6)	38	0.14 (0.04/ 0.10)	14 (53.8)	12 (46.2)	26	1.92 (0.64/ 1.28)
	Audits	37 (82.2)	8 (17.8)	45	2.03 (0.23/ 1.80)	19 (52.8)	17 (47.2)	36	5.93 (1.71/ 4.22)	12 (63.2)	7 (36.8)	19	0.11 (0.04/ 0.07)
	Mean %	88.0	12.0			70.2	29.8			64.3	35.7		
	Total				16.20				67.82				18.97
Therapist	Risk assessment	25 (100.0)	0 (0.0)	25	4.13 (0.59/ 3.55)	23 (92.0)	2 (8.0)	25	9.39 (3.54/ 5.85)	12 (52.2)	11 (47.8)	23	0.05 (0.02/ 0.03)
	Techniques	25 (100.0)	0 (0.0)	25	4.13 (0.59/ 3.55)	25 (100.0)	0 (0.0)	25	15.14 (5.71/ 9.43)	15 (60.0)	10 (40.0)	25	0.31 (0.14/ 0.17)
	Training	23 (92.0)	2 (8.0)	25	0.78 (0.11/ 0.67)	20 (87.0)	3 (13.0)	23	5.96 (2.25/ 3.71)	13 (65.0)	7 (35.0)	20	0.90 (0.41/ 0.49)
	Organising training	23 (92.0)	2 (8.0)	25	0.78 (0.11/ 0.67)	15 (65.2)	8 (34.8)	23	0.08 (0.03/ 0.05)	10 (66.7)	5 (33.3)	15	0.90 (0.41/ 0.49)
	Equipment	25 (100.0)	0 (0.0)	25	4.13 (0.59/ 3.55)	23 (92.0)	2 (8.0)	25	9.39 (3.54/ 5.85)	10 (43.5)	13 (56.5)	23	1.11 (0.51/ 0.60)
	Equipment management	22 (88.0)	3 (12.0)	25	0.09 (0.01/ 0.08)	8 (36.4)	14 (63.6)	22	6.29 (2.37/ 3.92)	6 (75.0)	2 (25.0)	8	1.36 (.062/ 0.74)
	Facility design	15 (60.0)	10 (40.0)	25	13.69 (1.94/ 11.75)	4 (26.7)	11 (73.3)	15	8.11 (3.06/ 5.05)	0 (0.0)	4 (100.0)	4	4.88 (2.18/ 2.60)
	Policy development	19 (76.0)	6 (24.0)	25	1.98 (0.28/ 1.70)	8 (42.1)	11 (57.9)	19	3.29 (1.24/ 2.05)	5 (62.5)	3 (37.5)	8	0.21 (0.10/ 0.11)
	Workplace culture	23 (92.0)	2 (8.0)	25	0.78 (0.11/ 0.67)	10 (43.5)	13 (56.5)	23	3.47 (1.31/ 2.16)	4 (40.0)	6 (60.0)	10	0.84 (0.38/ 0.46)
	Monitoring & evaluation	21 (84.0)	4 (16.0)	25	0.07 (0.01/ 0.06)	7 (33.3)	14 (66.7)	21	7.50 (2.83/ 4.67)	3 (42.9)	4 (57.1)	7	0.38 (0.17/ 0.21)
	Audits	15 (60.0)	10 (40.0)	25	13.69 (1.94/ 11.75)	4 (26.7)	11 (73.3)	15	8.11 (3.06/ 5.05)	2 (50.0)	2 (50.0)	4	0.03 (0.01/ 0.02)
	Mean %	85.8	14.2			58.6	41.4			50.7	49.3		
	Total				44.28				76.72				10.88

Table 3 *Familiarity with, use of, and change after use for H&S representatives and carers stratified on sections (sections 3-13) of the MHPG.*

	Subsector	Familiarity				Use				Change after use			
		Familiar (%)	Not familiar (%)	Total	X^2 ('Familiar vs 'Not familiar')	Use (%)	No use (%)	Total	X^2 ('Use vs 'No use')	Change (%)	No change (%)	Total	X^2 ('Change vs 'No change)
H&S representative	Risk assessment	16 (93.1)	1 (5.9)	17	0.11 (0.01/ 0.10)	13 (81.3)	3 (18.8)	16	4.38 (1.96/ 2.42)	8 (66.7)	4 (33.3)	12	0.02 (0.01/ 0.01)
	Techniques	16 (93.1)	1 (5.9)	17	0.11 (0.01/ 0.10)	15 (93.8)	1 (6.3)	16	9.60 (4.30/ 5.30)	12 (85.7)	2 (14.3)	14	1.90 (0.60/ 1.30)
	Training	15 (88.2)	2 (11.8)	17	0.33 (0.03/ 0.30)	11 (73.3)	4 (26.7)	15	1.99 (0.89/ 1.10)	7 (70.0)	3 (30.0)	10	0.01 (0.00/ 0.01)
	Organising training	15 (88.2	2 (11.8)	17	0.33 (0.03/ 0.30)	7 (46.7)	8 (53.3)	15	0.45 (0.20/ 0.25)	3 (50.0)	3 (50.0)	6	0.96 (0.30/ 0.66)
	Equipment	16 (94.1)	1 (5.9)	17	0.11 (0.01/ 0.10)	11 (68.8)	5 (31.2)	16	1.18 (0.53/ 0.65)	6 (60.0)	4. (40.0)	10	0.35 (0.11/ 0.24)
	Equipment management	16 (94.1)	1 (5.9)	17	0.11 (0.01/ 0.10)	6 (37.5)	10 (62.5)	16	2.03 (0.91/ 1.12)	3 (60.0)	2 (40.0)	5	0.17 (0.05/ 0.12)
	Facility design	15 (88.2)	2 (11.8)	17	0.33 (0.03/ 0.30)	2 (13.3)	13 (86.7)	15	10.65 (4.77/ 5.88)	1 (50.0)	1 (50.0)	2	0.32 (0.10/ 0.22)
	Policy development	15 (88.2)	2 (11.8)	17	0.33 (0.03/ 0.30)	8 (53.3)	7 (46.7)	15	0.02 (0.01/0.01)	6 (85.7)	1 (14.3)	7	0.95 (0.30/ 0.65)
	Workplace culture	16 (94.1)	1 (5.9)	17	0.11 (0.01/ 0.10)	9 (56.3)	7 (43.8)	16	0.00 (0.00/ 0.00)	5 (62.5)	3 (37.5)	8	0.14 (0.04/ 0.10)
	Monitoring & evaluation	16 (94.1)	1 (5.9)	17	0.11 (0.01/ 0.10)	7 (43.8)	9 (56.2)	16	0.85 (0.38/ 0.47)	4 (66.7)	2 (33.3)	6	0.01 (0.00/ 0.01)
	Audits	16 (94.1)	1 (5.9)	17	0.11 (0.01/ 0.10)	6 (37.5)	10 (62.5)	16	2.03 (0.91/ 1.12)	4 (66.7)	2 (33.3)	6	0.01 (0.00/ 0.01)
	Mean %	91.8	8.2			55.1	44.9			65.8	34.2		
	Total				0.996				33.20				4.84
Carer	Risk assessment	104 (83.9)	20 (16.1)	124	7.86 (2.15/ 5.71)	75 (72.1)	29 (27.9)	104	10.96 (4.82/ 6.14)	46 (71.9)	18 (28.1)	64	0.00 (0.00/ 0.00)
	Techniques	108 (87.1)	16 (12.9)	124	13.02 (3.56/ 9.46)	87 (80.6)	21 (19.4)	108	26.42 (11.62/ 14.80)	57 (75.0)	19 (25.0)	76	0.34 (0.10/ 0.24)
	Training	97 (78.2)	27 (21.8)	124	1.94 (0.53/ 1.41)	66 (68.0)	31 (32.0)	97	5.70 (2.51/ 3.19)	40 (71.4)	16 (28.6)	56	0.01 (0.00/ 0.01)
	Organising training	82 (66.1)	42 (33.9)	124	2.66 (0.73/ 1.93)	34 (41.5)	48 (58.5)	82	7.04 (3.10/ 3.94)	21 (72.4)	8 (27.6)	29	0.00 (0.00/ 0.00)
	Equipment	107 (86.3)	17 (13.7)	124	11.60 (3.17/ 8.43)	86 (80.4)	21 (19.6)	107	25.79 (11.35/ 14.44)	53 (70.7)	22 (29.3)	75	0.07 (0.02/ 0.05)
	Equipment management	100 (80.6)	24 (19.4)	124	3.99 (1.09/ 2.90)	48 (48.0)	52 (52.0)	100	2.60 (1.14/ 1.46)	29 (70.7)	12 (29.3)	41	0.03 (0.01/ 0.02)
	Facility design	72 (58.1)	52 (41.9)	124	13.28 (3.63/ 9.65)	19 (26.4)	53 (73.6)	72	25.63 (11.28/ 14.35)	12 (80.0)	3 (20.0)	15	0.47 (0.13/ 0.34)
	Policy development	69 (55.6)	55 (44.4)	124	18.06 (4.94/ 13.12)	25 (36.2)	44 (63.8)	69	10.95 (4.82/ 6.13)	16 (76.2)	5 (23.8)	21	0.18 (0.05/ 0.13)
	Workplace culture	95 (76.6)	29 (23.4)	124	0.98 (0.27/ 0.71)	45 (47.4)	50 (52.6)	95	2.88 (1.27/ 1.61)	27 (69.2)	12 (30.8)	39	0.15 (0.04/ 0.11)
	Monitoring & evaluation	82 (66.1)	42 (33.9)	124	2.66 (0.73/ 1.93)	38 (46.3)	44 (53.7)	82	3.11 (1.37/ 1.74)	21 (67.7)	10 (32.3)	31	0.28 (0.08/ 0.20)
	Audits	75 (60.5)	49 (39.5)	124	9.25 (2.53/ 6.72)	32 (42.7)	43 (57.3)	75	5.41 (2.38/ 3.03)	20 (71.4)	8 (28.6)	28	0.00 (0.00/ 0.00)
	Mean %	72.6	27.4			53.6	46.4			72.4	27.6		
	Total				85.28				126.48				1.54

Appendix 5: How are moving and handling people programmes implemented – learnings from three case studies

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Abstract (285)

Introduction Musculoskeletal injuries following moving and handling of people (MHP) is a problem in the healthcare sector. To reduce the effects of MHP, the development and introduction of multifaceted MHP programmes has been proposed as a solution. One example is the New Zealand Accident Compensation Corporation - the '*Moving and Handling People: The New Zealand Guidelines*' (MHPG). However, it is unknown how the MHPG is being implemented within healthcare organisations. The present study aimed to identify i) for whom the MHPG worked (or to what extent), ii) under which circumstances, and iii) why.

Methods The study used a case study design and a mix-methods approach with interviews, document review, and chronicle workshops among three hospitals (One private and two public) in New Zealand. Within each case organisation, four to five semi-structured interviews were conducted with key stakeholders in relation to MHP. Further, a workshop was conducted with up to eight people either directly involved with MHP, or with planning and implementation of MHP initiatives.

Findings The study showed that the healthcare sector had patient safety the main priority. As a result, the implementation of the MHPG was initiated by staff injuries following MHP. The MHP programme was implemented in a continuous process that resulted in numerous organisational changes. The implementation of a MHP programme needed the involved of key actor to drive the process. In order to do so, the key actor had to gain management support and establish supportive coalitions across the organisation. Implementation of a MHP programme was affected by internal (lack of management support, resistance toward change among staff, low availability of equipment, and inadequate facilities for safe MHP) and external contextual factors (Lack of government involvement, H&S legislation, and budget constraints).

Keywords

- Chronicle workshop
- Healthcare
- Patient handling
- Evaluation
- Intervention

Introduction

In 2012, a national moving and handling people (MHP) guideline was published in New Zealand by the Accident Compensation Corporation (ACC) - the '*Moving and Handling People: The New Zealand Guidelines*' (MHPG) (Accident Compensation Corporation, 2012). The purpose of the MHPG was to help reduce MHP related injuries, injury claims and costs. However, in 2016 – four years after the introduction of the MHPG - MHP related claims rates and claims costs had increased (Lidegaard et al., 2019a). Lack of awareness or use of the MHPG by intended users does not seem to be a plausible explanation for these increases because we have recently shown that awareness and use was high for the work roles that were expected to lead MHPG implementation i.e. MHP coordinators, occupational therapists and Health and Safety (H&S) managers (Lidegaard et al., 2019b). It is difficult to get a complete picture of why the MHPG was unsuccessful in reducing the injury claims rate by solely looking at injury claims data because many factors can affect injury claims data, e.g. low acceptance rate, certain work roles fail to claim (Cox and Lippel, 2008). The present paper therefore examined MHPG implementation barriers and facilitators in three case organisations in order to help us better understand how MHP programmes are implemented.

Implementation of an evidence based national healthcare guideline can be described as providing a new resource into the context of an organisation with the intention of changing the behaviour of individuals in the organisation. The guideline thereby intends to encourage the individuals and organisations to apply the recommendations of the guideline (Closs and Cheater, 1997; Masso and McCarthy, 2009). The implementation process of a guideline is the phase where strategies are developed within the organisation in order to operationalise the recommendations of the guideline (Thorsen and Mäkelä, 1999). The implementation of most guidelines is a complex process that needs to consider the contextual factors of the industry in which the guideline is introduced (Boaz et al., 2011). Further, to increase the implementation of a guideline, the mechanisms related to the implementation process need to be identified on a theoretical basis (Thompson et al., 2007). However, it is essential to recognise that no universal all-purpose solutions exist and that implementation of any guideline should be tailored to fit both the specific guideline and the context where the guideline is intended to be introduced (Masso et al., 2014; Richens et al., 2004).

A range of theories attempt to explain the dynamics of how evidence based guidelines are implemented through describing the factors responsible for creating the change in behaviour of individuals and hence changing the organisational behaviour (Eccles et al., 2005). However, few of these theories have ever been proven to work in a practical healthcare setting (Gagliardi et al., 2011; Rycroft-Malone, 2007). As a result, the implementation of guidelines in the healthcare sector constitutes a challenge, among others because the implementation from a political perspective receives less attention compared to the actual development of healthcare guidelines (Richens et al., 2004). Further, guideline developers often consider the organisations as being responsible for implementing a guideline as well as believing that the bare existence of a guideline automatically leads to implementation (Gagliardi et al., 2011; Richens et al., 2004).

A systematic review by Koppelaar et al, (2009), based on an assessment of study design, population and intervention type, identified factors either facilitating or hindering the implementation of MHP interventions (Koppelaar et al., 2009). The review found that the environmental factors e.g. management support or employee participation, rather than the individual factors, e.g. motivation or capability, accounted for the majority of the barriers and facilitators, with a ratio of 3:1. The most frequently reported environmental factors were the availability of resources, e.g. time to transfer, equipment and trained staff, and a supporting management climate, while the most frequently reported individual factor was motivation, e.g. willingness to change (Koppelaar et al., 2009). Several other studies echo and add to these findings as management support or interest (Dogherty et al., 2013; Lahti et al., 2019), availability of equipment (Dogherty et al., 2013; Engkvist, 2008; Krill et al., 2012; Olkowski and Stolfi, 2014), budget constraints (Dogherty et al., 2013; Silverstein et al., 2012), insufficient time (Dogherty et al., 2013; Kanaskie and Snyder, 2018; Krill et al., 2012), lack of staff (Dogherty et al., 2013; Engkvist, 2008; Kanaskie and Snyder, 2018; Olkowski and Stolfi, 2014; Silverstein et al., 2012), inadequate training (Kanaskie and Snyder, 2018; Olkowski and Stolfi, 2014), and workplace culture (Kanaskie and Snyder, 2018) have been identified as contextual factors facilitating or hindering the implementation of MHP interventions.

However, it is important to note that no single barrier or facilitator acted alone in any of the studies and that the implementation therefore is dependent on several facilitating or hindering factors.

A MHP programme can consists of a multiple components targeting different topics, e.g. risk assessment or training. This follows the believe that multifaceted interventions are more effective when being compared to single-component interventions (Institute of Medicine (U.S.), 2011). Looking at MHP interventions, this is being supported by four systematic reviews (Bos et al., 2006; Dawson et al., 2007; Hignett, 2003; Tullar et al., 2010). These four systematic reviews indicate that single-component interventions, focusing solely on MHP training, are ineffective, compared to multi-component interventions. Thus for an MHP intervention to effectively reduce MHP related injuries the intervention need to contain the components of an MHP programme which are not implemented in the organisation and they all need to be implemented.

The New Zealand MHPG recommends implementation of a multifaceted MHP programme containing three components related to the organisational systems (OSC) - policy development, workplace culture, monitoring, evaluation, and audit, and five core components related to skills and resources - (FCC) - risk assessment, techniques, training, equipment, and facility design. Inadequate implementation of one component would decrease the effectiveness of the entire MHP programme. The programme theory for the MHPG, i.e. how it was intended to work and be implemented, identified that the implementation of the OSC would create an organisational foundation/ culture that would support implementation of the FCC (Lidegaard et al., 2019c). The MHPG particularly saw H&S managers and MHP coordinators as actors responsible for the implementation of the MHPG. The MPHG recommend obtaining management support and involving knowledgeable, powerful, and passionate people in the development and implementation of the MHP programme. However, it is not known how MHP components are implemented and to what extent they are implemented and why.

The aims of the three case studies presented in this paper were to identify i) for whom the MHPG worked (or to what extent), ii) under which circumstances, and iii) why. More specifically for each case, we explored the process of implementation of the eight MHPG components.

Methods

Three case studies of healthcare organisations (a private hospital, and two public hospitals the frontrunner and the public hospital) in New Zealand were conducted between March 2017 and March 2018. All case studies were hospitals because the MHPG developers saw hospitals, particularly public hospitals, as drivers of change in the healthcare sector, and therefore had them as a main target sector (Lidegaard et al., 2019c). Further, the frontrunner was involved in the development of the MHPG, had received funding to develop MHP training and was considered to be the leading national hospital with respect to MHP.

The study was approved by the Massey University Human Ethics Committee (SOB 15/78) and was performed in accordance with the Helsinki Declaration.

Data collection

Data was collected in each case study organisation through semi-structured interviews, document review, and a chronicle workshop.

Interviews

Within each case organisation, three initial semi-structured interviews (Denzin, 1973; Treece and Treece Jr, 1977) were conducted with key stakeholders: the MHP coordinator, the H&S manager, and a representative from senior management. These work roles were identified in the MHPG as key actors that should lead implementation of a MHP programme (Lidegaard et al., 2019c). The purpose of these interviews was to obtain an overview of the organisation, its use of the MHPG, implementation of MHP programmes, and identification of people that could be appropriate to involve in the chronicle workshops or additional interviews. Additional people were interviewed on the basis of the initial interviews or the Chronicle workshop to get a more complete understanding of the implementation process. Table 1 gives an overview of the people selected for interviews in each organisation. Interview schedules were specific to each work role.

[Insert table 1]

Document review

Internal organisational diagrams and MHP related procedures were used to help identify participants for the chronicle workshops, and supplemented the information collected through the interviews about the MHP programme.

Chronicle workshops

Doing an evaluation of an implementation retrospectively, without having the opportunity to follow the implementation over time makes it difficult to assess what effect the particular implementation had and what other changes in the organisation affected the outcome. Thus, a chronicle workshop was conducted in each case organisation to identify MHP events and other events influencing MHP, key stakeholders involved and driving implementation of MHP programme elements, the initiatives and debates that had arisen during development and implementation, and factors that had supported or hindered the implementation of MHP initiatives.

Chronicle Workshop is a methodology that uses a group-based approach to gain knowledge about important events related to a specific topic (Gensby, 2014). It creates a shared history of the group's understanding or perception of the topic and what has influenced the topic over a predefined, specific time period (Hansen and Pedersen, 2014). The outcome is a historical description of the development of the topic, events that influenced the topic, people or organisations that were instrumental in the development, issues or discussions that emerged, and barriers and ways to overcome the barriers identified during the time period (Baungård Rasmussen, 2011; Gensby, 2014; Hagedorn-Rasmussen and Mac, 2007).

Participants

The participants in the workshops are presented in table 1. They were purposive selected to create maximum variation (Patton, 2002) covering differences in knowledge and expertise about MHP, length of service and position in the organisation. They should have been involved with MHP, or directly with planning and implementation of MHP initiatives. Including participants with a range of experience would enhance diversity of views and perspectives on implementation of MHP initiatives (Baungård Rasmussen, 2011).

The workshop

The workshops were held in a room with a wall big enough to display a timeline covering ten years. The participants sad in a half-moon facing the wall. Three researchers facilitated the workshops: leading the process, operating voice recorder, writing notes, photographing the timeline, and assisting by identifying themes as they emerged from discussions. Each workshop lasted four hours, covered the period between 2007 and 2017, and were divided into an exploration, and an interpretation phase.

The exploration phase had three sessions with the following three topics:

i) *What significant events have marked MHP as a priority at the hospital, and when?*
ii) *Which stakeholders, entities or institutions have characterised and driven the development and implementation of MHP efforts/programmes at the hospital, and when?*
iii) *What kind of initiatives and debate have arisen during the development and implementation of the MHP programme at the hospital, and when?*

The interpretation phase consisted of a plenum and a group work session.

iv) Participants *interpreted key trends in the history of MHP at the hospital and divided it into chapters (Plenum session).*
v) *Participants identified factors that had supported or hindered the process of implementing MHP initiatives (Group work session)*

The participants were provided sticky notes in particular colours for each session in order to link the notes to the specific session. Each exploration session was structured as follows: presentation of the topic; clarifying questions; participants wrote personal inputs on the notes (one issue per note) for five to ten minutes; one participant at a time placed notes on the wall and explained what it was about; clarifying questions, brief comment on the notes from other participants; and additional notes were placed on the wall if necessary.

In the first interpretation session, participants identified distinct periods on the timeline and created headings reflecting the events and placed them on the wall. These were discussed in plenum and mutually agreed headings were developed for each period. In the second interpretation session, participants were divided into groups of people with

similar background and experience. These groups analysed and interpreted the timeline and identified factors that had supported or hindered implementation MHP initiatives. The notes generated by each group were placed on the wall and explained. At the end of the workshop, participants were invited to share reflections on the workshop and contribute with additional comments.

Data analysis

All interviews were voice recorded, transcribed by the interviewer, and subsequently sent to the interviewee for approval.

The photographs of the chronicle workshop timeline were converted to a digital timeline in Prezi (www.prezi.com). The written notes were transcribed to a Microsoft Word document. The first author wrote the story chapter by chapter by listening to voice recordings of the chronicle workshop and consulting the notes and digital timeline. The story was discussed between the researchers and revised. Subsequently, it was sent to the participants with further clarifying questions. The first author conducted telephone conversation with those who wanted to answer the clarifying questions. These answers were incorporated into the story. See Olsen et al. (2017) for an example of a story (Olsen et al., 2017).

The stories and the interviews were analysed thematically in order to identify how each of the eight components (OSC and FCC) of a MHP programme were implemented, specifically looking for facilitating and hindering contextual factors, resources introduced, reasoning used, and the outcomes implementation of each component contributed to.

Results

This section presents the three case studies. Each case includes a description of the organisation, followed by descriptions of how each of the eight MHP components (OSC and FCC) were implemented and a table summarising facilitating and hindering contextual factors, resources introduced, reasoning used, and the outcomes. As the case studies cover a ten-year period, outcomes from the implementation of a component can subsequently act as either a context or a resource. Hence, certain outcomes may be mentioned as context, resource, and outcome within the implementation of the same component.

Case study 1 – 'The Private Hospital'

Description

The private hospital was a small hospital within a national hospital chain owned by a charity trust. Profit was reinvested in development of facilities, workforce, technology, and patient safety. A national office developed and was responsible for strategies, policies, and procedures, to which each hospital had to adhere. However, each hospital worked independently and was responsible for its operations and implementation of the strategies and policies. The national office distributed money between the hospitals, hence the more profitable hospitals supported the less profitable ones from which the private hospital benefitted. A national H&S manager, worked at the national office. She was contracted to work 0.4 full time equivalent (FTE) and was responsible for the H&S department, which included MHP. She coordinated H&S in the chain and received H&S information from each hospital through communication with the local H&S managers and MHP coordinators. The national H&S manager reported to the senior leadership team of the chain.

The private hospital, established in 1987, was merged with another local private hospital in 2007. The hospital provided short stay surgical care for around 6,000 patients a year, with freedom to select its own patients. It was audited to MoH's Health and Disability Service Standard to comply with the Health and Disability Services (Safety) Act 2001 (Parliament of New Zealand, 2001), which focused on patient safety. The hospital was led by a general manager and a senior management team consisting of five area managers in a relatively flat hierarchy structure, with easy access from all levels of the organisation to the general manager. The hospital employed around 50 FTE permanent staff, including nurses, administrators, facilities service, and a small number of casual and part-time staff. Medical doctors were self-employed and the private hospital provided its facilities and care to them and their patients. Due to the small size of the hospital, most managers and employees had more than one job role. Staff turnover was very low, only three staff had left in nine years. The average age of nurses was substantially higher compared to the average in the entire hospital chain. The hospital had a 0.5 FTE H&S manager who also managed facilities, and a part time MHP coordinator (0.8 FTE) responsible for implementing and running the hospital's MHP programme, based on the MHP

programme developed by the National office. H&S and MHP issues were considered in the executive H&S committee, which consisted of the quality and development manager, the H&S manager, and the MHP coordinator. The hospital's H&S committee consisted of the executive H&S committee and four H&S representatives. The work around the MHP programme was supposed to be supported by MHP assistants. However, no other staff were interested in acting as MHP assistants as most staff work at the hospital because it allowed them to prioritised family (there was limited requirements to work night shifts).

Implementation of the MHP programme

Factors influencing implementation of the MHP components at the private hospital are summarised in table 2.

The interviews and chronicle workshop identified implementation of aspects of all three of the MHPG OSC components: policy development, workplace culture, and monitoring, evaluation, and audit. However, they only uncovered information on the four of the FCCs: techniques, training, equipment, and facility design. There was no information on implementation of risk assessment.

The national H&S manager initiated implementation of **MHP policies** in the hospital chain, which facilitated implementation at the private hospital. The National H&S Manager conducted a cost benefit analysis identifying MHP associated costs and that a MHP programme would reduce these. This persuaded the national board to prioritise MHP and provide resources to a MHP programme including purchase of equipment. The national H&S manager gained information on MHP policies from the old ACC MHP guidelines and an expert in MHP programme development. When the MHPG was launched the national H&S manager assessed the existing MHP programme against it and found it followed its guidance. The private hospital received a report identifying gaps related to MHP and was required to develop an action plan and implement it. The private hospital perceived the national policies as wordy and unmanageable. Therefore, the local H&S manager who led the implementation adjusted them to local needs hoping this would increase compliance with the policies. The H&S representatives were involved in the process, which was also influenced by the merger of two hospitals' policies. The process resulted in more applicable H&S and MHP polices, creation of a MHP coordinator role, and a spread of H&S and MHP responsibilities. The local H&S manager and the quality development manager introduced a policy for pushing beds after re-occurrence of injuries. However, the local policies were difficult to audit, or it might have been difficult to show they were followed, which contributed to a poor audit result when audited to the MoH's Health and Disability Service Standard. This resulted in a revision so that policies became easier to audit. It also increased management focus on H&S and MHP. Following this the H&S committee discussed how a focus on safe MHP practice as opposed to merely a good audit result could be maintained.

Workplace culture was influenced by different perspectives on the priority of staff safety and MHP seen in relation to patient safety. The National H&S manager perceived the National senior manages as supportive of safe MHP whereas the private hospital's managers working with staff perceived them to prioritise patient safety over staff safety. Staff at the private hospital lacked interest in MHP and had resistance to change in relation to MHP. The MHP coordinator felt that staff prioritised their private life, hence not willing to take extra MHP responsibilities. The MHP coordinator first worked on gaining support from selected local managers, who showed an interest in MHP, in order to form a coalition that could help change staff attitude. In order to change staff's resistance the MHP coordinator established trust by working with staff on the floor and having a team approach to implementing MHP. The MHP coordinator and the quality development manager perceived this to have made staff feel respected, having influence, and being part of a team resulting in application of safe MHP practice. The MHP coordinator felt supported by the training the National H&S manager organised for the local MHP coordinators and H&S managers. This training aimed to create leaders in implementation of MHP programmes by preparing participants to meet resistance to change and provide opportunities for experience exchange. Preparation and introduction of the new H&S at Work act during 2014 to 2016 increased focus on senior management liability in relation to H&S, which was discussed at a local workshops arranged by the national H&S manager. This increased management support for and involvement in H&S and MHP resulting in more H&S and MHP information, higher recognition and involvement of H&S representatives, consolidation of H&S policies and procedures and an increased focus on incident reporting. This combined with communication of the organisations core values:

Responsibility, Respect, Teamwork and Aspiration and employment of a new local CEO were perceived to help staff take responsibility for H&S and MHP.

The private hospital used formal and informal ways to **monitor and evaluate** part of the MHP programme. The MHP coordinator, H&S representatives and managers observed staff behaviour through working closely with staff. Formal monitoring was particularly related to injury reporting and **audit**. Reoccurrence of injuries at the private hospital led to implementation of policies and equipment early in the period, however not all injuries were reported, recorded and analysed. The MHP coordinator and H&S representatives used the poor audit result, increased communication between the national H&S manager and ACC and the new H&S at Work Act to argue for a more systematic incident reporting and monitoring. Furthermore, the H&S manager and MHP coordinator used analysis of injuries to identify areas for improvement. They felt this increased staff's readiness for change and recognition of MHP as a risk.

The hospital was regularly externally **audited** to the Health and Disability Service Standard and as part of ACC's Accredited Employer Programme (focused on H&S and injury management). The national H&S manager oversaw the audits and in order to identify improvements and spread learnings amongst the hospitals. The management team supported the H&S manager to initiate implementation of H&S and MHP audit tools, which resulted in identification of the need for and implementation of MHP equipment. Following the poor audit result the private hospital developed policies, procedures, and practices that complied with the standard, in order to stay in business. The MHP coordinator and the H&S committee communicated audit results through staff meetings and the internal newsletter increasing awareness of MHP and needs for improvements. This assisted the process of created a more robust and less vulnerable organisation that was driven by the decentralisation of H&S responsibility as a result of the new H&S at work Act.

New (safer) MHP **techniques** were introduced at the private hospital through development of MHP training initiated by the MHP coordinator. However, there was resistance towards change (new techniques) among staff. The national H&S manager explained this with staff feeling they were corrected and told they had performed MHP incorrectly despite not experiencing any problems. To overcome this resistance, the MHP coordinator engaged and worked with staff on the floor demonstrating safe MHP and she used material developed by the national office and the MHPG technique section to show the evidence for the appropriateness of the techniques. This became the new approach to MHP training. The MHP coordinator felt this created buy-in from staff. However, the MHP coordinator recognised that the same few staff did not follow the new techniques.

The MHP coordinator conducted and developed MHP **training**. The MHP coordinator mainly used the material developed by the national office, supplemented with the MHPG when specific supplementary knowledge was needed. Management felt that providing MHP training supported staff in meeting their best potential and enhance knowledge of MHP. MHP training was first made compulsory for all ward staff and later included in induction for all staff including administrators to spread knowledge about safe MHP. Yearly MHP refresher training were integrated in in-ward training, which all staff attended. This training promoted experience and knowledge exchange. The MHP coordinator further used every opportunity equipment suppliers offered to provide training in use of MHP equipment. There was not a particularly high workload at the hospital, which might have facilitated high attendance to training. Training was perceived to have facilitated communication and reduced resistance towards new equipment.

The national senior management team assigned resources for **equipment** purchase following the cost benefit analysis conducted by the National H&S manager. The availability of MHP equipment was restricted but gradually increased during the period. The local H&S manager and the MHP coordination used analysis of injuries to argue that use of MHP equipment would improve patient safety as well as staff safety, if staff were provided sufficient equipment and training. This resulted in the purchase of hover mattresses and electrical beds. However, the chronicle workshop identified resistance from surgeons towards the use of hover mattresses in theatre. To overcome this, the national H&S manager encouraged staff at training days to be so proficient in the use that they could use it before the surgeons could object. The hover mattress was mainly used in theatre, not in the wards because they did not available there.

The private hospital had out-dated **facilities** and needed to rebuild. This opportunity was used by the H&S manager and the MHP coordinator to influence the new design resulting in wider corridors and doors and bigger rooms facilitating use of equipment and reduction of MHP related injury risks. The hospital's economic situation did not support a rebuild without funding from national office. The national H&S manager worked closely with the national facilities team to make sure she was involved in new facilities design. However, she was not always involved from the beginning. She described that they still made mistakes, which hindered safe MHP and that architects, engineers and builders were reluctant to involve workers like nurses. She saw this as a barrier to achieving design that facilitated safe MHP. She used the MHPG's facility design section to convince the designers that the MoH facilities standard did not facilitate use of MHP equipment. She also described that most local MHP coordinators and H&S managers did not have the skills and power to influence facility designers.

[Insert table 2 here]

Case study 2 – 'The Public hospital'

Description

Case study 2 was a public hospital within one of 20 district health boards (DHB) in New Zealand. The DHB structure was introduced in the 1970s. The DHBs manage public hospitals and other healthcare services. They were funded by the New Zealand Ministry of Health (MoH) that controlled the healthcare section. MoH determined rules and regulations establishing requirements all public healthcare providers should adhere to. MoH had power to impose budget constraint on individual hospitals and decide which services they should prioritise.

The public hospital was founded in 1847, but had several major rebuilds, the latest completed in 2008. The public hospital provided secondary healthcare service to a population of approximately 300,000 and tertiary healthcare services to a population of around 900,000 in New Zealand. The public hospital provided all types of services available in New Zealand, e.g. allied health, emergency services, mental health services, and palliative care. It was led by a chief executive officer and an executive leadership team consisting of 13 managers and directors. The DHB employed around 5,300 fulltime equivalent permanent employees where the majority were employed at the public hospital. The public hospital also used a pool of casual staff to supplement if needed. The hospital had a staff turnover of 12.6%. It had a full-time H&S manager, who led the H&S Services department, including a MHP coordinator (0.6 FTE) and an occupational health physician. The MHP coordinator was introduced as a fixed-term position and turned into a permanent, part time position in 2014. Three different people had served as MHP coordinator from 2007 to 2017. A newly established MHP steering committee, which consisted of the general managers, the executive directors, the professional heads, and the MHP coordinator, coordinated and advised on MHP. The MHP coordinator was in charge of implementing, promoting, and maintaining the MHP programme and for reviewing all MHP related incidents as well as training safe handling representatives.

Implementation of the MHP programme

Table 3 shows an overview of the implementation of the individual components of a MHP programme at the public hospital.

The interviews and chronicle workshop identified implementation of aspects of all three of the MHPG OSCs: policy development, workplace culture, and monitoring, evaluation, and audit. As well as all five FCCs: risk assessment, techniques, training, equipment, and facility design.

Implementation of a **MHP policy** began when a part-time, fixed-term MHP coordinator was employed to implement a MHP programme, including developing a MHP policy. Before the employment, MHP was part of H&S without a specific policy or programme. The MHP coordinator worked in isolation with good support from the H&S manager, however, there was not much support from management, which made it difficult to implement the MHP programme. The MHP coordinator identified and involved people that were passionate about MHP to gain support for the programme. The MHP coordinator felt that management had a narrow approach to MHP focusing on MHP training. The assistant director of nursing initiated an update of the policy, which the MHP coordinator revised in collaboration with the safe handling representatives. The aim was to create a more organised approach to MHP. However, there were still large differences in MHP procedures between wards. This was explained by the CW to be due to differences in the charge

nurses' priority of MHP, which influenced the attitude of the safe handling representatives.

A mining disaster in 2010 (Royal Commission on the Pike River Coal Mine Tragedy, 2012) and the new H&S at Work Act from 2015, increased public attention towards safety in the healthcare sector putting pressure on the sector to improve injury prevention. This raised the awareness in senior management of their responsibilities. This led to an organisational restructure and the employment of the new manager for corporate services, who had a strong focus on H&S, a new H&S manager, and a permanent MHP coordinator. Especially the H&S manager pushed for the introduction of a more robust approach towards MHP, particularly training, by working at a policy level trying to gain top management support. This resulted in the introduction of a policy for competency checks on staff and the formation of a moving and handling advisory board with the authority to raise problems and issues related to MHP at top management level. Establishing a moving and handling advisory board was the joint effort of the H&S manager and the MHP coordinator. Further, the new H&S at Work Act helped highlight MHP at top management and board level, resulting in more proactive engagement with the H&S manager aimed at reducing risks.

The **Workplace culture** at the public hospital was characterised by the value in the healthcare sector, which prioritised patient rather than staff safety. Staff would subordinate own safety to fulfil preference of patients related to equipment use and MHP techniques. Staff had low buy-in to safe MHP, which they perceived to take more time and be unfeasible in real-life setting and they were reluctant to attend MHP training because it was not tailored to their specific tasks at individual wards. Management perceived MHP training to be too time consuming and was reluctant to release staff, as this would remove staff from their core tasks. This was amplified by limited staff resources and high workload. Further, some senior managers were perceived to lack of vision in relation to staff safety. This might have been influenced by the economic situation for the hospital. Several factors helped to raise awareness of MHP among staff. The MHP coordinator attended H&S committee meetings and became more aware of the specific needs of each ward through the H&S representatives, hence providing advice and support that were more accessible to staff. In addition, introduction of H&S representatives in every department together with a focus on H&S and MHP at the monthly ward meetings raised the awareness staff safety and its connection with patient safety.

The public hospital was **audited** to the standard of the Accredited Employer programme. However, this was not mentioned during the interviews or the chronicle workshops. **Monitoring and evaluation** of MHP and H&S seemed to focus on incident and accident reporting. The MHP coordinator was in the process of auditing all wards in relation to MHP for the first time. This was encouraged by the new H&S manager. The MHP coordinator developed her own audit tool; a simplified version of the THROPI audit (Fray and Hignett, 2013) she had learned while studying for a certificate in moving and handling. She gave positive feedback, focused on improvements rather than faults to try to establish a more positive attitude towards MHP and the MHP a coordinator's work. As a reaction to the mine disaster and the new H&S at Work Act the hospital focused more on incident and injury reporting and implemented a new incident management system in 2012. Staff had some resistance to reporting injuries, which was perceived to be caused by difficulties understanding the new system, not having access to a computer, and not having time to fill in the form. However, the system and the pressure from outside were perceived to have resulted in management taking responsibility and acting on reported incidents and prioritise H&S and MHP higher.

Staff were perceived not to see the need for **risk assessment** of MHP. The MHP coordinator found that staff lost interest during training session when they came to risk assessment, in part due to the lack of formal MHP regulations. The permanent MHP coordinator and the safe handling representatives tried to overcome this resistance by taking a more coordinated approach to training staff in risk assessment by making the training more area specific. In addition, the H&S manager attempted to use the new HSW Act 2015 to improve risk assessment of MHP but found that managers did not see the need for it and found it too labour intensive. In order to ease to workload associated with risk assessment, the H&S manager created templates the managers just needed to adjust to their wards.

Many staff were not aware of correct MHP **techniques**. Further, some staff perceived safe MHP to take too much time and increase their workload. To change this attitude, the MHP coordinator introduced correct, evidence based techniques

through training. The MHP coordinator used the MHPG and other resources made available by ACC, e.g. the former MHP guidelines, along with knowledge gained from the postgraduate certificate in MHP to modify the information to staff.

The public hospital implemented and developed MHP **training** during the 10-year period. Initially it was initiated by two serious MHP related injuries to staff, which resulted in the public hospital being fined. Firstly MHP training was based on general MHP techniques, equipment, and risk management conducted by the MHP coordinator. Subsequently, the MHP coordinator managed to persuade management to establish ward trainers and 'Train the trainers', who were responsible for conducting on-ward training. The former MHP coordinator used a draft version of the MHPG to change the training from generic MHP training to more ward specific training. In addition, the MHP coordinator arranged meetings for the ward trainers, which facilitated discussion and experience exchange and she supported the trainers by recognising them and helping them as much as possible. The later change of training to focus on the need of the profession and the ward were perceived to have increased staff attendance at training sessions. Still, the training at the wards varied both because resources were not specifically allocated to MHP training and it was difficult to persuade staff to become ward trainers.

Later, study days for safe handling representatives were introduced by the nurse educators on the wards. They aimed at keeping safe handling representatives up to date with procedures and equipment related to MHP. This improved dissemination of safe MHP knowledge during ward training. Dissemination of MHP knowledge was further assisted through availability of online educational material and face-to-face sessions with low staff-to-trainer ratio on the wards developed by the H&S manager, MHP coordinator, and ACC. Attendance at refresher training was initially low, which was perceived to be due to high workload, unsupportive management, and that refresher training was not tailored to the needs of staff. However, due to the online module and focus on practical face-to-face sessions, the time required for refresher training was reduce. This increased attendance to refresher training. Still, the awareness of safe MHP varied across the hospital, mainly because doctors and non-clinical staff did not received MHP training. Hence, doctors had a lower awareness of MHP. The chronicle workshop described that some doctors and ward managers had a negative attitude toward MHP, which were perceived to influence staff attitude towards MHP trainers and training. The new H&S manager conducted a gap analysis of the MHP programme to improve senior and middle management attitude and MHP training. The H&S manager used the MHPG to argue for more time for MHP training. However, this was not yet approved. The MHP coordinator attempted to create frontline management support by involving them in implementation of MHP training, through supporting and talking to them.

Implementation of MHP **equipment** happened throughout the period. MHP equipment was first purchased as a result of the two serious injuries. Later equipment maintenance was improved after a serious injury at another hospital caused by poorly maintained equipment. This increased availability of MHP equipment, introduced new procedures related to MHP, and new MHP training focusing on equipment use. Implementation of equipment was restricted by the focus on patient safety rather than staff safety, lack of buy-in amongst staff, and lack of safety visions from senior management. People involved in implementing the MHP programme perceived the availability of MHP equipment to be low, however senior management and many managers perceived it to be sufficient. Media attention to the cost associated with broken MHP equipment and the MHP coordinator's support of MHP equipment purchase improved the understanding of the importance of availability and use of equipment.

The hospital experienced an increased number of bariatric patients. There were not enough resources to purchase enough bariatric equipment to make sure it was available when needed. The assistant director of nursing and the MHP coordinator implemented a bariatric-bundle where they rented bariatric equipment from a supplier who maintained it. This resulted in a reduction in incidents related to MHP. The equipment advisory board introduced a computer-based system aiming at optimising the equipment purchase process. At the same time, they restricted equipment purchase to be able to follow the budget, and implemented a new procurement policy transferring the authority for procurement from the charge nurse to the equipment advisory board. Further, staff found the procurement process difficult to understand, hence making it harder to purchase new equipment. The challenges associated with acquiring new equipment resulted in a formal letter - initiated by the occupational therapist in the

medical assessment unit - arguing for the need of additional equipment. Further, the MHP coordinator tried to overcome this challenge as well as a being involved in procurement by involving the H&S manager. Both contributed in making management aware of the problem.

The **facilities** at the public hospital were old and did not facilitate safe MHP. However, the public hospital had limited funding available to facility updates due to the tight regulation from MoH. As a result, MHP was often not prioritised in facility updates and new builds. To some extent this was amplified by that the MHP coordinator was not automatically included in the processes around facility updates and new builds. In order to be involved and influence the facility design process, the MHP coordinator used the information in the MHPG to argue for a prioritisation of MHP. This often happened by the MHP coordinator showing up at building meetings with a tape measure and the MHPG facility section in order to physically illustrate what it would require to incorporate MHP into the design. Overall, this resulted in the creation of facilities that, to the extent possible, accommodated safer MHP, hence became more MHP friendly.

[Insert table 3 here]

Case study 3 – 'The frontrunner'

Description

Case study 3 'The frontrunner' was a large public hospital within one the 20 DHB. It adhered to the same regulations as the public hospital, i.e. MoH's financial restrictions and regulations.

The frontrunner was founded in 1958 and was responsible for the delivery of secondary and tertiary healthcare. Like the public hospital, the frontrunner provided all types of services available in the New Zealand healthcare system, as well as responsibility for forensic care. The frontrunner provided secondary service to a population of 630,000 and tertiary services to a population of 1,700,000 the hospital with the largest client group, which was the fastest growing as well. Due to it geographical locations, this DHB had close collaboration with two other DHB. The three DHB shared the same chairman of their boards. The frontrunner was led by a chief executive and an executive leadership team consisting of nine directors and chief advisors. In addition to the frontrunner the DHB had two larger and two smaller facilities, as well as community facilities and employed approximately 6,500 fulltime equivalent permanent plus up to 1,500 casual staff. The frontrunner had a staff turnover for all staff of 12.5%. The H&S department, which was led by a full-time H&S manager and consisted of 20 people, mainly occupational H&S nurses, was responsible for H&S. MHP was the responsibility of the MHP team led by a full-time employed MHP coordinator, two part-time administrators and 14 educators, who worked as educators at least 0.1 FTE. The current MHP coordinator had been employed for more than 10 years and led the development of the MHP team. The MHP team and H&S department collaborated closely. The MHP coordinator had developed a strong collaboration and relationship with ACC and was involved in the development of the MHPG and secured funding from ACC to trail their MHP programme, which would form the basis for the MHPG.

Implementation of the MHP programme

Table 4 shows an overview of the implementation of the individual components of a MHP programme at the frontrunner.

The interviews and chronicle workshop identified implementation of aspects of all three of the MHPG OSC components: policy development, workplace culture, and monitoring, evaluation, and audit. As well as all five FCCs: risk assessment, techniques, training, equipment, and facility design.

The process of implementing a MHP **policy** and programme was initiated as a reaction from senior management following a series of serious shoulder injuries caused by MHP. The MHP programme was implemented through several smaller steps led by a newly appointed MHP coordinator in collaboration with the H&S manager, and a consultant from ACC. They used information from international MHP guidance material to develop a 'No-lift' and a 'Do not catch a falling patient' policies. In order to implement these policies, the MHP coordinator needed to challenge doctors and people in high positions in the wards to persuade them of the benefits of the MHP programme. This was done via engaging people, who opposed the MHP programme, and openly arguing that the use of correct techniques and equipment would lower the number of injures to staff. Through this process, the lack of possibility to consult external MHP experts, who had experience in implementing MHP programmes was a barrier, however, the H&S manager actively supported the work of the MHP

coordinator. The implementation of the new MHP policies contributed to a decrease in incidents.

Senior management focused on patient safety, partly due to limited funding. When the new H&S at work act was introduced, management provided funding to H&S in general, which was perceived to draw funding away from MHP. As a result, the MHP coordinator used a bottom-up approach to implement MHP policies, as this did not require senior management support. This was done through engaging the individual ward managers, who believed in the benefits of safe MHP, rather than attempting to change the entire organisation in one go. Further, the MHP coordinator approached the H&S manager in an attempt to influence senior management. The H&S manager implemented a targeted communication strategy for communicating new policies and procedures to the people that need to know, which contributed to an increased awareness of these.

A change in **workplace culture** began after a number of significant shoulder and back injuries caused by MHP, and the introduction of the first ACC MHP guideline. This raised the awareness and profile of MHP and the H&S manager managed to persuade the CEO that employing a MHP coordinator would improve staff safety. Thus, a full-time MHP coordinator was appointed. This helped MHP becoming a prioritised H&S area.

The frontrunner had economic constraints throughout the period due to low budgets and budget cuts. Further, the organisational vision, *'Best care for everyone',* was engrained in the workplace culture, which prioritised patient safety above staff safety. It was difficult to implement new initiatives because of resistance towards change among staff and because the healthcare sector was highly regulated by rules and procedures. At the same time, there was no involvement from MoH or support from national level to MHP. This could be interpreted as a lack of priority and contributed to MHP not being prioritised. To overcome the resistance, the MHP coordinator recruited MHP champions by persuading one person at the time. Especially having managers in the specific areas that saw the importance of MHP supported the implementation. In order to assist the supportive managers, the MHP coordinator directly approached them.

The frontrunner had a process of integrating MHP and H&S, despite the MHP team being a part of the H&S department. Allocating staff from the H&S department to specific areas lowered resistance towards MHP, as the H&S staff gained direct access to both management and staff. In addition, the H&S department had the mandate to 'force' areas to improve MHP practices if need, however this was rarely necessary. The H&S department introduced a rehabilitation programme for staff returning from injury related to MHP. Together with the establishment of WorkSafe, and the preparation and enactment of the new H&S at Work Act, this increased staff awareness of H&S and MHP and increased number of staff attending MHP training.

Monitoring and evaluation of the MHP programme focused on **Audits** and monitoring of MHP related injuries. The frontrunner was **audited** to the standard of ACC's Accredited Employers Programme, which included a yearly internal H&S audit. The H&S manager included MHP in the electronic audit system, which alerted managers automatically when an audit was due. This resulted in more MHP audits and compliance with audits. The H&S department introduced two digital support systems. One system calculated staffing needs based on patient acuity. The other provided a care plan for patients, including MHP needs. Together they highlighted the workload at the frontrunner, hereby increasing an acceptance among staff and middle management that a high workload can led to an increased injury reporting. As a consequence of the MHP team not being a part of the H&S department, the monitoring of MHP related injuries were difficult as differences between the H&S department and the MHP team made it hard to see relationships. This was reinforced by the frontrunner focusing more on information on patient safety and patient experience rather than staff experiences.

The two digital systems calculating staffing needs and the care plan including MHP requirements became part of the **risk assessment** process related to patients and MHP. Before this the hazard register was where the MHP risks were mentioned. However, the register was not visible and the awareness of it was low. When the HR manager integrated the hazard register with the organisational risk register it increased access to and visibility of hazards related to MHP and resulted in higher awareness of MHP related hazards. In addition, this ensured that staff conducted MHP related risk assessments of new patients.

The Frontrunner implemented many of the **techniques** described in the MHPG before the MPHG was launched because the MHP coordinator was involved in the development of the MHPG. Nevertheless, staff at the frontrunner were perceived to have a poor attitude towards MHP, which affected the appliance of the new techniques. Further, the frontrunner had a high turnover of staff, partly due to its geographical location, which imposed high living expenses on staff. As a result, the frontrunner struggled to maintain a critical mass of staff using safe MHP techniques. The frontrunner was perceived as an exemplar in relation to implementing safe MHP techniques, which senior management found motivating as it promoted the general perception of the frontrunner. This resulted in an increased attention towards MHP from management, in part because senior management expected the improved MHP techniques, through fewer injuries would led to a reduced levy.

MHP **training** was initiated after the MHP coordinator established collaboration with ACC that provided funding for piloting mandatory MHP training for all clinical staff. Alongside the employment of the MHP coordinator, this helped to highlight MHP as an important H&S area. The MHP coordinator and the H&S manager established a MHP team by advertising for staff interested in MHP. This identified potential trainers, who were passionate about MHP after the MHP coordinator had convinced management to appoint MHP trainers on the wards, by arguing that this would increase the quality and consistency of MHP. These trainers became responsible for in-service training on the wards, e.g. in equipment use. The trainers received training on special MHP training days. This supported subsequent introduction and use of new equipment by the MHP trainers serving as ambassadors for and easy accessible expert in safe MHP. Further, the MHP coordinator was able to get MHP included in the general staff orientation by arguing that this would increase attendance of the MHP training, because the individual wards would not have to pay salary to the staff being trained, as salary when being on orientation were covered centrally.

Mainly because of high workloads and understaffing, the MHP training was not prioritised on all wards and staff was not released for training because it was perceived to increase risk for the remaining staff. This hindered implementation of safe MHP. Lack of training facilities and the need for a low trainer to staff ratio reduced the number of MHP training sessions offered so that it could not keep up with the demand for sessions. In order to accommodate the increased need for training, the MHP coordinator was able to push for an upgrade of the training facilities for MHP. This was done trough arguing to senior management that better training facilities would increase attendance, hereby increase number of staff being trained, which would reduce the number of injuries occurring.

The frontrunner gradually implemented more and more advanced MHP **equipment**. Overall, this was assisted by the frontrunner having a more organised approach the introduction of new equipment. The MHP coordinator established a close relationship with MHP equipment suppliers, which included open discussions about benefits of different equipment and suppliers providing free training in equipment use when purchasing equipment. However, government purchasing rules made this difficult. In order to encourage staff to use the equipment, the MHP coordinator emphasised that staff safety also is patient safety, hence by using the equipment staff would ensure patient care. Furthermore, the increasing number of bariatric patients served as an argument for introducing and using MHP equipment.

The selection of MHP equipment was led by the director of nursing supported by the H&S manager and the MHP coordinator. They used a participatory process encouraging nurses, physiotherapists, and other staff to participate in finding the best equipment for the whole hospital. Decisions about purchase were often based on a cost-benefit discussion. The budget committee, of which the MHP coordinator was not a member, made the final decision about purchase of equipment including MHP equipment. The decision was mainly made based on how the equipment benefitted patient care and not staff safety, hence creating a barrier for implementation of new MHP equipment. Maintenance of MHP equipment improved after a clinical engineering department was established and introduction of an asset management system.

In addition, the enactment of the new H&S at Work Act assisted to highlight the need for more MHP equipment. This was the case, as the H&S at Work Act emphasised senior management responsibilities with respect to staff safety as well as starting the staff should have appropriate and sufficient equipment. Hereby senior management were obligated to ensure sufficient MHP equipment was being introduced.

Design of facilities was influenced by limited budgets and the frontrunner having out-dated facilities. It often did not include consideration of design that facilitated MHP. The H&S manager wrote to the board of the hospital describing that it would be a cheaper to include safe MHP measures, e.g. ceiling hoists, when building rather than adding these later. This led to the MHP coordinator being involved as a consult when a new unit was build. However, through arguing for the benefits of MHP safe facilities to staff safety and patient care, the MHP coordinator still had to push to be able to consult on facility design, resulting in the MHP team gradually became more involved in the facility design process. When involved, the MHP team often used the MHPG facility section to argue for larger rooms and design for, at least partial, ceiling hoists. As a result, facilities at the frontrunner became more MHP friendly with a reduced workload for staff as patients were easier to handle.

[Insert figure 4 here]

Discussion

This section will start by summarising the similarities and differences between the three case study organisations followed by a discussion of what motivated each of the case study organisations to implement a MHP programme. Finally, the process of implementing the MHP programme components and contextual factors hindering and facilitating the implementation will be discussed.

The case study organisations

The three hospitals included in this study had a number of similarities. All of them had work within the regulations and legislation outlined by the MoH. Further, the services provided by the hospital were comparable, especially between the public hospital and the frontrunner as they both were public hospitals with tertiary responsibilities. In addition, both the public hospital and the frontrunner were located in larger urban areas, hence both having a large catchment area. Still, the three hospitals were quite different and had unique contextual factors that strongly affected the implementation of the MHP programme and provided them with special opportunities. The private hospital benefited from the merge between two hospitals, which initiated a discussion about how to develop joint practices, policies, and procedures that provided an opportunity to improve the MHP practices as well as highlight the importance of MHP. The public hospital employed a H&S manager, who had a large focus on MHP and pushed for the introduction of a more robust approach towards MHP training, and a new chief operating officer, who had a strong focus on H&S, especially staff safety. Together these two employments raised the importance of MHP at the public hospital. The frontrunner employed a full-time MHP consultant, who was extremely dedicated. Through the initiatives of the MHP coordinator, the frontrunner was able to establish a partnership with ACC within the area of MHP. This resulted in ACC providing financial support to the frontrunner in order to develop and trial a MHP programme. This positioned the frontrunner in a favourable position with respect to implementing a MHP programme.

Motivation for implementing a MHP programme

The initial motivation for initiating the implementation of a MHP programmes were initiated by staff experiencing serious injuries related to MHP. The private hospital and the frontrunner started their implementation after analysis of MHP injuries. The public hospital's implementation was initiated after being fined because of two MHP related staff accidents. Thus, for all hospitals, implementation was driven by the burden of MHP related injuries and desire to reduce these injuries and the associated costs. In addition, all three hospitals acknowledged that the increasing number of bariatric patients increased the need for safer patient handling. This finding echoes Stenger et al (2007), which found that the main factor motivating the initiation of a move towards safer MHP was a high number of MHP related injuries to nurses (Stenger et al., 2007).

Later on all three hospitals were motivated to further develop and support their MHP programmes by the new Health and Safety at Work Act 2015, which emphasised senior management responsibility, worker engagement, and a risk management. The new act was used by H&S managers and MHP coordinators to make top management more aware of their H&S and MHP responsibilities.

The process of implementing a MHP programme

The implementation of the MHP programme in the three hospitals was a gradual process with smaller and larger changes, which continuously improved MHP practices. All case studies had introduced

components of a MHP programme, MHP training and equipment before the launch of the MHPG. As a result, the MHPG was primarily used to check and optimise existing MHP programme components rather than developing a programme from scratch. The MHP coordinators and H&S managers particularly used the MHPG as a support when influencing management, staff, architects, and builders.

The implementation process in all hospitals was driven by a passionate individual who saw the need for MHP. At the private hospital and the frontrunner, the H&S managers initiated the development of a MHP programme before passing it on to a dedicated MHP coordinator. In the public hospital, the MHP coordinator identified the need for a MHP programme. These people worked partially in isolation and was at times the sole person prioritising MHP within the organisation. They had to work on an organisational level to identify supportive persons in the organisations as well as to be accepted, and wanted, as a role and advisor. They particularly found support in H&S managers, trainers and some senior or middle managers that were supportive of MHP. Theberge and Neumann (2010) have previously described that ergonomists in the same way need to establish organisational support before initiating ergonomic interventions in workplaces. They state that the person responsible for the implementation needs to get people in the organisation on board, make sure they understand the need for the intervention and assign resources to it (Theberge and Neumann, 2010). Thus, if a person responsible for implementation experiences organisational resistance, they should attempt to created coalitions with committed senior and middle managers in order to facilitate implementation of the programme.

Within all case study organisations, the introduction or change of **policies** relating to MHP, e.g. techniques (e.g. 'Do not catch a falling patient') or use of equipment before introducing training, seemed to have highlighted the importance of MHP, hence helping to create management support and lower staff resistance. Lee et al (2018) reported that following the introduction of a MHP policy, as a part of a MHP programme enforced by safe MHP legislation in California, there was improvement in nurses perceiving the MHP programme to be very good or excellent (Lee et al., 2018). This support the findings from the current study that introduction of a MHP policy helps improve staff attitude towards MHP. Hence, it can be speculated that the improved staff attitude is related to the process of creating policies, which require organisational work.

In all three hospitals, **workplace culture**, especially management support, greatly influenced how well the different components of the MHP programme were being implemented. Especially ward and area managers, and charge nurses had a large influence on staff's attitude towards MHP training and workplace culture. At the private hospital staff's resistance to change was perceived to be the biggest challenge for implementation. Staff resistance also affected the public hospital and the frontrunner, however time constraints and heavy workload seemed to be larger barriers that created the negative attitude amongst staff at the public hospital. These findings corresponds with previous studies, as lack of willingness to change has been identified as one the most common barriers when implementing a MHP programme components (Koppelaar et al., 2009). Further, lack of management support or interest in a given topic has been shown to be a barrier for the implementation of both evidence based practice (Dogherty et al., 2013) and MHP programmes (Koppelaar et al., 2009; Lahti et al., 2019). In addition, the presence of a poor workplace culture has recently been reported as a barrier for implementation (Kanaskie and Snyder, 2018).

During the process of implementing of initiatives around **monitoring, evaluation, and audits**, all case organisations experienced an increasing focus on incident and injury reporting, which was influenced by the new H&S Act and an increased media focus on H&S in general and on injuries in the healthcare sector in particular. This led to a more systematic injury reporting, better identification of MHP risks, a higher awareness amongst staff, management, and top management, and greater acceptance of MHP initiatives. Combined, this served as a facilitator for the implementation of MHP practices. If the increased focus on injury reporting resulting in more incidents and injuries being reported in all three case studies was a trend throughout the entire healthcare sector, this could potential have acted as a contributing factor to the increased injury claims rates observed four years after the introduction of the MHPG (Lidegaard et al., 2019a).

At both the public hospital and the frontrunner, staff and management had a low interest and/ or awareness of **risk assessment**, which resulted in an incomplete integration of risk assessment in relation

to MHP, which served as a barrier for implementing the risk assessment. To change this, the H&S manager at the public hospital attempted to increase use by linking the new H&S legislation. Another approach was applied by the frontrunner, which integrated MHP related risk assessment into the organisational risk register. This assisted in creating an increased awareness and ensured the risk assessment of new patients was performed. Previous studies have highlighted the importance of risk assessment in a MHP programme (Hignett, 2003; Nelson et al., 2006). However, neither of these studies provides guidance on how to perform the implementation of risk assessment.

All organisations first introduced general MHP **training and techniques**, which they over time tailored to the local needs. However, all hospital experienced resistance amongst staff towards new techniques and use of equipment. The public hospital and the frontrunner also had difficulties making staff attend MHP training. This was perceived to be caused by staff not having time to attend because of understaffing in certain areas and some ward managers not wanting to release staff for training. Some ward managers even perceived that attending training would increase risk of injuries from MHP to the staff remaining at the ward. Previous studies also found that lack of staff (Dogherty et al., 2013; Engkvist, 2008; Kanaskie and Snyder, 2018; Olkowski and Stolfi, 2014; Silverstein et al., 2012) and insufficient time (Dogherty et al., 2013; Kanaskie and Snyder, 2018; Krill et al., 2012) hindered the implementation of a MHP programme. However, they did not identify the role the ward managers played.

Limited funding for **equipment** purchases, complicated procurement processes, and management's attitude that staff needed to go and get equipment or wait for it to be available were factors that resulted in low availability of MHP equipment in some areas which were identified as barriers for practicing safe MHP. Complicated procurement processes particularly affected the two public hospitals. They implemented processes to manage the limited resources available for equipment purchases in general, as they had the tightest budget because they had to apply to MoH budgets. The procurement committees at the two public hospitals focused on following the MoH's procurement rules, cost benefit analysis and on equipment that increased patient safety. They perceived MHP equipment to only improve staff safety, which led to MHP equipment being placed lower on the list of priority. Previous studies have identified both the availability of equipment (Dogherty et al., 2013; Engkvist, 2008; Koppelaar et al., 2009; Krill et al., 2012; Olkowski and Stolfi, 2014), and budget constraints (Dogherty et al., 2013; Silverstein et al., 2012) had been identify as barriers for implementation of MHP programmes. However, they have not identified how values in the healthcare sector, management attitude towards availability of MHP equipment, the perception of procurement committees and procurement processes can be barriers to purchase and use of MHP equipment, thus promoting unsafe MHP.

The **facilities** at all hospitals were identified as a barrier for safe MHP. All hospitals had facilities that hindered the use of MHP equipment. However when facilities were updated or renovated, it provided an opportunity to make them more MHP friendly. These opportunities were used by MHP coordinators and H&S managers at all hospitals when they became aware of them. Neither MHP coordinators nor H&S managers were automatically involved at the early stage of the renovation process and had to fight to be involved. When they were involved, they (the MHP coordinator at the public hospital and the frontrunner, and the national H&S manager at the private hospital) used the MHPG to argue for room design that accommodated use of MHP equipment. In some cases, it resulted in standards that exceeded MoH's standards. The MHPG identified that the MoH standard was inadequate. However, architects and engineers were reluctant to involve others and in particular local staff working in the areas. This resulted in other cases in facilities with insufficient space and too narrow doors for use of MHP equipment.

Despite the healthcare sector perceiving the MHP programme at the frontrunner to be an exemplar, the case studies showed that the frontrunner also struggled to implement their MHP programme. In particular, low middle management support, which resulted in fewer staff than expected being released for training, and the rigidity of the procurement process, which resulted in a lack of MHP equipment being available, were barriers for the implementation of the MHP programme.

In order to facilitate organisational changes, all three case studies highlighted the importance of the opportunity for experience exchange between actors seeing the need for a MHP programme. These opportunities happen both inside, e.g. study days for

MHP representatives, as well outside the organisation, e.g. cross DHB networks for MHP coordinators. Individually the actor predominantly had no or low organisational power, however, when creating coalitions, where they could synchronise efforts or develop joint strategies, they had greater impact.

Conclusion

The case studies showed that the healthcare sector valued patient safety as the highest priority, and staff safety as at least secondary. As a result, the occurrence of serious injuries to staff following MHP was the motivation for initiating the organisational changes needed to implement a MHP programme using components from the MHPG. Hence, senior management attention towards the importance of MHP was a precondition for the MHPG to work. The introduction of a MHP programme in any of the three case study organisations relied on a passionate actor, the MHP coordinators, to drive (design and implement) the programme. The actor responsible for driving the programme needed to gain organisational support from senior managers. Further, the implementation of components from the MHPG was influenced by the presence of parallel programmes, resources, and external attention, e.g. legislation prioritising H&S, and increased media attention towards the healthcare sector.

In all organisation, implementation of a MHP programme happened through an on-going process that improved MHP practices via smaller and larger changes in the organisations. These changes were facilitated by the opportunities for experience exchange, both internal and external to the organisation, between actors supporting a MHP programme. Further, the study showed the all three hospitals, to a various degree, had components of a MHP programme prior to the MHPG being introduced. Hence, the organisations did not need to create an entire MHP programme, thus they used the MHPG to check and optimise their existing MHP programmes.

Within all hospitals, internal contextual factors such as lack of management support, resistance toward change amongst staff, low availability of equipment, and inadequate facilities for safe MHP served as barriers for implementation of a MHP programme. These factors were especially prominent in contexts with limited budgets and staff shortage. In order to overcome the barriers associated with the implementation of a MHP programme, the key actors responsible for the implementation would benefit from having the possibility of having training the could have taught them how to overcome the resistance in the organisation.

Strengths and limitations

The main limitation of this study relates to the organisations taken part. As all participation was voluntary, only organisations that prioritised MHP and saw the benefits in having a MHP programme were willing to participate. As a result, organisations that did not consider MHP to be important were not possible to include as a case study organisation. Further, the feasibility of the chronicle workshop approach is greater in organisations characterised as being open and willing to investigate own practices and procedures (Gensby, 2014). This results in a selection bias towards organisations focused and motivated towards change, increasing the likelihood of successful outcome. In addition, only including hospital in the case studies led to an unbalanced focus on hospitals. However, as the MHPG developers anticipated hospitals, especially public hospitals, to be drivers of change within the healthcare sector, looking at hospitals would be in accordance with the expectations of programme theory of the MHPG. Also, by only investigating one subsector of the healthcare sector made it possible to identify difference or commonalities that might else could have been explained by differences in context due to being in different subsectors. In addition, due to limited resources within the study it was necessary to limit the numbers of case studies. Thus, limiting the influential contextual factors to one subsector.

A second limitation is that the study did not include observations or interviews with either staff only have a carer role or management that opposed the MHP programme. As a result, we only have opinions from people that were clearly opposing the implementation of a MHP programme.

As a methodology, chronicle workshop has limitations that need to be considered. Some of the limitations exist due to the selection criteria of the participants in the workshop (Hansen and Pedersen, 2014). There is, a potential risk of a 'knowledge hierarchy' that position facts above emotions, e.g. statements based on feeling rather than facts are being marginalised (Hansen and Pedersen, 2014). This is primarily due to an explicit focus on events, actors, and specific times throughout the workshop.

This potentially positions certain participants more favourably with respect to definition power. As a result, these individuals have a greater impact on the shared history and have an increased possibility to push through their personal beliefs. However, this was not experienced during any of the workshops in this study, hence the findings are unaffected by this.

A further limitation of the study was that we only were capable of including top management in the chronicle workshop in one of the case studies, whereas the two other case studies had a larger focus on ward than the organisation as a whole. Nevertheless, the same contextual factors were revealed across the three case studies indicating that the lack of top management participation in the chronicle workshop did not affect the outcomes of the workshops.

A strength of the study was the mixed-methods approach using both interviews, document review, and chronicle workshops. This allowed for triangulation as well as for the opportunity to collect supplementary information on issued that was not fully revealed following the either the interviews or chronicle workshop.

Using chronicle workshop has distinct advantages as it can i) identify a range of contextual factors affecting how an organisation implements interventions; ii) provide information about historical events that might have influenced the outcome of a specific intervention and help identify how much of the outcome was a result of a particular intervention and how much was influenced by other factors. In some ways this may be considered an alternative for pre and post assessments and case-control studies, when it is impossible to do these; and iii) gathering people with different perspectives on the intervention affords opportunity for to identify and discuss different factors that may have influenced the intervention. This would only have been otherwise possible through multiple interviews and re-interviews when unexpected or alternative factors were identified by some interviewees. Thus, Chronicle workshops are more time efficient in identifying outcomes and factors influencing interventions.

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Tables and figures

Table 1 *Overview of the work roles selected for interview and participation in the chronicle workshop. Years of being in the role indicated in brackets.*

Case study 1- The private hospital	Case study 2- The public hospital	Case study 3- The frontrunner
	Interviewees	
Local MHP coordinator Local H&S and facility manager Theatre services manager National H&S manager	Current MHP coordinator H&S manager Executive director of nursing and midwifery Former MHP coordinator	MHP coordinator Current H&S manager Organisational Development manager Human resources director Former H&S manager
	Chronicle workshop participants	
Hospital general manager *(2 years)* Contracted radiographer *(+10 years)* H&S representative for the theatre staff *(+25 years)* Quality Development Manager *(+10 years)* Theatre manager *(14 years)* H&S representative for administrative staff *(+10 years)*	Physiotherapist in a ward *(4 years)* Physiotherapist in community service *(+10 years)* Clinical nurse educator *(+15 years)* Safe handling representative, emergency department *(7 years)* Safe handling representative in a ward *(7 years)* H&S and safe handling representative, neonatal unit *(+10 years)* MHP coordinator *(3 years)* Nurse, employee representative *(+20 years)*	Charge Nurse in rehabilitation ward *(10 year)* Senior physiotherapist, rehabilitation ward, MHP Trainer *(8 years)* Nurse, rehabilitation ward, MHP Trainer *(6 years)* Medical Engineer, Department of Clinical Engineering, *(3 years)* Senior manager, Facilities services *(7 years)* Inventory and Supply Chain Manager *(4 years)*

Table 2 *How the private hospital implemented the different organisational system components and core components of a MHP programme. Contextual levels are indicated as: Supra-Macro (SM); Macro (Ma); Meso (Me); and Micro (Mi).*

Component	Facilitating contextual factor	Hindering contextual factor	Mechanisms (Resource & Reasoning)	Outcomes
Organisational System Components (OSC)				
Policy development	• Hospital chain core values (Ma) • National H&S and MHP policies (Ma) • Merge of two hospitals with two different sets of policies (Ma) • A poor audit results (Ma) • Reoccurrence of injuries from pushing beds (Ma)	• National policies perceived as wordy and unmanageable (Ma) • Loss of local knowledge (Ma)	Resource: • National H&S manager conducted cost benefit analysis • Old ACC guideline • MHP programme expert developer • Analysis of injuries Reasoning: National senior management • Realising the cost of MHP injuries and benefit of MHP programme Middle management • Want to avoid injuries • Focus on local needs/ issues will result in usage	• National office develop MHP policies and allocate resources • Increased awareness and recognition of MHP risks • More applicable H&S and MHP policies, however harder to audit • Creation of specialist roles, MHP coordinator • Spreading responsibilities for H&S and MHP • Local 'Pushing beds' policy •Electrical bed movers •Increased management focus on MHP
Workplace culture	• Preparation and enactment of H&S at Work Act (SM) • Organisational values are directed by National Office (Ma) • Merge of two hospitals with two different cultures (Ma) • National H&S manager organise training and workshops for H&S managers, MHP coordinators (Ma) • Local theatre manager focus on staff safety (Mi)	• The healthcare sector's core value: patient care and safety first (SM) • Lack of senior management support (Ma) • Loss of organisational knowledge as a result of the merger (Ma) • Resistance towards change from staff (Mi) • Lack of interest for MHP practices from staff (Mi) • Staff prioritising private life, not wanting to take on extra MHP tasks (Mi)	Resource: • National Office values • Local MHP coordinator with participatory approach • Workshops about the new H&S at work act • Workshops for MHP coordinators and H&S managers Reasoning: National and local senior management • Fulfilling legal requirements • Preparing MHP coordinator will ease changes Middle management • Communicating values will increase awareness of H&S For staff involved in MHP • MHP coordinator: forming a coalition / gaining management support will change staff attitude • Working with staff show recognition, will engage them and create buy-in • Feeling respected, influential, and being part of a team	• Focus on senior management responsibilities • More H&S and MHP information • Higher recognition of H&S representatives • Consolidation of H&S policies • Less hierarchical structure • Greater awareness for MHP • Greater responsibility towards own safety
Monitoring, evaluation, and audits	• New H&S at Work Act (SM) • ACC Accredited Employer Programme (SM) •Audited to MoH's Health and Disability Service Standard (SM) • National office oversee audits (Ma) • A poor audit results (Ma) • Re-occurring injuries (Ma) • Frequent staff meeting (Me)	• Local policies hard to audit (Ma) • Staff reluctant to report injuries (Mi)	Resource: • Communication with ACC on risk assessment • Communicating importance of reporting incidents and injuries at staff meetings • Audit standards (ACC and MoH) •Audit report with poor results & requirements for improvements • Communication of audit results to staff Reasoning: National senior management • Engaging the local MHP coordinators will facilitate spread of knowledge Senior management and the board • Needing to know how well the hospital performed • Staying in business • Complying with the national policies and procedures Middle management • Constantly identifying areas of improvement will assist continuous development; For staff involved in MHP • Decentralising of responsibilities would provide an opportunity to improve awareness of and support for MHP	• Systematic reporting of injuries • Local 'Pushing beds' policy • Electrical bed movers • Higher readiness for change • Recognition of MHP as a risk factor • Policies and procedures easier to audit • Recognising need for more MHP equipment • more robust and less vulnerable organisation • Increased spread of knowledge across staff • Decentralising of responsibilities

Table 2, continued *How the private hospital implemented the different organisational system components and core components of a MHP programme. Contextual levels are indicated as: Supra-Macro (SM); Macro (Ma); Meso (Me); and Micro (Mi).*

Component	Facilitating contextual factor	Hindering contextual factor	Mechanisms (Resource & Reasoning)	Outcomes
Five Core Components (FCC)				
Risk assessment				
Techniques	• Heavier clients (SM) • Appointment of a dedicated MHP coordinator (Ma)	Resistance towards change from staff (Mi)	Resource: • National Office MHP programme • MHPG techniques section • MHP coordinator work with staff on the floor Reasoning: For staff involved in MHP • New technique is possible and safe • Wanting to becoming more efficient • There is evidence for the new technique	• Increased knowledge of safe MHP techniques among staff • Mandatory MHP training at orientation •New technique and equipment used
Training	• Equipment supplier offer free training (SM) • Staff do not have a high work load (Ma) • Annual training day (Ma) National office focus on training and upskilling;		Resource: • National Office MHP programme • Dedicated MHP coordinator • MHPG training section • Equipment supplier training Reasoning: For management • Providing training will result in staff meeting their best potential • Having up-to-date MHP coordinators ensures proper training; • Training staff ensure safe MHP; For staff involved in MHP • Wanting to becoming more efficient • Knowing how to perform safe MHP • Being involved	• Mandatory MHP training at orientation • Staff capable of correct equipment use • Increased readiness to change • Application of safe MHP and equipment use
Equipment	• National H&S manager conducted cost benefit analysis (Ma)	• The Private hospitals' poor financial situation (Ma) • Low availability of equipment (Ma) • Surgeons' resistant towards the use of MHP equipment in theatres (Mi)	Resource: • Financial support from National Office • Injury analysis • National training days Reasoning: National senior management • Realising the cost of MHP injuries and benefit of MHP programme Middle management • Wanting to becoming more efficient • It improve patient safety and care For staff involved in MHP • Be efficient in equipment use • Correct use of equipment improve safety for me and the patient	• Equipment funding allocated by National Office • Hover mattresses • Electrical beds • Highlighting MHP as an important issue; • Efficient use of hover mattresses in theatre
Facility design	• Facilities needed upgrading (Ma) • National H&S manager competent in facility design	• MoH facility standards (SM) • Architects, engineers, and builders are reluctant to involve frontline staff (SM) • Facility upgrade was economical driven (Ma) • National H&S manager was not always informed of new builds (Me) • Local' H&S manager do not have the power to influence facility designers (Mi)	Resource: • MHPG facility design section • Funding from national office Reasoning: National facility team • Involvement of National H&S manager will assist facility updates Local management • applying MHPG standards that does not increase cost too much	• Wider doors and corridors and larger rooms • Reduces MHP related injuries

Table 3 *How the public hospital implemented the different organisational system components and core components of a MHP programme. Contextual levels are indicated as: Supra-Macro (SM); Macro (Ma); Meso (Me); and Micro (Mi).*

Component	Facilitating contextual factor	Hindering contextual factor	Mechanisms (Resource & Reasoning)	Outcomes
Organisational System Components (OSC)				
Policy development	• Mining disaster and inquiry (SM) • H&S at Work Act (SM) • Serious MHP injuries investigated by Department of Labour (Ma) • New corporate services manager focus on H&S (Ma)	• Differences in MHP procedures between wards (Me) • High workload (Ma) • Low priority of MHP among certain charge nurses (Mi) • MHP coordinator worked in isolation (Mi)	Resource: • Draft version of the MHPG • Previous H&S and MHP policies • International MHP guidelines • Discussion of the new H&S at work Act • Gap analysis by H&S manager • Employment of MHP coordinator Reasoning: For senior management and the board • Complying with legislation (recognition of accountability, fear of prosecution) • Being a good employer (policy statements shows we care) For middle management • Re-writing the MHP policies will re-emphasise the importance of MHP	• Policy for competency check for staff, - not implemented because of conflicting views on who should conduct them • MHP advisory board established • H&S and MHP policies updated • New manager for corporate services with focus on H&S • New H&S manager with focus on MHP • A permanent MHP coordinator
Workplace culture	• Mining disaster and inquiry (SM) • Press releases highlighted importance of MHP (SM) • Preparation and enactment of the new H&S at Work Act (SM)	• The healthcare sector has patient care and safety as first priority (SM) • Younger generations emphasis a good work-life balance (SM) • High work load and restricted staff resources (Ma) • Management does not promote safe MHP (Ma) • Senior management lack vision of safe MHP work culture (Ma) • Low staff buy-in to the MHP programme (Mi)	Resource: • Discussion of the new H&S at work Act • H&S representatives in all departments • Training days for safe MHP representatives • H&S on monthly ward meetings • Tailoring training to the needs of the job and ward • Reducing time needed for refresher training Reasoning: For senior management and the board • Complying with legislation and being a good employer (recognition of accountability, improved worker involvement) • Fear of being liable for injuries Management • What make management change attitude Staff • What make staff change attitude?	• Introduction of H&S representatives in each area • H&S at monthly staff meetings • Increased awareness of staff and patient safety
Monitoring, evaluation, and audits	• H&S at Work Act (SM) • Focus on reporting of incidents (Ma) • New H&S manager supports auditing and focus on MHP (Mi) • Appointment of permanent part-time MHP coordinator (Ma)	• High workload (Ma) • Incidents reporting system was difficult to understand (Ma) • The hospital had no MHP audit system (Ma) • Lack of evaluation of the MHP programme (Ma)	Resource: • Introduction of computer based incidents reporting • MHP postgraduate certificate • Audit tool (TROPHI) Reasoning: For senior management and the board • The hospital is responsible for incidents and injuries • Fulfil legal requirement to minimise injuries For middle management • The desire to minimise injuries should led to increase appliance with the audits For staff involved in MHP • Providing positive feedback to the wards will increase buy-in among charge nurses and staff	• Management more responsible for injury prevention • Better reporting and investigation of injuries including MHP • Simplified informal MHP audit • Suggested improvements of MHP in wards

Table 3, continued *How the public hospital implemented the different organisational system components and core components of a MHP programme. Contextual levels are indicated as: Supra-Macro (SM); Macro (Ma); Meso (Me); and Micro (Mi).*

Component	Facilitating contextual factor	Hindering contextual factor	Mechanisms (Resource & Reasoning)	Outcomes
Five Core Components (FCC)				
Risk assessment	• New H&S manager with focus on MHP (Ma) • Appointment of permanent part-time MHP coordinator (Ma) • Safe handling reps in the wards (Mi)	• Lack of formal MHP regulation (SM) • Staff lack interest in risk assessment (Me) • Management find risk assessment of MHP time consuming (Me)	Resource: • Preparation and enactment of the new H&S at Work Act • Templates for implementation Reasoning: For ward management • Templates makes it easy to do risk assessment	• Reduced workload for ward management
Techniques	• Preparation and launch of MHPG (SM) • Availability of online MHP material (SM) • Permanent MHP coordinator (Ma)	• Staff unaware of correct techniques (Mi) • Staff attitude to safe MHP ('it takes too long') (Mi)	Resource: • Old ACC guideline • MHPG techniques section • Knowledge from MHP postgraduate certificate Reasoning: MHP coordinator • Using evidence based material will ensure use of correct techniques	• Evidence based training in technique
Training	• Fined for two serious MHP injuries (Ma) • Part-time MHP coordinator (Ma)	• High workloads (Ma) • Low management support for MHP (Me) • Low staff attendance at refresher training (Mi) •High workload limited time for MHP (Mi) • Staff reluctant to be engaged in MHP task (Mi) • Doctors did not see MHP as important (Mi) • Management attitude affect the impact of MHP training (Mi)	Resource: • Old ACC guideline • Draft version of the MHPG • Three yearly MHP trainer meetings • Gap analysis by H&S manager • 'Train the trainer' approach • Introducing ward MHP trainers Reasoning: H&S manager and MHP coordinator • Reduction face to face training time and adjusting refresher training to staff need improve attendance and create positive attitude towards MHP • Gap analysis based on the MHPG will create senior management support and resources to extra training	• Introduction of ward specific training • Safe handling representatives spread knowledge on MHP • Improved attendance at MHP training • More people became involved in promotion of MHP
Equipment	• Incidents in other hospitals due to poor MHP equipment maintenance (SM) • Increased awareness of obese people/ patients (SM) • Two internal serious harm injuries related to MHP, investigated by Department of Labour (Ma)	• The healthcare sector's values: patient care and safety first (SM) • Tighter management of expenses from the MoH (SM) • Lack of senior management vision on MHP work culture (Ma) • Complicated, centralised procurement processes (Ma) • Unsafe MHP in areas with insufficient MHP equipment (Me) • Limited understanding of MHP safety from the Equipment Advisory Board (Ma) • lack of buy-in from staff (Mi) • Charge nurses do not have authority to spend money on equipment (Mi)	Resource: • Preparation and enactment of the new H&S at Work Act • Equipment Advisory Board • Procurement system Reasoning: For middle management • The desire to minimise injuries • Introducing a computer based system would optimise equipment purchase and implementation of new equipment faster and easier • The desire to stay within budget For staff involved in MHP • New equipment would reduce MHP injuries • Involving H&S manager strengthen the arguments for MHP equipment and increases the chance of purchase • Renting bariatric equipment reduce cost, increase availability when needed and use resulting in reduced injury risk For staff • If it takes too long to access equipment, then I cannot do all my jobs in time available	• Introduction of MHP equipment – both more equipment and different kinds of equipment • Availability and use of equipment • Introduction of equipment package focused on bariatric patients • Increased difficulties purchasing MHP equipment • Increased use of equipment in some areas • Reduced numbers of incidents • Increased awareness of insufficient levels of MHP equipment among management
Facility design	• Current facilities do not facilitate safe MHP (Ma)	• Tighter management of expenses from the MoH, leading to limited resources (SM) • MHP coordinator not always involved in facility design (Mi)	Resource: • Preparation and launch of the MHPG, especially the facility section Reasoning: MHP coordinator • Using the information in the MHPG would make it possible to engage and influence the facility design process;	• More MHP friendly facilities

Table 4 *How the frontrunner implemented the different organisational system components and core components of a MHP programme. Contextual levels are indicated as: Supra-Macro (SM); Macro (Ma); Meso (Me); and Micro (Mi).*

Component	Facilitating contextual factor	Hindering contextual factor	Mechanisms (Resource & Reasoning)	Outcomes
		Organisational System Components (OSC)		
Policy development	• Significant shoulder injuries to staff following MHP (Ma) • Increasing population (Ma) • Full-time employed MHP coordinator (Mi) • Supportive H&S manager (Mi)	• MHP not a priority in healthcare (SM) • Preparation and enactment of the new H&S at Work Act (SM) • Resource restriction (SM) • Lack of access to MHP experts (Ma) • Low senior management support (Ma)	Resource: • International MHP programmes Reasoning: For senior management and the board • Reducing injuries will reduce levy For staff involved in MHP • Through being able to provide evidence for the effect of the MHP programme is a way to be allocated more funds • Involving H&S manager will ensure management support	• Fewer injuries and more equipment • 'No lift' policy introduced • 'Do not catch a falling patient' policy introduced • Partnership with ACC
Workplace culture	• Establishment of WorkSafe (SM) • Significant shoulder injuries caused by MHP (Ma) • H&S department can enforce MHP improvements (Ma) • Supportive frontline managers (Mi)	• Lack of national involvement and support for safe MHP (SM) • Rigid procedures and rules in the healthcare system (SM) • MHP team not part of H&S department (Ma) • Focus on patient safety rather than staff safety (Ma) • Resistance towards change from staff (Mi)	Resource: • Former ACC MHP guideline • New H&S at Work Act • Full-time MHP coordinator • MHP champions Reasoning: For senior management and the board • MHP coordinator will reduce MHP injuries and cost	• Raised awareness of importance of MHP • Full-time employed MHP coordinator • More staff attending MHP training
Monitoring, evaluation, and audits	• Electronic audit system (Ma) • Internal audit related to Accredited Employer Programme (Ma)	• Focus on patient safety rather than staff safety (Ma) • MHP team not part of H&S department (Ma)	Resource: • Electronic system calculation of staffing • Electronic patient care plan • Electronic audit system Reasoning: For senior management and the board • Reducing injuries will reduce levy For middle management • Reduce injuries resulting from MHP • Reminding managers of audits will increase compliance	• Increased acceptance of injury reporting • Increased adherence and compliance with audits

Table 4, continued *How the frontrunner implemented the different organisational system components and core components of a MHP programme. Contextual levels are indicated as: Supra-Macro (SM); Macro (Ma); Meso (Me); and Micro (Mi).*

Component	Facilitating contextual factor	Hindering contextual factor	Mechanisms (Resource & Reasoning)	Outcomes
Five Core Components (FCC)				
Risk assessment		• Low visibility of hazard register (Ma) • Focus on patient safety rather than staff safety (Ma)	Resource: • H&S Hazard register integrated in organisational risk register • Electronic system calculation of staffing • Electronic patient care plan Reasoning: H&S manager • Integration of MHP in organisational risks leads to management and staff awareness and to better MHP hazard management For staff involved in MHP • Care plan has to be completed, including MHP risk assessment	• Increased awareness of MHP related hazards • MHP risk assessment performed for new patients
Techniques	• MHP coordinator involved in the development of the MHPG (Ma) • The existence of a MHP team (Me)	• High staff turnover (Ma) • Staff having poor attitude towards MHP	Resource: • Preparation the MHPG, Reasoning: For senior management and the board • Using correct techniques will reduce injuries, hereby lowering the levy MHP coordinator • If staff are aware of best MHP techniques, the risk of injuries will be reduced	• Improved knowledge of safe MHP techniques among staff • Increased attention towards MHP among management
Training	• Partnership with ACC plus financial support (Ma) • Full-time MHP coordinator (Ma) • Dedicated MHP training room (Ma) • MHP trainers (Me)	• Ward management do not considered MHP as important (Ma) • Insufficient number of staff (Ma) • Insufficient resources for training (Ma) • Staff not released for training due to prioritisation on wards (Me) • High staff turnover (Ma)	Resource: • Preparation of the MHPG • MHP in orientation • MHP in ward training Reasoning: For staff involved in MHP • Identifying trainers that have pride in MHP will increase quality of training • Using a group of trained trainer will improve consistency of training Front line management • Releasing staff for MHP training increase risk of injuries	• MHP incorporated into orientation • Increased use of equipment • More staff trained • Not all clinical staff released for MHP training
Equipment	• More bariatric patients (SM) • Establishment of Clinical Engineering Department (Ma) • Participatory approach to equipment purchase (Me)	• Government purchasing rules (SM) • MHP coordinator not included in procurement (Ma) • Budget committee approved equipment that improved patients safety (Ma)	Resource: • Communication with equipment suppliers • Assets management system • New H&S at Work Act Reasoning: For senior management and the board • Does MHP equipment improve patient care? • We are legally obligated to ensure sufficient MHP equipment For staff involved in MHP • Staff safety is patient safety	• A more systemised and effective approach to equipment maintenance
Facility design	• The MHP team (Me) • Supportive H&S manager (Mi)	• Having out-dated facilities (Ma) • Budget constrains and lack of funding for MHP (Ma) • MHP coordinator not involved in facility design	Resource: • MHPG, facility section Reasoning: For senior management and the board • MHP friendly facilities will lower workload for staff • It is too costly to design for ceiling hoists? For staff involved in MHP • Having sufficient facilities will improve staff safety	• MHP team more involved in facility design • Partially improved facilities for MHP

Appendix 6: Adjustment factors used in Study 1

Table 1 Adjustment factors for included ANZSIC codes.

Industry	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Labour Supply Services	1.20	1.14	1.11	1.23	1.11	1.14	1.09	1.09	1.04	1.04	1.05	1.04	1.10
Hospitals (except psychiatric hospitals)	8.73	8.34	9.94	7.51	7.81	7.28	7.36	8.71	8.89	9.19	7.33	7.20	8.09
General practice medical services	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Specialist medical services	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pathology and diagnostic imaging services	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Physiotherapy services	1.00	1.00	1.00	1.04	1.02	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01
Chiropractic and osteopathic services	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Other allied health services	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Ambulance services	1.17	1.05	1.00	1.00	1.02	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.02
Other healthcare services	1.16	1.14	1.11	1.11	1.17	1.14	1.13	1.05	1.02	1.02	1.01	1.01	1.07
Aged care residential services	1.17	1.17	1.19	1.10	1.11	1.11	1.09	1.23	1.28	1.28	1.30	1.29	1.19
Other residential care services	2.80	3.44	3.15	3.30	3.10	2.96	2.60	2.50	2.42	2.52	2.94	2.47	2.79
Child Care Services	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Other Social Assistance Services	1.08	1.05	1.01	1.02	1.17	1.34	1.28	1.33	1.31	1.37	1.54	1.48	1.26

Table 2 Adjustment factors for selected incident causes.

Industry	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Lifting/Carrying/Strain	1.37	1.37	1.32	1.31	1.33	1.32	1.29	1.49	1.62	1.66	1.60	1.54	1.44
Loss Balance/Personal Control	1.67	1.84	2.51	2.93	2.35	2.24	2.64	2.48	2.50	2.42	1.91	1.98	2.20
Loss of Hold	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Misjudgement of Support	1.73	1.57	1.54	1.63	1.69	1.43	1.26	1.44	1.63	1.60	1.71	2.58	1.59
Other or Unclear Cause	41.42	33.17	20.23	22.30	25.25	25.42	12.09	11.60	8.09	33.97	34.11	37.35	19.91
Pushed or Pulled	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Slipping, Skidding on Foot	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Something Giving way Underfoot	6.50	1.67	2.80	2.83	1.82	2.25	2.33	3.33	2.54	2.42	5.20	1.78	2.54
Struck by Person/Animal	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Tripping or Stumbling	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Twisting Movement	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Undefined Cause	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Appendix 7: Example of interview schedule for developer interview used in Study 2

Background

Please tell me about your involvement in the development of the ACC Manual Handling or People Guidelines 2012?

Please describe the process you and the group that revised the Guidelines went through when you developed the 2012 Guidelines?

How would you describe the aims for the Guidelines?

Have you also been involved in the development of the previous Guidelines, published in 2003?

If so, would you tell me about your involvement in the 2003 Guidelines?

What was the background for creating/developing the Guidelines 2003, and 2012 Guidelines?

Distribution/ Dissemination

Please describe who the intended recipients/ users of the 2012 Guidelines were, when you developed the Guidelines? (e.g. type of people, job roles in the health care sector, sub-sectors)

How were the 2012 Guidelines intended to be distributed to the intended users, and what actually happened?

What did you think would make the intended users choose to use the Guidelines?

What did you think would prevent the intended users from choosing to use the Guidelines?

Uptake of the Guidelines

In your opinion, how was the Guidelines 'received' by the intended users?

How do you feel that the Guidelines is being used by the different user groups?

Is use of the Guidelines different in different sub-sectors of the health care sector?

Are any specific parts of the Guidelines better/ more successfully implemented? If so, in what way?

Finally

Is there anything else you would like to add/ share with respect to the Guidelines?

Do you have any questions you would like to ask me?

If necessary, may I contact you with additional questions?

Appendix 8: Questionnaire used in Study 3 and Study 4

Introduction: Thank you for being willing to participate in this questionnaire survey. Your participation is entirely voluntary and confidential. The questionnaire enquires about your awareness and use of the 'Moving and Handling People: The New Zealand Guidelines 2012'. This questionnaire survey is part of a research project that aims to identify the uptake, use and impact, of the Accident Compensation Corporation's 'Moving and Handling People: The New Zealand Guidelines 2012' and additionally identify factors that facilitate or hinder use of the guidelines. It will take you about 12 – 18 minutes to complete the questionnaire, depending on your answers. It can be filled in over more than one session. If you want to return to the questionnaire at a later time, simply clink the link provide at the email again. Depending on your answers this questionnaire has up to 29 questions within six sections. If you have any questions about this questionnaire survey please contact: Mark Lidegaard by email m.lidegaard@massey.ac.nz

Start the questionnaire survey by clicking the 'Start Survey' button in the lower right corner

Section 1: You and your organisation: This section contains five questions about you and your organisation

Q1: Which sector(s) do you work in? (Please tick all applicable)

- ❑ Public hospitals
- ❑ Private Hospitals
- ❑ Age care
- ❑ Residential care
- ❑ Home care
- ❑ Hospice
- ❑ Training and Education
- ❑ Facility design
- ❑ Equipment supply
- ❑ Nursing studies
- ❑ Other (Please describe) _____

Q2: How many people are employed in your organisation?

- ❍ 5 or less
- ❍ 6 to 9
- ❍ 10 to 19
- ❍ 20 to 49
- ❍ 50-99
- ❍ 100 or more

Q3: Does your organisation have multiple work sites?

- ❍ Yes
- ❍ No
- ❍ Do not know/ Unsure

Q4: What are your role(s) in relation to moving and handling people? (Please tick all applicable)

- ❑ Carer, Health assistant, Support worker
- ❑ Nurse
- ❑ Nursing student
- ❑ Physiotherapist
- ❑ Occupational therapist
- ❑ Paramedic
- ❑ Senior manager
- ❑ Middle manager
- ❑ Director
- ❑ Policy maker
- ❑ Ward or unit manager
- ❑ Planner
- ❑ Occupational health and safety manager, coordinator or advisor
- ❑ Moving and handling people coordinator or advisor
- ❑ Assessor
- ❑ Trainer
- ❑ Educator
- ❑ Facility designer or manager
- ❑ Equipment supplier
- ❑ Health and Safety representative
- ❑ Other (Please describe) _____

Q4a: How often do you perform actual moving and handling of people?

- ❍ Most of the time
- ❍ Half the time or more
- ❍ Less than half the time
- ❍ Sometimes
- ❍ Never

Section 2: Awareness and use of the ACC Guidelines: This section contains up to seven questions about different versions of ACC guidelines relating to moving and handling

Q5: Before participating in this survey were you aware of any ACC guidelines for moving and handling people?

- ❍ Yes
- ❍ No
- ❍ Do not know/ Unsure

Q6: Are you aware of the following versions of ACC guidelines? (Please give an answer for each version)

If all questions *are answered 'No' or 'Do not know/ Unsure', then skip to* ***Q9****.*

	Yes	No	Do not know/ Unsure
The New Zealand Patient Handling Guidelines (2003)	❍	❍	❍
Moving and Handling People: The New Zealand Guidelines (2012) - Hard copy	❍	❍	❍
Moving and Handling People: The New Zealand Guidelines (2012) - CD-ROM	❍	❍	❍
Moving and Handling People: The New Zealand Guidelines (2012) - Internet version	❍	❍	❍

Do only *answer for version indicated as 'Yes' in* ***Q6***

Q6a: How did you become aware of this/ these guideline version(s)? (Please describe for each section by writing your answer in the box)

The New Zealand Patient Handling Guidelines (2003)
Moving and Handling People: The New Zealand Guidelines (2012) - Hard copy
Moving and Handling People: The New Zealand Guidelines (2012) – CD-ROM
Moving and Handling People: The New Zealand Guidelines (2012) - Internet version

*Do **only** answer for version indicated as 'Yes' in **Q6***

Q6b: Do you have access to any of the following guideline versions? (Please give an answer for each version)

	Yes	No	Do not know/ Unsure
The New Zealand Patient Handling Guidelines (2003)	❍	❍	❍
Moving and Handling People: The New Zealand Guidelines (2012) - Hard copy	❍	❍	❍
Moving and Handling People: The New Zealand Guidelines (2012) – CD-ROM	❍	❍	❍
Moving and Handling People: The New Zealand Guidelines (2012) - Internet version	❍	❍	❍

Q7: Have you, at any time read any sections of the 'Moving and Handling People: The New Zealand Guidelines (2012)'?

❍ Yes
❍ No
❍ Do not know/ Unsure

Q8: Have you, at any time used any sections of the 'Moving and Handling People: The New Zealand Guidelines (2012)'?

❍ Yes
❍ No
❍ Do not know/ Unsure

*Do **only** answer if: **Q8** is 'No' or 'Do not know/ Unsure'*

***Q8a:** What are the reasons why you have not used the 'Moving and Handling People: The New Zealand Guidelines (2012)'?

❑ Have not seen the guidelines
❑ Do not have a copy
❑ Guidelines do not suit my organisation
❑ No-one has responsibility for implementing safe patient handling in my organisation
❑ Management do not require use of the Guidelines
❑ Other reason(s) (Please describe) _____

Section 3: Familiarity with and use of specific sections in the 'Moving and Handling People: The New Zealand Guidelines (2012)': This section contains up to five questions about the different sections of the 'Moving and Handling People: The New Zealand Guidelines (2012)'

***Q9:** How familiar you are with each of the different sections of the 'Moving and Handling People: The New Zealand Guidelines (2012)'(Please give an answer for each section)

***If all questions** are answered 'No' or 'Do not know/ Unsure', then skip to **Q10**.*

	Very familiar	Familiar	Somewhat familiar	Not at all familiar
Introduction	❍	❍	❍	❍
Why moving and handling programmes are needed	❍	❍	❍	❍
Risk assessment	❍	❍	❍	❍
Techniques for moving and handling people	❍	❍	❍	❍
Training for moving and handling people	❍	❍	❍	❍
Organising training	❍	❍	❍	❍
Equipment for moving and handling people	❍	❍	❍	❍
Equipment management	❍	❍	❍	❍
Facility design and upgrade	❍	❍	❍	❍
Policy and programme planning	❍	❍	❍	❍
Workplace culture	❍	❍	❍	❍
Monitoring & evaluation	❍	❍	❍	❍
Audits	❍	❍	❍	❍
Bariatric clients	❍	❍	❍	❍

*Do **not** answer if: **Q9** is 'Not familiar at all'*

***Q9a:** Which of the following sections of the 'Moving and Handling People: The New Zealand Guidelines (2012)' have you used? (Please give an answer for each section)

	Used	Not used	Do not know/ Unsure
Introduction	❍	❍	❍
Why moving and handling programmes are needed	❍	❍	❍
Risk assessment	❍	❍	❍
Techniques for moving and handling people	❍	❍	❍
Training for moving and handling people	❍	❍	❍
Organising training	❍	❍	❍
Equipment for moving and handling people	❍	❍	❍
Equipment management	❍	❍	❍
Facility design and upgrade	❍	❍	❍
Policy and programme planning	❍	❍	❍
Workplace culture	❍	❍	❍
Monitoring & evaluation	❍	❍	❍
Audits	❍	❍	❍
Bariatric clients	❍	❍	❍

Do only** answer for sections indicated as 'Used' in **Q9a

***Q9b:** Please describe for what purposes you have used this/ these section(s)? (Please describe for each section by writing your answer in the box)

Introduction
Why moving and handling programmes are needed
Risk assessment
Techniques for moving and handling people
Training for moving and handling people
Organising training
Equipment for moving and handling people
Equipment management
Facility design and upgrade
Policy and programme planning
Workplace culture
Monitoring & evaluation
Audits
Bariatric clients

Do only *answer for sections indicated as 'Used' in* ***Q9a***

Q9c: Has the use of this/ these section(s) led to any change(s) in your organisation? (Please give an answer for each section)

If all questions *are answered 'No' or 'Do not know/ Unsure', then skip to* ***Q10****.*

	Yes	No	Do not know/ Unsure
Introduction	❍	❍	❍
Why moving and handling programmes are needed	❍	❍	❍
Risk assessment	❍	❍	❍
Techniques for moving and handling people	❍	❍	❍
Training for moving and handling people	❍	❍	❍
Organising training	❍	❍	❍
Equipment for moving and handling people	❍	❍	❍
Equipment management	❍	❍	❍
Facility design and upgrade	❍	❍	❍
Policy and programme planning	❍	❍	❍
Workplace culture	❍	❍	❍
Monitoring & evaluation	❍	❍	❍
Audits	❍	❍	❍
Bariatric clients	❍	❍	❍

*Do **only** answer for sections indicated as 'Yes' in **Q9c***

Q9d: Please describe the/ these change(s)? (Please describe for each section by writing your answer in the box)

Introduction
Why moving and handling programme are needed
Risk assessment
Techniques for moving and handling people
Training for moving and handling people
Organising training
Equipment for moving and handling people
Equipment management
Facility design and upgrade
Policy and programme planning
Workplace culture
Monitoring & evaluation
Audits
Bariatric clients

Section 4: Other people's use of the 'Moving and Handling People Guidelines (2012)': This section contains up to four questions about how the 'Moving and Handling People: The New Zealand Guidelines (2012)' is used by other people

Q10: Have you ever recommended the 'Moving and Handling People: The New Zealand Guidelines (2012)' to anyone?

- ❍ Yes
- ❍ No
- ❍ Do not know/ Unsure

*Do **only** answer if: **Q10** is 'Yes'*

Q10a: What is the role(s) of the person(s) to whom you recommended the 'Moving and Handling People: The New Zealand Guidelines (2012)' in relation to moving and handling people? (Please tick all applicable)

- ❑ Carer, Health assistant, Support worker
- ❑ Nurse
- ❑ Nursing student
- ❑ Physiotherapist
- ❑ Occupational therapist
- ❑ Paramedic
- ❑ Senior manager
- ❑ Middle manager
- ❑ Director
- ❑ Policy maker
- ❑ Ward or unit manager
- ❑ Planner
- ❑ Occupational health and safety manager, coordinator or advisor

- ❑ Moving and handling people coordinator or advisor
- ❑ Assessor
- ❑ Trainer
- ❑ Educator
- ❑ Facility designer or manager
- ❑ Equipment supplier
- ❑ Health and Safety representative
- ❑ Do not know/ Cannot remember
- ❑ Other (Please describe) _____

***Q11:** Do any of the following in your organisation use the 'Moving and Handling People: The New Zealand Guidelines (2012)' in relation to moving and handling people? (Please tick all applicable)

- ❑ Nobody uses them
- ❑ Do not know/ Unsure
- ❑ Carer, Health assistant, Support worker
- ❑ Nurse
- ❑ Nursing student
- ❑ Physiotherapist
- ❑ Occupational therapist
- ❑ Paramedic
- ❑ Senior manager
- ❑ Middle manager
- ❑ Director
- ❑ Policy maker
- ❑ Ward or unit manager
- ❑ Planner
- ❑ Occupational health and safety manager, coordinator or advisor
- ❑ Moving and handling people coordinator or advisor
- ❑ Assessor
- ❑ Trainer
- ❑ Educator
- ❑ Facility designer or manager
- ❑ Equipment supplier
- ❑ Health and Safety representative
- ❑ Other (Please describe) _____

*Do **only** answer if: any other user in **Q11** is 'indicated'*

Q11a: Please describe for what purposes they have used the 'Moving and Handling People: The New Zealand Guidelines (2012)? (Please EITHER tick OR write your answer in the box for each role)

	Do not know/ Unsure	Purpose
Carer, Health assistant, Support worker	❍	
Nurse	❍	
Physiotherapist	❍	
Occupational therapist	❍	
Paramedic	❍	
Senior manager	❍	
Middle manager	❍	
Director	❍	
Policy maker	❍	
Ward or unit manager	❍	
Planner	❍	
Occupational health and safety manager, coordinator or advisor	❍	
Moving and handling people coordinator or advisor	❍	
Assessor	❍	
Trainer	❍	
Educator	❍	
Facility designer or manager	❍	
Equipment supplier	❍	
Health and Safety representative	❍	
Nursing student	❍	
Other	❍	

Section 5: Other material and resources related to moving and handling of people: This section contains up to five questions about other moving and handling materials and resources

Q12: Do you use any other material or resource to get guidance in relation to moving and handling people?

❍ Yes
❍ No
❍ Do not know/ Unsure

*Do **only** answer if: **Q12** is 'Yes'*

*** Q12a:** What other materials or resources do you use? (Please list the material(s) used)

Q13: Do you think that your organisation needs any other materials or resources to improve moving and handling of people?

- ❍ Yes
- ❍ No
- ❍ Do not know/ Unsure

*Do **only** answer if: **Q13** is 'Yes'*

Q13a: What other materials or resources do you need? (Please describe)

***Q14:** Does your organisation keep a record of incidents specifically caused by moving and handling of people?

- ❍ Yes
- ❍ No
- ❍ Do not know/ Unsure

***Q15:** Do you have any other comments, in general, about the 'Moving and Handling People: The New Zealand Guidelines (2012)'?

***Q16:** Do you have any other comments, in general, about moving and handling of people?

Section 6: Further participation: This section contains up to four questions about your, and your organisation's, willingness to participate in further research

Q17 Are you willing to be contacted to find out if your organisation might be interested in participating in further research related to the 'Moving and Handling People: The New Zealand Guidelines (2012)'? By selecting 'Yes', you do not commit yourself or your organisation for any further participation. If 'Yes' is selected, you indicate that you are willing to be contacted by the researchers from Massey University about further participation. In order to establish contact, you will be asked to provide your name and email address. This information will only be used to contact you if the researcher would like to explore the opportunity to use your organisation as a case study organisation in the next phase of the research project.

- ❍ Yes
- ❍ No
- ❍ Do not know/ Unsure

*Do **only** answer if: Q17 is 'Yes'*

Q17a: Please provide your name and email address (Your name and email address will only be used if we wish to contact you about further research)

Appendix 9: Example of interview schedule for stakeholder interview used in Study 5

Interview schedule for case study interviews targeted H&S management

Personal role

Can you briefly describe your role in the organisation?

Probe: What is your title?

What is your background, experience and educational?

Probe: How many years have you worked within the hospital/ health care sector?

Probe: How many years have you been in this organisation?

Organisational background, including economy

Would you give me a quick overview of the organisation?

Probe: Can you tell me about the organisation's vision(s)?

Probe: How does your role fit into the organisation's vision(s)?

Probe: What is the level of staff turnover in the organisation?

Probe: What is the level of absenteeism in the organisation?

Probe: What is the level of incidents in the organisation?

Probe: To what extent is your organisation affected by budget constrains?

Probe: How do you do, compared to other equivalent organisations in the health care sector?

Probe: Time allocation for staff to do risk assessment?

Probe: Time allocation for staff to do MHP tasks?

External influence

Tell me about what external factors influence your organisation, e.g. change in demographic, economic or legislative factors?

Probe: To what extent does legislation and government initiatives influence your organisation?

Probe: In particular to MHP?

Probe: How big an influence do parallel programmes have on your MHP procedures?

Prevention of musculoskeletal injuries

Compared to other injuries and OHS risks, how big is MSD in your organisation?

Probe: In particular to MHP

Probe: What does the organisation do to prevent MSD injuries resulting from MHP?

Probe: When did the organisation realise the need to prevent MSD injuries resulting from MHP?

Probe: When did the organisation start a dedicated prevention of MSD resulting from MHP?

Probe: Who in the organisation are involved in prevention of MSD injuries resulting from MHP?

Probe: How are you involved with MHP and injuries?

The H&S in the organisation

Can you briefly explain how H&S is organised in your organisation?

Probe: How does MHP fit in the H&S-system?

MHP Programme

The MHP programme

Can you explain the organisation's programme for MHP?

Probe: How and when was your MHP programme created?

Probe: What elements are included in your MHP programme?

Development of the MHP programme

Can you explain the process of developing the organisation's programme for MHP?

Probe: Who was involved in developing your MHP programme?

Probe: What skills and expertise had the developers of your MHP programme?

Probe: From your perspective, were these the right skills and expertise?

Probe: When developing the MHP programme, did the organisation look at/ was it inspired by other programmes on MHP?

Probe: What were the biggest challenges when developing your MHP programme?

Probe: What is your advice to others, who are about to develop a MHP programme?

Implementation of the MHP programme

Can tell me about the process of implementing the MHP programme?

Probe: Has your MHP programme been (fully) implemented?

Probe: In no, what hurdles remain to complete the implementation?

Probe: If yes, how was your MHP programme implemented?

Probe: What were the biggest challenges when implementing your MHP programme?

Probe: Who was involved in the implementation of your MHP programme?

Probe: When was your MHP programme implemented?

Probe: What was your main concern about implementing your MHP programme?

Probe: What has been the general reception of the MHP programme?

Probe: Did the implementation of the MHP programme require the organisation to make any changes to other procedures?

Probe: Do you think implementing a MHP programme was worthwhile? Why?

Use of the MHP programme

Tell me about how the MHP programme is being used?

Probe: Are the different elements of the MHP programme being used equally?

Probe: Why are some of elements used more than others?

Probe: Main reasons that your MHP programme is used/ not used?

Probe: What has been the most obvious advantage of using the MHP programme?

Probe: How do you and your colleagues use the MHP programme in your daily work?

Probe: Does management support the use of the programme?

Probe: Are there any persons/ groups in the organisation who you think might not be the biggest fans of using the MHP programme?

Effects of the programme

How has the MHP programme affected the organisation?

Probe: What are the long-term impacts of the MHP programme?

Probe: Is there anything about the programme you would like to see changed?

Probe: How was MHP conducted 10 years ago?

Probe: Has the MHP programme affected the work/workflow in the organisation?

Probe: How do you introduce new staff to your MHP programme?

Probe: Is this/your approach different to other equivalent organisations in the health care sector?

Probe: Do different groups in the organisation have varying perception of the importance MHP?

Probe: Do you feel this perception influences the use of your MHP programme?

Probe: How do you evaluate if the programme works?

Probe: Do you record injuries specified on cause?

Probe: Do you record information on sickness absence and absenteeism?

Probe: Has the implementation and use of the programme resulted in fewer incidents of MSD? And associated costs?

Chronicle workshop participants and supplementary interviews

Is there anyone in the organisation you think we should include in the chronicle workshop?

Probe: Particular persons?

Probe: Particular roles?

Is there anyone else in the organisation you think we should talk to?

Probe: Particular persons?

Probe: Particular roles?

To finish

Is there anything else you would like to add/ share with respect to the topics we have discussed?

Probe: Do you have any questions you would like to ask me?

If necessary, may I contact you with additional questions?

Appendix 10: Chronicle workshop agenda used in Study 5

Time schedule	Activity
8:00 (15 minutes)	Introduction of the workshop theme *'Moving and handling people safely -reviewing the MHP effort/ programmes from 2007-2017'*. Participants present themselves. The method is presented
	Stage 1- Exploration phase: Visualising the past
8:15 (40 minutes)	1st round: *What significant events have marked MHP as a priority at the hospital, and when?* – Individual inputs on sticky notes (Yellow) – Placing sticky notes – Commenting on individual inputs
8:55 (10 minutes)	**Break**
9:05 (40 minutes)	2nd round: *Which stakeholder, entities or institutions have characterised and driven the development and implementation of MHP efforts/ programmes at the hospital, and when?* – Individual inputs on sticky notes (Blue) – Placing sticky notes – Commenting on individual inputs
9:45 (40 minutes)	3rd round: *What kind of initiatives and debate have arisen during the development and implementation of the MHP programme at the hospital, and when?* – Individual inputs on sticky notes (Orange) – Placing sticky notes – Commenting on individual inputs
10:25 (10 minutes)	**Break**
	Stage 2- Interpretation phase: Making the history
10:35 (25 minutes)	Plenum work session: *The participants interpret key trends in the collective history of MHP at the hospital. They divide the history into separate chapters.* – Plenum discussion of chapters -Consensus seeking
11:00 (50 minutes)	Group work session: *The participants reflect upon what factors that have supported or hindered the process of implementing a MHP programme* – Group input on sticky notes (Green and Red) – Commenting from each group
11:50 (10 minutes)	Evaluation and closure of the workshop

Appendix 11: Statement of contribution forms (DRC16)

DRC 16

MASSEY UNIVERSITY
GRADUATE RESEARCH SCHOOL

STATEMENT OF CONTRIBUTION
TO DOCTORAL THESIS CONTAINING PUBLICATIONS

(To appear at the end of each thesis chapter/section/appendix submitted as an article/paper or collected as an appendix at the end of the thesis)

We, the candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of Candidate: Mark Lidegaard

Name/Title of Principal Supervisor: Kirsten Bendix Olsen/ Dr

Name of Published Research Output and full reference:

Lidegaard, M, Olsen, KB, Legg, SJ, and Douwes, J. The introduction of a national moving and handling people guideline fails to reduce injury rates and associated costs. (In preparation, not yet submitted).

In which Chapter is the Published Work: Chapter 2

Please indicate either:

- The percentage of the Published Work that was contributed by the candidate:

  and / or

- Describe the contribution that the candidate has made to the Published Work:

The candidate has:
• Strongly contributed to the conceptual design of the study
• Been responsible for obtaining claims data through liaisons with ACC
• Identified the statistical analysis methods and conducted all statistical analyses
• Contributed to the interpretation of the findings
• Led the process of writing the manuscript targeted for publication in a peer-review journal

Mark Lidegaard Digitalt signeret af Mark Lidegaard Dato: 2018.12.06 09:21:19 +01'00'

Candidate's Signature

6/12 2018

Date

Kirsten Olsen Digitally signed by Kirsten Olsen Date: 2018.12.07 10:53:33 +13'00'

Principal Supervisor's signature

7/12 2018

Date

GRS Version 3– 16 September 2011

MASSEY UNIVERSITY
GRADUATE RESEARCH SCHOOL

STATEMENT OF CONTRIBUTION
TO DOCTORAL THESIS CONTAINING PUBLICATIONS

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We, the candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of Candidate: Mark Lidegaard

Name/Title of Principal Supervisor: Kirsten Bendix Olsen

Name of Published Research Output and full reference:

Lidegaard, M, Olsen, KB, and Legg, SJ. How was a national moving and handling people guideline intended to work? The underlying programme theory. (Submitted September 2018 to Evaluation and Program Planning. In review (5th November 2018)).

In which Chapter is the Published Work: Chapter 3

Please indicate either:

- The percentage of the Published Work that was contributed by the candidate:

  and / or

- Describe the contribution that the candidate has made to the Published Work:

The candidate has:
• Contributed to the conceptual design
• Expanded the theoretical understanding of the methodology applied (Mechanisms)
• Conducted the data collection (Interviews & obtained documents) and led the data analysis
• Contributed to the interpretation of the findings
• Led the process of writing the manuscript targeted for publication in a peer-review journal

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Candidate's Signature

6/12 2018

Date

Kirsten Olsen Digitally signed by Kirsten Olsen Date: 2018.12.07 10:55:06 +13'00'

Principal Supervisor's signature

7/12 2018

Date

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STATEMENT OF CONTRIBUTION
TO DOCTORAL THESIS CONTAINING PUBLICATIONS

(To appear at the end of each thesis chapter/section/appendix submitted as an article/paper or collected as an appendix at the end of the thesis)

We, the candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of Candidate: Mark Lidegaard

Name/Title of Principal Supervisor: Kirsten Bendix Olsen/ Dr

Name of Published Research Output and full reference:

Lidegaard, M, Olsen, KB, Legg, SJ, and Douwes, J. Awareness and use of a national moving and handling people guideline. (In preparation, not yet submitted)

In which Chapter is the Published Work: Chapter 4

Please indicate either:

- The percentage of the Published Work that was contributed by the candidate:

  and / or

- Describe the contribution that the candidate has made to the Published Work:

The candidate has:
• Highly contributed to the conceptual design
• Led the process of designing the questionnaire and identifying recipients
• Been responsible for the distribution of the questionnaire through liaison with more than ten third-parties related to the healthcare sector
• Identified the statistical analysis methods and conducted all statistical analysis
• Led the interpretation of the findings
• Led the process of writing the manuscript targeted for publication in a peer-review journal

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We, the candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of Candidate: Mark Lidegaard

Name/Title of Principal Supervisor: Kirsten Bendix Olsen /Dr

Name of Published Research Output and full reference:

Lidegaard, M, Olsen, KB, and Legg, SJ. Familiarity, use, and change after use of the components of a national moving and handling people guideline. (In preliminary state of preparation, not yet submitted)

In which Chapter is the Published Work: Chapter 5

Please indicate either:

- The percentage of the Published Work that was contributed by the candidate:

  and / or

- Describe the contribution that the candidate has made to the Published Work:

The candidate has:
• Highly contributed to the conceptual design of the study
• Led the process of designing the questionnaire and identifying recipients
• Been responsible for the distribution of the questionnaire through liaison with more than ten third-parties related to the healthcare sector
• Identified the statistical analysis methods and conducted all statistical analysis
• Led to the interpretation of the findings
• Led the process of writing the manuscript targeted for publication in a peer-review journal

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STATEMENT OF CONTRIBUTION
TO DOCTORAL THESIS CONTAINING PUBLICATIONS

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Name of Candidate: Mark Lidegaard

Name/Title of Principal Supervisor: Kirsten Bendix Olsen/ Dr

Name of Published Research Output and full reference:

Lidegaard, M, Olsen, KB, Legg, SJ, and Trevelyan, F. How are moving and handling people programmes implemented – learnings from three case studies. (In preparation,not yet submitted)

In which Chapter is the Published Work: Chapter 6

Please indicate either:

- The percentage of the Published Work that was contributed by the candidate:

  and / or

- Describe the contribution that the candidate has made to the Published Work:

The candidate has:
• Developed the concept of the study with the supervisors
• Been responsible for the recruitment of and all contact with all case study organisation
• Been responsible for data collection (Interviews, Workshops, & obtaining Documents)
• Conducted interviews and led the workshops
• Led the data analysis (Interviews, Workshops, & Documents)
• Led the interpretation of the findings
• Led the process of writing the manuscript targeted for publication in a peer-review journal

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Principal Supervisor's signature

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