Barriers for Nurses to use the Hendrich II Fall Risk Model to Plan Preventive Care

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Abstract

Background

Falls are an unacceptable cost to the patient and their family/whānau and to the health care environment. A risk assessment tool to identify which hospital in-patients have a high risk of a fall enables staff to implement targeted fall prevention strategies. The tool should have good specificity and sensitivity, be clear and quick to complete and be acceptable to the staff members who use it. This study aimed to identify barriers for nurses and midwives using the Hendrich II Fall Risk Model.

Method

A non-experimental descriptive survey design was selected to explore the research questions. The validated questionnaire, the Barriers and Facilitators Assessment Instrument, was used to identify the barriers for nurses and midwives (n = 404) from medical, surgical and obstetric settings, in five hospitals and two continuing care facilities in one New Zealand District Health Board.

Results

An overall response rate of 31% was achieved. The barriers found were insufficient supportive staff, a lack of equipment, poor design of space, the specificity and flexibility of the Hendrich II Fall Risk Model, lack of care provider knowledge and motivation and that patients do not cooperate with their falls prevention plan. Results demonstrated that respondents work according to procedures, are able to adapt their practice to incorporate new routines and use the Hendrich II Fall Risk Model as a beginning point for falls prevention planning. Analysis of the responses of nurses in medical and surgical areas was different from responses from hospital staff in outpatient, paediatric, obstetric and emergency department areas.

Conclusion

The study identified a number of barriers to the use of the Hendrich II Fall Risk Model. The recommendations to the District Health Board included professional development for nurses about how to incorporate clinical judgment as part of falls risk assessment, to improve patient education regarding falls prevention, to review the Upright training and use other methods of assessing falls risk in specific areas of practice. Further research into acceptable tools to assess risk is required in short stay, outpatient clinics, paediatric and obstetric areas.

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Chapter One – Introduction

1.1 Introduction

The nature of a patient fall is complex and consequently research into falls is challenging. A fall is influenced by patient-specific factors such as diagnosis and acuity of condition, by aspects of the environment and staffing, and by organisational resources and procedures. Falls are the most common serious adverse event reported in New Zealand hospitals (Health, Quality and Safety Commission, 2012). Falls may result in extended treatment or serious psychological or physical morbidity, or death (Joint Commission Resources, 2005). Research into falls in New Zealand is needed as much as it is in other parts of the world.

Falls in hospital and when a serious injury is sustained are predominately in the population who are over 60 years of age (Hitcho et al., 2004). As this is the same population that is predicted to rise in coming years (World Health Organization (WHO), 2007), there is likely to be an increase in incidence and prevalence of falls. Without effective measures to prevent falls, there will be increasing costs to the district health boards, to patients and to their families. Studies in New Zealand have looked at in-patient falls but none have identified the barriers to the use of a risk assessment tool to plan preventive care for falls for nurses and midwives.

Most literature pertaining to falls prevention in a hospital setting supports the use of a validated tool to assess risk, staff knowledge regarding falls prevention, provision of a well-resourced and safe environment, leadership support, facilitation of a multidisciplinary approach and a robust method of reporting and learning from fall events (Miake-Lye, Hempel, Ganz, & Shekelle, 2013). Despite the wealth of literature, studies to prevent falls are largely inconclusive about which single or multi-factorial strategies to implement (Cameron et al., 2012; Hempel et al., 2013; Oliver, Daly, Martin, & McMurdo, 2004). It is therefore difficult to apply an effective hospital-wide programme based on best-evidence literature. Many interventions to improve the rate of falls begin with introduction of a new falls risk assessment (Hempel et al., 2013), although others have advocated that they are not essential to a prevention strategy (Oliver, 2008). This study investigated the barriers to the validated Hendrich II Fall Risk Model (H2FRM), a replacement in 2010 to the locally developed falls risk assessment.

In this chapter, the background to this project and an outline of the purpose of this study is provided. A description of the locality of the study is followed by definitions of the research participants and of a fall. Issues related to research into falls prevention are identified and the

motivators for these studies are highlighted. In order to focus on barriers to a falls risk assessment tool, a model is presented to conceptualise and provide boundaries to the large number of studies in this area. The research question and aims are then stated. The five chapters of the study are briefly overviewed before the conclusion to the chapter.

1.2 Background

The large District Health Board (DHB) where this study was carried out has five hospitals, seven birthing units, a mental health facility and 20 community bases accounting for a range of primary, secondary and tertiary health services (Waikato District Health Board, 2013a). There are over 370,000 people in the DHB area, but tertiary services are provided for a larger population of 846,600 people (Waikato District Health Board, 2013a). According to the New Zealand Ministry of Health Manatū Hauora (2013a), when comparisons are made between the DHB population and the national average, the age structure is comparable, there is a slightly higher proportion of Māori, a smaller proportion of Pacific peoples and a slightly higher number of people who are classified as deprived.

In New Zealand, the DHB is one of the twenty DHBs funded by the National Health Board, which in turn, fund hospitals and services in their board area. The National Health Board sets health targets and priorities for the DHBs to implement, monitors performance and undertakes funding accountability checks. Each DHB sets priorities based on those from the National Health Board (Ministry of Health Manatū Hauora, 2013a).

The twenty DHBs also comply with the Health and Disability Services (Safety) Act (2001). One the guiding principles of this Act is to provide safe services and to continuously improve such services (Health & Disability Services, 2001). The Health, Quality and Safety Commission (HQSC) is charged with ensuring that the Act is implemented. Since 2007, DHBs have submitted the number of in-patients sustaining a fall as part of the reporting of serious and sentinel events (SSE) (Health Quality and Safety Commission, 2012). Five percent of admissions are associated with an adverse event in hospital settings, falls comprising the largest event type (Davis, Lay-Yee, Briant, & Scott, 2003). The number of SSE falls increased from 2007/8 until 2011/12, when there was a slight decrease, although still comprising 47% of the reported serious and sentinel events. This decrease was despite all of the DHBs being asked to report falls more consistently. Previous to 2011/12, some boards reported on preventable falls only, that is, where a reason for the fall was known (Health Quality and Safety Commission, 2012). In that year all boards were asked to include both preventable and non-preventable falls.

In 2009, the DHB has instigated a patient safety initiative that prioritised reducing the number of hospital falls by ten per cent (Waikato District Health Board, 2012b) and introduced a wide-ranging package to meet this goal. This included an updated definition of a fall; leadership such as the appointment of a Lead Facilitator for falls prevention and promotion of falls champions in wards; purchase of a validated tool to assess risk and supporting media; resourcing of equipment such as *ultra low* beds and *non-slip socks*; and continued the use of incident forms to monitor the rate of falls. The DHB also has hospital policy and procedure documents such as the Falls Minimisation and Management policy on the intranet which includes actions to take following the fall of a patient and an ordering system for additional patient equipment. However, the statistics for the *falls risk assessment, minimisation and management (inpatient*) procedure showed that the ten per cent decrease in falls was difficult to achieve.

One of the measures introduced into the DHB to improve provision of care and reduce adverse events including falls, is the Productive Ward quality improvement programme which was developed in England by the National Health Service Institute for Innovation and Improvement (NHS Institute). It is an initiative which the Ministry of Health has provided support to the DHBs to implement (Moore & Blick, 2013). The Productive Ward House of Modules include foundation modules such as the Well Organised Ward and process modules such as Shift Handover (NHS Institute, 2012). Each module has a structured approach for nursing staff to follow in order to examine practices and the ward or unit environment, identify the gaps and implement improvements. Falls prevention can be the focus of the Well Organised Ward module. It was reported that the modules completed in wards in the DHB have resulted in a gain of 19% direct care time (Moore & Blick, 2013).

A specific intervention purchased to achieve the hospital falls reduction goal was a validated falls assessment tool, the H2FRM (Appendix 1). The H2FRM document has the patient risk scoring system on one side and Risk Factor Operational Definitions on the back. The H2FRM is completed on patient admission, whenever there has been a change in condition (including after a fall), and at least every week. A score of five or more indicates that a patient is likely to have a fall. A high score equates to a higher risk as the assumption is that when more risk factors are present, the patient is more likely to fall (Hendrich, Bender, & Nyhuis, 2003). When the assessment of risk is made, an individualised plan is written by the patient's nurse or midwife on the Patient Care Plan (PCP) (Waikato District Health Board, 2012a). This informs the extra interventions to minimise a fall and according to the DHB policy document, includes liaison with the multidisciplinary team (MDT). Usual cares may

be on the PCP and these include factors such as a de-cluttered environment, call bell within reach and good lighting to toilets.

The aim of the online training package associated with the H2FRM is to "establish a pro-active approach to avoid adverse events" (Hendrich, n.d., para. 1). The H2FRM package, Upright, includes monitoring the completion of the online training. The statistics indicated that the completion rate was very good (Waikato District Health Board, 2013b). The training has to be completed at least once and takes approximately two hours.

In addition to the document and the online training, the H2FRM is operationalised in the DHB hospitals as a Stop Falls poster for the bed area, a flip chart with information and suggested interventions and a dedicated webpage on the DHB intranet, all using the Upright logo. In 2012, the H2FRM was the only fall risk screen used across the DHB hospitals, convalescent care facilities and birthing units. While the literature states that the H2FRM was developed in "an acute care tertiary facility" (Hendrich et al., 2003, p.9), so might be expected to only be useful for acutely ill patients, rehabilitation populations were included and obstetrics and paediatrics excluded in the developmental study (A. Hendrich, personal communication, 7 December 2012, Appendix 1). This seems to justify the use of the H2FRM throughout all the areas in the DHB hospitals with the possible exception of obstetrics and paediatrics.

The staff who routinely complete the one page H2FRM scoring document, have been defined for the purpose of this study as clinical nurses (both registered and enrolled) and clinical (registered) midwives. Clinical nurses and midwives work across many settings and have different duties but all are governed by the Health Practitioners Competence Assurance (HPCA) Act (2003). The Act states that the scope of practice for the nurses is regulated by the Nursing Council of New Zealand and midwives by the Midwifery Council of New Zealand. The term Registered Nurse (RN) includes different qualifications, usually achieved with three years of education, so the scope defines the individual's nursing practice (Ministry of Health Manatū Hauora, 2013c). The term RN is equivalent to baccalaureate or professional nurses in the literature. Enrolled Nurses (ENs) have different qualifications and at present, the qualification is gained after 18 months of study (Ministry of Health Manatū Hauora, 2013b). The EN title is the equivalent to associate nurse in the literature. Both RN and EN scopes of practice include levels of expertise. Similarly, Registered Midwives (RMs) hold different qualifications but are registered by the Midwifery Council of New Zealand to comply with the principle to protect the health and safety of women during childbirth.

In the DHB hospitals, falls are notified by the completion of incident forms by RNs, RMs or ENs. The statistical analysis of these is reported regularly to management and board members. In 2012, the reporting of falls had increased and the patient injury rate from falls was down (Waikato District Health Board, 2013b). An increase in the rate of an event has been attributed to raising awareness leading to increased reporting (Mardon, Khanna, Sorra, Dyer, & Famolaro, 2010; Smith, 2005).

When an innovation such as a risk assessment model is introduced, the fall rate is usually used to evaluate effectiveness so defining what is and is not a fall is required. Many definitions of a fall are based on that of the World Health Organisation, "inadvertently coming to rest on the ground, floor other lower level, excluding intentional change in position to rest in furniture, wall or other objects" (World Health Organization (WHO), 2007, p.1). Internationally, the definition of a hospital fall is not standardised. Cummings et al. (2008) commented that *unpreventable* falls, such as an unanticipated physiological fall, should be included in the data. Others state that assisted lowering to the floor needs to be included, while others exclude certain patient groupings such as an unconscious patient or toddler in their definition (Morse, 2009). In the DHB hospitals where this study was undertaken, a fall is defined as "a sudden unintentional or unanticipated change in body position with the individual landing at a lower level" (Waikato District Health Board, 2012, para. 1). A systematic review by the Cochrane Collaboration concluded that a common definition would aid understanding of the issues by researchers, would help consistency across studies and comparisons between studies which aim to identify what interventions make a difference (Cameron et al., 2012). Even so, studies on this topic often record falls as injurious or non-injurious.

The categorisation of whether a fall is preventable, non-preventable, serious or sentinel, can be difficult. The Joint Commission (2005) defined a serious event as one which results in extended treatment, and a sentinel event as one resulting in serious psychological or physical morbidity, or mortality. In 2013, the Health, Quality and Safety Commission (HQSC) changed the use of serious and sentinel to serious adverse event, defined as "one which has led to significant additional treatment, is life threatening or has led to an unexpected death or major loss of function" (Health, Quality and Safety Commission, 2013, para. 2). This is in accordance with literature that states that it is difficult to put falls into discrete reliable categories (Halfona, Egglib, Van Mellec, & Vagnair, 2001).

Further issues using the rate of falls to measure effectiveness of an intervention include the low rate of falls and associated ethical issues. The rate of falls was reported as 2.7 per 1000 bed days in a large Swiss study (approximately 236,000 hospital days), but varied from 0%

(obstetrics, gynaecology, paediatric intensive care) to 12% (Halfona et al., 2001). A higher rate of 20 falls per 1000 bed days was reported in sub-acute settings (Haines & Waldron, 2011). The falls per 1000 bed days are not recorded by HQSC partly because of the inconsistencies in measurement across the DHBs.

The falls rate is dependent on the patient case-mix and is high for those areas who have patients with cognitive impairment (Haines & Waldron, 2011). A study to measure the actual rate of fall events found relative increases of 13% to 125% when compared to using incident reports alone, with significant differences depending on speciality (Shorr et al., 2008). Morse (2006) suggested that the fall injury rate is a more valid statistic for judging the efficacy of a new intervention protocol as incident reports are almost always filed when there is a fall with injury. However, Shorr et al. found there were 28% more falls, although this was not found to be statistically significant, when using a fall researcher to record all fall-with-injury events. This variability, the few number of falls per 1000 bed days and differences in event recording, mean that consistent reporting and many patients over a lengthy time, are required for an innovation to have sufficient power to be statistically proven as effective (DiBardino, Cohen, & Didwania, 2012).

Another issue with research into falls prevention is that it is unethical to ask staff to cease providing the usual falls prevention cares when a study is being undertaken (Myers & Nikoletti, 2003). The authors of this literature critique concluded that where staff become aware of the study and increase the effectiveness of their usual falls prevention care, the result from the intervention on the falls rate is more difficult to interpret. These issues need to be discussed when the research is published.

In New Zealand a survey of safety processes and measures was completed in 18 DHBs (Raymont et al., 2012). It was found that most of the DHBs had a falls risk assessment and protocol and use of both were mandatory, however, compliance was not assessed in many of them. All DHBs had a system for reporting adverse events but many of the Quality and Risk personnel surveyed did not rate the willingness of staff to engage in open disclosure as high. Raymont et al. stated that some DHBs monitored nursing staff ratios and had systems for maintaining staffing but few adjusted these for the patient case-mix and even fewer for the nurse skill level. It seems unlikely that New Zealand DHBs can have safe systems for preventing falls even when there is a high level of commitment and teamwork, if the nursing staff numbers and level of expertise are not suited to the needs of the patients.

Patient safety involves interconnecting levels within an organisation. The DHB management are accountable, with the board, for leadership, resourcing and ensuring that a safe

environment is provided to optimise the health of patients. Management write and review policy documents which define and describe the roles and responsibilities of different positions. The Nursing Council of New Zealand Nurses' Code of Practice, Principle 4, states that nurses uphold professional standards regarding safe health care (Nursing Council of New Zealand, 2012). The Midwifery Code of Practice states that midwives will adhere to legislation and work in partnership with women (Midwifery Council of New Zealand, 2010). As any new protocols developed to improve the rate of patient falls require organisational support to effect change (Fixsen, Scott, Blase, Naoom, & Wagar, 2011), both codes of practice need to be taken into account when an innovation is proposed that affect nursing and midwifery practice. Since RNs, ENs and RMs are obliged to comply with the relevant code, it is incumbent on the organisation to facilitate this by direction from the strategic level, management commitment, regular education and support, monitoring and resourcing.

The financial costs of a fall are often stated as one of the reasons an organisation seeks to reduce falls. The no-fault Accident Compensation Corporation (ACC) in New Zealand meets financial costs related to a fall when certain criteria are met (Accident Compensation Corporation, 2012). In the U.S.A., two of the major health insurers have stopped funding hospitals for *never events*, such as in-patient falls (Shever, Titler, Mackin, & Kueny, 2011). Consequently there are calls for more economic evaluation of efficacious interventions (Miake-Lye et al., 2013). While there is a very different system of health care in New Zealand, if the same expectation that falls are preventable and therefore the costs of them should not fall on ACC, the insurer, the decrease in funding would impact on hospital budgets.

Further costs of a fall are to the patient and often to family members. Psychological effects for the patient have been noted as fear, decreased self-efficacy (Fortinsky et al., 2004), loss of confidence (Hendrich et al., 2003) and avoidance of activity (Zecevic, Salmoni, Speechley, & Vandervoort, 2006). The fear of a fall may be more disabling than the fall itself as the decreased activity increases health issues and affects the person's quality of life. Increased hospital stays and increased discharge to long-term facilities are costs for the patient, family and hospital (Oliver et al., 2004). Effective falls reduction measures are important for many reasons.

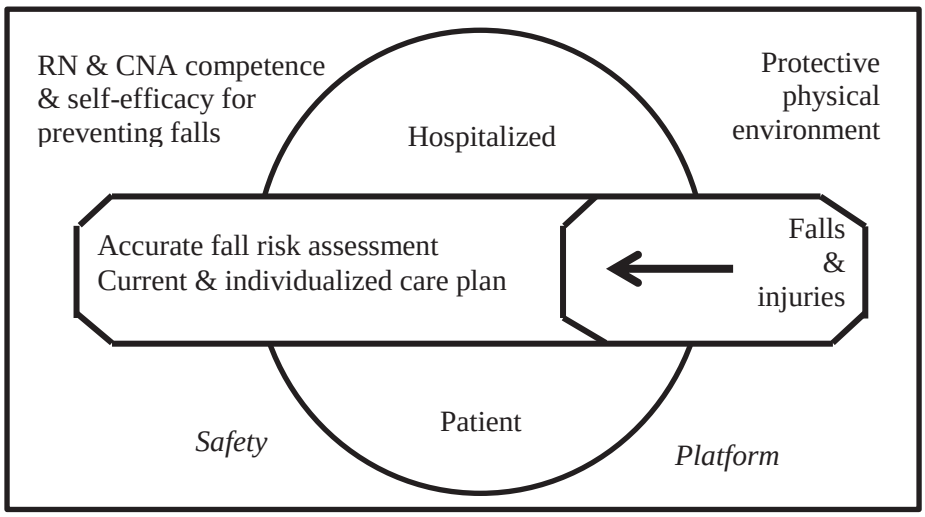
When using the number of falls as a measure of the efficacy of a fall risk tool, it is not only the tool that is measured, but also the fall prevention procedure. A decrease in the fall rate may be due to the accurate identification of at-risk patients and consequent implementation of effective strategies, but could also be a result of factors which could not be controlled. In 2005 a staff survey of Singaporean nurses identified barriers to the implementation of a fall

prevention strategy (Koh, Manias, Hutchinson, Donath, & Johnston, 2008). The goal of that study was find ways to better target implementation of a Clinical Practice Guideline (CPG) to reduce the number of falls. This was not dissimilar to the issue in the DHB in that the number of falls had not shown the expected decrease since the introduction of the H2FRM. The focus of both studies was on the identification of barriers rather than effectiveness of the prevention procedure as measured by the rate of falls. The result from a similar study could help the DHB management decide through an increased understanding of the barriers and facilitators for the clinical staff using the tool, whether to retain and budget for the H2FRM package as part of the falls prevention strategy.

1.3 A model for the study

The barriers found in the study by Koh at al. (2008) could be organised using the *Safety Platform* model developed by Dykes et al. (2011, p.440). This model has the patient at the centre and surrounded and kept on the platform by the care providers, the protective environment and the accurate fall risk assessment with a current and individualised care plan (Figure 1). The care providers are registered nurses (RNs) and certified nursing assistants (CNA). They are described by Dykes et al. as having competence (skills and knowledge), self-efficacy (self-belief in ability to achieve goals), capability (affected by priorities and workload) and commitment (motivation to do task). Lack of any of these elements could be understood as personal barriers affecting falls prevention by clinical staff. The protective environment includes assistive devices in good working order, safe facilities and organisational support, policies and procedures. The care plan, based on correctly identified falls risk factors, includes explicit interventions and evaluation of the effectiveness of these. The four concepts of patient, risk assessment, care provider, and context have formed the basis of the research questions.

Figure 1. Safety Platform Model from Dykes et al. (2011)



1.4 The aim and research questions of the study

The aim of this study was to identify barriers for clinical nurses and clinical midwives when using the Hendrich II Fall Risk Model to plan preventive care for falls in the hospitals, continuing care facilities and birthing units of a DHB.

1.4.1 Research Questions

- What are the Hendrich II Fall Risk Model barriers for clinical nurses to plan falls prevention care?
- What are the Hendrich II Fall Risk Model barriers for clinical midwives to plan falls prevention care?
- What personal barriers for falls prevention care do clinical nurses and clinical midwives hold?
- From the clinical nurse or clinical midwife perspective, what patient characteristics are barriers to falls prevention care?
- What are context barriers for planning falls prevention care?

1.5 Summary of chapters

There are five chapters in this research thesis.

Chapter One: Introduction

This chapter introduced fall prevention in the international, national and local setting. It provided an overview into why study into falls prevention care is important and introduced the headings used in this research. The aim and research questions were stated.

Chapter Two: Literature Review

This chapter presents a substantive overview of the literature associated with barriers to implementation of an innovation to reduce the number of falls in hospitals. Firstly, falls prevention is described and risk assessments including the Hendrich II Fall Risk Model are critiqued. Patient and care provider characteristics and lastly context factors are evaluated in relation to falls prevention.

Chapter Three: Research Design

This chapter discusses the rationale of the non-experimental descriptive survey approach. In this chapter the sampling frame is explained, how the nurses who routinely complete the H2FRM were chosen, and how the survey was conducted. A section on the validity and reliability of the survey instrument and data analysis is presented. The chapter concludes with ethical considerations.

Chapter Four: Results

This chapter provides the analysis of the data. This analysis includes the barrier calculation by the authors' of the survey instrument, frequencies and measures of central tendency, and comparisons within and between different subgroups. Further analysis using correlation coefficients is stated. The information is presented using text, tables and figures.

Chapter Five: Discussion

This chapter discusses the key findings of the study to the research questions. Reference is made to the literature to explain the results. The methodological limitations of the study are acknowledged. Suggestions for further research and recommendations to the DHB are made.

1.6 Conclusion

Research into the barriers for nurses and midwives when using a tool to plan preventive care for falls is a worthwhile area of study and has not been addressed in the New Zealand context. This chapter has provided the background and rationale for the study in the DHB. Falls prevention has been described as affecting the interconnecting systems at the board, management, care provider and patient levels. The mandate to implement strategies to reduce falls has been stated as arising from legislature and national directives, from within the DHB and from the patient and their family. The difficulty of monitoring the effectiveness of interventions has been highlighted by the definition of a fall and the scarcity of fall events. A model was introduced in order to focus this study on the risk assessment, the care provider, the patient and the context. In this chapter, the aim and research questions have been articulated, and an overview of the chapters to follow summarised.

Chapter Two – Literature Review

2.1 Introduction

The previous chapter presented the context and background to the study and provided an overview of the issues related to effective fall prevention strategies. This chapter examines the literature related to barriers for nurses and midwives using a falls assessment tool to plan for preventive care. A critical literature review is important to establish the topic within the body of material on the subject and to help define the research questions (Coughlan, Cronin, & Ryan, 2007).

This chapter begins by setting out the strategy used to access the literature included in this review. The review is discussed under the four areas of the safety platform model presented on page 8. Firstly four tools and nurse clinical judgement to identify the risk of a fall are discussed, then, the other parts of the safety platform model. They are the characteristics of the care provider (nursing and midwifery staff), patient risk factors and the protective environment or context elements. The elements discussed are safety culture, teamwork and organisational development. Finally, research on the adoption of an innovation, such as a new falls risk tool, is reviewed in order to place studies on the implementation of the H2FRM into context.

2.2 Search strategy

The rationale for this research was that leaders in the DHB wanted to identify the barriers and facilitators for clinical staff when using the H2FRM. As the risk model was introduced throughout all of the hospitals in the DHB, a search was made into articles and information on acute, short-stay, convalescent and long-term hospital care across all specialities, such as medical, surgical, oncology, obstetrics and paediatrics.

The literature search was carried out using the terms *hospital fall risk, fall risk assessment, Hendrich II Fall Risk Model*; *organisation safety* and *safety culture* were added once the research questions had been identified. Searches were made of the Cumulative Index for Nursing and Allied Health Plus, Web of Science, Scopus and Cochrane Library and relevant policy publications. The search commenced with date restrictions between 2005 and 2013 then broadened to include seminal articles on falls prevention, and was limited to the English language. Reference lists were also reviewed for cited papers. Articles included primary research studies, systematic and clinical reviews. Unpublished material from the DHB, reports, guidelines, and personal communication from experts were also considered. The search was carried out in 2012 and again in the first six months of 2013.

2.3 Prevention planning

The knowledge of where and when a patient is likely to fall aids prevention planning. Most in-patient falls happen at the bedside either transferring from bed to chair, or while undertaking activities of daily living (Ang, Mordiffi, & Wong, 2011), before the weekend and after eating (especially lunch) (Grenier-Sennelier, Lombart, Jeny-Loeper, Maillet-Gouret, & Minvielle, 2002). A higher risk of falling is associated with unfamiliar surroundings (Hsiao, 2012) so the longer the patient is in hospital, the lower the risk of a fall (Haines et al., 2011; Schwendimann, Bühler, De Geest, & Milisen, 2006). The median length of stay before a fall is three days, with oncology and surgical wards having the highest median stay before the first fall (7 and 8 days) (Hitcho et al., 2004). A fall where an injury is sustained is even more important to prevent. According to Hitcho et al. (2004), a fall occurring when attempting to meet elimination needs increased the risk of an injury, especially if the patient was older than 65 years. An increased risk of a fall with injury was found to occur during evenings and overnight, and moving without assistance (Hendrich, n.d.). While studies can identify increased risk at specific times and places, when deciding how to use these findings in an area of practice, consideration needs to be given to differences between the study and the local context regarding the culture, environment, patients and staffing.

In fall prevention studies, criticisms have been made of the lack of description of the intervention and comparison groups and the way that innovations are introduced and sustained (Haines & Waldron, 2011; Hempel et al., 2013) as without such information the usefulness of results are limited. The difficulty of translating evidence into clinical practice is demonstrated by the following examples. The suggested plan for high-risk patients usually includes placing the patient close to the nurses' station to enable increased monitoring (Spoelstra, Given, & Given, 2012). While that can improve vigilance, Tzeng et al. (2011) found that the single variable, quietness, as assessed by the patient, accounted for 16% of the variability in the fall rate. Increased noise increased the number of falls but quietness is threatened in bed-spaces near to the nurses' office where vigilance is enhanced. *Bed alarms*, fall-risk alert signage, *ultra low* beds and non-slip footwear, are commonly used interventions yet studies do not indicate that they significantly decrease the rate of falls (Cameron et al., 2012). Another common strategy is regular toileting and timed observations (Hempel et al., 2013), but staff reported difficulty in adhering to such falls prevention interventions (Tucker, Bieber, Attlesey-Pries, Olson, & Dierkhising, 2012; Tzeng, 2011). Many studies use multi-factorial interventions so it is not known whether it is the combination or a single intervention that has an effect on the rate of falls (Cameron et al.,

2012). It is a challenge for management and clinical staff to institute evidence-based interventions that are appropriate and effective.

A multifactorial approach is recommended in order to prevent falls. According to one review this approach will include a falls risk assessment, integration of the prevention plan with electronic records, a post-fall follow-up and a culture of safety (Spoelstra et al., 2012). This list has some similarities with the model presented on page 8 which is used to structure this review. The focus of this study is the H2FRM and the literature review begins with a discussion of this tool and three of the other commonly used tools.

2.4 Risk assessment tools

Discussions of risk assessment tools centre on the development, risk factors and the usefulness of the tool in clinical settings. A review of the tools used for assessing falls risk found that most were developed using literature review and clinical information, and few included case control (Haines, Hill, Walsh, & Osborne, 2007). Those tools which used face and content validity to select factors of importance were criticised by Morse (2006) as being imprecise. According to Myers and Nikoletti (2003), confounding variables such as lack of blinding and treatment paradox meant that no tool could be recommended. It was stated that the tools were lacking in statistical and methodological rigour, such as the process to identify risk factors, the controlling of variables, and that there were few tests of validity on the tools once they were developed.

Two statistics are commonly used to gauge the effectiveness of a tool. Sensitivity is a measure of how well a risk model will predict a fall for those identified as high risk, and specificity of how often a person with low risk did not fall (Oliver, Papaioannou, et al., 2008). A sensitivity of over 80% and specificity over 75% have been stated as acceptable statistics (Perell et al., 2001). The Youden Index has been developed to combine the two statistics, specificity and sensitivity, so that one figure can be used to compare different tools (Haines et al., 2007). A zero Youden index indicates a relationship through chance, and a one indicates perfect accuracy.

Tools to assess the risk of falling have been developed so that nurses or midwives correctly identify a patient to receive targeted interventions in order for that patient to not sustain a fall. Development of the screening or assessment tools have identified risk factors, either through prospective or retrospective analysis of fall and non-fall data, or literature review, and they are then summed with the assumption that this will more accurately predict risk (Haines et al., 2007). According to Oliver (2008), such assessments, where fall risk is reduced to a single figure, prompt interventions based on the figure rather than the needs of the patient

and that this was the underlying reason that the number of patient falls had not decreased. Similarly, Shever et al. (2011) suggested that interventions based on identified risk factors would be more appropriate than a single score and generalised strategies. High risk scores are not enough to protect a patient from a fall but whether this is because the tools are inaccurate, the nursing and the involvement of the multi-disciplinary team is inadequate, the organisation has an ineffective strategy or as a result of patient non-compliance, are issues analysed in this review.

There are so many tools to assess falls risk that Perrell et al. (2001) asserted that there is no need for organisations to develop their own. However, it is difficult for organisations intending to use a validated tool to choose the best when there are differences between the psychometrics of the developmental population and those of later studies using the same tool. Three of the oldest and widely cited tools are the Morse Fall Scale (MFS), the St Thomas Risk Assessment Tool in Falling Elderly Inpatients (STRATIFY) and the Downton Index. The next section discusses these, the H2FRM and nurse clinical judgment, just five of the many measures to ascertain the risk of falling.

2.4.1 MFS, STRATIFY and Downton Index

The MFS and STRATIFY tools were both developed by prospective data analysis followed by validation of the draft tool in a different population. The MFS was developed in 1989 in acute care, rehabilitation and nursing home areas from data on 2,689 patients (Morse, 2006). This scale requires an assessment to be completed for six weighted risk factors and scores risk from zero to 120. Patients who score 25 or more are categorised as having a falls risk. Reassessments need to be completed at least each duty in acute areas but may be weekly in areas where the patient's condition is stable. STRATIFY was published in 1997 and developed on patients who were over 65 years of age on 116 cases and 116 controls (Oliver et al., 2004). The original tool had five unweighted risk factors and high risk identified with a score three or higher. There have been modifications published since with weighted factors. A third tool commonly used in research studies, the Downton Index, published in 1992, contrary to the above, was developed using clinical knowledge. It was then tested with older residents in continuing care facilities to find the specificity and sensitivity. Similar to the above, the index includes a history of falls, medications, sensory deficits, mental state and gait as risk factors with a score of three or more indicating high risk (Vassallo, Stockdale, Jagdish, Briggs, & Allen, 2005).

The psychometric studies of 36 risk screening tools were examined using the Youden Index. The two tools that had the most studies able to be calculated were STRATIFY with 11 studies, and MFS, four studies (Haines et al., 2007). These tools had a similar Youden Index

to each other and to that of the pooled studies (mean = 0.2, 95% confidence interval 0.1 - 0.25). The two prospective studies on the Downton tool had the highest predictive accuracy in the study. The authors noted that even those tools where the Youden Index indicated greater accuracy in the prediction of falls, other factors such as the completion rate of the tool in clinical practice and the costs associated with the tool needed to be taken into account when making comparisons.

2.4.2 The Hendrich II Fall Risk Model

The H2FRM is one of the commonly used tools for judging fall risk (Swartzell, Fulton, & Friesth, 2013). It was published in 1992 as the Hendrich Fall Risk Model, revalidated to overcome its limitations in 2003 and renamed the H2FRM (Hendrich et al., 2003). The revalidation was completed in an acute care hospital by a concurrent, randomised, case-control retrospective study of over 1000 patients using logical regression analysis. The resulting model consisted of seven weighted items and a get-up-and-go test (Appendix 1). As it is trademarked, it cannot be modified by an organisation which adopts the H2FRM and the intellectual property rights of creating the tool are protected (United States Patent and Trademark Office, 2014). In the developmental population the model had a sensitivity of 74.9% and specificity of 73.9% (Hendrich et al., 2003).

The Youden index for the H2FRM, just one study included for the calculation, was good (mean = 0.5, 95% confidence interval 0.4 - 0.6). However the authors found that tools that were developed on retrospective data over-predicted their accuracy and the most accurate tools had few studies associated with them. These concerns need to be considered when identifying the H2FRM as a good predictor of falls.

Studies have endorsed the use of the H2FRM. Two studies found the sensitivity to be 70%, and 86% and specificity 61.5% and 43% respectively (Ang, Mordiffi, Wong, Devi, & Evans, 2007; Ivziku, Matarese, & Pedone, 2011). Both studies recommended the use of the H2FRM as the statistics were similar enough to those of the developmental population. The populations studied were 80 adult patients who had fallen in Singaporean acute medical and surgical units (Ang et al., 2007) and patients older than 65 years in an Italian acute care geriatric setting who had fallen over in an eight month period (Ivziku et al., 2011). A randomised control study in an acute care hospital which used the H2FRM for identifying patients to receive additional targeted interventions, showed a significant reduction in the number of falls (Ang, Mordiffi, & Wong, 2011).

A different study did not recommend the H2FRM. Using the earlier version, the Hendrich Fall Risk Model and 560 patients recruited from a German geriatric hospital, the authors considered the sensitivity and specificity values to be good (Heinze, Dassen, Halfens, &

Lohemann, 2008). However, the recommendation was to use a general care plan, as the fall prediction rate was similar and the workload less, when completing only one form.

Morse (2006) differentiated between tools used for risk and assessment. Risk scores are quick and provide little information for further care planning. An assessment takes longer, is thorough, involves the multi-disciplinary team (MDT) and provides a plan for the fall prevention and protection measures that need to be taken based on physiological, psychological and socio-cultural attributes (Morse, 2006). On this basis, the H2FRM is not an assessment as it is rapid and the sum of the risk factors do not provide the rationale as to why a patient is at risk of having a fall (Hendrich, 2007). However, some tools incorporate both a risk screen and risk assessment. One such tool escalates interventions from two simple Yes/No questions through to education and referral as the risk of a fall becomes more likely (Äberg, Lundin-Olsson, & Rosendahl, 2009).

According to Perrell et al. (2001) a good risk tool should be developed on a similar population to that where it is implemented, have an explicit written outline on its use, have good inter-rater reliability, can be completed in a reasonable timeframe and the score for high risk is clear. A study found that the H2FRM is easy to use, quick and clearly identifies patients who have a high risk of falling (Chapman, Bachand, &Hyrkas, 2011). However, other authors state that a good risk tool will identify modifiable risk factors (Haines et al., 2007), but this is not the aim of the H2FRM (Hendrich et al., 2003).

Specific criticisms have been made of the implementation of the H2FRM. A retrospective study in U.S.A. used the H2FRM on 73 matched faller and non-faller patients who had a diagnosis of diabetes mellitus, acute heart failure or a stroke (Swartzell et al., 2013). For the 53 patients who fell and had diabetes mellitus, the H2FRM score was related positively to high risk at predicting a fall. However, a similar relationship was not seen for the smaller number (10) of patients with heart failure. As 44% of patients who fell did not have a H2FRM high falls risk, the authors considered this error in risk score too high. Missing information in the data meant that 41% of charts had to be removed from the analysis. This non-compliance and that patients fell when the tool did not identify a risk, suggested to the authors that the H2FRM may not be valued by staff. Other criticisms included the apparently objective ‘up-and-go test’ which has no published reliability and validity data, inter-rater reliability which appeared to be threatened by clinical judgements and the lack of standardised measures for confusion and depression (Swartzell et al., 2013). Criticisms have also been raised concerning the lack of clarity about why certain factors are part of the H2FRM and how the weighting for the factors was calculated (Morse, 2006).

The implementation of the H2FRM was assessed in a pre- and post-audit study in a New Zealand hospital by examining the completion of documentation. After a focused education package, the post-audit showed an increase in accuracy and frequency of completing the risk score and 80% documentation of targeted intervention plans, but no improvement in the evaluation of the effectiveness of the care plan nor of the falls education to patient and family (Gibbons et al., 2013). It was noted that this did not mean that such interventions were not occurring. Another H2FRM implementation study suggested specific education in the scoring of the H2FRM scale, as it was found that 2.3% of H2FRM scores had errors in assessment or addition (Chapman et al., 2011).

The H2FRM has many factors in common with other falls risk assessments. Mental state, gait or mobility, the falls history, and medications were in most of the 32 fall risk assessments examined by Myers and Nikoletti (2003). The H2FRM includes altered cognition and requires a sit-to-stand test, but does not include a patient's falls history and lists specific medications. A study on medications found that contrary to earlier findings, it was not the number of drugs a patient was on, it was the type of medications, in particular those that affected the central nervous system, that were correlated with a fall (Lamis, Kramer, Hale, Zackula, & Berg, 2012). The medications listed in the H2FRM as risk factors are anti-epileptics (anticonvulsants) and benzodiazepines (or benzodiazepine like drugs) which is consistent with this finding.

According to Myers and Nikoletti (2003), the next most commonly shared factors are changes in elimination, poor vision, diagnosis, older age, poor hearing and mood. The regression analysis for the H2FRM proved a strong relationship with altered elimination and weighted this accordingly. Vision and hearing loss, age and diagnosis are not factors included in the H2FRM. Dizziness, vertigo and male gender are categories in the H2FRM but were not listed in the most common categories (Myers & Nikoletti, 2003). As varied methodologies were used to develop the 32 risk assessments, the most common factors are likely to have face validity as they have been derived from literature or analysis of falls data. The H2FRM includes lesser known factors and does not include some common factors, so it may lack this type of validity.

2.4.3 Clinical judgement of falls risk

The area of contention of whether a nurse's clinical judgement of falls risk is as good as using a validated tool has been studied. The nurses in one prospective cohort study over 14 weeks judged falls risk with good sensitivity but poor specificity, with a subgroup of the less experienced nurses being the poorest judge. The sensitivity and specificity finding for the nurses was similar to the fall assessments that were used as comparisons for the 34 patients

who fell from the 226 patients in the sample (Myers & Nikoletti, 2003). Nurse clinical judgement (NCJ) was required in a qualitative study involving 23 nurses as the MFS was believed "to be incomplete" (Dykes, Benoit, Carroll, Middleton, & 2009, p. 6). This finding suggests a complementary relationship between a tool and NCJ.

Six studies were used to compare the accuracy of falls prediction using the Youden Index calculation with the result that NCJ was similar to the average pooled Youden Index across all of the studies, and the results for the STRATIFY and MFS tools (mean = 0.2, 95% confidence interval 0.1 - 0.3) (Haines et al., 2007). The authors stated that NCJ had moderate levels of predictive accuracy across many different settings, an issue for all tools, and met many other criteria for a tool, such as time taken to identify high risk. They suggested that new tools could use NCJ as the standard for comparison (Haines et al., 2007). The accessibility of NCJ would be of assistance both when developing a falls risk tool and whenever a hospital team wish to validate a tool for their specific patient population.

In a quasi-experimental study in rehabilitation wards using the Downton Index for comparison with NCJ, the introduction of the tool made no significant difference to the rate of patient falls but the number of reported falls in the intervention ward was higher (Vassallo et al., 2004). Another study using the Downton Index had a strong recommendation. It was to stop using assessment tools and use NCJ as the tools are a cost rather than an aid (Meyer, Köpke, Haastert, & Mühlhauser, 2009). This twelve month cluster-randomised control trial in Hamburg on a large elderly population in nursing homes provided education on falls prevention to all care providers before the cluster randomisation. The costs of the education and the time and resources needed for the reassessment protocol were used for an economic analysis. As the use of the assessment tool showed no effect on the number of patients who fell or sustained fall-related injuries, the authors concluded that using the Downton Index was not economic. Similarly, a different study concluded that NCJ and working to remove or ameliorate aspects of the hospital environmental that cause risk would be better than a screening tool (Swartzell et al., 2013).

A synergistic relationship could exist between the use of a tool and NCJ as neither has perfect sensitivity and specificity. For many nurses, their clinical judgement and usual care may be as effective as an intervention, but a tool promotes consistency of risk score between staff, allows for reassessment of the same patient using the same parameters and facilitates coordinated care (Joint Commission Resources, 2005). The interaction between using a tool and NCJ is apparent when a protocol states that the falls risk is reassessed when there is a change of the patient's condition, and that decision is made through clinical judgement.

Falls risk assessment tools have been reviewed. The development and factors included in different tools have been compared and contrasted, and nurse clinical judgement has been compared to the use of tools with the conclusion that both are required. The aim of the risk assessment is to implement extra cares to prevent a patient from falling. Intrinsic patient factors, including the issue of effective patient education, socio-cultural and extrinsic risk factors are examined in the next section.

2.5 Risk factors of the patient

The major intrinsic, physiological, patient risk factors are cognitive impairment, especially delirium, dementia and depression; altered elimination and/or excretion; musculoskeletal deficits affecting balance and strength; sensory deficits and recent injury or infection (Hendrich et al., 2003; Hsaio, 2012; Oliver et al., 2004). Contributing and adding to these risk factors are medications that affect the function of the neurological, digestive and urinary systems causing fluid or electrolyte imbalances and deficits (Shever et al., 2011). Age, gender, most diagnoses and comorbidities, and severity of illness were not found to be significantly related to falling (Titler, Shever, Kanak, Picone, & Qin, 2011), similar to findings by Hendrich (2003) but different to the Myers (2003) summary of domains found in risk assessment tools. While research into ways to improve physical strength and balance have been shown to reduce the likelihood of a fall by a patient (Cameron et al., 2012), interventions may not be successful as, for many patients, the intrinsic factors are hard to modify (Cumming et al., 2008).

Falls for obstetric patients are primarily physiological. Predisposing factors include weakness and fainting, and most occur when patients are ambulating unassisted to the toilet (Chen, Chen, & Su, 2010). A search for fall prevention tools for obstetric patients indicated that there has been little development in this area, despite the U.S.A. National Safety Goals including obstetric patient falls (Frank, Lane, & Hokanson, 2009). An assessment for a postpartum mother who has had an epidural delivery has been developed by Frank et al. (2009) and a general assessment by Heafner (2013), and both acknowledge that it is difficult as falls are few and that, generally, the women are healthy. However, another study identified that all women in labour or delivery are at a high risk for a fall (Johnson et al., 2011). The aim of an obstetric tool is similar to other falls risk assessments – to identify risk factors and plan care to reduce risk, such as supporting blood pressure, treating infection or providing education, in order to prevent a fall from occurring. In a hospital, prevention for the newborn infant from sustaining a fall is in procedures outlining where an infant can be fed, changed and bathed (Waikato District Health Board, 2012a).

As well as physiological, intrinsic risk can be categorised as psychological and socio-cultural. The psychological risk, fear of falling, is evidenced by behaviour of being unwilling and slow to mobilise after a previous fall (Jellesmark, Herling, Egerod, & Beyer, 2012). A study claimed that health professionals seek information of factors before and after the fall, while the patient's main concern was the emotional distress associated with a fall, and what it means for their health (Zecevic et al., 2006). A near-miss will be considered of lesser importance and may not be reported by staff, yet to the patient any loss of balance may damage their self-confidence and self-efficacy leading to avoidance of mobilisation. This study concluded that patients felt stigmatised when labelled a 'faller' with its connotations of fragility and aging. A qualitative synthesis of 11 studies stated that many older people did not want to accept the stigma of being a 'faller' and may rationalise it as a 'small trip' rather than a non-injurious fall (McInnes, Seers, & Tutton, 2011). A fall was seen as threatening to the person's competence, independence and sense of control. It was suggested that in order to motivate patients for whom this holds true, health professionals need to listen carefully to the patient. This synthesis concluded that an injurious fall is a motivator to increase knowledge and self-management such as allowing time to mobilise and taking care to avoid hazards.

Adult teaching strategies on falls prevention also involve motivators. Strategies acknowledge the patient's prior knowledge and the involvement of the patient in developing their care plan and the setting of goals (Grol & Grimshaw, 2003). A literature review found a dissonance between the patient's and an institution's primary concerns regarding quality of care. The patient's concerns were the care provider's competence, knowledge and ability, but quality of care studies concentrated on the staffing, skill mix and nurse autonomy (Currie, Harvey, West, McKenna, & Keeney, 2005). The latter studies may not elucidate the need for care providers to involve patients to participate in and be responsible for their falls prevention. A qualitative interview-based study of nine patient participants found that the in-patients had emotional obstacles around asking for help and stated that they needed to be part of the individualised plan of care (Carroll, 2010). The participants in this study said that they were not aware of their risk of falls and received inconsistent messages regarding how to reduce their risk, which affected their sense of safety and autonomy. Care provider knowledge about falls prevention needs to be consistently conveyed to patients so that they can participate in their preventive care as patients themselves are an important part of falls prevention management.

Education is one way that a person can gain control and confidence. A study used a script developed by staff to provide education to reduce the risk of a fall and asked the patient to repeat the message back after the education (Quigley et al., 2009). This *teach back* method was rated as very successful by the nursing staff. It was part of the multifactorial intervention

which reduced the number of falls in the study when compared to the baseline data. A study which followed 102 patients up after discharge to measure the effectiveness of the education and pamphlets regarding prevention of falls, found that the intervention did not affect the fall rate, nor fear-of-falling, after hospitalisation (Rucker et al., 2006). Education by health professionals on falls prevention has to be sensitive to the patient's psychological and physiological blocks, as well as their knowledge and understanding.

Patient education can be effective to reduce the fall rate. A randomised control trial was undertaken in Singapore using the H2FRM to identify patients who were at a high risk of falling. Education was provided to these patients (and their family where appropriate) for 30 minutes on additional targeted fall prevention activities (Ang et al., 2011). There was a significant reduction in the number of falls for the intervention group. An Australian trial with 1206 patients used multimedia education with individual follow-up by a trained health professional for one group (complete package), just the multimedia for the second and usual cares for the control group (Haines et al., 2011). Overall there was no significant reduction in the rate of falls for the three groups, but the authors found that falls were least in those cognitively-intact patients who had the complete package.

The education of a patient is usually part of any multi-intervention strategy in order to involve and motivate a patient to be compliant with their care plan. Education is part of the Patient Code of Rights, particularly Right 6, the right to be fully informed (Health & Disability Commissioner, 2009). Nurses and midwives in New Zealand need to comply with this Code so falls education, particularly for patients who have a high risk, is a required part of clinical practice. Seeking to find the patient's goal for mobilisation (Rush et al., 2008), and raising staff awareness to take time to teach fall preventive strategies, is seen as crucial to preventing falls and reducing the psychological distress associated with fear of falling (Cameron et al., 2012). However, a large survey of 10,184 nurses on missed care in Pennsylvanian hospitals, found that talking with patients was an unmet need 40% of the time, and teaching the patient or family was missed 29% of the time (Lucero, Lake, & Aiken, 2010). In a Michigan hospital survey, patient teaching was omitted 80% of the time (Kalisch, Landstrom, & Williams, 2009). These findings indicate that patients, and their families, are not likely to be consistently receiving education about how to reduce their risk of a fall.

A patient may have a high falls risk solely based on their socio-cultural status so that staff members cannot communicate easily with them. It was found that education on falls prevention was more difficult when there is a nurse-patient cultural barrier (Koh et al., 2008). Patient ethnicity (classified as black or non-black) did not have an effect on falls in a survey of nurses in the U.S.A. (Lucero et al., 2010). Male gender was noted by Hendrich et al. (2003) to be related to impulsiveness and increased risk of falling. New Zealand is a multi-

cultural society with a bi-cultural heritage. All nurses are encouraged to comply with Principle 2 of the Nurses Code of Conduct which states that the cultural needs and values of health consumers are to be respected (Nursing Council of New Zealand, 2012). This includes knowledge of tikanga Māori and incorporating Māori models of health into preventive care for falls, such as involving family/whānau when planning care, and respecting the dignity and privacy of the patient. A patient's socio-cultural status is likely to affect their understanding of hospital policies and practices, including those related to falls prevention.

Extrinsic patient risk factors, those factors that are not inherent in the individual, include poor building design, being alone, inadequate staffing and environmental risks such as clutter, poor lighting and trip hazards. Modifying the environment has been shown to be effective (Cameron et al., 2012) and some falls risk checklists include external risk factors such as safe footwear and call bell at hand (Schwendimann et al., 2006) which could be considered standard nursing practice or usual cares. Extrinsic factors such as building layout, floor surfaces and illumination may not be able to be easily ameliorated, whereas a patient's improper use or poorly maintained mobilisation device may be easily improved.

This section has reviewed patient intrinsic and extrinsic risk factors for falls. It has been reported that safety involves minimising physiological risk factors, patient education to reduce risk of falling and increase self-confidence, and reducing trip hazards in the environment. Nurses, the health professionals who spend most time with a patient, hold a key position to ensure a patient's safety. The next section discusses competence and self-efficacy from the Safety platform model by Dykes et al. (2011) (see Figure 1, page 8), focussing on the knowledge, attitudes and motivation of the care provider.

2.6 Care provider characteristics

Nurses and midwives are described by the title care provider. The care provider may be the person who feels most responsible for a patient who has a fall. The aim of this thesis is to identify the barriers for clinical care providers when using the H2FRM to plan preventive care for falls. As a comprehensive discussion on attitudes, beliefs, values, readiness to work with others, and use of evidence in practice, are outside of what is able to be discussed for this study, only research which is primarily about nurses' knowledge of, and attitude to, falls prevention and implementation of strategies is examined. This has been summarised as care provider competence, capability and commitment (Äberg et al., 2009).

2.6.1 Knowledge

There are few studies that specifically assess fall prevention knowledge. One pre and posttest study involved 40 nurses (El Enein, El Ghany, & Zaghloul, 2012). Knowledge of

environmental factors affecting falls did not significantly improve following the education. However, after training, all nurses, except those who held a professional qualification, improved their knowledge on health education and the impact on fall prevention. The authors suggested that the nursing school curricula should be updated to reflect current knowledge. A survey of 1830 nurses to identify barriers to implementing fall prevention Clinical Practice Guidelines found that the highest barrier (83%) for care providers was knowledge and motivation (Koh et al., 2008). The follow-up study after strategies were instituted to reduce this barrier, concluded that the nurses' completion of the Clinical Practice Guideline form was a good marker of success of the new protocol, even when there had been no decrease in the fall rate (Koh et al., 2009). This study reported that 99% of the nurses completed the form compared to 50% before education.

The five root causes of falls, as identified by the Joint Commission, were used to analyse interviews in a study which concluded that nurses lacked knowledge or overestimated knowledge of evidence-based specific fall prevention measures (Tzeng & Yin, 2008). By far the most frequent barrier that staff identified was the unsafe environment. The authors stated that this was expected as people blame external events rather than their own capability - the focus of the four other root causes. As none of the nine staff nurses interviewed in the study mentioned the root cause *staff training and orientation*, it indicated to the authors that there was lack of fall prevention knowledge.

Other studies have highlighted the importance of knowledge. The recommendation from a small qualitative study was that site and patient specific knowledge are needed for nurses in regard to falls prevention and use of restraint (Williams et al., 2011). A study in the United States over three years demonstrated a decrease in the total number of falls (Johnson et al., 2011). In this study, the Helping Hands programme, *falls champions* were utilised to educate and engage nurses to undertake best practice for falls prevention. The programme began with staff education and over the three years introduced six more falls prevention measures, such as *shift-change handovers* and *post-fall huddles* to discuss patient safety and ensure continuity of care. These studies showed that context-specific fall prevention knowledge is an important precursor to good fall prevention practice.

An integrative review identified that nurses use colleagues for much of their tacit knowledge for assessment and clinical care (Spenceley, O'Leary, Chizawsky, Ross, & Estabrooks, 2008). The lack of a knowledge culture, of which tacit knowledge is a part, is one of the reasons that some authors give to explain the lack of effectiveness of a falls prevention strategy (Dykes et al., 2010; Schwendimann et al., 2006; Semin-Goosens, van der Helm, & Bossuyt, 2003; van Harten-Krouwel, Schuurmans, Emmelot-Vonk, & Pel-Littel, 2011). On the other hand, studies which examine nurses' judgement of risk suggest that knowledge of

falls prevention is good as there is little difference between scores of high risk by a validated model or by clinical judgement (Cina-Tschumi, Schubert, Kressig, De Geest, & Schwendimann, 2009; Myers & Nikoletti, 2003; Vassallo et al., 2004). The dynamics of the nursing team and use of tacit knowledge may be as important as the attributes of the individual care provider.

The knowledge culture was explored in a Dutch study. The five-month study which surveyed nurses and made 82 observations on nurse interventions for 15 post-fall patients, found that nurses survey responses indicated knowledge as a minor barrier (8%) to the application of a prevention protocol (van Harten-Krouwel et al., 2011). Consequently, it seemed inconsistent that the prescribed protocol for the delirium/confusion intervention was seldom observed to be used (24% of the time). This "forgetfulness" was attributed to the ward customs. The authors concluded that nurses needed to be educated about prevention of falls, especially those that require more time and knowledge such as using a protocol or contacting the family.

While an integrative review recommended staff training in falls prevention (Spoelstra et al., 2012), the Cochrane Database of Systematic Reviews did not find that studies involving staff training decreased the number of falls (Cameron et al., 2012). Improved knowledge of aspects of fall prevention, particularly health promotion and safety culture relevant to the speciality, rather than of environmental hazards may be required. This knowledge could be gained through orientation or on-going site-specific training and methods other than the rate of falls may be more sensitive to the effectiveness of improved knowledge.

2.6.2 Attitudes and motivation

There is a wealth of literature on how nurses' attitudes affect seeking and applying evidence-based practice, but little of this is specifically on falls prevention. The role of a care provider in falls rate reduction requires both an attitude that it is possible to reduce the number of falls and motivation to take steps towards that aim. A research study concluded that nurses attitudes towards fall prevention are nihilistic and need to change (Semin-Goosens et al., 2003). This two-year study in neurology and internal medicine wards in Amsterdam used a behavioural change model and planned to introduce fall prevention evidence-based guidelines. The authors found that during the study there was a lack of congruity in observed and self-reported nurse behaviours, no improvement in completing risk assessments nor consistent reporting of fall events. They attributed this to feelings of helplessness in the staff members and an attitude that falls are inevitable and cannot be prevented. Similarly, in a one year Australian study to implement fall prevention strategies, nurses stated that they were already doing everything possible to prevent falls happening and could not improve the fall

statistics (O'Connell & Myers, 2001). Both of these studies detailed the design and methodology enabling later researchers to learn from their methods such as leadership and the preparedness for staff to make changes.

A study undertaken in Australia to improve nurses' attitudes towards falls prevention through professional development on decision-making, found no change in the psychological and social factors that were measured (Dempsey, 2009). There was however, an enhanced use of fall prevention activities although the reduction in falls was not significant. This mixed methods study identified a number of confounding factors which impacted on the attitudes of the nurses. An attitude is an individual trait and while the goal is for nurses to individually have an attitude towards safety including falls prevention (Joint Commission Resources, 2005), in the Dempsey (2009) study groups of nurses were worked with. They found that team relationships affect individual nurse attitudes. A recommendation from the study was that decision-making on falls prevention improvements should be made within teams and at the local level.

Avoidance of stress can be a motivator to prevent further falls. A qualitative study with 15 participants on acute care nurses' experiences of a fall, found that even when it was an omission or action of the patient that contributed to the fall, the aftermath was stressful and time consuming for all parties involved (Rush et al., 2008). In a qualitative study of 23 health care professionals, fear of legal action seemed to result in compliance to safety guidelines (Stenberg & Wann-Hanson, 2011). Extra fall prevention interventions for all patients were implemented, including those who were identified as low-risk. Such actions resulted in nurses feeling confident that patients under their care were safe, while at the same time being criticised for being wasteful of resources. ACC, the New Zealand insurer for accidents, has a no-fault mandate. In New Zealand approximately 5% of hospital admissions are associated with a preventable adverse event which is similar to data from U.S.A. and Australia (Davis et al., 2003). Avoidance of the potential stress arising from a malpractice suit does not seem to have an effect on the adverse event data. It appears that it is not a simple relationship between stress avoidance and improved compliance. Nevertheless, Haines and Waldron (2011) in a review of literature on prevention of patient falls, summarised that overall, as different areas have different rates of falls, nurses will have different motivations and stress avoidance behaviours which necessitates a local approach to preventive practices.

Attitudes and motivation were found to be very high barriers for staff to implement a fall prevention guideline (Koh et al., 2008). While a patient assessment for each shift and taking of blood glucose and were missed the least (17% and 26% respectively), other cares that pertain to risk of falling were found to be omitted regularly in a study in three Michigan

hospitals (Kalisch et al., 2009). Ambulation, toileting within five minutes and response to call lights were missed 80%, 70% and 66% of the time respectively. There was similarity between the events in the three hospitals and reasons given for the omission of nursing care. They included lack of time, inadequate staffing, and that associate-level trained nurses reported more missed care than those who held diploma or degree certifications. The authors suggested the latter finding may be a result of associate nurses providing nursing care as a series of tasks, whereas falls prevention involves the integration of regular assessment, environmental safety and mitigation of patient risk factors in a timely way rather than by scheduled task.

In summary, nurses may have an attitude that many falls cannot be prevented and this may be a reflection of the culture of the workplace. There is evidence that behaviours that could help prevent falls are being omitted. The motivation of a care provider to prevent a patient from falling results in the completion of prevention tasks and is affected by the nurse's self-efficacy, need to keep the patient safe and teamwork. The protective environment is discussed next.

2.7 Context

Context is defined as "characteristics of the organisational, social, political and societal system" (Harmsen, Peters, & Wensing, 2005, p. 2). The context for the introduction of a new falls prevention innovation can be considered from the position of organisational development or change models, or social and community development models such as health promotion. It can be discussed from the worldwide perspective to the context of a single ward. As the innovation in this study is the adoption of an updated falls risk model across many hospitals and specialities, a discussion on the characteristics of a safety culture, teamwork and leadership, organisational development and economic assessment of falls prevention measures is presented. A brief discussion on the adoption of a risk assessment tool into an organisation, under the topics of issues around the appropriate goal for the reduction in the falls rate, whether one tool can be used across all specialities and the challenges of correctly identifying falls risk over the length of a patient's admission are then presented.

2.7.1 Safety culture

The health care system itself is said to make quality improvements difficult. Health care systems are described as heterogeneous, complex, have inexact procedures performed in often rapidly changing environments on increasingly fragile people (Page, 2004). A safety culture is one where patients are kept safe as a result of the perceptions and actions of all health professionals (Äberg et al., 2009) which improves outcomes for the patient, care

provider and organisation. These elements are part of the Safety platform model (see Figure 1, page 8), as the safe patient, care provider competence and self-efficacy and the protective physical environment (Dykes et al., 2011).

Äberg et al. (2009) identified the three dimensions of a safety culture as organisation, staff and leadership. Organisation components include staff who have safety as a priority and who automatically apply safety-promoting behaviours, staff and leadership who learn from events, updated policies and guidelines and lastly, a well-resourced environment. Staff and leadership have five components which are commitment, competence, capability, support and control. The authors identify organisational learning as the use of evidence-based practices, but where local knowledge reframes these to aid adoption and facilitate an innovation into becoming routine practice.

Magnet® hospitals affirm the local knowledge of nurses. Magnet hospitals were a concept developed in the U.S.A. in the 1980s which has subsequently been adopted by hospitals across the U.S.A. and in other countries. The aim of the first Magnet association was to fully utilise the expertise and knowledge of nurses. The result is that high quality care is provided, that there are better outcomes for all staff, not just nursing staff, and that there is stability of staffing (Parsons & Cornett, 2011). Magnet status is achieved, in part, by employing nurses with degree or baccalaureate-level and specialist qualifications and having safety patient-focused initiatives for events such as falls, hand-washing, pressure ulcers, restraint and infections (Swanson & Tidwell, 2011). A comparison of fall rate and staffing in Magnet versus non-Magnet hospitals found that there were fewer falls across all specialities in the Magnet hospitals (Lake, Shang, Klaus, & Dunton, 2010). Analysis of the difference found that it was not the higher registered nurse staffing ratio that accounted for the 5% lower fall rate, but that it was an organisational effect. This finding suggests that management have to recognise and value nurses and nursing, have quality the goal throughout the organisation and improve the safety culture to reduce the fall rate.

The relationship between patient safety and adverse events, including patient falls, was the focus of an exploratory study in 179 hospitals. The hospitals in the study were a sample of those registered with the American Hospital Association, and were not named as holding Magnet status. The patient safety data was correlated with the perceptions of nurses and allied health professional staff to the safety culture in the hospital that respondents worked in (Mardon et al., 2010). The statistics from the Hospital Survey of Patient Safety found a significant inverse relationship. The largest negative regression coefficients were for handoffs and transitions, teamwork across units and frequency of events reported, that is, better handovers of care were correlated with lower numbers of falls. A high reporting of adverse events was seen as an indicator of a safety culture. Staff members were able to report

and the organisation and care providers learn from the errors. This improved the coping resilience of individuals and of the group. Mardon et al. concluded that after controlling for size, ownership and teaching status, hospitals with fewer patient adverse events had a higher safety culture.

2.7.2 Teamwork and leadership

The Joint Commission (2005) stated that the goal for each individual health care provider is to take responsibility to reduce falls for high risk patients. Wilson (2013) though, has studied collective traits as the means to ensuring patient safety. Safety organising behaviours are described by teamwork, leadership support, feedback on errors, staffing and environment. The study of 381 medical-surgical nurses found that teamwork explained 28% of the variance in safety organising behaviours, and the use of individual strengths, independent of positional power, contributed to that finding (Wilson, 2013). Feedback on error was found to improve competence and commitment. A significant finding of this study was the importance of communication openness, constant sharing of information and situational awareness.

Patient handovers aim to share information about the patients and the ward environment and improve the continuity of care for patients. Ways to improve information between team members about a patient's falls risk include the individualised falls care plan discussed at shift handover (Mardon et al., 2010; Spoelstra et al., 2012), signage at the patient's bedside so that all stakeholders are aware of the general care the patient requires (Johnson et al., 2011) and clear delegation to members of the team (Dykes et al, 2009). Wilson (2013) found that improved safety organising behaviours were associated with nurses' holding a positive attitude to members of their team and to actions promoting safety made by the manager. A computer-generated care plan for identified risk factors significantly reduced the rate of falls partly because of the improved communication from one caregiver to the next and throughout the interdisciplinary communication network (Browne et al., 2004).

The results from an Australian study were that even the most experienced individual nurse did not have the capability or capacity to enact cultural change and at the ward and hospital level many factors could influence context (Schultz & Kitson, 2010). This finding is in accordance with that of Wilson (2013) who found that safety organising behaviours were best interpreted at the local level. The Schultz and Kitson (2010) study utilised the Alberta Context Tool (ACT), and the context element of the Promoting Action on Research Implementation in Health Services (PARIHS) framework in an acute care hospital. Intervention wards undertook professional development on improving the care of older persons, including the topic of patient falls. Responses to the ACT questionnaires were used to identify wards and areas where the context was amenable for development and change.

The study concluded that intervention should be targeted at ward level as there is significant variation in context factors between wards. While that study focused on unit level leadership, another which interviewed 15 Chief Nursing Officers of Magnet hospitals identified that it was at executive level where quality improvement changes were sustained (Parsons & Cornett, 2011). This finding may reflect the participants positional power, and not preclude that ward level managers also have a role in introducing and maintaining new strategies.

Teams have been described as the natural organisation of health care providers. The sustainability of a teamwork project was followed up one-year after the completion of a quality improvement study. The Collaborative Breakthrough Series on the prevention of falls, was conducted to determine the progress of the 37 teams who had been involved, and to ascertain if the programme had been maintained after the researchers left (Neily, Howard, Quigley, & Mills, 2005). Over 90% of teams said that they had continued to collect data and maintain the gains made after the initial year-long quality improvement cycle. Four of the sites that were used for falls data collection had a non-significant increase in fall rate and all had a zero major injury rate. Leadership support, as part of the supportive staffing initiative, was cited as the success factor behind the continued implementation of the project. Leaders of successful teams nurture relationships, support creativity and accomplishments while controlling the group tasks and goals (Holleman, Poot, Mintjes-de Groot, & van Achterberg, 2009), particularly when innovations are introduced.

Staffing is a responsibility for people in leadership positions. It is recommended to be in accordance with best practice research to reduce the likelihood of a fall (Page, 2004). Interviews of nurse managers found that they identified factors such as bed alarms, rounds to check on patients and sitters to monitor those patients who had a high falls risk, but none of the managers identified the need to manage staffing as part of routine preventative actions (Shever et al., 2011). Translation of evidence-based practice into clinical practice was required and the authors of this study suggested reimbursement could be an incentive for improvement of falls prevention practices. This study illustrates that professional development of managers to improve competence is as important as clinical staff knowledge of evidence-based fall prevention practices. A study which found that few staff are empowered to question management decisions on safety (Aiken, Sloane, Bruyneel, Koen, & Sermeus, 2013) confirms the need for education of managers. Without education on evidence-based practice there may be no tension for management to initiate or sustain innovations.

The Institute of Medicine recommends nurse involvement in non-hierarchical decision-making and that management demonstrate trust in nurses and promote trust by nurses (Page, 2004). Interviews of 20 managers to find out how falls clinical practice guidelines (CPG)

were developed and used found that they were best used as an interactive tool that established minimum standards and where strategies for staff to be able to receive feedback were embedded in the guideline (Bahtsevani, Willman, Stoltz, & Östman, 2010). The authors found that participant narratives included the PARIHS context element. Leadership and a reiterative process to review and refine the CPG were used until the practice was routine and the CPG not used. The participants stated that too many CPGs decreased critical thinking and lead to stagnation in professional development. This study highlighted that leaders need to allow time from the introduction of an innovation for it to become routine practice, for new staff to be well-orientated to the culture and practices of the area and for challenges to initiatives to be expected.

2.7.3 Organisational development

Motivators for change within organisations include statistics such as those indicating high numbers of preventable falls, and mandates from government or funders which incentivise management to improve patient safety. Models for organisational development state that people at all levels of the organisation have to be prepared for an innovation before it is introduced, require multilevel support and targeting of barriers for its implementation, have to be able to adapt the innovation to the locality, need to monitor the effect of the innovation and that good resourcing is crucial (Greenhalgh et al., 2004; Joint Commission Resources, 2005; Scott et al., 2003). Barriers arise when any of these factors are not taken into consideration. Scott et al. (2003) warn that planned top-down change can have dysfunctional consequences which may adversely affect patients, but Greenhalgh et al. (2004) point out that these can increase the success of adoption providing that the resourcing is good and that there is capacity within the organisation.

The PARIHS framework has been used to map the interconnecting systems at the policy, ward and individual level, and the feedback systems. Such mapping can highlight gaps in processes when undertaking organisational development. An example is the inclusion of the interdisciplinary team to ensure that physiological, psychological and socio-cultural risk factors are identified (Joint Commission Resources, 2005). Some fall risk studies state how the medical team, physiotherapists and occupational therapists will be involved (Schwendimann et al., 2006; van Harten-Krouwel et al., 2011), and a nurse referral to other health professionals is seen as a necessary action to prevent falls (Johnson et al., 2011), but many do not state how different disciplines are included (Pentland et al., 2011). Organisational development involves people at all levels and in all positions.

A quality initiative, the Productive Ward quality improvement programme, which is based on an organisational change model, has been evaluated. The programme engages ward staff to

make local changes in order to increase the time they have for direct care, increase patient satisfaction and improve efficiency. A mixed methods study of its uptake in the U.K. indicated that it has a high positive impact on teamwork (86%) and staff experience (82%) (Robert, Morrow, Maben, Griffiths, & Callard, 2011). This study attributes the positive adoption of the programme to locally adapted modules, resourcing, formal vertical dissemination channels and that it is owned and controlled largely by ward staff. A report on the Well Organised Ward, a module which can have a focus on reducing patient falls, states that mortality from falls decreased after completion of the programme (Dean, 2010).

Structural empowerment is the removal of dependence and powerlessness and has similarities to the Productive Ward model. A study to investigate this and its relationship to patient and nurse satisfaction in Canada surveyed 679 medical and surgical nurses (Purdy, Laschinger, Kerr, & Olivera, 2010). The study established that group processes are mediated by team-level structural empowerment and that this empowerment significantly reduces the number of patient falls. The rate of patient falls was inversely proportional to the percentage of registered nurses in the staffing roster. There was also a non-significant but clear positive relationship between structural empowerment and nurse attributes of psychological empowerment, quality of care and job satisfaction. Manager led structural empowerment included access to information for care, time, equipment, support, guidance and opportunities for professional growth for the nurses. The individual care provider and team characteristics are closely linked in improvement initiatives.

Another approach to the adoption of an innovation is by the employment of cultural change models. Cultural change is facilitated by a different leadership style compared to structural change in an organisation (Scott, Mannion, Davies, & Marshall, 2003). The provision of rewards, such as monetary incentives, by management when structural goals are achieved is transactional leadership. On the other hand, transformational leadership, used for cultural change, is a relationship based on working together towards jointly-held goals (Page, 2004). A review concluded that a leader using a transformative learning process, involves critical reflection on performance and is effective for educating nurses about new evidence-based research and putting this knowledge into action (Matthew-Maich, Ploeg, Jack, & Dobbins, 2010). Adoption of an updated falls risk screening tool fits with a transformational leadership model of learning.

Time for the adopter to interact with, learn about and become competent in its use, is essential for an innovation to become effective. A lengthy time will allow for embedding of practices after the initial launch and promotion period of a new preventive regime (Haines et al., 2011). An organisation can help with the development of competency through good resourcing for training, coaching and performance assessment (Fixsen et al., 2011). During

this time indicators are required to monitor progress towards the goals and provide feedback (Grol & Grimshaw, 2003). The measurement of progress for a falls risk tool can take the form of identifying barriers and facilitators to the uptake of the innovation or measuring the effectiveness of the implementation through improved preventive care.

2.7.4 Economic assessment

Safety innovations are more likely to become routine if there are resources committed to the implementation (Greenhalgh et al., 2004) and the costs of resources can be offset against the cost of a patient sustaining a fall. There are few published economic studies of improvement costs, such as the cost of *bed alarms* and *ultra low* beds balanced against the costs of a patient fall, but nurses in many countries feel that their workplaces are under-resourced when it comes to safety and that safety is not a priority (Aiken et al., 2013).

Economic evaluations are difficult for the reasons given earlier such as deciding what a fall is and the accuracy of the monitoring process. An analysis of data from 9,000 patients found that when there was a lower than median level of RN staffing, there were increased costs to the hospital due to the increase in the number of falls (Titler et al., 2005). The analysis of the costs of implementing an effective falls reduction multi-media programme in cognitively intact patients, found that there had to be more than 4% of such patients having a fall to pay for the additional cost of the programme (Haines et al., 2013). A study did not recommend the use of the Downton Index risk assessment tool after an economic analysis (Meyer et al., 2009). The Cochrane Collaboration of Systematic Reviews stated that no economic-based conclusions could be drawn from the trials reviewed (Cameron et al., 2012). While economic studies are important for resourcing decisions, an economic analysis which includes the non-financial costs of the decreased quality of life of the patient, their families, and the costs related to the effects that a fall has on health care staff, is required for the best analysis.

2.8 Adoption of a risk assessment tool

Interaction between the adopter (clinician) and innovation affect the sustainability of change. Adopter traits of motivation, intelligence, tolerance of ambiguity and compatibility of values have been found to be associated with the successful adoption of innovations (Wadensten & Carlsson, 2007). Greenhalgh, Robert, MacFarlane, Bate and Kyriakkidou (2004) described features of an innovation which help make change possible. The features are that the innovation will have a relative advantage over the previous model, will be compatible with the adopters' and organisations values, there will be organisational systems to implement the innovation which have simple 'hard core' and fuzzy periphery processes, will be feasible and easy-to-use, will have support through training or a helpdesk, the benefits can be seen, and it will be able to be adapted by the adopters. From the earlier discussion, adoption of the

H2FRM should be acceptable as most organisations have a falls risk assessment as part of the prevention of falls procedure, it is simple, easy-to-use and supported by the Upright training. However, as it is a validated and trademarked model, it is not able to be altered or reframed without further revalidation and the permission of the author.

As well as the debate on the appropriate sensitivity and specificity of risk assessment tools and whether a single figure indicating risk of falling gives sufficient information, there are three areas relating to the adoption of a tool in the context of a health organisation which are included in this review. They are the goal for falls reduction, specifically to zero falls, and two examples of operationalization of the tool, the "hard core, irreducible elements of the innovation" (Greenhalgh et al., 2004, p. 597). The examples are whether any tool is accurate enough to use across all specialities and whether it is accurate over the length of a patient's admission.

2.8.1 Assessment and zero falls

In order to evaluate the effectiveness of a fall prevention innovation, indicators of performance progress or a goal are required, such as the goal of zero patient falls. Since 2008 in the U.S.A., the Centers for Medicare and Medicaid have stated that falls would no longer be reimbursed as such events are preventable, increasing the expectation that zero falls are achievable (Dykes et al., 2009). Even with the goal of zero falls, it was concluded after 19 months of implementation of a continuous quality improvement study, that it was unrealistic to prevent all falls despite the significant reduction noted (Lohse et al., 2012). Another quality improvement study in France to reduce the number of falls, concluded that it was possible to eliminate preventable falls by quality improvement systems targeting certain factors, but that it is unrealistic to stop all falls from happening (Grenier-Sennelier et al., 2002). This was explained by stating that a risk management strategy, by definition, means that not all falls are preventable. To minimise, isolate or eliminate the risk they worked with individual nurses to improve information at handover, developed better leadership to coordinate the multidisciplinary team and linked the quality improvements to the strategic plan. Rush et al. (2008) stated that the tension between protecting a patient from harm and promoting activity and independence will always result in some patients sustaining a fall. This is in accordance with others who assert that the 'zero' fall rate is unrealistic (Oliver, Killick, Even, & Wilmott, 2008) and that no scale for falls risk can identify 100% of patients who will go on to have a fall (Morse, 2006).

A goal of a particular falls rate, taking into account the patient mix and resources available may be better to use as a measure of effectiveness upon the introduction of a new falls assessment tool (Äberg et al., 2009; Haines & Waldron, 2011). The Joint Commission (2005)

state that design of safe systems is a priority rather than error-free individual performance. Therefore, indicators for a falls prevention programmes could be safe systems rather than a zero fall rate as demonstration of such systems will account for variations in nurse workload, a patient's risk of falling and the context of the provision of care. One example of a safe system is evidence that the risk of falling has been assessed. Such documented completion has been used in some studies as a measure of the effectiveness of an education intervention aimed at nurses (Gibbons, Esselink, & McHugh, 2013; Koh, Hafizah, Lee, & Muthu, 2009).

2.8.2 Assessment with one tool in different settings

There are contradictory views regarding the flexibility and validity of a tool when used in different settings. Some researchers into in-patient falls state that a risk tool needs to be validated in the settings and populations where it will be used, especially if the patients are different from the developmental population or when it has not been previously validated in an area (Chapman et al., 2011; Myers, 2003; Oliver, 2007). Morse (2006) states that the MFS can be used in psychiatric units despite no such patients/clients in the developmental population, as there are "no theoretical rationale why the scale will not perform in groups … not included in the development of the MFS" (Morse, 2006, p.80). Others state that specific risk screens should be used in areas such as outpatients, children's wards, emergency departments and obstetrics due to the specific requirements of these areas. In outpatient areas where the patient stay is short and there is less risk of rapid changes in condition, functional assessments such as the Timed Up and Go or Berg Balance Scale, are stated to be useful (Perell et al., 2001). In children's wards the adult scales are not appropriate for the paediatric patient and useful tools are still being developed (Razmus, Wilson, Smith, & Newman, 2006). In emergency departments the tools used on wards have poor sensitivity and specificity, possibly because the reason for the fall is different in this department so a different assessment is required (Terrell, Weaver, Giles, & Ross, 2009). Similarly, the reason women fall in obstetric departments is known but risk tools do not measure the precipitating factors well (Heafner, 2013).

Haines and Waldron (2011) assert that it is useful and advisable to use a falls risk tool that has been previously validated as effective especially if there is not the capability or capacity in the organisation to validate a locally designed one. While many hospitals use a validated tool, in one survey 15% of the hospitals were using a locally developed risk assessment (Shever et al., 2011) and many research articles detail the development of their local risk assessment (Äberg et al., 2009; Browne, Covington, & Davila, 2004; Giles et al., 2006; Johnson, Veneziano, Green, Howarth, & Malast, 2011; Lohse et al., 2012). A model validated for the specific patient population is the preferred tool but it seems that a tool that is

credible to clinical staff is important when an innovation is introduced into any area, especially if education is not readily available.

2.8.3 Assessment over length of admission

A reassessment protocol is common to risk tools. A study of over 1500 patients in adult acute settings (medical, medical/surgical, critical care and family birthing units) explored whether the time of assessments of a fall risk impacted on accuracy of a fall event (Chapman et al., 2011). Only one tool, the MFS, of the four tools studied, accurately rated all of those who fell as having had a high risk of falling on the same day as the assessment was completed. Regardless of the tool used, increasing numbers of patients with low risk fell over the time of the study. Two (29%) 'low risk patients' according to the H2FRM, fell within 24 hours, rising to seven (37%) by three days post assessment. This study not only reinforced that it is impossible for the falls risk score to be completely correct, it highlighted the importance of the reassessment protocol. Clinical judgement is vital to reassess risk when required rather than reassessment to be completed by a schedule.

The timeliness of the reassessment protocol was challenged in a study to understand the efficacy of pre-operative patient education. The control group (n = 172) had seven fallers, only two of which were classified as high risk by the H2FRM (Clarke, Timm, Goldburg, & Hattrup, 2012). The ward policy was that 12 hourly assessments of risk were made (H2FRM document states that reassessments occur at a change of patient's condition or location, after fall, or every 7 days) but the study did not report on adherence to the protocol. It was reported by the researchers that A. Hendrich stated the poor ability of the tool to identify a patient who subsequently fell was probably due to the lengthy time between assessments. A study in rehabilitation areas found that the risk of falling can change more rapidly than a risk tool can be completed (Äberg et al., 2009). Even when a tool can be completed in a reasonable timeframe, in clinical practice it is one of many tasks that need to be prioritised for the quality provision of care.

2.9 Conclusion

In this chapter the H2FRM and screening tools were discussed. Research shows that the H2FRM is clear, simple and quick to complete, but there are issues with its use in populations that are not medical and surgical, its face validity and the degree to which it adds value to professional clinical judgement. It was suggested that a falls risk assessment tool is best used in conjunction with clinical judgement. Education on scoring and on the factors using local scenarios could improve the inter-rater reliability. During the time innovations take to become routine, it is expected that there will be reframing to meet the site-specific

needs but as the H2FRM is a trademarked and validated model, changes cannot be made to the H2FRM without permission and revalidation.

Many intrinsic patient attributes that raise falls risk are difficult to ameliorate. Patient education was identified as an issue and one that seems to feature in studies of missed care. Increased knowledge and giving consistent messages were discussed as challenging, and a patient who has altered cognition has particular difficulties with understanding fall prevention strategies. Identification and treatment of the causes of patient risk factors requires involvement of the multidisciplinary team.

Usual cares need to include general risk reduction measures and clear well-communicated individualised prevention strategies. The involvement of the patient, family and multi-disciplinary team in such strategies was recommended. Context-specific falls prevention knowledge is seen as a precursor to good falls prevention practices. This may change the attitudes of nurses and empower them towards better fall prevention although the dynamics of the team may be more important than changing the individual nurse attitude. Leadership is vital to facilitate change but transformational leadership is not easy to apply and sustain in complex hospital settings.

The aim for the safety culture is to have safe systems to reduce the fall rate rather than the goal of zero patient falls. It was stated that zero falls was not possible over the longer term but may be possible over shorter terms because of the variability in the fall rate. Falls with injuries may be a better indicator than falls without injury, but other methods of judging the effect of a new falls risk tool are required such as documentation of assessment, planning and evaluation of care. Care provider competence, capability and commitment affect the falls rate but are difficult to quantify compared to using the fall rate as a measure of the success of an intervention.

This review highlighted the need for further research to be conducted to examine the barriers to the implementation of a falls risk tool. A study could find out whether the barriers are related to the tool itself, personal attitudes of the nurses and midwives towards falls prevention, or attributes of the patients, or whether the barriers arise from factors in the environment or organisational practices. The next chapter will present an overview of the non-experimental descriptive study design which was used for this study.

Chapter Three – Research Design

3.1 Introduction

The previous chapter reviewed the literature related to the prevention of in-patient falls under the headings of prevention planning, risk assessment tools and clinical judgement of falls risk, care provider characteristics, patient risk factors and context. The review highlighted that there is a need for further research to identify barriers for nurses and midwives when using the H2FRM to plan preventive care for falls. In particular, the research questions were:

- What are the Hendrich II Fall Risk Model barriers for clinical nurses to plan falls prevention care?
- What are the Hendrich II Fall Risk Model barriers for clinical midwives to plan falls prevention care?
- What personal barriers for falls prevention care do clinical nurses and clinical midwives hold?
- From the clinical nurse or clinical midwife perspective, what patient characteristics are barriers to falls prevention care?
- What are context barriers for planning falls prevention care?

This chapter explains the research design and methodology of a survey to research the questions. In this chapter the measures, participants and procedures and the ethical considerations are presented.

3.2 Survey design

Research is the basis for evidence-based practice. Good research design will facilitate worthwhile results to be translated into clinical care. The approach and philosophy that is used to research a question directs the sampling techniques and how data is collected, analysed and presented (Creswell, 2014). The research question for both qualitative and quantitative designs can begin with "What are …?" The researcher critically analyses the strengths and weaknesses of possible methodologies and their underpinning assumptions to decide on the best approach to answer the research question (Creswell, 2014). A quantitative design was chosen for this research as a numeric description of the attitudes and opinions of the staff members who complete the H2FRM was sought.

The assumptions for a quantitative design are that there is a systematic empirical observation of a phenomena and that the results are statistically analysed to prove or disprove a hypothesis, and support or refute a theory (LoBiondo-Wood & Haber, 2006). Empirical observation states that when observing behaviour the researcher will not influence what is

being recorded (Creswell, 2014). The statistical tests which are used for quantitative designs have assumptions which determine which test can be used (Armitage, Berry, & Matthews, 2002).

The quantitative non-experimental descriptive survey research design can be used to gather information about a population to allow comparisons of a variable in groups of people or when little is known in order to guide more research (Kermode & Roberts, 2006). The design of this survey is non-experimental as there is no group who are receiving an intervention (Kermode & Roberts, 2006). A survey is descriptive as it seeks to describe characteristics such as attitude, belief, behaviour or knowledge (Minichiello, Sullivan, Greenwood, & Axford, 2004). The above characteristics of a survey are compatible with the research focus to describe the attitudes and knowledge barriers that care providers hold towards the H2FRM when planning falls prevention care.

A high response rate is desirable in order to reduce sampling error and bias, and increase the representativeness and therefore generalisability of results to the population from which the sample is drawn (Browne, 2005). Browne stated that voluntary participation can be a source of bias as the reason for respondents purposely completing the questionnaire is not known. A sample, even if large, drawn in a way so that many participants could not access the survey may mean that the results are not representative (Armitage et al., 2002).

Non-sampling error is a function of the survey instrument not measuring the attitude, belief, behaviour or knowledge it is designed for and is more difficult to detect than sampling error (Browne, 2005). One type of non-sampling error is when respondents give answers that they think are acceptable to the researcher. This may be minimised by assurances of confidentiality, so that respondents answer truthfully rather than giving socially desirable answers. Poor validity and reliability of the survey instrument are also described as non-sampling errors.

This research used the same survey instrument that was used in a study in Singapore hospitals on falls prevention (Koh et al., 2008). The aim of that study was to identify nurses' perceived barriers to the implementation of Fall Prevention Clinical Practice Guidelines. A similar design was used as the conclusions that were reached in that study were useful to the management of the Singapore hospitals. Despite cultural differences, the predisposing factors to patients having a fall are similar, so basing a study on another with a similar aim, can establish or challenge the findings of that study and is less expensive as the design and methodology have already been determined (Moule & Goodman, 2009). The differences between the Koh et al. study and this one were the questionnaire, staff members working in

acute medical, surgical and geriatric tertiary hospitals were surveyed in Singapore but most staff in the DHB were included in this survey, and the method of delivering and returning questionnaires was different.

3.2.1 Survey method

Survey research gathers information using questionnaires which are delivered through face-to-face or telephone interviews, online or mail, and each method has advantages and disadvantages (Browne, 2005). Online and mail surveys are usually less costly to administer than surveys using interviews (Browne, 2005) and allow time for respondents to give considered responses (McKenna, Hasson, & Keeney, 2010). A disadvantage of one-shot surveys is that the standardised format of the questionnaires and interviews do not measure change and results are limited to when and where they were completed (McKenna et al., 2010). Further disadvantages of self-administered questionnaires are that there is no absolute certainty that the person completing the questionnaire is from the sample population, that participants are not sharing responses (McKenna et al., 2010), and that the questions have been interpreted as intended (Browne, 2005). The wording, attractiveness, dissemination and return of a survey have to be accomplished in a way that suits the respondents as otherwise the response rate will be threatened.

3.3 Measures

The study questions direct the research design. The questionnaire consisted of the Barriers and Facilitators Assessment Instrument and demographic questions. In this section the instrument that was used and the psychometric tests on it are discussed, then the demographic questions are considered.

3.3.1 The instrument

The Barriers and Facilitators Assessment Instrument was developed in the Netherlands for use in settings where those who provide patient care are implementing or have implemented a new preventive care strategy (Peters, Harmsen, Laurant, & Wensing, 2002). The instrument was developed by the authors undertaking a "literature review and expert panel using a consensus procedure" (Harmsen et al., 2005, p. 2) with the aim to identify barriers and facilitators influencing the adoption of an innovation. Thus there is a fit between the aims of the research and the aims of the instrument.

Studies by Wensing and Grol (as cited in Harmsen et al., 2005) have used the instrument to identify barriers to the adoption of changes to clinical practice such as implementation of a new cerebrovascular accident prevention protocol. The instrument is said to be useful as it has been drawn from a range of different theoretical perspectives – organisational theory,

marketing, social learning, adult learning, behavioural and cognitive theories or models (Harmsen et al., 2005). The authors gave permission for its use and requested feedback on the results (Appendix 4).

The Barriers and Facilitators Assessment Instrument (Peters et al., 2002) begins with questions that are easier to answer; has questions that are clearly stated and unambiguous; has questions that do not use leading or emotive words; does not have questions that lead respondents to a particular answer, groups questions logically so that they flow well, and is in an easy-to-read format. According to Minichiello et al. (2004), these are tenets of good questionnaire design. The questions on the instrument were answered on a 5-point Likert scale. This scale enabled respondents who held a neutral position to indicate the mid-point, while indicating direction and intensity of the respondent's choice on either side of it.

As per the authors' recommendations, changes were made to the Peters et al. (2002) instrument before it was distributed. These changes were to replace "innovation" with the "Hendrich II Fall Risk Model" and questions that were not relevant were removed such as those on opening hours and reimbursement. The questionnaire was discussed with three management staff of the DHB with the result that changes were made. Firstly, two open, or free form, questions were added. The aim of this was to allow respondents to elaborate, if they wished to, on the questions "I think parts of the H2FRM are incorrect" (question 8) and "the H2FRM does not fit into my way of preventing patient falls" (question 16). Secondly, the question that other health professionals "do not cooperate to apply the H2FRM" (question 10) was divided into three questions: working with doctors, with physiotherapists and with occupational therapists. Thirdly, minor wording changes were made to questions to improve interpretation such as, "weigh the wishes of the patient" was changed to "consider the wishes of the patient". The authors (Peters et al., 2002) suggested that questions could be added to elicit more information so two questions were inserted based on the literature. One addition related to the perception respondents have of the hospital safety culture and the other to the efficacy of delegation. These changes meant that the original 27 item instrument was modified into 23 items with one question in three parts and three free form questions.

The questions in the Barriers and Facilitators Assessment Instrument were divided into four categories and ordered so that all of the questions for one category were not asked in sequence. The categories were: Innovation (H2FRM), Care provider, Patient and Context. The characteristics in the H2FRM category concerned the usefulness of the model – time taken, flexibility in its use, whether the training was adequate. The questions for the Care provider characteristics were in relation to the knowledge, skills and attitudes towards falls prevention and the H2FRM. The questions for the three Patient characteristics were

pertaining to intrinsic factors. The characteristics of the Context category were measured by questions about the extrinsic factors in the workplace and attitudes of the respondent to working with members of the multi-disciplinary team. The survey with the modified instrument is attached as Appendix 3.

It is important that survey questionnaires are understood by the potential respondents (Minichiello et al. 2004). While some questions in the instrument were altered to enhance understanding, the characteristics were unchanged except *specificality* to *specificity* and *didactive* to *didactic.* Some characteristics relate better to the questions than others. For example, the unaltered instrument question, "It is difficult to give preventive care for falls to patients with a different cultural background", is the *ethnicity* characteristic, while "Working according to the H2FRM is too time consuming", is the *time investment* characteristic. The questions in the modified instrument and their associated categories and characteristics are attached as Appendix 5.

The authors of the instrument placed the *group norms, socialisation* characteristic in the *Care provider* category. The survey questionnaire, when used by Koh et al. (2008) to investigate the perceived barriers to clinical practice guidelines, placed this characteristic under Context. As the definition of context includes social characteristics (Peters et al., 2002), the decision was made to put this characteristic in the same category as the Koh et al. (2008) study in order to assist with comparison of the results between the two studies.

3.3.2 Validity and reliability of the survey instrument

A reliable and valid survey instrument is central to quantitative research in order to consistently measure a particular concept which will also enable comparison of findings across studies (Sushil & Verma, 2010). Reliability refers to consistency of measurement (Armitage et al., 2002). Validity is described as a construct that holds when there is a logical relationship among questions, and external validity is when the findings are able to be generalised to a wider population (LoBiondo-Wood & Haber, 2006). A validated instrument was used for this study.

Psychometric and validation testing for the instrument were carried out in the Netherlands and the authors stated that it was useful in twelve studies. It has a Cronbach alpha coefficient between 0.63, care provider characteristics, to 0.68 for patient characteristics. This coefficient is a measure of internal consistency and for new scales, a coefficient of 0.70 is acceptable (DeVellis, 2003). However the statistic is less sensitive when there are less than ten items (Pallant, 2007), which is the case for the four subscales of the instrument.

3.3.3 Demographic questions

Demographic questions need to be based on literature and avoid asking for extraneous information (Browne, 2005). The rationale for the three demographic question are as follows. A question on the practice setting was included as a risk screening tool has been found to be of most use when the population it is used on is similar to that of the developmental study population (Oliver et al., 2004; Spoelstra et al., 2012). The qualification of the respondent was asked as grey data from the DHB indicated that midwives were not undertaking the online education on the H2FRM at the same rate as nurses. The third demographic question asked about the years of experience as new graduate nurses were less able to assess risk without a tool than other nurses (Myers & Nikoletti, 2003) and experienced nurses are more likely to have used a variety of frameworks to score fall risk and have a comparison. The diploma or degree status was not asked, nor was gender or age, as there was no literature to suggest completing the falls risk assessment related to those variables. The Koh et al. (2008) study using the same instrument reported no relationships with the qualification, gender and age demographic variables.

3.3.4 Piloting

As there is no contact when using a questionnaire survey between the researcher and the participants, misunderstandings regarding questions may arise. Pilot studies provide a check that the meaning of each question is unambiguous and that the time taken is appropriate (De Vaus, 2004). De Vaus also stated that piloting helps to ensure that the layout of the questionnaire is clear and inviting, that respondents are able to make accurate responses and that support, if required, is available. Piloting gives an opportunity to check systems of distribution, collection, entering, coding and cleaning data (Boynton, 2004). Lastly, it is a check that the survey has a clear focus and purpose which relate to the research questions and that the respondent is engaged and motivated to complete it (Rattray & Jones, 2007). The results of psychometric tests on a pilot study show that questions which have a high return rate demonstrate that respondents understand the question, but where less than 20% have endorsed a response then that the item may be unreliable (Rattray & Jones, 2007).

The nurses who were invited to pilot the questionnaire included one new graduate registered nurse, one senior registered nurse, one registered nurse who identified as Māori, two registered nurses who spoke English as their second language, two registered midwives, one enrolled nurse and the Falls Committee members present at the August 2012 meeting. Despite the invitation to midwives to pilot the study, no responses were received. The feedback from this consultation resulted in minor wording changes so that the questions were easier to understand in the New Zealand context while retaining the meaning.

3.4 Participants

The project was carried out in the hospital facilities of a DHB. These included a large tertiary teaching hospital, four rural hospitals, two rural continuing care facilities and seven birthing units – a total of 770 beds. The specialities, wards, units and areas, included acute medical and surgical wards, emergency departments, oncology, paediatrics, rehabilitation and convalescent care wards, obstetrics units and gynaecology wards, a psychiatric unit, day-stay medical and surgical areas and outpatient clinics.

Efforts were made before the survey was distributed to identify the number of clinical staff in the population of nurses and midwives who are expected to routinely complete the H2FRM. Some areas in the DHB had an exemption from completing the assessment, and others said that they were intending to apply for an exemption because the manager did not think that the H2FRM was an appropriate falls assessment tool. Exemptions to the routine completion of the H2FRM were granted by the DHB Director of Nursing. In these areas, the Manager of the area used a standardised DHB framework to address why using the H2FRM was not appropriate e.g. patients do not move, have a nurse at the bedside and have constant monitoring. The sampling frame excluded those wards exempted but included all the areas which indicated they were intending to apply for an exemption, except the psychiatric services where staff requested the researcher to not distribute the survey despite DHB approval to do so. This area was removed from the sampling frame. Similarly, surveys did not get distributed to all of the outpatients' clinics as the Manager stated that this area would be applying, and subsequently did apply, for an exemption. Lead Maternity Carers (LMC), midwives, who were not employed by the DHB but only work there when following their client, are not expected to complete DHB admission documentation, so were not included in the sampling frame. The participants were clinical nurses and clinical midwives from medical and surgical wards, day and long stay wards/units, obstetrics and paediatric areas, who routinely completed the H2FRM on admission, whenever there has been a change of condition, and at least every week.

According to Browne (2005) this is a non-probability purposive sample as the participants are not drawn at random but were included because of their knowledge on the subject. As stated by the DHB policy, the nurses and midwives in this study understand the H2FRM and routinely complete it to ascertain the falls risk of their patients. The use of the purposive sampling approach meant that there is likely to be bias related to familiarity with, and attitude towards, the H2FRM.

The pool of potential respondents was 1328 and included 1156 clinical registered nurses, 50 clinical enrolled nurses and 122 clinical midwives employed by the DHB who worked in wards, clinics and units where they were expected, as part of their patient assessment, to complete the H2FRM.

3.4.1 Participant consent

The Information Sheet (Appendix 2) was attached to the instrument and demographic questions and was available for all respondents to read. The sheet outlined the purpose of the research, how it would be conducted, the timeframe and details should respondents need to contact the researcher or supervisor. The rights of the respondents and the benefits of participating in the research were stated. It was clearly expressed on the Information Sheet that completion and return was taken as consent to be able to use the response.

3.4.2 Recruitment

The survey was distributed to wards, facilities, clinics and units throughout the DHB hospitals. The rationale for using the survey procedure is that pen and paper surveys are often used in the DHB to gather information from nurses. It was considered that it would be beneficial to use this familiar approach rather than using an online survey design. Each survey pack included an Information Sheet (Appendix 2), the modified Barriers and Facilitators Assessment Instrument questionnaire and demographic data questions (Appendix 3) and a small chocolate bar as a token of reciprocity.

3.5 Procedures

The H2FRM is used in all areas of the DHB hospitals and continuing care units. The surveys were hand-delivered and the number left for distribution was determined by either the manager or clinical educator of the ward or area, who told the researcher how many clinical staff, registered and enrolled nurses and registered midwives, were on the roster and the best way to distribute the surveys. This was by the manager or educator of the ward hand delivering them, by being left in the ward staffroom for staff to independently access, or by being named and placed in the staff member's personal mailbox. Most surveys were distributed over October to mid-November 2012 but by request of the Clinical Nurse Managers, the questionnaires for one ward and one unit[1] were distributed in January - February 2013. The return address was on the back of the last sheet of paper with fold lines so that respondents could fold and staple the form and put it in the internal mail to the researcher. A poster, indicating a return date of one month after distribution of the survey, was displayed in the most appropriate place for the ward or area.

[1] Psychiatric unit. Subsequently it was decided to not distribute the surveys.

Over the time that the survey was conducted, there were activities around the tertiary hospital that could have impacted on the return rate (Haines & Waldron, 2011). Several wards were preparing to shift to new premises and some had shifted within the two months previous to the survey. An audit and a comprehensive education package on the H2FRM was undertaken in another area and on-going audits were mentioned by several ward leaders. One manager asked for the survey distribution to be delayed because of audits.

According to De Vaus (2004) reminders increase participation rates, so weekly emails were sent to the nominated contact person in the ward or area for three weeks following distribution of the questionnaire requesting staff to respond. Notes were also written in the ward Communication book, for staff to be notified directly. Questionnaires were on the ward or area until the closing date. After that date, a notice thanking participants was put up and the in the ward, clinic or area visited to retrieve any remaining surveys.

3.6 Data analysis

Mail surveys are commonly reported to have a response rate of 25 - 30% (Gills & Jackson, 2002). It was therefore expected that there would be between 330 and 400 responses as 1328 surveys were distributed. Generally a higher response rate means that there is more certainty that the analysis will be able to be generalised to the population (Neuman, as cited in Minichiello et al., 2004).

The process of cleansing the data is to detect errors that will affect the analysis of the data and then correct or delete these (Armitage et al., 2002). Reviewing data may also indicate why a response is incomplete and provide information on the population who did not respond to the survey. Data were visually screened before analysis for missing values, coding errors, responses from participants who were not in the sampling frame and other inaccuracies. Responses that had at least one answer in the Likert-scale section were retained.

Data were entered into an Microsoft Excel spreadsheet and transferred into SPSS version 18.0 (PASW Statistics Student Version 18.0, 2009) for analysis. Controllers were placed on what could be entered into the Excel database in order to aid correct entry. The recoding that was required by the authors of the Barriers and Facilitators Assessment Instrument was carried out on nominated questions. Some respondents had more than one qualification. The most relevant or highest qualification was entered such as RM, if the respondent was working in an obstetrics area, or RN as the higher qualification.

The responses to the questionnaire were on a 5-point Likert scale. Responses have been collapsed for analyses within questions or groups of questions. For instance, this was

necessary for the barrier calculation which was “the percentage who agree and fully agree” (Harmsen et al., 2005, p.5); certain characteristics were obtained by the average of “the percentage who agree and fully agree” responses for two or more questions; and ‘day stay’ included medical and surgical day stay. As there were few responses from the post-anaesthetic care unit, these responses were in *day stay* as there were similarities in the time a patient spent in the area.

Analysis used non-parametric tests as they do not have to meet assumptions on the normality of the distribution or that the scale is ordinal. Gamma, a non-parametric coefficient, can be used to investigate correlations or relationships on a bivariate tables where there is ordinal data, such as the Likert scale, and is less sensitive to cells which have a frequency less than five and rare combinations of responses compared to other correlation tests (Denscombe, 2010). The limitation is that the coefficient does not describe a relationship where there is one-way dependence and that values of -1 to +1 will not always indicate an association (Argyrous, 2000). Therefore Gamma is not useful for directionality, cause and effect or an important causal relationship, but tests the null hypothesis that there is no independent relationship between two categories. A Gamma of -1 indicates perfect negative association, of +1 when there are only concordant pairs and 0 when there is as many concordant as there are discordant pairs (Argyrous, 2000). A - 0.30 Gamma correlation can be considered weak negative association and + 0.70, a strong positive association (Denscombe, 2010).

Descriptive data analyses include measures of central tendency and variance analysis. Even though the Likert scale is ordinal, the assumption has been made that the distances between responses are nearly equal, indicating that the descriptive statistics, mean, median, mode and standard deviation, can be used (Plitcha & Garzon, 2009).

3.7 Ethical considerations

When conducting research in health settings researchers have a responsibility to be mindful of beneficence and non-maleficence (Rogers & Niven, 2003). In addition, ethical assessment includes patient autonomy and justice (Dovey, Hall, & Phillips, 2011). In order to demonstrate this, the research has to be of benefit to the individual and to the organisation, to avoid psychological, physiological, social or economic harm during the research process and to remove harm that may result from the research. Individual self-determination, ethical and legal rights to be involved in the project need to be upheld. The informed consent process needs to meet standards considered adequate by reviewers. Ethical considerations need to be applied to all aspects of the research process from securing funding, recruitment, data

collection, data analysis, writing up, publication and dissemination to potential readers of the report (Creswell, 2014).

The ethical approval was gained from the Massey University Human Ethics Committee (Appendix 6). The application included support from Kaumatua Kaunihera of the DHB to conduct the research (Appendix 7) and DHB authorisation for the research to proceed (Appendix 8). The study appendices also include the Information Sheet (Appendix 2) and a letter of approval for the use of the Barriers and Facilitators Assessment Instrument (Appendix 4).

The researcher tried to minimise impact on the wards by checking initially with the Clinical Nurse Managers that a survey could be distributed and the best method and timing to do that within the ward culture. These recommendations were subsequently adhered to.

A pilot of the survey on a similar but different group from the sample can ascertain if there are issues such as literacy or inappropriate terminology and how to mitigate these while ensuring the questionnaire remains valid (Minichiello et al., 2004). The responses to the pilot study showed that the length of the questionnaire was appropriate to the time that staff had to complete it in their working day. As the participants were required to have completed a qualification and be currently employed by the DHB in order to be recruited, vulnerabilities due to age, literacy level and physical condition were not manifested. Neither the authors of the survey nor Koh et al. (2008) indicated that the survey had questions that were intrusive or caused offense. The nurses who were involved in the pilot survey were asked specifically if there were any questions that were difficult to answer for reasons such as these and all replied that there were no issues. The pilot included both a similar group and potential respondents.

Consultation about the research started early with the DHB Māori consultation committee, Kaumatua Kaunihera, to ensure issues of cultural safety could be addressed. No participant used any of the methods – telephone, direct contact or email, to contact the researcher or the Supervisor to express concerns about the survey.

Informed consent was presumed after the respondent had read about the survey on the Information Sheet and decided to complete and post the questionnaire. Confidentiality and anonymity were maintained as nothing on the questionnaire could be used to identify the respondent. A few named responses were returned and immediately de-identified. Some respondents chose to write comments and these were used sparingly and only to demonstrate a result from the data analysis so that confidentiality was maintained.

Responses are kept at the time of writing in a locked cupboard and a password protected computer and the data will be destroyed at the end of the study by Massey University (in about 5 years). The Supervisor and the researcher were the only people to see the responses. While a small incentive (a chocolate bar) to complete the questionnaire was offered, these relied on an honesty system to collect and no person could feel pressured by the researcher into completing the questionnaire. No conflict of interest was identified and there were no financial incentives for the participants or the researcher.

The responses identify position and speciality. The authors of a multi-national study stated that different countries have different ethical priorities (Dovey et al., 2011). They stated that as New Zealand has a small population, maintaining and protecting privacy is a greater issue than in other more populous countries. While there was a low response rate for some specialities, it was not low enough to be able to identify a particular clinical nurse or clinical midwife.

3.8 Conclusion

The Research Design chapter has discussed and given the rationale behind the use of the descriptive non-experimental survey. The rationale for the use of a survey was that it is an appropriate design to identify attitudes of nurses, specifically the barriers for clinical nurses and midwives when using the Hendrich II Fall Risk Model to plan preventive care for falls; that the survey would aid understanding about an issue that had arisen in the DHB; that survey methodology is familiar to the nurses employed by the DHB and could be completed during the time they were at work; and that it was relatively inexpensive.

The participants are a sample of clinical nurses and clinical midwives working for a New Zealand DHB, selected on the basis of willingness to participate in the survey. The validity of the survey tool, developed for identifying barriers for health care staff using a new preventive strategy, has been discussed. Some of the issues in the distribution process have been explained including the reason why not all of the nurses and midwives employed by the DHB were included in the survey. Data analysis procedures were presented. The ethical considerations for the design and method, and the informed consent process, have been discussed and relevant permissions have been referred to. In the next chapter, the results of the survey are given.

Chapter Four – Results

4.1 Introduction

In previous chapters the issues of patient falls were introduced and the reasons for this study were presented. The study aimed to identify the barriers that clinical nurses and clinical midwives have when using the H2FRM to plan preventive care for falls. The methodology chapter explained the descriptive non-experimental survey approach in order to obtain data to answer the research questions. The survey used the validated Barriers and Facilitators Assessment Instrument (Peters et al., 2002). The research questions were:

- What are the Hendrich II Fall Risk Model barriers for clinical nurses to plan falls prevention care?
- What are the Hendrich II Fall Risk Model barriers for clinical midwives to plan falls prevention care?
- What personal barriers for falls prevention care do clinical nurses and clinical midwives hold?
- From the clinical nurse or clinical midwife perspective, what patient characteristics are barriers to falls prevention care?
- What are context barriers for planning falls prevention care?

This chapter presents the results. Firstly, the demographics of the sample are presented, followed by the barriers identified by calculations for the sample and for subgroups in each research question. Lastly, the correlation statistics are presented.

4.2 Sample characteristics

The purpose of this section is to understand the data in order to compare it with known statistics of the population and infer information about the sample. The data includes the demographic variables relating to qualification, length of time nursing and area of work. This data comes from the nurse/midwife responses.

4.2.1 Response rate and sample description

Demographic information provides information on the type of nurses and midwives who responded. A total of 404 responses were used for analysis. The total response rate was 31% (Table 1). Nearly half of the enrolled nurses responded to the survey, a third of the registered nurses and a small proportion of the registered midwives. Eight respondents did not indicate what qualification they held. Five of these responses were completed to the end of the second page and the other responses had only the demographic questions left incomplete. The

frequencies of responses per question for the sample were all above 94%. Nineteen of the twenty three questions were answered by over 97% of respondents.

Table 1

Sample Demographics by Qualification

Qualification	Population	Number of respondents	Percentage (%)
Enrolled nurse (EN)	50	21	42
Registered nurse (RN)	1156	366	32
Registered midwife (RM)	122	9	7
Unspecified		8	
TOTAL	1328	404	31

Respondents were asked how many years they had been nursing (Table 2). The mean was 13 years 8 months with a standard deviation of 11 years (SD = 11.0). The mean for the registered nurses years of experience was 12 years (SD = 10.6) which was less than that of the midwives in the sample, at 18 years (SD = 9.9). The mean for enrolled nurses was much longer at 27 years (SD = 12.6). The training for enrolled nurses stopped for ten years and only resumed again in 2003 (Meek, 2009) and in the local training establishment in 2010, so the experience level for enrolled nurses reflects the length of time since they gained their qualification. The Nursing Council of New Zealand state that 75% of enrolled nurses are older than 50 years of age (Nursing Council of New Zealand, 2011) which is in accordance with the length of service of the EN sample.

Table 2

Sample Demographics by Experience

Years of experience	Survey Sample (n)	Response Rate (%)	Cumulative Percentage* (%)
Up to 1 year	24	6	6
2 to 5 years	84	21	27
6 to 10 years	91	23	49
11 to 15 years	45	11	60
16 to 20 years	47	12	72
More than 20 years	82	20	92
Unspecified	31	8	100
TOTAL	404	100	100

*Rounding effect applies

Half of the respondents have been working 10 years or less, and a fifth have been working longer than 20 years (Table 2). The Nursing Council report stated that surgical nursing has the lowest number of older nurses (Nursing Council of New Zealand, 2011) and as surgical nurses comprise about one third of the respondents, the sample may be from a younger age cohort of nurses.

Table 3

Sample Demographics by Area of Practice

Ward or area	Population (N)	Number of respondents (n)	Percentage of respondents (%)
Surgical wards	233	140	60
Medical wards	342	135	39
Rehabilitation/Convalescent care wards	108	28	26
Day-stay (medical and surgical)	58	12	21
Outpatient clinics	64	12	19
Work across wards	189	34	18
Paediatric wards	71	7	10
Emergency departments	130	9	7
Obstetric (Pre- post-natal wards, delivery)	133	8	6
Unspecified		19	
TOTAL	1328	404	31

Surgical wards had the highest return rate and the lowest return rate was from the emergency departments and obstetric areas (including delivery and pre-and postnatal) (Table 3). When the response rate is above 30% there is more certainty that the analysis will be representative (Neuman, as cited in Minichiello et al., 2004). Using this rule, the results from surgical and medical areas can be generalised, the response rate of the longer-stay wards (26%) may be representative, but the response rate from day-stay areas, outpatient clinics, paediatric wards and emergency departments was not likely to be representative. As most midwives work in the pre- and post-natal and the delivery suite, the low response from this area (7%) is associated with the low response from midwives (6%). *Work across wards* refers to those nurses who work in different areas depending on staffing needs. Responses were received from all of the wards, clinics and areas into which the surveys were distributed as shown by Table 3.

The Barriers and Facilitators Assessment Instrument is used "to measure barriers to and facilitators for improvement of patient care, with a special focus on preventive care" (Harmsen et al., 2005, p.2). The barriers will now be discussed firstly by frequency distributions, then calculations of the percentage and mean barriers.

4.3 Summary of barriers

The protocol for the use of the Barriers and Facilitators Assessment Instrument is to identify the barriers for the 18 characteristics (Harmsen et al., 2005). A barrier is defined by the authors of the instrument as "the percentage of those who 'disagree' and 'fully disagree' of positive questions 1-3 and 14; the percentage of those who 'agree' and 'fully agree' of negative questions 4-13 and 16-22; the average of questions for the *specificity, flexibility* and *group norms, socialisation* characteristics" (Harmsen et al., 2005, p.9). Firstly, the distribution of the sample is presented. This is followed by a summary of barriers as calculated by the percentages as above and by descriptive statistics, in particular, the mean.

The purpose of descriptive statistics is to describe and summarise the numerical data in order to draw conclusions from the analysis. Descriptive statistics include measures of central tendency and of variability (Plitcha & Garzon, 2009). Measures of central tendency include the mean, median and mode. A discussion of variability indicates how the data is distributed and includes the shape of the distribution, outliers, standard deviation, range and interquartile range.

The rating used for the Peters et al. (2002) questionnaire is a 5-point Likert scale. This scale is subjective and ordinal but can be used to measure the attitudes in a quantifiable way with comparisons of rank order (Denscombe, 2010). The coding of responses from 1 to 5 corresponded to *strongly disagree* through to *strongly agree*, so a mean response can be calculated. The 5-point Likert scale has been collapsed rather than calculating the median and is presented as the percentage barrier. Percentage barriers may be the more appropriate statistic to use to explain the data as it is recommended by the authors of the instrument and it does not assume ratio data. As there are many modes, this measure of central tendency has not been included.

A barrier was indicated when the percentage calculation was 30% or more and/or the mean score was 3.0 or greater. A higher mean score was a stronger perceived barrier. Low scores indicated a facilitator to the use of the H2FRM to plan preventive care for falls. Questions 15 and 23, the additional questions, are discussed in section 4.6. In the following tables, barriers are highlighted in bold.

4.3.1 Distribution of sample

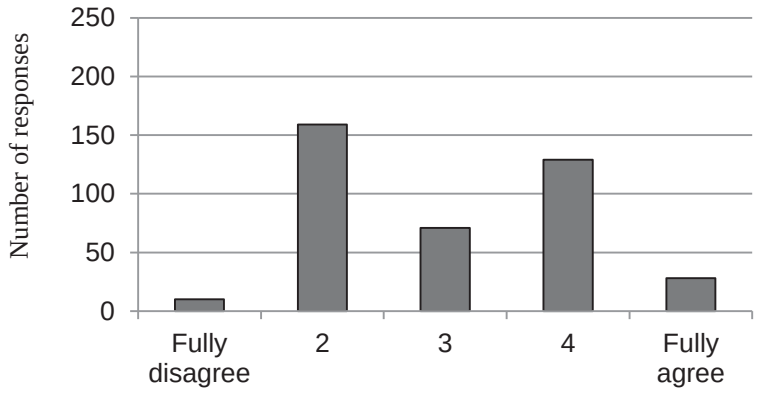
The shape of a distribution will indicate information about how the question was answered (Plitcha & Garzon, 2009). Typically the shapes of frequency distributions are described as symmetrical normal bell-curve, U-shaped, bi-modal or asymmetrical by a skew to the right or left (Plitcha & Garzon, 2009). Outliers are values that are much larger or smaller so are distant from other values.

The frequencies for responses on the Likert scale for each question have been graphed. From the shapes of these graphs, respondents did not mark many responses as *strongly agree* or *strongly disagree* and tended to use the middle categories of *agree, do not agree or disagree* and *disagree*. It was found that approximately a third of the participant questionnaires had no response on the Likert scale marked in either the *strongly agree* or *strongly disagree* choices, a third had marked either the *strongly agree/disagree* at least once, and the final third had marked both the *strongly agree* and *strongly disagree* choices at least once. This indicates that the questions did not generate an intense reaction in the respondents.

Only one question had responses that had a symmetrical bell-shaped frequency distribution graph. This was the question about whether nurses had *doubts about the H2FRM*. As the most common response was non-committal, agree and disagree frequencies similar, and few responses at the extremes, there appears to be ambivalence about this characteristic.

Five questions had a bimodal frequency distribution graph. The questions were on the *flexibility*, *specificity of the H2FRM*, *involvement*, *knowledge*, *motivation*, and the *health status*. The sample was evenly divided between those who agree and those who disagree as illustrated in Figure 2.

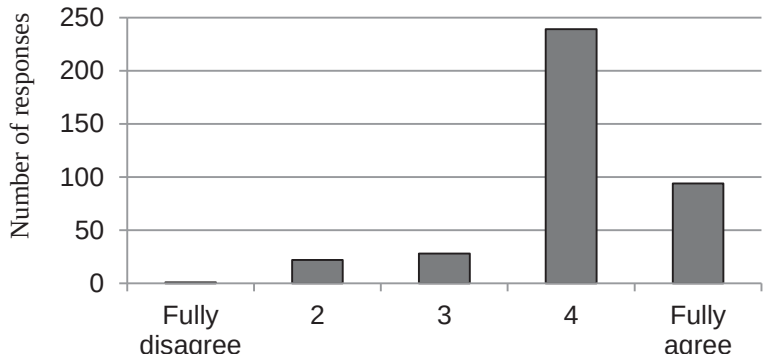
Figure 2. Bimodal distribution of responses to question 1: *The H2FRM leaves enough room for me to make my own conclusions about falls prevention.*



A graph with a negative skew frequency distribution for the Likert scale, where *1* is *fully disagree* and *5*, *fully agree*, will have the lower tail longer than the upper tail (Armitage et al.,

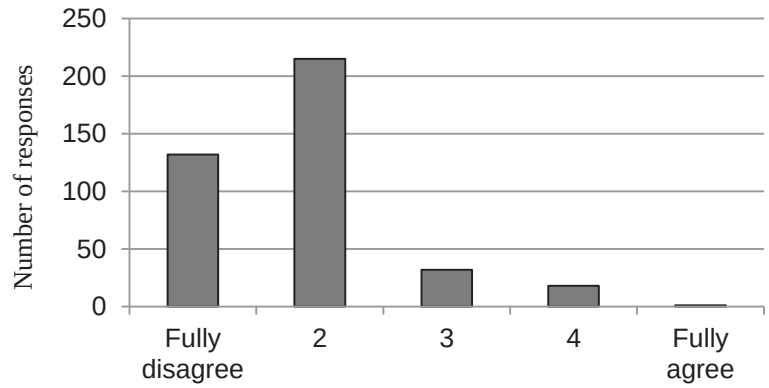
2002) and most responses will be towards the *fully agree*, that is, a strong barrier. The three questions that had a negative skew were all in the *Context* category. They were nurse/midwife attitudes to the *supportive staff* they work with and having the *facilities* and the *building* conducive to preventing falls. The negative skew is illustrated in Figure 3.

Figure 3. Negative skew distribution of responses to question 19: *It is difficult to give prevention care if physical space if lacking, say at the bedside or in the toilet.*



The rest of the questions have a positive skew frequency distribution indicating that most responses are *disagree* or *fully disagree*, and that the characteristic is not a strong barrier and may be a facilitator. Two questions had distributions that indicated higher numbers of *fully disagree* than were seen in other questions. One of these was the characteristic *attitude, role perception* (Figure 4) and the other was *time investment*. The nurses who completed these questions seemed to completely refute the questions, implying that respondents had no personal problems with accepting new procedures, and that time to complete the H2FRM was reasonable.

Figure 4. Positive skew distribution of responses to question 7: *I have a general resistance to working according to procedures.*



There was a weak positive skew to the frequency distributions of the three characteristics, *group norms, socialisation*; *ethnicity* and *compatibility*. The distribution indicated weaker barriers to these questions when compared to questions with a stronger positive skew distribution. A rectangular distribution was noted for the question pertaining to how nurses rated patient's *motivation to change.*

4.3.2 Summary of barriers for the sample

The calculations for the summary of barriers for the data are presented in Table 4. For most characteristics, if a percentage barrier was 30% or more, it was also a barrier by use of the mean, that is, 3.0 or greater.

The strongest barriers demonstrated by both the percentage and mean data are the Context characteristics, lack of physical space, equipment and supportive staff. Despite the strength of these barriers, there were no free form comments to support these results.

The specificity and flexibility of the instrument was a strong barrier and many free form comments such as "the model needs to be updated to allow nursing discretion to come into the equation", "the form is not specific to post-anaesthetic patients" and "need to have medium risk", supported this.

Lesser barriers were doubts about the correctness of the instrument, knowledge of how to provide falls prevention and involvement of the H2FRM in the way staff prevent falls. The latter two barriers were not supported by the calculation of the means. Free form comments supported the barrier that parts of the H2FRM were not correct. They included that the tool did not include a previous history of falls, age of the patient, vision and other disabilities. Respondents commented that they wanted more medications such as opioids on the list, the "foreign environment" acknowledged and disagreed that male was a risk factor. Also "I have never heard of anyone referring to it once it has been filled in or taken it into consideration in care planning" and "I don't find it pertinent to patients real risk of falls". More specific comments were that the H2FRM did not provide for patients with a nerve block or in pain, and also noted that the up-and-go test was limited as it did not account for mobility aids or unsteadiness after starting to mobilise.

A patient's motivation to engage in their fall prevention plan was also demonstrated as a barrier and free form comments such as "taught about call bell but patient still don't use it, patients take short cuts" and "can't prevent the confused from falling", reflect this issue. The health status of the patient was demonstrated as a lesser barrier to effective falls prevention.

Of note were the very low barriers, perhaps facilitators. These were that *changing routines* and *working to procedures* were not barriers to the adoption of the H2FRM. Free form comments on this area stated that respondents were willing to comply with procedures,

Table 4

Summary of Barriers (n=404)

Barrier	Percentage Barrier (%)	Mean Barrier
H2FRM Characteristics		
Specificity, flexibility	**43**	**3.1**
Compatibility	23	2.2
Attractiveness	19	2.6
Time investment	13	2.4
Didactic benefit	9	2.2
Care Provider Characteristics		
Knowledge, motivation	**36**	2.9
Involvement	**33**	2.7
Doubts about the H2FRM	**30**	**3.0**
Education	15	2.4
Lifestyle, working style	6	2.1
Attitude, role perception	5	1.9
Patient Characteristics		
Motivation to change	**38**	**3.1**
Health status	**32**	2.7
Ethnicity	26	2.8
Context Characteristics		
Facilities	**87**	**4.1**
Building	**87**	**4.0**
Supportive staff	**82**	**3.9**
Group norms,/socialisation	15	2.5

especially when they improved patient safety. The results also demonstrated that the H2FRM is a good starting point to find out more about falls prevention.

4.4 Barriers identified for research questions

The results for the subgroups for each research questions are analysed by the percentage and mean calculations and are presented in this section.

4.4.1 What are the H2FRM barriers for clinical nurses to plan falls prevention care?

The strongest barrier demonstrated by the data in Table 5 was the *specificity, flexibility* of the H2FRM for RNs and ENs. This characteristic is discussed further in 4.4.1.1.

The time to complete the H2FRM and *compatibility* of the Upright training are barriers for ENs. The free form comments, "it takes time away from being able to prevent falls", is consistent with the EN time investment barrier. Other comments, "the online training is too long and most people I know that have done the training just skip over as there is just too much too read", "the online certification … if you don't click the 'expected' answer its wrong, waste of money! Waste of time!" and "terrible voiceover" appear to demonstrate a compatibility barrier. The usefulness, *didactic benefit*, of the H2FRM to the planning of falls prevention care interventions is not a barrier.

Table 5

Barriers for H2FRM Characteristics for Nurses

Qualification	RN (n=363)		EN (n=21)	
H2FRM Characteristic	Percentage Barrier (%)	Mean Barrier	Percentage Barrier (%)	Mean Barrier
Specificity, flexibility	**45**	**3.2**	**30**	2.9
Compatibility	23	2.7	**30**	3.0
Attractiveness	19	2.6	10	2.6
Time investment	12	2.4	**35**	**3.0**
Didactic benefit	8	2.2	10	2.4

The H2FRM characteristics are analysed further by the area of practice of the RNs and ENs (Table 6). This breakdown showed few barriers except for the sample of nurses from the paediatric wards for whom all of these characteristics were barriers, the *didactic benefit* and

time investment for staff working in say stay areas, and the H2FRM attractiveness for nurses in ED.

Table 6

Barriers for H2FRM Characteristics by Area of Practice

Characteristic		Compatibility		Attractiveness		Time Investment		Didactic Benefit	
	Barrier	Percent (%)	Mean	Percent (%)	Mean	Percent (%)	Mean	Percent (%)	Mean
Subgroup	n								
Surgical	140	24	2.7	23	2.6	13	2.5	10	2.6
Medical	135	25	2.7	19	2.5	11	2.4	10	2.2
Rehab	28	21	2.8	11	2.6	25	2.2	0	2.2
Day Stay	24	10	2.2	25	2.3	**34**	2.3	9	**3.0**
Paediatric	7	**80**	2.7	**40**	**3.5**	**40**	**3.4**	**33**	2.3
ED	9	22	2.1	**33**	**3.1**	0	2.7	0	1.9

4.4.1.1 Specificity and flexibility characteristic

The *specificity, flexibility/nurse* (question: "The H2FRM leaves enough room for me to make my own conclusions about falls prevention") and *specificity, flexibility/patient* (question: "The H2FRM leaves enough room to incorporate the wishes of the patient") questions were barriers for many respondents. The questions were answered slightly differently for the different subgroups and are presented in Table 7.

Respondents practising in surgical, medical and rehabilitation settings had a stronger barrier towards the ability to include the patient's perception into the care plan than they did to add their own clinical judgement. This finding was clearer for RNs than for ENs. RMs did not demonstrate a barrier for this characteristic. The results for the acute surgical and medical wards, areas similar to the developmental population of the H2FRM, consistently demonstrated stronger barriers than most of the other areas of practice. Strong barriers were found for nurses working in rehabilitation and paediatrics, the small number of responses affected the results from nurses in day stay.

Table 7

Summary of Responses for Specificity, Flexibility Characteristic

Specificity, Flexibility		/Nurse		/Patient	
	Barrier	Percent (%)	Mean	Percent (%)	Mean
Subgroup	n				
RN	366	**42**	**3.0**	**50**	**3.3**
EN	21	24	2.8	24	**3.1**
RM	9	0	2.3	0	2.1
Surgical	140	**44**	**3.1**	**49**	**3.3**
Medical	135	**31**	**3.1**	**36**	**3.3**
Rehabilitation	28	**36**	2.9	**61**	**3.5**
Day Stay	24	17	**3.1**	13	**3.1**
Paediatric	7	**71**	**3.9**	**71**	**3.9**
ED	9	11	2.6	22	2.7
Obstetric	8	0	2.4	0	2.4

4.4.2 What are the barriers for clinical midwives using the H2FRM to plan falls prevention?

A difference from the data for nurses was that RMs responses did not indicate any barriers to the H2FRM (Table 8). However the free form comments were strong. They included that there was "very little need to implement this in postnatal area", "if faint there is usually little warning", and that the H2FRM "does not apply to the birthing unit".

Table 8

Barriers for H2FRM Characteristics for Midwives

Qualification	RM (n=9)	
H2FRM Characteristics	Percentage Barrier (%)	Mean Barrier
Specificity, flexibility	0	2.2
Compatibility	14	2.9
Attractiveness	14	2.7
Time investment	0	2.7
Didactic benefit	11	2.0

4.4.3 What personal barriers for falls prevention care do clinical nurses and midwives hold?

The data on Table 4 and the breakdown by qualification and years of experience did not demonstrate barriers for the *Care provider* characteristics of *lifestyle, working style* and *attitude, role perception.* The subgroup results for the other four characteristics in this category are presented in Table 9. The data is grouped by the qualification of the respondent and by area of practice. When the percentage barriers are over 45%, there are also barriers by use of means, independent of sample number. However, there is poor consistency in the results between the two methods of calculating the barriers compared to barriers to those of the subgroups in the H2FRM category. When the numbers in the sample are low the inconsistency to the identification of barriers is probably a result of the variability in responses.

The data demonstrated a strong barrier for RNs, ENs and RMs to provide falls preventive care due to a lack of training and this was especially high for nurses practising in the paediatric and ED areas.

Nurses working in surgical, medical and paediatric wards had doubts that the H2FRM is correct, and the data shows that this may be a barrier for nurses in day stay and rehabilitation areas. The response that RM respondents had no doubts about the veracity of the H2FRM did not seem to be in accordance with making an informed choice as a barrier for the group was *knowledge, motivation* and *involvement* in the H2FRM and RM responses demonstrated a lack of knowledge of the H2FRM.

RNs, ENs, RMs and nurses in surgical and rehabilitation areas have strong barriers indicated by the percentage barrier calculation but not the mean calculation for the fit between the way

that falls prevention is provided and the H2FRM. There is a strong barrier for nurses working in paediatrics for the usefulness of the H2FRM in the way that they prevent falls for children.

There is no strong barrier related to the knowledge of the instrument except that there may be barriers for RMs and nurses working in paediatric wards.

Table 9

Barriers for Care Providers by Qualification and Area of Practice

Characteristic		Knowledge, motivation		Doubts about the H2FRM		Involvement		Education	
	Barrier	Percent (%)	Mean	Percent (%)	Mean	Percent (%)	Mean	Percent (%)	Mean
Subgroup	n								
RN	366	**34**	2.9	**30**	2.9	**31**	2.7	16	2.4
EN	21	**48**	**3.3**	24	**3.0**	**52**	2.7	5	2.7
RM	9	**56**	**3.4**	0	2.4	**44**	2.7	29	**3.0**
Surgical	140	28	2.8	**36**	**3.0**	**33**	2.7	11	2.3
Medical	135	**36**	2.9	**31**	**3.0**	28	2.8	17	2.4
Rehab	28	**44**	2.8	26	**3.0**	**36**	2.6	19	2.7
Day Stay	24	0	2.7	**52**	2.7	19	2.6	0	2.2
Paediatric	7	**67**	**3.4**	**33**	**3.7**	**83**	**3.5**	**40**	2.7
ED	9	**67**	**3.8**	22	2.0	11	2.8	22	2.7
Obstetric	8	**44**	2.9	25	**3.0**	22	2.8	25	2.4

4.4.5 From the clinical nurse or clinical midwife perspective, what patient characteristics are barriers to falls prevention care?

The previous table (Table 4) demonstrated that ethnicity was not a barrier, however, when the results are organised by qualifications and areas of practice, strong barriers for this characteristic and the other characteristics were found in the *Patient* category and this data is presented in Table 10.

Most nurses and midwives working throughout many specialities believe that the patient's ability to change their behaviour in accordance with their fall prevention care is a strong barrier. The only group where this was not demonstrated was by the staff members working in day stay.

Table 10

Barriers for Patients

Characteristic		Motivation to change		Health status		Ethnicity	
	Barrier	Percent (%)	Mean	Percent (%)	Mean	Percent (%)	Mean
Subgroup	n						
RN	366	**37**	**3.1**	**31**	2.8	26	2.7
EN	21	**63**	**3.7**	29	2.8	20	2.5
RM	9	29	**3.1**	**57**	**3.1**	14	**3.6**
Surgical	140	**39**	**3.1**	**32**	2.6	18	2.8
Medical	135	**35**	**3.0**	**32**	2.8	**32**	2.7
Rehab	28	**57**	**3.2**	**63**	**3.2**	**33**	**3.6**
Day Stay	24	19	2.7	19	2.6	23	2.7
Paediatric	7	20	**3.0**	20	2.5	20	2.7
ED	9	**33**	**3.5**	**33**	**3.0**	16	2.9
Obstetric	8	**38**	**3.3**	20	**3.3**	20	**3.7**

The small number of respondents in the RM, Rehab and ED subgroups demonstrated strong barriers to providing falls preventive care to patients who seem healthy. Percentage barriers for this characteristic were found for RNs and nurses in surgical and medical settings, but were not supported by similar mean barriers calculations.

While the patient's cultural background was not a barrier for most groups, those nurses in rehabilitation/convalescent care, have demonstrated that this is a strong barrier. Some results indicate that nurses in medical wards, RMs and obstetric areas also found ethnicity to be a barrier.

4.4.5 What are the context barriers for planning falls prevention care?

The Context characteristics regarding supportive staff, facilities and building were all demonstrated as strong barriers without exception (Table 11). These questions were aimed at finding what factors respondents generally considered important for preventive care rather than asking if these were important barriers in the area of practice of the respondent.

The context questions relating to *group norms, socialisation* were not strong barriers except for nurses and midwives practising in paediatric and obstetric areas. There may be barriers cooperating with members of the team for nurses working in surgical, day stay, and ED but the barriers were not demonstrated by both barrier calculations.

Table 11

Context Barriers

Characteristic		Facilities		Building		Supportive staff		Group norms, socialisation	
	Barrier	Percent (%)	Mean	Percent (%)	Mean	Percent (%)	Mean	Percent (%)	Mean
Subgroup	n								
RN	366	**89**	**4.1**	**87**	**4.3**	**83**	**3.9**	15	**3.0**
EN	21	**67**	**3.6**	**67**	**3.6**	**67**	**3.6**	25	**3.0**
RM	9	**86**	**4.4**	**86**	**4.4**	**71**	**3.9**	14	**3.0**
Surgical	140	**86**	**4.0**	**88**	**4.1**	**85**	**3.9**	15	**3.2**
Medical	135	**86**	**4.0**	**87**	**4.0**	**80**	**3.9**	13	2.4
Rehab	28	**89**	**4.4**	**92**	**4.5**	**89**	**4.3**	16	2.0
Day Stay	24	**74**	**4.1**	**81**	**4.1**	**39**	**3.8**	**55**	2.6
Paediatric	7	**100**	**4.0**	**80**	**3.5**	**50**	**3.5**	**48**	**3.8**
ED	9	**89**	**4.3**	**78**	**4.1**	**78**	**4.4**	13	**3.1**
Obstetric	8	**88**	**4.4**	**100**	**4.6**	**80**	**3.7**	**30**	**3.4**

The three original survey questions on teamwork were expanded to five questions to find nurses' perceptions of how specific members of the multidisciplinary team *cooperate with the*

nurse on the application of the H2FRM. The questions on team support, although consecutive, did not show a pattern of response. ENs rated all five questions contributing to this characteristic as higher barriers when compared to those of the RNs (Table 12).

Table 12

Percentage Barriers for Group Norms, Socialisation Characteristic

		Study (%)	RN Response (%)	EN Response (%)	RM Response (%)
Question	n	404	366	21	9
… nurses cooperation		11	11	19	14
… doctors cooperation		**33**	**34**	**37**	17
… physiotherapists cooperation		11	10	26	20
…occupational therapists cooperation		11	10	21	17
… managers cooperation		10	9	20	0

The highest barrier within this characteristic (with one exception) was on the teamwork with doctors. Many free form comments were made about lack of doctors' knowledge of the nursing fall prevention procedures. Additional comments were that physiotherapists do not always cooperate. Managers, on the other hand, seem to be considered as supportive and the comments included that "management are committed".

4.4.6 The effect of experience

Few of the results demonstrated any effect on the barriers by years of experience. Experienced RNs may have perceived a stronger barrier to the H2FRM category compared to the other RN respondents (RN 16 - 20 years, n = 42, percentage = 24%, mean = 3.0; RN 21+ years, n = 63, percentage = 24%, mean = 3.5). The EN *flexibility* and *compatibility* barriers (mean = 3.0) were the same for the ENs of 21+ years as for the sample as most ENs (n = 16) were in this subgroup.

RNs of all experience levels had a barrier that patients were not motivated to comply with their falls prevention plan (mean = 3.1), and RNs of 2 to 5 years of experience indicated that it is difficult to provide falls prevention care to patients who are healthy (n = 61, percentage = 51%, mean = 3.0). All respondents at all levels of experience demonstrated that lack of space in the building was a barrier (means from 3.9 to 4.4).

4.5 Gamma correlation analysis

As noted earlier, the gamma coefficient does not indicate directionality, cause and effect and may not even point to an important relationship. The following correlations do not pertain directly to the research questions as they cross categories of the questionnaire. While there are many small correlations that seem important, only those with medium to strong associations are discussed but all of those greater than 0.30 are listed in Appendix 9. The correlations have been computed on the total sample after being reverse coded.

4.5.1 Education

Four of the strongest relationships were about education. The correlations between *education*, the knowledge of the H2FRM and *doubts about the H2FRM* was 0.98, and between *education* and the patient's *motivation to change* was 0.89. The correlation between the H2FRM in the falls prevention process with patient *health status* was 0.63.

4.5.2 Specificity, flexibility of the H2FRM

The barrier related to the *specificity, flexibility* of the model was 43% in the H2FRM barriers category and had a mean greater than 3.0 for many groups (Tables 4, 5 and 7). The correlation between *involvement,* the way H2FRM is part of the falls prevention process, and *specificity, flexibility/nurse* was 0.50. Correlations between the H2FRM *flexibility, specificity* and *group norms, socialisation/manager* were 0.96 and 0.40 for the two questions. The correlation between the question that the H2FRM does not leave enough room to consider the wishes of the patient was 0.6 with both *health status* and the *ethnicity* characteristics. *Ethnicity* also had a strong correlation with the ability of the nurse to use clinical judgement (0.5).

4.5.3 Supportive staff

The Context question that it is *difficult to give preventive care if there is not enough supportive staff* has been reported as a strong barrier in all of the results sections. There are many strong correlations that include one of the three characteristics which had the highest barriers – *supportive staff, facilities* and *building*. The two correlations between *supportive staff* and *manager cooperation to apply the H2FRM* and secondly, *supportive staff* with the patient's *health status*, were 0.59 and 0.51 respectively.

4.6 Safety culture and delegation questions

The questions numbered 13 and 24 were not part of the validated survey tool but were added as they seemed pertinent according to the literature. The return rate for the two questions was 98% and 95% respectively, so the questions show clarity, but less than 20% have endorsed some responses so the items may be unreliable. The results are presented in Table 13.

Table 13

Summary of Percentage Barriers for Additional Questions

	Safety Culture (Q. 15) (n = 395) (%)	Delegation (Q. 23) (n = 384) (%)
Survey sample	14	14
Surgical	11	12
Medical	17	16
Work across wards	3	18
Rehabilitation/Convalescent care	25	25
Day stay	3	6
Obstetrics	13	0
Paediatrics	**57**	14

Using the formula for the validated survey to calculate barriers, it can be seen that both questions were responded to in the low percentages (except for paediatric nurses and safety culture). The results show that the H2FRM does engender a safety culture and delegation to staff about risk of falling was implemented effectively.

4.7 Conclusion

The 31% response rate can be considered a representative sample but there was wide variation of the response rate from the subgroups. The response rate from surgical, medical and rehabilitation/convalescent care specialities appears to be representative, but from other specialities, the response rate and the number of surveys returned were too low to generalise the results. The barriers were identified by using shapes of the frequency distributions; percentage barriers and means for the sample and subgroups of qualifications, specialities and experience levels; and gamma correlation coefficients. There is general accordance between the different measures used to identify the main barriers in relation to the five research questions.

The barriers identified by both the percentage barriers and means in this sample of clinical staff when using the H2FRM to plan preventive care for falls are the barriers for *supportive staff, facilities* and *building,* the *specificity*, *flexibility* of the H2FRM, the patient's *motivation to change* and issues with how *doctors cooperate in applying the H2FRM*. The results for percentage barrier calculation included the characteristics: *knowledge, motivation,*

involvement, doubts about the H2FRM and the patient characteristic, *health status.* The EN results for the means included *compatibility* and *time investment* characteristics as barriers.

Analysis of subgroup data found a barrier to nearly all of the other characteristics of the survey although the numbers in many of the subgroups were too low to make generalisations. Respondents working in surgical and medical areas, a similar population to that on which the H2FRM was developed, often had different barriers to respondents from other specialities. Respondents with six to ten years of experience reported fewer barriers that other experience level groups. Nurse respondents working in the paediatric wards and emergency departments and registered midwife respondents had more barriers than other subgroups.

Weak barriers implied that some characteristics were facilitators to the use of the H2FRM rather than barriers. Managers were perceived as generally showing leadership and co-operated with providing falls prevention care. The H2FRM is a benefit as demonstrated by the results to questions on *attitude, role perception* and *didactic benefit.* In the next chapter the results of this study are discussed under the research questions with reference to the literature.

Chapter Five – Discussion

5.1 Introduction

The aim of this study was to identify the barriers for clinical nurses and clinical midwives when using the H2FRM to plan preventive care for falls. As the identification of barriers is the basis of planning for change, it was thought that information from the study would be of use to DHB personnel to assist with their planning to reduce the number of patient falls. Falls prevention is a widely researched topic as the cost of an inpatient fall is unacceptably high. However, sustained reduction in the fall rate has not been easy to achieve in any hospital. A model of falls risk by Dykes et al. (2011) presented falls prevention as the *safety platform* of the patient; a current and individualised care plan based on an accurate falls risk assessment; care provider competence, self-efficacy, commitment and capability; and context of care including the protective physical environment (see Figure 1, page 8).

The H2FRM for predicting patient falls was validated in acute medical and surgical areas and further studies have recommended its use in similar areas. While it is expected that no tool for assessing risk can be 100% accurate, the sensitivity and specificity results for the H2FRM are similar to that of other commonly used falls risk assessments. In the DHB, where the present research took place, the H2FRM document for the patient's notes has supporting material including an online training module, signage for high risk above the patient's bed, a flip chart to assist with planning preventive care, monitoring of fall events and policy documents. The DHB also has resourced a leader to coordinate the falls prevention programme and equipment to help prevent falls such as bed alarms. The falls prevention programme is linked to the DHB strategic plan. The H2FRM is used throughout the hospitals of the DHB and the few exceptions to this have met stringent falls prevention criteria. The individualised falls prevention care plan is written for patients who have a high falls risk identified through the completion of the H2FRM. This does not mean that patient's with a low risk do not need re-assessment.

Five research questions were written and a quantitative non-experimental descriptive survey design was used to address the aim of the study. The nurses and midwives who were expected to complete the H2FRM, as per the DHB Falls risk assessment, minimisation and management policy, comprised the sampling frame. The validated Barriers and Facilitators Assessment Instrument was used to identify attitudes to the H2FRM and to falls prevention.

There were 404 responses used for analysis (366 from registered nurses, 21 from enrolled nurses, 9 from registered midwives and 8 with no qualification) from the 1300 surveys that were distributed. The response rate means that findings can be generalised from the sample

and RN, EN, surgical, medical and long-stay subgroups, but is less likely to be representative of other subgroups. Percentage barrier and descriptive statistics calculations were used to analyse the data. The difficulty of providing falls preventive care when there was insufficient supportive staff, a lack of equipment and poor design of space, were identified as barriers for the sample and all subgroups. The results clearly indicated that there were issues related to the training in and utilisation of the H2FRM and that patients did not cooperate with their care prevention plan. Respondents indicated that they work according to procedures, are able to adapt their practice to incorporate new routines and cooperate with members of their team.

This section, 5.2 to 5.6, discusses the implications of the results to each of the five research questions. The basis for discussing a barrier is a percentage calculation of 30% or more and supported by the mean of 3.0 or greater.

5.2 Research question: *What are the Hendrich II Fall Risk Model barriers for clinical nurses to plan falls prevention care?*

This research question examined barriers related to the H2FRM, namely its specificity and flexibility, didactic benefit, compatibility and attractiveness. The term 'nurse' refers to both registered and enrolled nurses, staff who have different responsibilities and scopes of practice. The RN and EN groups responded differently to the survey questions so RN and EN findings are discussed separately. The gamma correlations are discussed in 5.2.1 as RNs composed 91% of the sample so had the largest effect on the calculations.

5.2.1 What are the H2FRM barriers for clinical RNs to plan falls prevention care?

The highest characteristic barrier was *specificity, flexibility*. This was not the highest characteristic barrier in a similar study in Singapore hospitals and the authors did not indicate that they had split the characteristic into the two questions (Koh et al., 2008). With few exceptions, the highest barrier in this study was for the second question in this characteristic that asked whether the H2FRM leaves enough room to consider the wishes of the patient.

The H2FRM is a validated and trademarked tool so it is not possible to add more risk factors. However, incorporating the wishes of the patient into the falls risk assessment is supported by studies that indicated the importance of the patient's voice as part of planning care (Currie et al., 2005), that patients requested to be part of the team who make decisions to prevent them from falling (Carroll, 2010), and that the patient's perspective is valid even when it is different from that of staff (Rush et al., 2008). The patient's attributes such as their culture, cannot be entered into the falls risk, but the two questions were highly correlated. Difficulties in communication and understanding of the care plan can arise from cultural

differences (Koh et al., 2008), consequently basing a plan only on the H2FRM factors would not manage this risk. This characteristic is a barrier to effective planning.

The second question for the *specificity, flexibility* characteristic was whether the H2FRM leaves enough room for the nurse to make her/his own conclusions about falls prevention. The nurse can make a judgement call for some factors on the H2FRM such as, *confusion/ disorientation/ impulsivity* and *altered elimination* and guidelines are provided in the Upright training on how to score these factors. However, the application of the nurse's assessment is limited. This barrier may be explained by referring to the literature regarding the accuracy of clinical judgment to assess fall risk.

The use of NCJ to assess falls risk is generally supported by the literature. The results of studies conclude that NCJ is not good enough to use in acute hospital settings (Webster et al., 2010); that the specificity of NCJ is good enough for surgical and general medicine patients who were less than 75 years old (Milisen et al., 2012); that NCJ of experienced nurses is accurate enough to judge the falls risk (Myers & Nikoletti, 2003); and partly because of its flexibility, NCJ is good enough to use as a standard for judging the effectiveness of new tools (Haines et al., 2007). The reason for this barrier may be because there is no factor in the validated H2FRM which supports the use of NCJ. The H2FRM was designed to be objective with high inter-rater reliability (Hendrich et al., 2003). However, an individualised care plan could be based on both the H2FRM and NCJ. Risk factors identified on the H2FRM, NCJ and the needs of the patient could be given equal weighting when planning care.

The high correlations between this *specificity, flexibility* question and the questions on the patient's *ethnicity*, the *health status* of the patient, and *involvement* are in accordance with the conclusion to affirm NCJ when planning care. A measure of risk of falling made by using only the H2FRM is restrictive and clinical judgement can improve the accuracy of the risk assessment and individualised care plan based on this.

5.2.2 What are the H2FRM barriers for clinical ENs to plan falls prevention care?

Enrolled nurses, or their equivalent in other countries, are seldom differentiated in studies of falls prevention. In the study there were few enrolled nurse respondents (n = 21) but a good response rate. The barriers identified were *specificity, flexibility, time investment* and *compatibility. The specificity, flexibility,* barrier has been discussed for RNs and the literature probably applies similarly to EN respondents.

The time taken to complete the H2FRM has been recorded as one minute (Ivziku et al., 2011), so it seems that the EN *time investment* barrier is inconsistent with the literature as this is a reasonable time to complete the risk score. A similar study, in which 27% of the

demographics were enrolled nurses, did not have time investment as a barrier (Koh et al., 2008). However, there is support in the literature for the time investment related to the frequency that the H2FRM would have to be completed in acute settings. Correspondence from the H2FRM author regarding the number of incorrectly H2FRM identified patients who fell, stated that the risk scores needed to be completed more frequently (Clarke et al., 2012). It has been suggested that associate nurses are more task orientated than baccalaureate nurses (Kalisch et al., 2009). If the ENs were considering the time taken to frequently update the H2FRM document in the patient's notes, the result would be in accordance with the literature. Also, if respondents considered the time taken to provide fall prevention care when giving their response, several studies endorse the findings that there is insufficient time for care (Lucero et al., 2010; O'Connell & Myers, 2001; Robert et al., 2011).

The *compatibility* characteristic may be understood as a barrier against the use of a screening tool. While some authors state that a risk screen or assessment is the beginning of the process (Dykes et al., 2009), other authors do not propose this as mandatory (Cameron et al., 2012; Oliver, 2008). This means that whether this is seen as a barrier or not, is in accordance with the literature. The Koh et al. (2008) study found this characteristic to be a facilitator.

5.3 Research question: *What are the Hendrich II Fall Risk Model barriers for clinical midwives to plan falls prevention care?*

The generalisation of the results for midwives is not possible as just 7% of the RM population responded, nine respondents in total. The low response rate may indicate opposition to the survey, which is consistent with cognitive stacking where tasks designated as low priority are not completed (Sitterding, Broome, Everett, & Ebright, 2012). The low response rate may also be due to the lack of use of the H2FRM in the obstetric areas as indicated by the DHB grey literature which showed a lack of completion of the Upright training by RMs.

The highest barriers for the respondents were the personal barriers *knowledge*, *motivation* and *involvement* (indicated by the percentage barriers) and *compatibility* with the H2FRM (indicated by the mean score). These barriers reveal a lack of familiarity with the H2FRM by RMs which is in agreement with the free form responses that the H2FRM was not suitable for RM use. The barriers and comments are supported by the literature such as that a specific fall risk assessment is needed for the obstetrics area of practice (Heafner, 2013). Also the obstetric area was not part of the population which Hendrich used to develop the model and studies state that a tool should only be used in populations similar to where they were developed (Perrell et al., 2001). The barriers need to be acknowledged as there is a gap in the way falls assessments for obstetric clients are made.

5.4 Research question: *What personal barriers for falls prevention care do clinical nurses hold?*

This section examined the respondents' knowledge of the H2FRM, *knowledge, motivation* and *involvement* characteristics; whether they considered the H2FRM to be accurate, *doubts about H2FRM*; *education* and understanding of falls preventive care; and attitudes, *attitude, role perception* and *lifestyle, working style* characteristics.

The *knowledge, motivation* characteristic was a barrier for respondents particularly for nurses in the emergency units and paediatric wards when compared to respondents from acute medical and surgical areas, and ENs. It has been found that this characteristic is typically a barrier when introducing a new innovation (Grol & Grimshaw, 2003; Johnson et al., 2011; Koh et al., 2008). However, in the DHB the H2FRM was launched two years before the survey with an associated training package so it was expected that the H2FRM would be familiar to all clinical staff.

Knowledge, motivation has been found to be barrier in falls prevention studies and was the highest barriers in a study using the same survey instrument and with a similar aim. The barrier was attributed to the difficulty of knowing and applying all of the published best practice guidelines (Koh et al., 2008) but in this study the barrier is specific to the lack of knowledge of the H2FRM. Despite the H2FRM supporting documentation, this barrier points to lack of effective messages. Systematic reviews recommend that staff have a good knowledge of falls prevention (Hempel et al., 2013; Spoelstra et al., 2012) and staff education in prevention of falls was seen as an essential pre-requisite to a multi-factorial intervention study (van Harten-Krouwel et al., 2011). In contrast, the Cochrane Bone and Joint Collaboration concluded that improving staff knowledge of falls prevention made no difference to the falls rate (Cameron et al., 2012). Correlations were found between this characteristic and the context characteristics of supportive staff, good facilities and a safe building which seems to indicate that the elements of the safety platform model are well understood. This question is similar to the 'involvement' question and both had similar percentage barriers.

The *involvement* characteristic was a barrier, It was higher for nurses working in medical and rehabilitation/convalescent care wards and ENs. This characteristic was a similar percentage barrier in a study using the same survey instrument, but in that study it was of lesser importance compared with the other identified barriers (Koh et al., 2008), so not discussed. It is known that nurses gain much of their knowledge from colleagues (Spenceley et al., 2008), that professional development is associated with increased self-efficacy (Dempsey, 2009;

McKinley et al., 2007) and work satisfaction (Purdy et al., 2010). If knowledge of the H2FRM is predominantly gained from colleagues, any misunderstandings about the Upright training may persist with the result that the barriers to *knowledge*, *motivation* and *involvement* questions would be similar, as was found. The moderate correlation found between the *involvement* barrier and the incorporation of the nurse's judgement into the falls assessment is in accordance with that conclusion. In addition, the free form comments pointed to issues with the Upright training. The method of delivery or lack of local content in the training (Johnson et al., 2011) may have made this characteristic a barrier rather than there being a resistance to professional development.

Doubts about the H2FRM was the next highest percentage barrier identified by respondents. Doubts about a part of a risk assessment instrument are not reported in the falls literature. However, a study using the same survey tool reported this characteristic as an 80% barrier to the use of a new protocol for a sample of doctors (Wensing & Grol, as cited in Harmsen, 2005). If the barrier signposted that factors are missing from the H2FRM, such as a history of falls and older age, it is in accordance with literature on falls screening or assessment tools as many include these factors (Myers, 2003; Spoelstra et al., 2012). Free form comments also stated that the H2FRM should include such factors. The lack of falls history, older age visual impairment and diagnosis may give rise to doubts about the H2FRM even though statistically the extra factors were not important enough to include in the H2FRM when it was developed.

There was a strong correlation between the *doubts about the H2FRM* characteristic and the *education* characteristic. As the provision of safe care is a principle of the Code of Rights (Health & Disability Commissioner, 2009) it is part of nurse education and training. The correlation may indicate that nurse education on falls prevention does not include the use of a falls risk tool to identify risk. The barrier, the literature, the comments and the correlation suggest that there is a lack of understanding about how the H2FRM was developed and its recommended use in falls prevention care. The *education* characteristic was a percentage barrier for respondents from the paediatric area and mean calculation barrier for ED respondents. The specific characteristics of these specialities may be the reason respondents identified *education* as a barrier rather than a lack of training in providing preventive care.

5.5 Research question: *From the clinical nurse or clinical midwife perspective, what patient characteristics are barriers to falls prevention care?*

All three questions regarding the patient were barriers. The means for the *motivation to change* characteristic indicated that this was an issue for nurses and midwives in most areas. *Health status* was a barrier to RNs working in areas similar to where the model was developed, and to RMs. The third question asked about the *ethnicity* barrier. This was a

barrier for the study by Koh et al. (2008), but only a barrier in this study for RNs working in rehabilitation and medical wards, and RMs.

The barrier identified by nurses that patients lack motivation to apply falls risk interventions, is supported by the literature and by the high correlation with the education barrier. It is in accordance with a study that found nurses are likely to relate the reasons for a fall to the patient or environment rather than to themselves (Tzeng & Yin, 2008). While a successful fall reduction intervention was patient education, targeted at the patient's individual fall risks and undertaken by the researchers (Ang et al., 2011), such interventions are not always successful in reducing the fall rate (Cumming et al., 2008). Effective teaching requires time to check that a patient understands their care plan. Nurses find that time to provide education is difficult to fit into their workload (Tucker et al., 2012). Further issues related to this barrier are that patients do not always follow instructions or ask for assistance (Carroll, 2010; Fortinsky et al., 2004; Kalisch, Tschannen, & Lee, 2012) and that falls are sometimes beyond the nurse's control (Rush et al., 2008). This question was not asked in the study by Koh et al. (2008). The barrier and literature suggest a gap in nurse education about how to motivate patients to be responsible for their falls prevention. The very high correlation with the motivation to change barrier and … *I am not trained in giving preventive care* supports this conclusion.

The second barrier, *health status*, was not specifically asking about the H2FRM. This barrier is in accordance with the Koh et al. (2008) study where the authors asserted that nurses were unable to place the healthy patient in the clinical guideline with the result that falls prevention care to patients who seem healthy was a barrier. A moderate correlation between *health status* and the *involvement* characteristic suggests that the part of the Upright training where the importance of usual cares is discussed, for instance, maintaining a safe environment, call bell and walking aids within reach, bed in lowest position, may not be remembered.

The barrier may also be discussed in relation to patient attributes. It is expected that younger patients have less risk factors (less cognitive impairment, unaltered elimination and/or excretion, few musculoskeletal and sensory deficits) and so have a lower falls risk. Yet statistics from the HQSC state that increasing numbers of patients between 40 and 45 years old sustain falls (Health Quality and Safety Commission, 2012), and a randomised control trial found no change to the fall rate for patients who were less than 65 years old, but a significant decrease for those over 65 years post-intervention (Dykes et al., 2010). The younger patient, who may appear to be healthier, may be more difficult to provide preventive care to.

Non-preventable falls are, by definition, the unexpected events and risk assessments are less sensitive to the precipitating factors, so the barrier may reflect this type of unexpected fall and inability to control the factors associated with it. In such cases where the healthy patient falls, an in-depth post-fall debrief is suggested in order to prevent recurrence and to aid staff learning (Gray-Miceli, 2007; Grenier-Sennelier et al., 2002; Quigley et al., 2009). In accordance with Koh et al. (2008), the patient who seems healthy is difficult to give preventive care to because of their attributes and because the H2FRM does not identify such patients as high risk so they do not receive targeted interventions.

According to Koh et al. (2008) *ethnicity* was also a barrier to effective falls prevention as it was in this study for some subgroups of RNs. The barrier was discussed by Koh et al. (2008) in relation to the multi-racial context of Singapore hospitals and lack of readily available interpreters to communicate with patients about falls education. Listening to the patient, essential to communication, is the beginning of understanding falls risk behaviour on which to base individualised education in falls prevention (McInnes et al., 2011). *Ethnicity*, if it affects communication, will be a barrier to falls prevention. Education of the nurse will help find ways around this barrier.

5.6 Research question: *What are context barriers for planning falls prevention care?*

Context is defined as characteristics of the "organisational, social, political and societal system" (Harmsen et al., 2005, p. 2). The context questions asked about giving preventive care when there is insufficient supportive staff, equipment, space and when members of the multidisciplinary team (MDT) do not cooperate with applying the H2FRM falls risk score. There was a dichotomy of results with the first three high barriers and the questions on *group norms, socialisation* for colleagues, managers, physiotherapists and occupational therapists indicating low barriers, or facilitators.

The exception to the low *group norms, socialisation* barrier was the cooperation of doctors. This was a barrier for most groups of respondents. Referrals to physiotherapists and occupational therapists are routine in many specialities and may use the H2FRM as assessment information. In contrast, communication with doctors may be supported by literature that states that the post-fall focus is on the physiological effects from a fall (Zecevic et al., 2006). Two studies to improve falls prevention targeted inter-professional communication, including with doctors (Andreoli et al., 2010; Browne et al., 2004). It was found that a tool improved communication in a wide range of situations, teamwork and within interdisciplinary units. Communication using the H2FRM as part of providing a patient assessment may be a gap.

The *supportive staff* and *facilities* characteristics were also barriers in a similar study in Singapore hospitals (Koh et al., 2008). The meaning that respondents applied to *supportive staff* is unclear as other questions about how health professionals cooperate to apply the H2FRM were low barriers in this study. In the Koh et al. (2008) study, *supportive staff* were explained as "a fall nurse specialist or a change champion" (p. 6) and stated that the lack of people in these roles was a barrier to effective falls prevention. Similarly this could be an explanation for this barrier as these are not formal positions in the DHB. There were many moderate or strong gamma correlations with the three characteristics, *supportive staff, building, facilities*, which indicated how important they are to attitudes and ways of preventing falls. These barriers do not mean that they are in the areas of practice of the respondents' but are an acknowledgement that they are issues for effective falls prevention.

As most of the multifactorial studies on fall prevention identify context barriers, the findings of this study are supported in the literature. Minimising consequences of less than ideal facilities and building layout (Grenier-Sennelier et al., 2002; Robert et al., 2011), utilising empowerment and leadership support (Johnson et al., 2011; Quigley et al., 2009) and organisational goal-setting (Grol & Grimshaw, 2003) are all important in falls prevention. The questions asked in this survey did not comprehensively include the range of context factors, for instance there were no specific questions on organisational policies, processes, resourcing, professional development or specific equipment.

5.7 Limitations of study

There were methodological limitations of this study similar to all survey designs. A low return rate for a self-completed postal questionnaire may mean that the sample is not representative of the population and the findings not generalisable (Browne, 2005). Mail surveys are commonly reported to have a response rate of 25-30% (Gills & Jackson, 2002). The return rate for this survey was 31%, so generalisable using that criteria, but it varied between 6% and 60% for sub-groups of respondents. As the population was defined as the clinical nurses and midwives from one DHB, the results cannot be generalised to a different DHB without further understanding of the populations of other DHBs. A further limitation is that results are threatened as respondents may have provided answers that did not reflect their thinking and only those who have a favourable attitude to surveys and the H2FRM may have responded. Finally, the survey was taken at one point of time so if repeated, the findings may be different.

Questions were altered to use words that are more commonly used in the DHB such as, *weigh the wishes of the patient* became *to consider the patient's wishes*. This may have altered the validity of the instrument. According to the literature, the Cronbach alpha of the categories

within the Barriers and Facilitators Instrument was not high (DeVellis, 2003) and the additional questions were not psychometrically tested, so limiting the validity.

Survey data does not allow for a deeper understanding of the reasons behind a respondent's answer and topics are limited to the questions in the survey. While there were changes to wording to make the meaning more clear, it is not known how respondents interpreted words such as *healthy* and *supportive staff*. Communication of falls risk is a common issue found through studies but this was either not a barrier in the DHB or the survey questions did not uncover this issue.

It is known that confounding variables affect outcomes (Scott et al., 2003). Educational programmes and audits were concurrently happening while the survey was distributed. While during the month that the survey was available, no ward shifted sites as part of the major building programme, it was not possible to avoid the preparations before a shift or the reorganisation afterwards. It is likely these ward changes have affected the findings and response rate.

The statistics used to analyse results were those suggested by the authors of the instrument and measures of dispersion and central tendency. The mean statistics may not be appropriate as the 5-point Likert scale does not provide ratio numbers.

The strengths of the survey are that the questions were from a range of disciplines. The good response rate for both the survey and for individual questions, means that there can be confidence in the results. The low response rate from some areas can also be considered a strength as it is in accordance with the resistance that was noted in the DHB grey data and the free form comments on the surveys. As the H2FRM is particularly relevant to the acute medical-surgical area, the high response rate from respondents strengthens the generalisability of the findings for these areas.

5.8 Recommendations

This study set out to investigate the barriers to the use of the H2FRM. Falls are a cost to patients, families and the health system so reducing the rate is very worthwhile. While the focus of this study has been on the falls assessment tool, the recommendations are not limited to the H2FRM. Underpinning the recommendations is that change needs to be owned at the ward level (Dempsey, 2009; Robert et al., 2011; van Harten-Krouwel et al., 2011) that leadership is required (Holleman et al., 2009; Parsons & Cornett, 2011; Purdy et al., 2010; Schultz & Kitson, 2010) and that any intervention has to be mindful of other initiatives and audits that are occurring at the same time (Scott et al., 2003). The recommendations arising from the present study are incorporation of nurse clinical judgment, review of the Upright

training, increase knowledge of falls prevention, improve patient education in falls prevention planning, trial specific falls risk screen or tool for the obstetrics and paediatrics areas and investigate orientation of doctors.

5.8.1 Incorporation of nurse clinical judgement

The Hendrich II Fall Risk Model cannot be altered without further psychometric validation testing. However, flexibility needs to be incorporated into targeted fall prevention strategies at the ward level. The issues raised by this study and in the literature were that there are more risk factors than the H2FRM caters for and that these are often specific to a speciality. This recommendation is to retain the H2FRM as it is supported by the results as a good starting point for falls prevention planning, is quick, clear, provides consistent messages, is well-established and generally has good inter-rater reliability, but to ensure flexibility is incorporated in the individualised care plan.

Flexibility could be added through focussed nursing interventions which are specific to the patient diagnosis and ward culture based on NCJ, not necessarily just on H2FRM. The current hospital procedures of the Upright training, completion of H2FRM, application of risk minimisation usual cares and specific cares, documentation and evaluation of interventions would be reinforced. Interventions for ward/unit/facility issues may be evidenced as a flowchart for different common conditions, a regular discussion point at ward meetings, handovers, in-service discussions, or through the communication book. It would fit with the ward culture of communication and learning. The specific interventions may be shared with the appropriate Co-ordinator in the DHB for further discussion. If the ward nurses agree, the module in the Productive Wards, the Well Organised Ward, could be used for falls prevention (Robert et al., 2011), to utilise the plan, do, study, act cycle with a focus on increasing flexibility.

The outcome would be that targeted strategies are written in the Fall Minimisation section of the Patient Care Plan. This care plan has been in place unchanged for several years and the recommendation is that in the next reprint this section needs to be larger or the form reformatted to be in accordance with the established flip chart. Furthermore, the DHB policy would also need to be revisited and updated.

Included in this recommendation is that the following areas use NCJ as the fall risk assessment until a new risk score has been established. The outpatient clinics are considering options but clinical judgement alone may be sensitive enough as the falls risk screen in this area. Day stay medical and surgical units and post-anaesthetic units require additional study in order to understand how H2FRM fits their patients. Fall risk tools for the emergency department (ED) have been developed (Terrell et al., 2009) and some psychometric testing

has been completed on them. Even though H2FRM used ED data in the developmental population, the low return rate in this survey seems to reflect a resistance to the use of the H2FRM, hence a specific tool is needed in this area. The standardised forms that are currently used could be updated to facilitate this. According to Äberg et al. (2009) two questions are sufficient for an initial screen of risk and these could be on the form. High risk would need to be recorded as would documentation and evaluation of the preventive actions.

5.8.2 Review of the Upright training

The training, despite the good uptake, has not resulted in good understanding of how the H2FRM was developed. The training could be retained as it is part of the H2FRM trade-marked package, but a short, relevant to the population of the DHB questionnaire using adult teaching and learning principles could be developed for Moodle. Moodle is the online self-paced programme used by the DHB for many different learning activities designed to update certifications of practice. The aims could be to understand the advantages and limitations of the H2FRM, and to evaluate the care plan of a high risk patient. The principles of online learning, content delivery, application and integration into practice (Magnussen, 2008) would be applied. Nurses could be guided to use, or help create, an intervention plan for specific diagnoses and develop targeted interventions, particularly for the identified barrier on how to educate and motivate a patient to prevent themselves from falling.

5.8.3 Increase knowledge of falls prevention interventions

The DHB policy states that a team debrief will happen as soon as practical after a patient has fallen. The recommendation is to use a *post-fall* huddle. This strategy was used as part of an effective multifactorial intervention in a study on falls prevention (Johnson et al., 2011). It is a planned discussion involving as many staff as possible in critical reflection and discourse on the fall to identify the root cause and for everyone to learn to improve provision of care. This transformative learning process requires a leader and whether it is a coordinator or manager, the ward management would need to decide what is most practical for their situation.

5.8.4 Improve patient education in falls prevention planning

While patient education is a separate box in the DHB *Falls Risk Assessment Process* and section in the DHB Patient Care Plan, its importance to falls prevention planning and that it was identified as a barrier, means that it is a separate recommendation. This is in accordance with findings by Ang et al. (2011) who found that the intervention group of patients who received targeted education relating to their individual falls risk as well as the general preventive measures, had significantly fewer falls. Effective education seems to be difficult to do when there are time and staffing pressures (Lucero et al., 2010). The sharing of

experiences and scenarios at in-service meetings would be timetabled as part of the ward preventive strategy. Topics to be covered could be how to include relatives, an issue according to literature and falls education to "patients who seem healthy", a barrier identified by the survey.

5.8.5 Trial specific fall risk screen for obstetrics and paediatrics

Both of these specialities indicated lack of fit of the H2FRM to their areas, and were supported in this by the literature (Heafner, 2013; Razmus et al., 2006), so investigations to find better instruments for these areas needs to be carried out.

5.8.6 Investigate orientation of doctors

As it was indicated by respondents that doctors may not know that nurses complete the H2FRM, the orientation of the medical officers to the DHB could ensure that this is covered. This may appropriately discussed in conjunction with the gathering of assessment information when communicating with nurses (Andreoli et al., 2010; Browne et al., 2004).

5.9 Further research

This study has highlighted areas where more research could be conducted.

5.9.1 Fall risk tool for paediatrics, obstetrics, emergency department

Terrell et al. (2009) considered that the H2FRM did not cover all of the risk factors for patients in the emergency department. Heafner (2013) similarly concluded that tools developed in medical-surgical wards with older patients did not fit the obstetric population, and disorientation and falls history were the best indicators of falling in the paediatric area (Razmus et al., 2006). These studies recommended more research in these areas and this study makes a similar finding to develop a screen or assessment suitable for these areas.

5.9.2 Efficacy of nurse clinical judgement for short stay areas in the hospital

The clinical judgement of a nurse can be made quickly and so be responsive to the changing condition of a patient (Haines et al., 2007). In this study, barriers to the use of the H2FRM were identified in outpatient clinics and the transit lounge. These areas have a high throughput of patients, so a judgement of falls risk seems to be congruent with NCJ. Future studies could identify whether clinical judgement is efficacious.

5.9.3 How to increase patient self-responsibility to prevent themselves from falling

International studies have shown that patient education can reduce falls (Ang et al., 2011: Haines et al., 2011) and *teach-back*, or verification of learning, was effective for patient education (Quigley et al., 2009). A barrier noted in this study was the cooperation of patients with their fall prevention care plan. This gap may be the result of ineffective education.

Further studies on how to improve this aspect of fall prevention in the New Zealand context would be worthwhile.

5.10 Concluding statement

This study highlighted that there are issues with the flexibility of the validated H2FRM scoring document to include all risks as judged by nurses, the training in the model and the involvement of patients in their fall prevention plan. Although there were similarities in the identification of the barriers for registered and enrolled nurses and registered midwives, the small number of responses from the latter meant that the results need to be interpreted with caution. A model was used to depict the inter-relationships between the patient, accurate falls risk assessment with its associated current and individualised care plan, the care provider and safe environment (Dykes et al., 2011). Two issues with this model were that the *accurate falls risk* did not necessarily reconcile well with clinical judgement, especially when NCJ was not part of the falls risk assessment. Secondly, although the patient is in the centre, the active involvement of the patient in their fall prevention care was not a clear outcome of this placement.

A validated risk assessment is a part of evidence-based practice. The present research identified that the H2FRM should only be retained in adult, acute and longer stay areas. Different ways of assessing risk, relevant to the local patient population, should be used in outpatient clinics and other short stay areas, paediatric wards and obstetric units. The importance of usual cares such as removing environmental hazards, education measures for falls prevention to patients and clear well-communicated individualised prevention strategies need to be part of ward orientation. Such messages could also be included in the Moodle training package and a post-fall huddle. Communication of the H2FRM risk to colleagues in the multidisciplinary team, in particular, doctors, was identified as a gap.

It is suggested that the barriers about the flexibility of the model to incorporate site-specific falls risk issues, can be minimised through the sharing of effective interventions and evaluations with the team. These need to be documented on the care plan and evaluated in the notes. Active dissemination using timetabled in-service or use of the nurse-led Productive Ward module is recommended. The online training should be kept but modified to be more user-friendly so important messages are retained, such as about the validity of the model.

Patients were considered by many respondents to be unmotivated or unable to follow fall prevention care plans. It was suggested that staff share scenarios of successful interventions in their local context. The site-specific interventions would include the patient's voice in the plan.

The most consistent and strongest barriers identified were the lack of supportive staff to implement preventive care, facilities and equipment that reduce ability plan for safety and building layouts which do not reduce extrinsic risk factors. As these results demonstrated general issues rather than highlighting specific ward or unit barriers, it is incumbent on management to continue to reduce these barriers through leadership, resourcing and strategic direction.

This study found that staff members are willing to accept new procedures, able to adapt their routines and that they can cooperate with many members of the multi-disciplinary team. Many other studies have found that team communication is a barrier, but although not specifically asked about this issue, the nurses and midwives at the DHB have not identified this as a barrier. Team dynamics are important for effective falls prevention care. Working with colleagues, managers and the multidisciplinary team was not found to be a barrier, nor delegation of the risk of falling. Finally, it is the competence of the team and nurse/midwife, the commitment to reduce risk behaviour in patients or elements of the environment, and the organisation providing the capacity for these to occur that will reduce the number of patients sustaining a fall.

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Appendix 1 Hendrich II Fall Risk Model
and A. Hendrich Personal communication

Hendrich II Fall Risk Model™

		Risk points	
Confusion Disorientation Impulsivity		4	
Symptomatic Depression		2	
Altered Elimination		1	
Dizziness Vertigo		1	
Male Gender		1	
Any Administered Antiepilectics		2	
Any Administered Benzodiazepines		1	
Get Up & Go Test			
Able to rise in a single movement – No loss of balance with steps		0	
Pushes up, successful in one attempt		1	
Multiple attempts, but successful		3	
Unable to rise without assistance during test (OR if a medical order states the same and/or complete bedrest us ordered) *If unable to assess, document this on the patient's chart with the date and time		4	
A Score of 5 or Greater = High Risk **Total**		**Score**	

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Personal Communication from A. Hendrich

Hendrich, Ann [AHendrich@ascensionhealth.org]

Sent: Friday, 7 December 2012 3:21 a.m.

To: Elizabeth MacColl

Hello Elizabeth

Please identify where you are and if this is a study or QI initiative.

The numerous studies were done initially in a large, tertiary, medical center in a randomized, diverse, population. The validity and reliability has been validated in numerous replication studies in the US and multiple countries. Rehabilitation, ED, behavioral health, ICU, med/surg, etc. were all randomized in the case-control methodology. The study does not apply to OB and pediatrics.

Regards,
Ann Hendrich PhD, RN, FAAN
SVP, Quality and Safety
Executive Director, PSO
314-733-8187
Executive Assistant, Gabriele Nash
314-733-8187
Ascension Health
Sent from my iPad

Appendix 2 Information Sheet

A Study on the Barriers to the Implementation of the Hendrich II Fall Risk Model

Kia ora,

I am a Masters student at Massey University and a nurse working in orthopaedics at Waikato Hospital. I would like to invite you to participate in a survey into the use of Hendrich II Fall Risk Model. This research project is part of my Masters programme of study.

I am distributing the questionnaires for you to complete and return anonymously. Completion and return of the questionnaire implies that you consent for me to use your responses for my research.

How you complete the survey, or whether you choose not to, will have no impact on your employment with Waikato DHB. You do not have to answer any or all of the questions.

Patient falls are a concern to all of us. Every RN, RM and EN who is expected to routinely complete the Hendrich II Fall Risk Model will be receiving the questionnaire. The information gathered will help identify factors that are not working well, or which are working well, of the model. While it is not compulsory to complete the questionnaire, the more everybody contributes, the better the data and the more meaningful the conclusions.

It will take about 15 minutes to complete the questionnaire and I hope you will be able to find that time within the usual duties that you will be doing today.

The survey is based on a validated questionnaire to identify barriers and enablers for a new assessment in a health care setting[1]. If you want to talk to me about any issues regarding this survey, I can be contacted through Ward 6, or 07 8716716, or at lizsurvey.HFRM@gmail.com.

My Supervisor and I will be the only ones who will see your returned questionnaires and I will be the one analysing them. I will ensure that the paper questionnaires stay locked away until they are destroyed, and that digitally stored data will be password protected until it too is destroyed.

I hope next year that you will read about the results. I intend to have them on the intranet, for them to be available in your ward or area, to talk about them at the Nursing Round Table, and eventually, for the thesis to be published and be available in the library. A report will be provided to the WDHB Board.

Participant's Rights
You are under no obligation to accept this invitation. If you decide to participate, you have the right to:

- decline to answer any particular question;
- withdraw from the study (before data analysis begins in November 2012);
- ask any questions about the study at any time during participation;
- provide information on the understanding that your name will not be used unless you give permission to the researcher;
- be given access to a summary of the project findings when it is concluded.

Ka kite anō

Liz MacColl, 07 8716716, lizsurvey.HFRM@gmail.com
Dr Stephen Neville, (Supervisor) 0800 MASSEY, 09 4140800, S.J.Neville@massey.ac.nz

This project has been reviewed and approved by the Massey University Human Ethics Committee: Northern, Application MUHECN 12/059. If you have any concerns about the conduct of this research, please contact Dr Ralph Bathurst, Chair, Massey University Human Ethics Committee: Northern, telephone 09 414 0800 x 9570, email humanethicsnorth@massey.ac.nz.

MASSEY UNIVERSITY

Implementation of the Hendrich II Fall Risk Model™

The Hendrich II Fall Risk Model ...	**Fully disagree**	**Disagree**	**Do not agree or disagree**	**Agree**
1 leaves enough room for me to make my own conclusions about falls prevention.	☐	☐	☐	☐
2 leaves enough room to consider the wishes of the patient.	☐	☐	☐	☐
3 is a good starting point for me to find out more about falls prevention.	☐	☐	☐	☐
Tick the box that best represents your answer:				
4 I do not remember the 'Upright' training about how to implement the Hendrich II Fall Risk Model.	☐	☐	☐	☐
5 I wish I had more knowledge about the Hendrich II Fall Risk Model before I had to apply it.	☐	☐	☐	☐
6 I have problems with changing my routines.	☐	☐	☐	☐
7 I have a general resistance to working according to procedures.	☐	☐	☐	☐
8 I think parts of the Hendrich II Fall Risk Model are incorrect.	☐	☐	☐	☐

If you think parts are incorrect, which parts: _____

		Fully disagree	Disagree	Do not agree or disagree	Agree
9	Nurses in my team do not cooperate in applying the Hendrich II Fall Risk Model.	☐	☐	☐	☐
10	Other health professionals do not cooperate in applying the Hendrich II Fall Risk Model.				
	Doctor/s	☐	☐	☐	☐
	Physiotherapist/s	☐	☐	☐	☐
	Occupational Therapist/s	☐	☐	☐	☐
11	Managers do not cooperate in applying the Hendrich II Fall Risk Model.	☐	☐	☐	☐
12	Patients do not cooperate in applying their fall risk interventions.	☐	☐	☐	☐
13	Working according to the Hendrich II Fall Risk Model is too time consuming.	☐	☐	☐	☐
14	The lay-out of the Hendrich II Fall Risk Model is practical.	☐	☐	☐	☐
15	The Hendrich II Fall Risk Model encourages me to support a culture of safety in my workplace.	☐	☐	☐	☐
16	The Hendrich II Fall Risk Model does not fit into my ways of preventing patient falls.	☐	☐	☐	☐

If you disagree/strongly disagree, explain further: _____

_____

_____

_____

It is difficult to give prevention care for falls …

17	if there is not enough supportive staff for effective falls prevention implementation.	☐	☐	☐	☐	☐
18	if the required equipment is not available for fall prevention implementation.	☐	☐	☐	☐	☐
19	if physical space is lacking, say at the bedside or in the toilet.	☐	☐	☐	☐	☐
20	because I am not trained in giving preventive care.	☐	☐	☐	☐	☐
21	to patients with a different cultural background.	☐	☐	☐	☐	☐
22	to patients who seem healthy.	☐	☐	☐	☐	☐
23	when the delegation about a patient's risk of falling is not effective.	☐	☐	☐	☐	☐

I need to know a little about you…

Years of experience (approximately) ☐

Practice Setting

☐ Acute Medical ☐ Acute Surgical ☐ (please state) _____

Position

☐ Registered Nurse ☐ Registered Midwife

☐ Enrolled Nurse

Any further comment about how you use the Hendrich II Fall Risk Model …

_____

_____

Thanks

[1] Peters, M. A. J., Harmsen, M., Laurant, M. G. H., & Wensing, M. (2002). Barriers to and facilitators for improvement of patient care Retrieved from www.iqhealthcare.nl

Appendix 4 Permission to use Barriers and Facilitators Assessment Instrument

M.Hilbink@iq.umcn.nl 4/17/12

to **M.Harmsen**, me

Dear Liz,

Please find attached an English version of the barriers and facilitators assessment instrument. It is no problem that you use the instrument, as long as you refer to it properly.

Best wishes,

Mirrian Hilbink

Dr. Mirrian Hilbink-Smolders

Postdoc onderzoeker / klinisch epidemioloog B

Universitair Medisch Centrum St Radboud

Scientific Institute for Quality of Healthcare

Postbus 9101, 114 IQ healthcare

6500 HB NIJMEGEN

Tel: 024-361 96 41

Fax: 024-354 01 66

E-mail: M.Hilbink@iq.umcn.nl

Internet: www.iqhealthcare.nl

Aanwezig: maandag, dinsdag en donderdag

Appendix 5 Category, characteristic and survey questions

Category	Characteristic	Question Number	Question in survey
H2FRM	Specificity, flexibility/nurse	1	The H2FRM leaves enough room for me to make my own conclusions about falls prevention.
	Specificity, flexibility/patient	2	The H2FRM leaves enough room to consider the wishes of the patient.
	Didactic benefit	3	The H2FRM is a good starting point for me to find out more about falls prevention.
	Compatibility	4	I do not remember the 'Upright' training about how to implement the Hendrich II Fall Risk Model.
	Time investment	13	Working according to the Hendrich II Fall Risk Model is too time consuming.
	Attractiveness	14	The lay-out of the Hendrich Fall Risk Model is practical.
Care provider	Knowledge, motivation	5	It is difficult to give prevention care because I am not trained in giving preventive care.
	Lifestyle, working style	6	I have problems with changing my routines.
	Attitude, role perception	7	I have a general resistance to working according to procedures.
	Doubts about the innovation	8	I think parts of the Hendrich II Fall Risk Model are incorrect.
	Involvement	16	The Hendrich II Fall Risk Model does not fit into my way of preventing patient falls.
	Education	20	I wish I had more knowledge about the Hendrich Fall Risk Model before I had to apply it.
Patient	Motivation to change	12	Patients do not cooperate in applying their fall risk interventions.
	Health status	21	It is difficult to give prevention care to patients who seem healthy.
	Ethnicity	22	It is difficult to give prevention care to patients with a different cultural background.

Category	Characteristic	Question Number	Question in survey
Context	Group norms, socialisation/ nurse	9	Nurses in my team do not cooperate in applying the Hendrich II Fall Risk Model.
	Group norms, socialisation/ doctor	10	Doctors do not cooperate in applying the Hendrich II Fall Risk Model.
	Group norms, socialisation/ physio	10	Physiotherapists do not cooperate in applying the Hendrich II Fall Risk Model.
	Group norms, socialisation/ OT	10	Occupational therapists do not cooperate in applying the Hendrich II Fall Risk Model.
	Group norms, socialisation/ manager	11	Managers do not cooperate in applying the Hendrich II Fall Risk Model.
	Supportive staff	17	It is difficult to give prevention care if there is not enough supportive staff for effective fall prevention.
	Facilities	18	It is difficult to give prevention care if the required equipment is not available for fall prevention implementation.
	Building	19	It is difficult to give prevention care if physical space if lacking, say at the bedside or in the toilet.
	Additional questions	15	The Hendrich II Fall Risk Model encourages me to support a culture of safety in my workplace.
		23	It is difficult to give prevention care when the delegation about a patient's risk of falling is not effective.

Appendix 6 Ethical approval

MASSEY UNIVERSITY
ALBANY

11 September 2012

Elizabeth MacColl
c/- Dr S Neville
College of Humanities and Social Sciences
Massey University
Albany

Dear Elizabeth

HUMAN ETHICS APPROVAL APPLICATION – MUHECN 12/059
Nurses' Barriers to the Implementation of the 'Upright' Hendrich II Fall Risk Model for the Prevention of Falls

Thank you for your application. It has been fully considered, and approved by the Massey University Human Ethics Committee: Northern.

Approval is for three years. If this project has not been completed within three years from the date of this letter, a reapproval must be requested.

If the nature, content, location, procedures or personnel of your approved application change, please advise the Secretary of the Committee.

Yours sincerely

Dr Ralph Bathurst
Chair
Human Ethics Committee: Northern

cc: Dr S Neville
College of Humanities and Social Sciences

Te Kunenga ki Pūrehuroa
Research Ethics Office
Private Bag 102 904, Auckland, 0745, New Zealand Telephone +64 9 414 0800 ex 9539 humanethicsnorth@massey.ac.nz

Appendix 7 Māori consultation

1 August 2012

Liz MacColl
Registered Nurse
Waikato District Health Board

RE: Letter of Support for research project titled:

- *Nurses barriers to the implementation of the upright model for the prevention of falls*

Tēnā Kōe Liz

Thank you for submitting your proposal on the **10 July 2012** Kaumatua Kaunihera Ethics Research Committee meeting. As this was a different process, the Kaumatua Kaunihera Ethics Research committee and accepted your proposal and we are very pleased to provide you support to your research with an invitation to:

a. Provide progress updates to Te Puna Oranga and Kaumatua Kaunihera regarding the study.
b. The Kaumātua Kaunihera receiving a copy of the results at the completion of the study

We wish you well with the study and should you have any further queries please contact me.

Noho ora mai ra

Rose Smith
Kaumātua Kaunihera Sub-Committee representative

Manaaki Nepia
Service Development Manager
Te Puna Oranga-Maori Health Service
Manaaki.nepia@waikatodhb.health.nz
07 834 3628
021 415 062

Appendix 8 DHB authorisation

HEALTH WAIKATO
CARING FOR YOU
Waikato District Health Board

Observational Research/Audit Required Document Checklist (from 1st July 2012)

All items must be made available to Waikato DHB Research Office (RO) prior to commencing any research involving patients, patient information, staff or sites of Waikato DHB. Documents can be made available via HDEC online application system (where appropriate) by authorising Waikato DHB to view your project file.
Waikato DHB Registration# RD 012003 (Fall)

Documentation	Comments	Date sent to RO
Project Registration	Complete Register Your Research form. You will be given a registration (RD) number. Old form	6/9/2012
Project Proposal	Email to research@waikatodhb.health.nz	6/9/2012
Waikato DHB Approval of Research Form	Form will be emailed to researcher following registration and proposal. Emails from approvers are acceptable as electronic sign-off or return signed form. Old form Usually manager, clinical director and group manager approval may be required depending on your study.	12/9/2012
Waikato DHB Clinical Support Services Sign-off (if any) e.g. Clinical Records, Pharmacy, Labs, Decision Support, Radiology, etc.	Form will be emailed to researcher following registration and proposal. Emails from approvers are acceptable as electronic sign-off or return signed form. **Note: any study that includes the administration of medicines should use Interventional Research Document Checklist.**	—
Ethics Application Form (if required)	For HDEC: **Waikato DHB** must be selected as an authoriser in the online HDEC system. For other Institutional Ethics Committees: the final approved version is required.	12/9/2012
Participant Information Sheet (if any)	Final **Waikato DHB** version required. ✓	12/9/2012
Participant questionnaire or interview schedules (if any)	Final **Waikato DHB** version required. ✓	
Participant consent form (if required)	Final **Waikato DHB** version required. ✓	
Participant advertisements/ letters of invitation (if any)	Final **Waikato DHB** version required. ✓	
Funding Contract (if any)	Required only if signed by Waikato DHB. The Chief Operating Officer (COO) must sign all research contracts on behalf of Waikato DHB. Send to sarah.brodnax@waikatodhb.health.nz	—
Evidence of cultural consultation (if required)	Go to website and complete required form(s). Any queries, please contact Manaaki Nepia, Service Development Manager (07) 8343628 or email manaaki.nepia@waikatodhb.health.nz	12/9/2012
Waikato DHB Confidentiality Agreement	Required for any non-Waikato DHB staff accessing Waikato DHB patients, patient information or premises.	—
Letter of approval from researcher's Institution	Letter of approval and acceptability where PI is a student researcher not employed by Waikato DHB and is accessing Waikato DHB patient information or premises.	—
HDEC Ethics Committee Approval Letter (if required)	For HDEC: **Waikato DHB** must be selected as an authoriser in the online HDEC system. For other Institutional Ethics Committees: the final approval letter is required.	12/9/2012

Any queries should be directed to Waikato DHB Research Office by email **research@waikatodhb.health.nz**

V.Gibbons (July2012) DRAFT (*modified from Awhina Research & Knowledge*) v1

A3432HWF

Waikato District Health Board

Research authorisation checklist/database form

1. Principal investigator: Elizabeth MacCou Contact number: Ward 6 (96606) or 078716716

Project title: Nurses' barriers to the implementation of the Hendrich II Fall Risk Model for the prevention of falls

Proposed start date: September 2012 (dd/mm/yy)

Brief outline of the research/study: The priority two Waikato DHB patient safety initiative is to reduce falls by ten percent. The Hendrich II Falls Risk Model was introduced over two years ago and while there has been good uptake of the supporting online training, there has not been the corresponding reduction in the targeted number of falls. This study seeks to identify the barriers to the implementation of the model by use of a descriptive cross-sectional survey using a validated questionnaire. The sampling frame is registered nurses, registered midwives & enrolled nurses who routinely complete the model within the DHB.

Number of researchers involved One

Research project/study funds in $ (either by patient or for the full amount of the study grant):
N.I

Full time equivalent (FTE) of principal investigator and other researchers' time devoted to this project:

2. Approval received from specific bodies? Yes ☐ No ☐ n/a ☑
e.g. National Radiation Laboratory, Standing Committee on Therapeutic Trials (SCOTT)

State which:

2.1 **Research project** - statistical data collection for the Ministry of Health, Department of Statistics, Ministry of Research, Science and Technology and other government funding agencies

2.1.2 **Research funding category** - please tick the funding category which best represents the type of funding received

Own funds ☑	NZ private sector ☐	NZ government funding agency ☐
Other NZ government department ☐	NZ tertiary education ☐	Overseas funds ☐

2.1.3 **Research category** - please tick the category which best represents the type of research being carried out. Please refer to the research definitions below:

Research category definitions

- **Pure basic research** - research to pursue knowledge without any particular application in view
- **Targeted basic research** - research to produce a broad base of new knowledge likely to underpin solutions to current or future applications
- **Applied research** - new work undertaken to acquire knowledge for a specific practical aim, or work to determine possible uses of basic research or work to determine new ways of achieving a predetermined objective

08/09JB

- **Experimental development** – systematic work undertaken using existing knowledge for the purpose of creating new or improved materials, products, processes and/or services

Pure basic research ☐	Targeted basic research ☐	Applied research ☑ Yes
Experimental development ☐	Commercial drug trial ☐	

3. Approval of increased workload and/or payment arrangements by clinical director of area where research is likely to impact (e.g. laboratory, nursing, pharmacy, radiology, medical records etc).

Service area	Date (dd/mm/yy)	Signature: clinical director (or delegate)
(DHB wide) Fall Prevention Programme	6.6.2012.	S.McCullogh (SQC R+CS + Lead DHB fall prevention programme)
Ward 6 Orthopaedic	31.8.2012	([illegible])
Mail Room	26.7.2012.	M. [illegible] (Team Leader).
Human Resources	21/8/2012	[signature] GMHR

4. All reasonable actions have been taken to comply with the Health and Disability Commissioner (Code of Health and Disability Services Consumers' Rights) Regulations 1996

5. ~~Service unit manager~~ NURSE MANAGER / clinical director approves research project.

Signature: [signature] (YEO)

Date: 31-8-12 (dd/mm/yy)

6. ~~Service manager~~ NURSE MANAGER. ensures research project complies with applicable legislation and approves research project:

Signature: [signature] (YEO)

Date: 31-8-12 (dd/mm/yy)

Documents required for signoff at service unit level:

- **Copy of completed Ethics Application form, including Part V Declaration and Locality Assessment**
- **Project budget (approved by service unit accountant)**

7.	Attachments required for final sign-off:	Approved/completed by:	
7.1	Letter of ethical approval	Ethics committee	☐
7.2	Copy of completed ethics application form	Principal investigator	☐
7.3	Approved project budget	Service unit accountant	☐
7.4	Signed Waikato DHB Deed of Indemnity (if relevant)	External sponsor/agency	☐
7.5	Approved site agreements or other contractual documentation (if relevant)	Waikato DHB corporate solicitor/legal advisor	☐
7.6	Lodge copy of form with office of chair, Board of Clinical Governance (level 9 Menzies Building) for database number to be allocated		

Approval to proceed

Signed: [signature]
Research Group Manager

Date: 1-10-12 (dd/mm/yy)

Signed: [signature]
Chief Operating Officer

Date: 2 October 2012 (dd/mm/yy)

Research database number. This must be present for final approval.

RD 1255

Appendix 9 Gamma correlations

The following bullet point are a list the correlations that have been calculated as greater than 0.3. The characteristics and the questions related to them are in Appendix 5.

Correlation	Characteristic	Characteristic
0.98	Doubts about H2FRM	Education
0.97	Didactic benefit*	Ethnicity
0.96	Group norms, socialisation/manager	Specificity, flexibility/patient*
0.94	Doubts about the H2FRM	Supportive staff
0.94	Lifestyle, working style	Motivation to change
0.91	Lifestyle, working style	Group norms, socialisation/doctor
0.89	Education	Motivation to change
0.89	Knowledge, motivation	Building
0.83	Attitude, role perception	Motivation to change
0.83	Group norms, socialisation/OT	Ethnicity
0.83	Doubts about H2FRM	Building
0.81	PT group norms	Ethnicity
0.77	Doubts about H2FRM	Facilities
0.77	Time investment	Ethnicity
0.75	Attractiveness	Ethnicity
0.71	Specificity, flexibility/nurse*	Facilities
0.65	Didactic benefit*	Lifestyle, working style
0.63	Involvement	Health of patient
0.63	Knowledge, motivation	Facilities
0.63	Specificity, flexibility/nurse*	Ethnicity
0.61	Group norms, socialisation/manager	Building
0.60	Specificity, flexibility/nurse*	Health of patient
0.60	Specificity, flexibility/patient*	Ethnicity
0.59	Group norms, socialisation/manager	Supportive staff
0.59	Group norms, socialisation/doctor	Ethnicity
0.59	Time investment	Building
0.58	Knowledge, motivation	Supportive staff
0.58	Compatibility	Building
0.57	Time investment	Facilities
0.54	Health status	Attractiveness
0.53	Attitude, role perception	Supportive staff
0.52	Attractiveness	Motivation to change
0.51	Health status	Supportive staff
0.50	Specificity, flexibility/nurse*	Involvement
0.48	Time investment	Supportive staff
0.47	Group norms, socialisation/doctor	Supportive staff
0.47	Involvement	Facilities
0.44	Didactic benefit*	Health of patient
0.43	Specificity, flexibility/patient*	Facilities
0.40	Group norms, socialisation/manager	Specificity, flexibility/nurse*
0.39	Attitude, role perception	Attractiveness*

0.39	Time investment	Facilities
0.39	Time investment	Ethnicity
0.39	Group norms, socialisation/manager	Ethnicity
0.39	Education	Building
0.36	Group norms, socialisation/OT	Health of patient
0.36	Education	Facilities
0.36	Health status	Facilities
0.36	Group norms, socialisation/doctor	Facilities
0.36	Attitude, role perception	Facilities
0.34	Attractiveness*	Education
0.31	Compatibility	Facilities
0.30	Group norms, socialisation/physio	Health of patient

* Questions were reverse coded before the correlation calculation was made.