

EXPLORING THE BARRIERS AND LEVERS TO HAND HYGIENE  
OF NURSING AND MEDICAL STAFF  
IN EMERGENCY DEPARTMENTS: A MIXED METHODS STUDY

BY

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Abstract

## **Background**

Emergency Departments (ED) frequently host patients with undiagnosed infectious conditions and patients who are vulnerable to infection. Minimising the risk of exposure to infectious diseases is a priority in healthcare and is managed using a variety of strategies. Hand hygiene (HH) underpins these strategies, but ED have lagged behind improvement in HH compared to other units in New Zealand public hospitals. Given the consequences of healthcare associated infections (HAI), further investigation is warranted to identify barriers and levers to HH in the challenging environment of ED.

The aim of this explanatory sequential mixed methods study was to identify barriers and levers to HH practice in two ED in New Zealand.

## **Design**

The mixed methods study was conducted in two phases. In Phase One, a questionnaire was used to survey nurses and doctors in the two ED sites. In Phase Two, follow-on focus groups were used to explore in-depth, specific aspects of the survey results.

## **Methods**

In Phase One, doctors and nurses in the ED sites were surveyed to identify perceived barriers and levers of HH. A previously validated questionnaire from the United Kingdom was used. Following piloting, the questionnaire was circulated via email to all doctors and registered nurses. Results were analysed descriptively. Areas identified as strong barriers and levers to HH practice were identified, and used to inform development of a focus group interview guide.

In Phase Two, focus group participants were identified from a self-selected convenience sample of survey respondents. Focus groups were audio-recorded and data transcribed verbatim into NVivo Pro 11 before undergoing thematic analysis.

## **Results**

The survey was distributed to doctors (n= 81) and nurses (n= 214). The response rate was low (11% for nurses, 12% for doctors). Two focus groups (n=6 & n=2) and one face to face interview (n=1) was held with nurses participating in each session. No medical staff participated in this phase of data collection. All respondents had worked in healthcare

more than three years. Healthcare workers identified that professional role was the strongest lever for HH (93.1%, n=95), closely followed by knowledge and skills (84.3%, n=86). Healthcare workers demonstrated an awareness of benefits of HH including improving patient confidence and avoidance on infection for the patient and themselves (65.9%, n= 89). 45.6% (n=62) of responses identified a lack of encouragement or role modelling in this area of practice.

The physical environment in the ED was a major barrier (53.7%, n=73) although shorter stays in ED were not perceived as a barrier to HH (73.5%, n= 25). High patient turnover and acuity were also perceived as barriers to HH. HH initiatives were perceived to have a marginal effect (55.3%, n=57). Social influences and communication were further barriers to HH, with healthcare workers identifying discomfort when challenging others about HH.

## **Conclusion**

Current barriers to HH including the environmental challenges, and social and cultural barriers to HH need to be addressed. Hand hygiene education that targets known challenges in, and misunderstandings about practice, need to be developed. Organisations must clearly articulate expectations of HH through policy and procedure, including a commitment to address non-compliance. Doctors and nurses should be supported in developing strategies to effectively communicate about, and challenge HH practices. With organisational support and a harnessing of the professional responsibilities that doctors and nurses hold, there is opportunity to strengthen barriers and mitigate barriers to HH.

## Acknowledgements

It has been a privilege to undertake this course of study and I have had an opportunity to explore another dimension of nursing and delivery of healthcare. There have been many challenges during this time and I have given my best.

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# Table of Contents

<b>Abstract .....</b>	<b>iii</b>
<b>Acknowledgements .....</b>	<b>v</b>
<b>List of Tables .....</b>	<b>ix</b>
<b>List of Figures .....</b>	<b>ix</b>
<b>1. Introduction .....</b>	<b>1</b>
Background .....	1
Purpose of the Study .....	3
Structure of the Thesis .....	4
Conclusion .....	4
<b>2. Literature Review .....</b>	<b>5</b>
Introduction .....	5
Search Strategy .....	6
Results .....	11
HH Adherence .....	11
Predictors of Hand Hygiene .....	13
Access to Alcohol-Based Hand Rub .....	13
Beliefs .....	15
Environment and Context .....	16
Use of Gloves .....	17
Workload .....	19
Ethos .....	20
Multimodal Interventions .....	21
Conclusion .....	21
<b>3. Methodology and Method .....</b>	<b>23</b>
Research Methodology .....	23
Introduction .....	23
Philosophical Underpinnings .....	23
Quantitative Paradigm .....	24
Qualitative Paradigm .....	26
Pragmatic Approach to Research .....	28
Mixed Methods Research .....	28
Design .....	29
Study Overview – An Explanatory Sequential Mixed Methods Study .....	30
Setting .....	30
Sample .....	30
Methods .....	31
Phase One – Survey Design .....	31

Phase Two – Focus Group .....	37
Ethics .....	39
The Treaty of Waitangi (Tiriti o Waitangi) .....	40
Rigour .....	40
Conclusion.....	41
<b>4. Results .....</b>	<b>42</b>
Introduction .....	42
Questionnaire.....	42
Survey Demographics.....	42
Theoretical Domains Framework .....	45
Domains .....	45
Focus Groups .....	51
Findings .....	52
Conclusion.....	60
<b>5. Discussion .....</b>	<b>61</b>
Introduction .....	61
Summary of Results .....	61
Levers of Hand Hygiene in Emergency Departments .....	62
Barriers to Hand Hygiene in Emergency Departments.....	64
Contextual Influences.....	64
Culture of Hand Hygiene.....	66
Normalisation of Deviance.....	70
Conclusion.....	72
<b>6. Conclusion.....</b>	<b>73</b>
Introduction .....	73
Summary of Findings .....	73
Strengths and Limitations .....	74
Significance of Study Findings.....	74
Future Research .....	75
Conclusion and Recommendations .....	76
<b>Appendices .....</b>	<b>77</b>
Appendix A: Ethics approval DHB One.....	77
Appendix B: Ethics approval DHB Two .....	78
Appendix C: Participant information sheet .....	81
Appendix D: Questionnaire.....	82
Appendix E: Recruitment poster.....	87
Appendix F: Focus group participant information sheet.....	88
Appendix G: Focus group consent form .....	90

Appendix H: Focus group indicative guide .....	91
Appendix I: Coding in NVivo .....	93
Appendix J: Initial mind mapping using NVivo .....	94
Appendix K: Victoria University of Wellington Human Ethics Committee approval .....	95
Appendix L: Victoria University of Wellington Human Ethics Committee, amendment one .....	96
Appendix M: Victoria University of Wellington Human Ethics Committee, amendment two .....	97
Appendix N: Responses by Domain .....	98
<b>References .....</b>	<b>101</b>



## List of Tables

Table 2.1: Summary of literature .....	8
Table 2.2: Hand hygiene compliance and use of wearable ABHR dispenser .....	14
Table 2.3: Clinical urgency .....	19
Table 3.1: District Health Board .....	30
Table 3.2: Examples of coding used for agreement scale, demonstrating reverse coding ...	35
Table 3.3: Example of reverse coding.....	36
Table 3.4: Item: I cannot be bothered with hand hygiene.....	36
Table 3.5: Domain: Motivation and Goals.....	36
Table 4.1: Response rates by doctors, nurses and combined DHB.....	43
Table 4.2: Demographic of responses (n = 34).....	44
Table 4.3: Self-reported perceived compliance with best practice hand hygiene guidelines.....	50
Table 4.4: Perceived compliance with best practice hand hygiene guidelines of colleagues .....	50

## List of Figures

Figure 2.1: Literature review search strategy .....	7
Figure 4.1: Domains by summated response (%).....	46
Figure 4.2: Perceived compliance with hand hygiene.....	50
Figure 4.3: Thematic framework developed during coding .....	52

## 1. Introduction

Primum non nocere, first do no harm. This is the maxim that health care organisations and health care professionals uphold. One area of patient, family and staff harm that has gained significant attention by academics and popular press is the risk and management of healthcare associated infection (HAI). Key, in the effective management of such infections is effective hand hygiene (HH) practices. Whilst much work has been undertaken in this area, there still remains significant challenges in embedding and sustaining good HH practices in health care settings. This is the area of focus for this study.

This chapter provides information about the context for the study, the area being explored, and the processes used to study this. The structure of the thesis is also outlined.

### Background

Healthcare-associated infections were reported to cost \$137 million for all predicted medical and surgical admissions to New Zealand hospitals during 1998/1999 financial year (Graves, Nicholls, & Morris, 2003). These costings reflect lost opportunity for patients on waiting lists for elective surgery and impacts on patient flow through the healthcare system as a result of increased length of stay, when patients have a HAI. This financial burden does not include costs attributable to primary care services nor the financial impact on patients. Financial impact aside, HAI can and do have devastating consequences for patients, with increased risk of long-term effects and death. It is therefore an ethical responsibility, for healthcare professionals, to ensure that we do no harm.

Not all HAI are avoidable, however the risk of cross infection is mitigated by the application of standard precautions when providing healthcare, which includes HH and, when appropriate, isolation precautions: these are commonly referred to as transmission-based precautions. Such strategies are generally adopted by most healthcare systems and are well embedded in New Zealand health care. All healthcare workers are expected to use these precautions and importantly to practice HH at appropriate opportunities in clinical settings.

Hand hygiene is fundamental to clinical practice and has been shown to reduce the risk of HAI (Allegranzi & Pittet, 2009; World Health Organisation, 2009a). Despite demonstrated reduction in HAI as a result of HH improvement programmes (Pittet et al., 2000), many studies demonstrate a struggle to sustain increased rates of HH compliance (Haas & Larson,

2008; Larson, Albrecht, & O'Keefe, 2005; Saint, Conti, et al., 2009), although some have shown sustained improvement using the World Health Organization multi-model strategy (Allegranzi et al., 2013). The multi-model strategies include: Improved access at point of care to alcohol-based hand products, HH training, education and compliance feedback, visual prompts to remind and encourage healthcare workers, and emphasis on a culture of patient safety (World Health Organization, 2009a).

A HH improvement programme, based on the World Health Organization HH guidelines (2009a), was introduced to New Zealand hospitals in 2009 and was well-established by 2012. An evaluation of the HH improvement programme in 2014, identified that HH compliance ranged between 61-73% in hospital settings except for emergency departments (ED), whose compliance with recommended HH practices was 42% (Health Partners Consulting Group, 2014). There is emerging research on HH practices in ED, one study includes data from a New Zealand ED, which does not reflect well in this setting (Al-Damouk, Pudney, & Bleetman, 2004). Ten years on from Al-Damouk et al. (2004) study, it is evident that ED HH compliance remains well behind other services in public hospitals.

The risk of HAI is significant in clinical settings and particularly in areas that have high patient turnover, high acuity and crowding (sometimes referred to as overcrowding or access block) such as ED. Patient presentations to ED range from minor non-life threatening conditions to complex, urgent and life-threatening events. The volume of patient presentations to ED fluctuate throughout a 24-hour period, with patient demand often exceeding the physical capacity of bed spaces, resulting in crowding. Crowding is frequently demonstrated by occupied beds in corridors. When patients are located in corridors, not only is safe passage of equipment and supplies, removal of waste and used linen, and transportation of patients on beds impeded, patient privacy is severely compromised (Magid et al., 2009). When crowding occurs, which increases demand on available resources, patient safety is further compromised which negatively influences clinical outcomes for patients (Hoot & Aronsky, 2008; Ministry of Health, 2011). Quach et al. (2012) identified a threefold increased risk of acquiring a respiratory or gastrointestinal infection following a visit to an ED. Opportunities to decrease the risk of cross infection i.e. infective organisms moving from one person to another by direct or indirect means, as a result of exposure to an infectious disease in ED, warrants further investigation.

Commonly, HH compliance in ED is poor and initiatives to improve and sustain HH adherence rates are a major challenge (Di Martino et al., 2011; Larson et al., 2005; Meengs, Giles, Chisholm, Cordell, & Nelson, 1994). Improvement strategies have included better access to cleansing agents such as alcohol-based hand rubs (ABHR), development of efficient workflows and evaluation of improved hand product dispensing devices (Haas & Larson, 2008; Larson et al., 2005; Scheithauer et al., 2013). The reported strategies have made some improvements to compliance rates but HH adherence in ED is still well short of good HH practice.

Alternatively, compliance with good HH practices are evident when senior staff are engaged and championing HH improvement initiatives (Venkatesh, Pallin, Kayden, & Schuur, 2011). Sustained improvement in HH compliance requires a supportive organisational culture, behavioural changes and continuous reinforcement of good HH practices (Di Martino et al., 2011).

International literature has identified predictors of HH practice in healthcare settings, some of which have been shown to be applicable to ED (Di Martino et al., 2011; Venkatesh et al., 2011). It is unclear if the predictors of HH identified elsewhere, are applicable to ED in New Zealand. However, as the available data suggests, EDs in New Zealand are struggling to apply good HH practices. It is therefore worthy of investigation. Currently barriers and levers to HH in New Zealand ED are unknown, understanding these will provide a platform to inform future interventions to improve HH in ED and enhance patient safety.

### Purpose of the Study

The purpose of this study was to identify the barriers and levers to HH, from the perspective of nurses and doctors in New Zealand ED.

The objectives of the study, as applied to nursing and medical staff in ED, were to:

1. Explore barriers and levers of HH that influence HH compliance.
2. Make recommendations for HH practice and future research

This research project was conducted using a sequential mixed methods research design. The study was conducted in two phases. In Phase One, a questionnaire was used to survey nurses and doctors in ED. In Phase Two, follow-on focus groups were used to explore in-depth, specific aspects of the survey results in.

## Structure of the Thesis

There are six chapters in this thesis exploring barriers and levers to HH in ED. The first chapter provides an introduction to the thesis and includes a description of the context of HAI, strategies to minimise their risk focussing on HH and application to ED. Chapter Two describes the findings of a literature review dated between 2004-2014, focusing on the current knowledge of HH of healthcare workers in the ED. Predictors of HH are identified and influences of multimodal interventions. The third chapter outlines the research methodology and details of the mixed methods design and its application to this study. Chapter Four presents the results of the study in two phases. The quantitative results are presented first, followed by the qualitative focus group findings, which inform the results from Phase One. Chapter Five presents a discussion of the study results, interpreting the questionnaire result with the support of the focus group findings. The final chapter concludes this thesis by summarising the barriers and levers to HH in ED and making recommendations for future research.

## Conclusion

The cost of HAI in New Zealand hospitals is high, and impacts on patient flow and elective waiting lists. The body of literature in this area identified that the ED is a high-risk area for HAI and under increasing pressure due to high patient acuity and turn over. This busy high-risk environment is the context in which healthcare workers' HH adherence is poor; the very time when HH should be maximised. Mitigating the risk of HAI will improve patient outcomes and reduce patient length of stay in hospital.

Predictors of HH are well established in multiple care settings, with some limited work undertaken in ED. Knowledge in this area needs further development with exploration of whether this work is generalisable to ED in New Zealand. Further work is required to understand what underlying factors contribute to poor HH in this setting. This study seeks to address this.

## 2. Literature Review

### Introduction

Healthcare-associated infections (HAI) have a significant impact on consumers and their families that incurs substantial social, physical and financial burden, and results in increased length of stay in hospital, temporary or permanent disability and loss of income. It has been estimated that 5-10% of patients admitted to hospital will acquire a HAI (Burns, Bowers, Pak, Wignall, & Roberts, 2010) with costs associated with HAI per annum estimated to be \$137 million in New Zealand (Graves et al., 2003). Given that a number of these infections are avoidable, concerted effort to minimise the risk of HAIs is a priority and one that requires participation of all healthcare personal, administrators and consumers.

Hand hygiene is the cornerstone of infection prevention and infection control in healthcare delivery. Hand hygiene is the term used to describe cleansing the hands using either soap and water or alternatively an alcohol-based hand rub (ABHR), which also includes alcohol based hand gels or sanitisers. Compared to soap and water, ABHR is more effective in reducing the microbial load on the hands, and is quicker and potentially more accessible than hand basins (World Health Organisation, 2009a). Comprehensive HH guidelines have been written for healthcare workers by both Centers for Disease Control (2002) and the World Health Organization (2009a). Hand hygiene is a core practice that all healthcare professionals subscribe to, yet audited adherence in hospital settings, falls well short of expectations. Considerable work has been undertaken to report on HH in healthcare settings and includes: adherence reporting, raising awareness, exploring interventions and evaluation of outcomes of interventional studies (Huis et al., 2011; Huis et al., 2012; Larson, Bryan, Adler, & Blane, 1997; Pittet, 2000; Pittet et al., 2006).

Given the substantial infection prevention challenges that ED poses, HH practices of healthcare workers in ED is an emerging field of study that warrants further research (Liang, Theodoro, Schuur, & Marschall, 2014). The purpose of this literature review is to explore what is known about the HH practices of doctors and nurses in the ED. A narrative literature review was undertaken including a critique and summary of the literature. From this, conclusions were drawn and research gaps identified to support the development of the research question (Cronin, Ryan, & Coughlan, 2008; Timmins & McCabe, 2005) that guided this thesis.

## Search Strategy

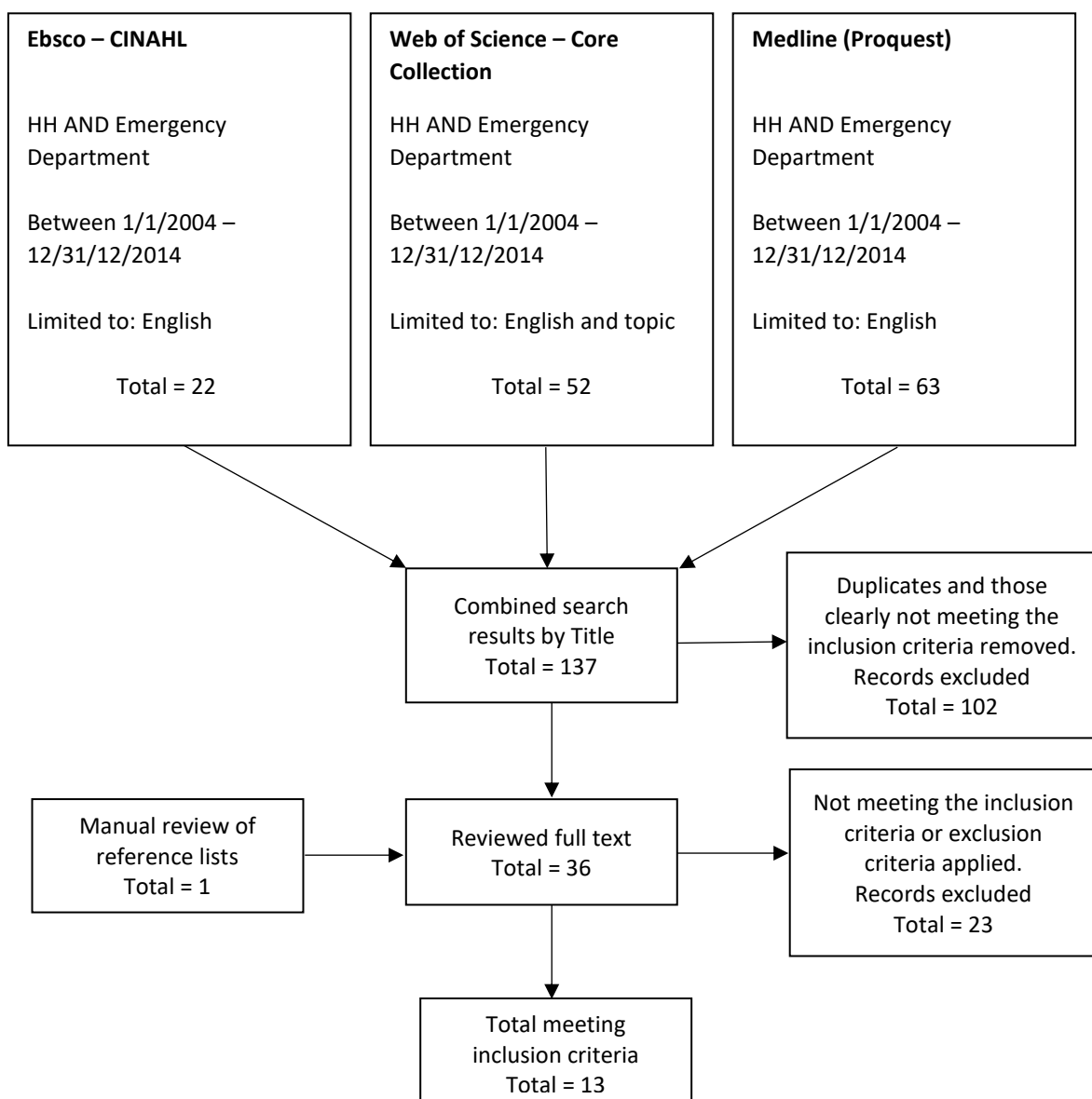
A literature review was undertaken using bibliographic databases including Cumulative Index Nursing and Allied Health Literature (CINAHL), Proquest - Health and Medical, and Web of Science – Core Collection. In developing the proposal for this study, initial literature searches revealed few empirical papers specific to HH in emergency departments. In view of this, the following types of papers were included in the search strategy: Original research, practice improvement, literature reviews, brief or concise communications.

Inclusion criteria included:

- Papers exploring hand hygiene in emergency departments
- Hand hygiene in emergency departments
- Initiatives associated with improving hand hygiene in emergency departments
- Predictors of hand hygiene adherence in emergency departments
- Published between January 2004 – December 2014
- English language

Exclusion criteria included:

- Hand hygiene related to emergency services prior to arrival at emergency department
- Hand hygiene in clinical areas other than emergency department
- Hand hygiene in developing health systems or countries with significant cultural differences
- Papers not accessible through Victoria University of Wellington library



**Figure 2.1:** Literature Review Search Strategy



**Table 2.1:** Summary of Literature

Author	Research design	Aim	Setting	Sample	Key findings
Al-Damouk et al. (2004)	Single blind observational study.	To assess doctors' adherence with good HH between patient episodes and asepsis during invasive procedures.	Emergency departments, United Kingdom & New Zealand.	Doctors working on any shift when the observers were rostered who had patient contact and performed an invasive procedure.	Doctors HH adherence between patients in one ED in the United Kingdom = 14%, and 12% in New Zealand. Clinical urgency in ED did not appear to negatively impact on HH and aseptic techniques.
Carter, Pouch, Larson (2014)	Literature review.	Examine literature regarding adherence to infection prevention and control practices.	Emergency departments.	Not applicable.	Significant range of HH adherence reported in ED, possibly influenced by variation in study designs and non-standardized tools.
Di Martino, Ban, Bartoloni, Fowler, Saint, Mannelli (2011)	Post intervention evaluation.	To assess post intervention adherence 1 year following intervention.	Paediatric ED, Florence Italy Retest.	Doctors and nurses working in the ED.	Overall adherence did not change significantly, from 44.9% to 45.3% one-year post intervention. Nurses who were exposed to ongoing education continued to improve, while doctors HH declined.
Haas and Larson (2008)	Quasi-experimental trial.	To assess HH rates when a personal wearable alcohol based sanitizer was worn.	Emergency department, New York University Medical Centre.	18 bed emergency department.	HH improvement was transient from 43% at baseline, peaking at 62% then declining to 51% by completion of the study.
Larson et al. (2005)	Crossover interventional.	Comparing frequency of use of manual versus touch-free dispensers of hand sanitizer.	Paediatric ED undisclosed region or country.	17 Bed ED and 14 bed paediatric intensive care unit.	While automated dispenser was used more frequently, HH compliance was still 35% in the ED. Multimodal factors need to be considered when attempting to improve HHC.

Author	Research design	Aim	Setting	Sample	Key findings
Liang, Theodoro, Schuur, Marschall (2014)	Literature review.	To identify where infection prevention improvements can be made in ED and identify gaps in knowledge for future research.	Emergency departments.	Not applicable.	Barriers to improvements need to be understood, addressed and overcome. Access to personal protective equipment, HH products, reminders and feedback to reinforce education. A culture that positively engages healthcare workers and administration, showing commitment to a shared patient safety culture.
Parmeggiani, Abbate, Marinelli, and Angelillo (2010)	Cross-sectional study, using a questionnaire.	To assess level of knowledge, attitudes and adherence regarding standard precautions about HAI among healthcare workers in ED.	Eight academic, acute general hospitals in the regions of Caserta and Naples, Italy.	550 healthcare workers working in the emergency departments.	Healthcare workers who had received education, were more knowledgeable and reported using control measure more frequently than those who had not received education. Overall adherence with standard precautions was low, although nurses reported better adherence than doctors.
Reardon, Valenzuela, Parmar, Venkatesh, Schuur, Allen, Pallin (2013)	Prospective observational study.	To quantify the time burden of using alcohol-based hand cleanser when using non sterile gloves.	Adult tertiary care ED, United States of America.	40 healthcare professionals	Time for gloving and removal using ABHR before and after glove usage took 44 seconds (mean).
Saint, Bartoloni, Virgili, Mannelli, Fumagalli, di Martino, Conti, Kaufman, Gensini, Conti (2009)	Observational study.	To assess current rate of HH adherence of doctors and nurses, three years after a HH improvement programme.	Florence, Italy.	Five separate units, four units in one hospital and an ED in the fifth. Doctors and nurses working in five units across two hospitals.	Emergency department HH compliance was 14.3% three years after the introduction of an area wide HH promotion.

Author	Research design	Aim	Setting	Sample	Key findings
Saint, Conti, Bartoloni, Virgili, Mannelli, Fumagalli, di Martino, Conti, Kaufman, Rogers, Gensini (2009)	Multi-modal interventional study.	To improve HH adherence of doctors and nurses, across five previously studied units. To understand variability of results between the units, despite close proximity.	Florence, Italy.	Five separate units, four units in one hospital and an ED in the fifth. Doctors and nurses working in five units across two hospitals.	Following on from previous work and baseline compliance at 14.3%. A multimodal intervention achieved 30.6% HH compliance post intervention. Findings recommended use of multimodal interventions, including physician champions. Caution was urged when comparing overall rates as there can be significant unit level variation.
Scheithauer, Kamerseder, Petersen, Brokmann, Lopez-Gonzalez, Mach, Lemmen, (2013)	Prospective tri-phase interventional before and after study.	To define the number of hand rubs needed for an individual patient care at the ED. Optimize HH adherence without increasing workload.	Emergency department RWTH Aachen University Hospital, Germany.	A minimum of 125 patients were enrolled into the study at each observation phase. This number was divided into surgical or non-surgical patients.	Hand hygiene compliance increased from 21% to 45% over the three phases of intervention. Improved workflow with SOP enhanced hand hygiene compliance by reducing the number of HH opportunities required. Use of gloves instead of performing HH remains a challenge despite clear guidelines. Work to be done on myth that gloves replace the need for HH and education on current best practice guidelines.
Stoner, Cohen, Fernandez, Bonsu (2007)	Prospective study.	To identify the preferences and perceptions by parents regarding HH by their child's doctor.	Emergency department, Columbus Children's Hospital, Ohio.	100 healthcare workers and 99 parents whose children presented to the ED.	Education to disseminate evidence based recommendations.
Venkatesh, Pallin, Kayden, Schuur (2011)	Observational study.	To describe the prevalence of HH adherence and to identify the predictive value of healthcare worker type, ED layout and workflow on HH in the ED.	Large, urban emergency department, United States of America.	All healthcare workers who came into contact with patients.	HH was negatively influenced by patient location within the department, use of gloves, healthcare worker types and high visibility rooms. HH compliance by professional group was highest for physician assistants (96.7%) and lowest for transport staff (63.3%). Compliance by location of the patient in a hallway 82.3%.

## Results

Initial database search results retrieved a combined total of 137 papers. Following review of titles and abstracts, duplications and papers clearly not meeting the inclusion criteria were removed. The remaining 35 papers were read in full and 13 papers meeting the inclusion criteria were identified. Of the 13 papers retained, two papers were literature reviews specific to the ED setting. The remaining 11 papers included: one conducted in Germany; four in the United States of America; one in the United Kingdom; one in New Zealand; one undisclosed site; and one paper that reported the results of the same study from two ED. The remaining four papers were from Italy, of which three papers were linked to the same research project conducted in five clinical units, across two hospital sites. The first of the Italian papers reported results three years after the introduction of a regional HH improvement initiative. The second paper, by the same authors, reported findings following a multimodal intervention to improve HH conducted over six months, in the same five units across the two hospital sites. The third Italian paper reported on findings in one clinical unit i.e. the ED, one-year post intervention.

Findings of this literature review will be presented as themes that were developed from the findings identified in the literature. These include: reporting on HH adherence, predictors of HH, HH products and multi-modal interventions.

### HH Adherence

HH adherence in ED has been reported in the literature. Reported rates of HH adherence in ED varies significantly from as low as 12% (Al-Damouk et al., 2004), 14.3% (Saint, Bartoloni, et al., 2009) to 89.7% (Venkatesh et al., 2011). Others have reported HH adherence rates between these figures including: Haas and Larson (2008) 43% at base rate to 51% post intervention, Di Martino et al. (2011) 45.2% one year post intervention, Larson et al. (2005) 38.4% and Scheithauer et al. (2013) from 21% at base rate to 45 % post intervention. However, methods of measuring adherence are not consistent across these papers.

Al-Damouk et al. (2004) study of HH and aseptic technique in two ED, defined HH as decontamination of hands between patient episodes. This is in contrast to Larson et al. (2005) who measured HH adherence using the following indications:

1. Before direct contact with a patient
2. Before donning sterile gloves when inserting central venous catheters
3. Before inserting invasive devices
4. After touching patients intact skin
5. After touching bodily fluids, wounds or non-intact skin
6. Before moving from a contaminated site to a clean site in the same patient
7. After contact with inanimate objects in the patient 's vicinity
8. After removing gloves

Papers written since 2008 have tended to utilise some or all of the World Health Organization's (2009a) 'My Five Moments for Hand Hygiene' which are:

1. Before patient contact
2. Before a clean/aseptic procedure
3. After body fluid exposure risk
4. After touching a patient
5. After touching patient surroundings

This is illustrated in several of the papers identified in this literature review. Venkatesh et al. (2011) used before and after patient contact, Saint, Conti, et al. (2009), Di Martino et al. (2011) results measured HH before patient contact and Scheithauer et al. (2013) used all five indications. All studies used similar observational templates to record HH adherence. The templates measured the indication for HH, professional role, type of hand decontamination i.e. AHBR, wash using soap and water or missed, glove use was also included.

Comparing HH adherence rates reported in the literature should be approached with caution. It is clear that what is being measured (method used) and reported (results presented) often varies, which can account for the range of adherence rates. Reported rates can be temporally associated with HH initiatives and are unit and context specific, making comparisons very difficult. This is demonstrated by Venkatesh et al. (2011) study which reports an overall rate of 91.9% compliance by ED physicians. This result is markedly different for physician compliance, compared to rates reported by Saint, Conti, et al. (2009) (42.8%) and Di Martino et al. (2011) (36.5%). Venkatesh et al. study was undertaken during a physician led HH service improvement programme, Saint, Conti, et al. (2009) study

reported HH within 10 weeks of a service improvement initiative and Di Martino et al. (2011) reported HH compliance one year following Saint, Conti, et al. (2009) intervention. In spite of this, the majority of studies indicate that HH adherence in the ED is low and warrants further study.

### Predictors of Hand Hygiene

Previously identified influences on HH are frequently referred to as predictors of HH and tends to imply prediction of poor HH. They are well documented, particularly in hospital settings, in literature outside the criteria of this literature review (World Health Organisation, 2009a) some of which are addressed in the study undertaken by Venkatesh et al. (2011) and mentioned in others (Di Martino et al., 2011; Haas & Larson, 2008; Saint, Conti, et al., 2009). Predictors may include, but is not limited to accessibility to HH facilities inclusive of hand basins or ABHR, health care workers type or professional discipline, workflow, environmental context and social influence. These predictors, related to HH in ED will be explored in the discussion to follow.

#### *Access to Alcohol-Based Hand Rub*

Methods to improve access and dispensing units of ABHR have been trialled. Haas and Larson (2008) study investigated HH adherence in one ED by trialling the use of a wearable alcohol gel dispenser. Wearable alcohol dispensers contain a small volume of ABHR (30-100 mls) and can be clipped onto a pocket or belt of a healthcare worker so that it is readily available at the point of use for hand cleansing. In this study, the access to 18 hand basins, three of which were primarily used in the clinical setting and 16 previously wall mounted ABHR dispensers, situated around the ED were unchanged. The wearable gel dispensers were issued to staff with instruction on how to use them correctly. Hand hygiene adherence was measured, using the World Health Organization's (2009a) 'Five Moments For HH' and compliance was recorded during three observational periods over three months. A total of 757 HH opportunities were observed during the study. Of all HH moments that were observed during the three-month trial, the wearable ABHR dispenser was only used 9% in the first month, 13% in the second month and 6% in the last month. Hand hygiene rates compared to use of wearable dispensers is tabulated below.

**Table 2.2:** Hand hygiene compliance and use of wearable ABHR dispenser

	Baseline	Observation 1	Observation 2	Observation 3
HH Compliance	43%	62%	53%	51%
Use of Wearable ABHR Dispenser	NA	9%	13%	6%

Haas and Larson (2008) reported no significant change in type of product used, i.e. soap and water or wall mounted or wearable ABHR during the trial, but noted that the increase in the first month was mainly attributable to increase use of soap and water. Haas and Larson (2008) acknowledged that interventions need to be multi-modal to improve and sustain HH adherence.

Saint, Conti, et al. (2009) study, measured HH compliance before and after an intervention in five hospital units, one being an ED. The intervention included presentation of current HH practices to doctors and nurses within the ED, identification of champions, education for nurses and doctors, badges for champions to wear saying 'Ask me if I have washed my hands', promotion of the use of ABHR including individual ABHR dispenser to enhance hand cleansing at point of use. In this study, results of HH compliance for doctors and nurses were reported for the ED. Doctors rates of HH compliance improved from 7.7% to 50.5% and nurses from 19.2 to 40.7%. Interestingly doctors increased their use of ABHR and nurses increased their use of soap and water. It is difficult to determine what impact the individual ABHR dispensers had on the increased rates of HH. One-year post intervention, Di Martino et al. (2011) followed Saint, Conti, et al. (2009) study with repeat observation of HH compliance in the same ED. Doctors' rates of HH decreased from 50.5% to 35.5% and nurses increased from 40.7% to 49.8%. Overall rates were maintained (44.9% vs. 45.2%). The only apparent difference reported, that may have explained the change in HH rates, was the expectation that nurses would attend at least one of the monthly HH education sessions.

In spite of improved access to ABHR, it remains challenging to identify barriers to sustained HH improvement. Practical challenges exist using wearable ABHR dispensers. The small volume needs to be replaced regularly, the ability to misplace the dispensers and the cost of continued supply (Larson et al., 2005) need to be addressed. Regardless, this was an opportunity for healthcare workers to adopt an intervention that improved access to HH products, but sustained improvement was unrealised.

## *Beliefs*

In a cross sectional survey, Parmeggiani et al. (2010) reported on healthcare workers knowledge, attitudes and behaviours about HAI. When health care workers in the survey (n=307) were specifically asked about HH practices 86.6% said they often or always performed HH when moving between patients, 88.6% said they wear gloves in contact with a patient, but only 65.8% performed HH before putting on gloves. 91.4% cleansed their hands after removal of gloves. It is important to note that the results indicate that healthcare workers are aware of recommended practices e.g. cleansing hands before and after wearing gloves and before touching a patient, and for some reason they achieve 65.8% compliance when cleansing hands before putting on gloves.

Beliefs about ABHR may impact on poor HH rates. Saint, Conti, et al. (2009) reported that the use of ABHR appeared to be less favoured, particularly by nurses in the ED. The main reasons cited were that nurses were unsure of the benefits of the alcohol-based products with some nurses reporting difficulty in access, skin sensitivities and underlying concerns that the product was carcinogenic.

Hand hygiene using soap and water is considered the traditional method for cleansing hands. Stoner, Cohen, Fernandez, and Bonsu (2007) study, reported on nurses, doctors and parents of children presenting to ED, and their preferred method of HH i.e. using either soap and water or ABHR. The questionnaire was distributed to 99 parents and 100 healthcare workers (64 nurses, 29 doctors and 7 nurse practitioners). The healthcare workers were asked to respond to the questionnaire as if they were receiving medical care. When asked 'how would you like your doctor to clean his or her hands?', 45.5% of nurses and doctors favoured soap and water (51.5% had no preference), while 52.2% of parents preferred soap and water (39.1% of parents had no preference). When this same group of participants were asked 'which method do you feel is better?', 56.6% of combined healthcare workers favoured soap and water (34.3% had no preference). In addition, 54.3% of parents thought soap and water was 'better' (31.5% had no preference). Other studies report variable use of ABHR, 79.4% (Larson et al., 2005) and 70% (Di Martino et al., 2011). Regardless of the high rates of ABHR use, Larson et al. (2005) study, reports 38.4% HH adherence, and Di Martino et al. (2011) 45.2%.



Access to HH facilities has been reported as a predictor of HH adherence. As discussed above, improved access to ABHR in the ED does not necessarily correlate with sustained improvement in HH. Underlying concerns of healthcare workers in ED, about efficacy of ABHR products has either not been fully addressed or failure to acknowledge these concerns during education may contribute to poor HH adherence. Understanding healthcare worker's beliefs and attitudes about HH practices is essential in the context of ED and this conundrum contributes to this thesis.

### *Environment and Context*

Environmental context is used to describe the physical layout, workflow or the ethos of the ED. The physical layout of the ED is specifically designed with designated areas to care for patients with different clinical needs. Bed or seating areas are often based on patient acuity and can range from major trauma areas, high observational areas e.g. cardiac monitoring, lower observational areas e.g. awaiting diagnostic testing or results, and provision of single rooms. High patient acuity, turnover and crowding will all impact on the area within the ED that the patient will be managed. The term crowding is not well defined, however it is a term used when patient volume exceeds available resources, often demonstrated when patients are located in areas that are not designed to act as a clinical assessment area, i.e. the patient is managed on a bed in the hallway.

The influence of such environmental factors on HH performance were explored by Venkatesh et al. (2011). In their prospective study, Venkatesh et al. investigated the predictive value of healthcare worker discipline, the physical layout and workflow in ED. This study recorded compliance at each opportunity of HH i.e. before or after patient contact, healthcare worker role, patient location at the time of the HH opportunity and use of gloves. There were 5,865 opportunities for HH observed. Overall rate of HH was high at 89.7%. Reduced HH was noted when patients were located in hallways (82.3%) compared to 90.8% in private rooms and in the lower acuity observation areas (84%). Hand hygiene compliance by all but one healthcare worker type was above 86.8%, the remaining healthcare worker type i.e. transport staff rate of compliance was 63.3%. Venkatesh et al. contends that the results for patient location in hallways (82.2%), transport staff (63.3%) and lower acuity observation area (84%) are predictors of poor HH practice. Potential reasons for the reduced HH rates were lack of readily available ABHR in hallways or a potential indicator of the effect of crowding and/or workload associated with patients

located in hallways. The authors suggest that poorer compliance in the observation area was potentially related to staff perception that lower acuity patients have less infection risk than higher acuity patients.

#### *Use of Gloves*

Infection risk is managed by use of personal protective equipment such as gowns, masks or non-sterile gloves. In the ED, trauma patients frequently have significant blood loss which healthcare workers are exposed to during the course of their work. Non-sterile gloves are used in clinical situations to reduce the risk of healthcare workers exposure to blood or body fluids. Blood and body fluids are a vehicle for blood borne viruses including hepatitis B & C, and human immunodeficiency virus (HIV). These viruses can cause chronic disease which may be life limiting. Other communicable diseases associated with exposure to blood or body fluids, which may be minimised by the use of gloves, include diarrhoea and vomiting, exposure to infections – particularly multi-drug resistant bacteria e.g. methicillin resistant *Staphylococcal aureus* (MRSA).

The appropriate use of gloves in combination with HH can minimise the risk of infection, however both Scheithauer et al. (2013) and Venkatesh et al. (2011) noted that glove usage had a negative impact on HH adherence. This infers that HH is performed less often before putting on gloves or after gloves are removed. In Venkatesh et al. study, all but one variable scored a HH compliance rate between 82.3-96.7%. Hand hygiene compliance when gloves were used was 83.3%. It could be argued that a compliance rate of 83.3% does not meet the criteria as a predictor of poor HH practice, however in the context of this study, it is at the lower end of the reported compliance. Venkatesh et al. contends that some health care workers perceive that glove usage is an alternative to HH, which is a concept that is well socialised in ED because of their high patient turnover and therefore considered time efficient. Conversely, Haas and Larson (2008) noted in their study that the use of gloves did not significantly impact on HH, ( $p = 0.1$ , 95% CI = 0.88 to 2). Regardless of Haas and Larson (2008) findings other practice concerns may impact on appropriate use of gloves.

The World Health Organization (2009a) specify that hands should be cleansed prior to patient contact and after exposure to blood or body fluid and/or patient contact. If gloves are indicated during patient contact, hands should be dry before putting on gloves.

Following anecdotal reports that hands were too sticky if ABHR was applied prior to putting

on gloves, Reardon et al. (2013) study investigated the time burden of applying ABHR before putting on gloves. The length of time to apply ABHR, put on gloves, remove gloves and cleanse hands with ABHR was 44 seconds (mean). Alternatively putting on and removing gloves without ABHR took 20 seconds, the difference of 24 seconds was the mean time observed to apply ABHR. Taking into account an average number of times gloves would be worn per patient, per physician, per hour it was suggested that, balanced against the cost of a HAI the time taken to use ABHR before and after putting on and removing gloves was a manageable time commitment. There are several points to note regarding this study. The first is that gloves should be used when there is potential exposure to blood and body fluid, or if the patient's condition requires contact precautions. There is a tendency to over utilise gloves, adding to time burden. There are potential time saving opportunities if gloves are used according to the World Health Organization guidelines (2009a). Secondly, prior to the introduction of ABHR, hand washing with soap and water was the standard of practice. The estimated time to perform hand washing to remove transient bacteria was between 40-60 seconds i.e. twice as long as ABHR (World Health Organisation, 2009a). Therefore, if gloves are used at the appropriate times, the introduction of ABHR can be viewed as a time saver.

Multiple factors influence workflow in ED including the volume of patients requiring assessment and treatment, acuity, staffing expertise and ratio of staff to patients. Managing workflow in an environment that has the propensity to change rapidly is extremely challenging and applicable to ED. Scheithauer et al. (2013) explored workflow in one ED by undertaking a prospective tri-phase study. Healthcare workers HH was observed while providing care to 378 patients during the study period. A total of 5674 opportunities for HH were observed. Three, six-week observation periods were interspersed with two, six-week interventions. The first set of interventions included HH education, observation with immediate feedback and compilation of standard operating procedures (SOPs) for specific procedures that occur commonly in the ED e.g. taking blood cultures. The second set of interventions, in addition to the first set, added review of SOPs, development of flowcharts and distribution of the SOPs. Using this approach, Scheithauer et al. (2013) was able to achieve efficiencies in workflow that reduced the required number of HH opportunities at the same time as raising HH adherence. Hand hygiene adherence rates improved from baseline of 21% to 45% at the completion of the third phase. Improvement

in HH adherence rates were significant, however final HH adherence rate remains well short of acceptable standards of practice.

### *Workload*

Workload is reported to negatively impact on HH adherence in all settings but particularly in ED (Magid et al., 2009). This is potentially due to high patient turnover, patient acuity, crowding and poor staff to patient ratios. These factors influence the busyness of departments and demand reprioritisation of patient care to manage those with the most urgent need. Al-Damouk et al. (2004) observational study conducted in two ED one in New Zealand and the other in the United Kingdom (UK) was designed to assess adherence to good practice standards during aseptic procedures, which would have included HH as one element of their study. Their findings reported that doctors HH adherence between patients was poor, 12% in New Zealand and 14% in the UK, regardless of apparent urgency. Urgency was calculated using the UK and New Zealand triage systems at the time of the study (Table 2.3).

**Table 2.3:** Clinical Urgency

UK triage system	New Zealand triage system	Study urgency category
Red - immediate	Red - immediate	Immediate
Orange - within 10 minutes	Yellow - 10 minutes	Urgent
Yellow - within 1 hour	Green - 30 minutes	Urgent
Green - within 2 hours	Blue - 1 hour	Non-urgent
Blue - 4 hours	White/black - 2 hours	Non-urgent

In Al-Damouk et al. (2004) study, 43 procedures were observed in New Zealand and 22 in the UK, 35 were classified as non-urgent. High compliance with good practice standards for asepsis was 50% across all procedures and 58% in procedures classed as non-urgent. High compliance was classified as greater than 50% compliance and low compliance was less than 50% compliance with good practice standards for aseptic procedures. Intravenous cannulation was the most common procedure observed (n=27). Of the cannulations, 18/27 were described as immediate or urgent and 9/27 as non-urgent. High compliance with good practice standards for the immediate or urgent cannulations was 61% (11/18). High compliance with good practice standards in the remaining non-urgent attempts at cannulation was 33% (3/9). These results indicate that overall compliance with good

practice standards for aseptic procedures was poor and that of the non-urgent cases, i.e. no clinical reason for urgency, HH was worse. Liang et al. (2014) and Scheithauer et al. (2013) noted that a perceived lack of time is a predictor of poor HH practices.

### *Ethos*

Ethos describes the 'culture' of the ED and is potentially reflected in behaviour. Di Martino et al. (2011) suggests that changes in behaviour are related to support from management and organisational culture. Liang et al. (2014) notes that 'a shared culture of safety' underpinned by clinical and management commitment supports ownership of infection prevention in ED. A quality improvement programme, initiated and championed by a senior doctor, reported HH compliance rates that most ED would be proud of Venkatesh et al. (2011). Venkatesh et al. study suggests that there was clinical engagement and commitment, and by implication, management support, through approval to undertake this study by the institutional review board.

Parmeggiani et al. (2010) survey showed that 65.8% of healthcare workers said they often or always cleansed their hands before putting on gloves and 86% after removing gloves. This suggests that healthcare workers in this ED had a high degree of knowledge about recommended practice. In comparison Scheithauer et al. (2013) expressed some frustration with poor HH when gloves were used. Despite education specific activities and solid improvement regarding HH and glove use, the practice continued in a 'high proportion' of glove usage. It is unclear what underpinned this behaviour, but does reflect a gap in our knowledge and understanding of behaviour and culture.

Social influences such as role modelling and HH champions, are reported to impact on HH compliance and are one element of multi-model interventions (Liang et al., 2014; Saint, Conti, et al., 2009; Venkatesh et al., 2011). The literature tends to imply that improved HH compliance occurs when using medical staff as role models (Venkatesh et al., 2011). Saint, Conti, et al. (2009) work, across five hospital services including cardiology, geriatrics, infectious diseases, ophthalmology and an ED, indicates that a lack of physician champion in one unit was responsible for a decrease in HH adherence from 6.4% before the intervention to 3.8% after the intervention and nurses HH in the same unit increased from 27.8% to 39.3%, respectively. While this is not directly linked to ED it demonstrates the

challenges of gaining the required level of commitment to improve HH compliance. The impact of nurses as role models and champions is not overtly reported in the ED literature.

### Multimodal Interventions

As noted above, several elements impact on HH behaviour. Undertaking a quality improvement project focussing on a limited number of elements does not appear to improve and sustain HH improvements (Haas & Larson, 2008; Larson et al., 2005). A combination of improvement activities, referred to as multimodal interventions, tends to support longer-term sustainability (Di Martino et al., 2011; Saint, Conti, et al., 2009).

Components of multi-modal interventions identified in this literature review included feedback on HH practices, education, soliciting unit based champions and wearable ABHR that could be worn or carried for individual use. Di Martino et al. (2011) demonstrated overall sustained HH compliance from 44.9% to 45.2% over one year, however within the rates reported by Di Martino, nurses improved from 40.7% to 49.8% and doctors decreased from 50.5% to 36.6%. On the face of it, the multimodal intervention was sustained, but further analysis revealed a marked decline by doctors, offset by improved compliance by nurses. A possible explanation of this was that nurses were encouraged to attend, at least one, HH education session that was offered monthly. Doctors did not attend this programme. These results would suggest that multi-model interventions can improve HH, however a one off programme alone is not sufficient and that on going dedicated commitment will have longer-term gains. These findings indicate that HH in ED need to be improved. There are potentially unique characteristics that apply to an ED which contribute to poor HH that require further exploration.

### Conclusion

Improvement in HH practices in the ED is required. Papers included in this literature review report varying rates of HH compliance in the ED, identified through both observational and interventional studies (Al-Damouk et al., 2004; Haas & Larson, 2008; Larson et al., 2005; Saint, Conti, et al., 2009; Scheithauer et al., 2013; Venkatesh et al., 2011). In all except one study (Venkatesh et al., 2011), HH improvement did not exceed 51% compliance. HH compliance needs to be significantly better than this to enhance a culture of patient safety.

What we know from the literature is that in general HH is poor in ED. Some factors that influence HH, often termed predictors of HH, appear to be applicable to ED and have been discussed in the literature including: access to HH facilities, ABHR, beliefs, ethos and environment and context together with layout, workload, work flow. Education to enhance knowledge of recommended HH practices have had mixed results. Improved access to ABHR and improved workflow have some positive impact on HH compliance, however sustained improvement in HH to an acceptable level of compliance in the ED is yet to be realised. Crowding in the ED is emerging as a potential predictor of HH. Other impediments to HH, specific to ED do not appear to have been identified, if indeed they exist.

Several gaps in knowledge are identified from this literature review. Good HH practices are difficult to achieve, despite improvement initiatives designed to counter some of the previously mentioned barriers e.g. individual ABHR. The value assigned to HH in the ED is not apparent, and it is unclear what the contributing factors to poor HH practices are specific to this setting. To begin to understand some of these deeply seated problems it is essential that possible barriers to HH in the ED are identified and explored.

Papers included in this literature review have been from wide geographical locations, with the exception of four papers from Italy. It would be reasonable to suggest that differences in health systems, cultural and organisational norms are reflected in the study findings. Only one study specifically related to HH practices in New Zealand. With the exception of two literature reviews, studies meeting the inclusion criteria have included observational, interventional, and survey studies from a qualitative paradigm. No mixed methods designs have contributed to this body of knowledge.

Understanding ED specific HH practices will enhance patient and staff safety. This study will aim to understand the barriers and levers to HH in ED to ensure that safe care is provided for patients and staff are protected from HAI. By using a mixed methods research approach this study will aim to identify barriers or levers to HH will guide on going interventions to improve HH.

### 3. Methodology and Method

#### Research Methodology

##### *Introduction*

Adherence to hand hygiene (HH) practices in emergency department (ED) is well-reported in empirical work. As evidenced in the preceding chapter, poor HH practices are particularly evident in 'controlled' or non-urgent situations. Poor HH is a contemporary practice issue that negatively impacts on patient outcomes. It is therefore worthy of exploration in order to understand and improve HH practice in this setting. To explore HH practices of doctors and nurses in the ED empirically, a pragmatic mixed methods study was undertaken using an explanatory sequential research design.

##### *Philosophical Underpinnings*

Research methodology is underpinned by a 'lens' or worldview paradigm. This 'lens' is variously described as how one sees the world (Creswell & Plano Clark, 2011), or as a way of "experiencing and thinking about the world, including beliefs about morals, values and aesthetics" (Morgan, 2007). Research paradigms are informed by this way of thinking. Scientific approaches, that test hypotheses and theory related to the quantitative paradigm, are often termed a positivist approach. Alternatively, social science research that seeks to understand social phenomena adopts the qualitative paradigm, in which researchers use an interpretive approach in undertaking the research to make meaning of experiences and events as constructed by individuals. A third paradigm, pragmatism, utilises strengths of both qualitative and quantitative research methods to address the subject of inquiry. The pragmatic paradigm, which is influenced by context, practicality and tools to understand the subject of inquiry, focussing on the best fit or 'what works' (Creswell & Plano Clark, 2011; Greene & Hall, 2010), was used in undertaking this study, rather adopting a specific a priori world view.

For this study, the pragmatic paradigm appeared to offer a methodologically suitable approach. As a paradigm, Johnson and Onwuegbuzie (2004), assert that pragmatism offers a framework to select methodological combinations to best answer the research question. Purists contend that there is no middle ground between quantitative and qualitative paradigms, however this dualistic debate between paradigms is often seen as a distraction that detracts from the advantages of pragmatism (Johnson & Onwuegbuzie, 2004).



Acknowledging on going discussions around philosophical underpinnings, and to help move forward with the development of this thesis, the traditional views of quantitative and qualitative research as paradigms will now be explored. This is undertaken in order to understand a pragmatic approach to research and qualify the merits of both qualitative and quantitative paradigms.

### *Quantitative Paradigm*

Quantitative research is a method of inquiry that systematically and objectively tests theories using measurement, asserting causation deductively (Creswell, 2014; Green & Hall, 2010; Guba & Lincoln, 1982). Scientifically, the purpose of quantitative research is to predict outcomes by testing hypothesis or theory. There are also opportunities to use a quantitative approach in social sciences where the purpose is to gather information by measuring the focus of research such as attitudes or behaviours. A common example is to use surveys within social sciences.

Philosophically, quantitative researchers aim to test cause and effect by limiting influences such as variables, contextual setting or the relationship between the researcher and the object of study. Researchers using this paradigm retain objectivity to carefully manage and limit bias believing that controlling these will add to a continuous body of knowledge (Creswell, 2014; Lincoln & Guba, 1985). The research controls used, build study rigour, and are generated by testing and reporting reliability and validity. Proponents of quantitative research deny any influence of values on their findings (Guba & Lincoln, 1982).

The quantitative paradigm supports deductive reasoning by working from broad theory down to focused results that either confirm or refute the hypothesis or prediction. Quantitative design uses a structured format beginning with a theory, from which a hypothesis is developed or prediction is made. The process to test the hypothesis, include identifying what is being measured, tools or instruments to gather data and a means of undertaking the study. Quantitative research can take the form of experimental or survey design. Experimental design is used to test the outcome of a 'treatment' on the study population. Randomised controlled trials, considered to be the gold standard in experimental design, are used when the effect of the test item is measured on two separate groups, one the control group and the other is the study group. Ideally the study is 'blinded' i.e. participants are randomised to either group, and if double blinded, the

research team are unaware which group is the control group and which is the study group. Survey design, used to gather information or data about a group of people or population, can use questionnaires. A questionnaire will utilise closed ended questions, designed to test the hypothesis or research question and is measured against a scale (Creswell, 2014; Watson, 2014).

Important elements of quantitative research include population and sample, instrument to be used, data analysis and interpretation. Participants are drawn from a sample, which may represent the wider population being studied. Sampling frameworks provide guidance for selection of participants that will allow generalisation to a population (De Vaus, 2002). Sampling methods that best reflect a population is called probability sampling and is influenced by the ability to describe the population and access to the sampling frame i.e. a list of the population and ability to randomly select the sample. This has the advantage of limiting bias in the selection of participants in sample (Moule & Goodman, 2014). Non-probability sampling, recognises challenges of access and availability of participants, therefore these methods do not use a random selection process. Typical non probability sampling includes convenience, quota or purposive sampling (De Vaus, 2002).

Rigour in quantitative research is evidenced by testing reliability and validity of the instruments used. When developing a questionnaire in survey design, reliability is demonstrated by testing how consistently the questionnaire measures what is intended. This can be undertaken using a test-retest method followed by evaluation of the results to determine consistency of response. Validity ensures the instrument measures what it is intended to measure, referred to as content validity. Content validity includes question design, sequencing of questions, length of time to complete and appropriate measurement scale (Timmins, 2015).

In quantitative research, data is analysed numerically using statistical methods to present the results. Experimental designs utilise detailed statistics to make inferences from the sample to a wider population. Descriptive analysis, often used with survey design, summarises results to inform the reader about the overall picture of the results. In addition to narrative description, tables and graphs are frequently used to present the data (De Vaus, 2002).

The advantage of quantitative research is the standardised approach to research that works methodically from theory, hypothesis, data collection to conclusion, either supporting or refuting the hypothesis. The process is designed to be replicable and ultimately generalisable to a population that is reflective of the sample group. This type of study accommodates research of large populations, supported by statistical analysis. In theory the researcher has a degree of independence, which is reflected in the overall approach to the research method. The disadvantage is the assumption that context specific attributes have no place in the research findings. The relevance of this is that generalisations to wider populations do not always apply to all settings (Johnson & Onwuegbuzie, 2004).

### *Qualitative Paradigm*

Qualitative research is interpretive in that it seeks to understand participant's experiences in depth. This paradigm of inquiry recognises context specific influences, is sensitive and responsive to the participant's view of reality (Creswell & Plano Clark, 2001; Gelling, 2015). Its purpose is to explore a small number of cases, looking for patterns inductively. It is free of the constraints of quantitative research in terms of limiting variables or testing theory and can generate theory depending on the type of method of inquiry. Data collection involves interactions between the researcher and participants, using open-ended questions to explore concepts in depth. Findings are generated from an iterative process, that may be data or participant driven, creating meaning from the data (Gelling, 2015).

The research question drives the selection of research approach, of which there are a number to choose from. Research approaches may include grounded theory, phenomenology, and ethnography. Grounded theory seeks to generate hypothesis and theory from people's experience of a particular phenomenon. Data collection strategies utilise interviews but may also include others e.g. diary entries, written notes or conversations (Moule & Goodman, 2014). A distinguishing feature of grounded theory is the concurrent data collection and analysis, which is an iterative process. Ethnography seeks to understand the relationship between culture and the population being studied, identifying the influence they have on each other (Draper, 2015). The researcher has a unique role as part of the landscape or field of study, identifying up front their position and views. Much of the data collection is observational, and requires sensitivity and respect for both the group and culture being studied (Creswell, 2012). Phenomenology aims to attach meaning to participants lived experiences of a phenomenon e.g. grief, a type of surgery

(hysterectomy) or a nurse's experience of working in a cardiothoracic unit. This is achieved by selecting participants who have experienced the study phenomenon and discovering how they lived that experience taking into consideration the use of language, actions and emotions (Wilson, 2015). Data collection is generally using interview, although fieldwork and observations can also be used.

Demonstration of rigour is also required in qualitative research and can be described through the concept of trustworthiness. Criteria used to assess rigour include credibility, dependability, transferability and confirmability (Lincoln & Guba, 1985). Techniques to achieve trustworthiness will be methodology specific e.g. ethnography would expect significant commitment to fieldwork. In general terms though, trustworthiness will include an audit trail, peer discussion, participant checking, and detailed description of the setting or context. Thus, the aim is to provide sufficient contextual information and transparency of the methodology to support readers in determining its transferability.

Within the qualitative research methodology there are further layers of specificity appropriate to the research question. Data collection strategies such as interview are recognised as justified approaches to data collection across each of the described research methodologies. Focus groups, a type of interview, are commonly used to explore and understand differences, influences, behaviour or motivation of a group of people about a specific area of focus (Krueger & Casey, 2015).

The strength of a qualitative methodology is to describe in rich detail the phenomena being studied within a given context. The research will take into account local, individualised situations through the eyes of the participants, respecting perceptions and acknowledging changes if undertaken over an extended period of time. As the data describes findings from fieldwork or local settings, generalisations are not possible. The data collection is time consuming as is analysis and interpretation (Johnson & Onwuegbuzie, 2004).

Notwithstanding the differences between quantitative and qualitative research methodologies, it should be noted that the differing paradigms provide flexibility to research diverse research questions in an organised and recognised process. Purists will debate ad infinitum about the benefits of each paradigm to the extent that there is minimal tolerance of opposing positions. However, in the last 30 years a strengthening position of a

pragmatic paradigm is bridging the gap between opposing ends of the research spectrum. A discussion regarding this paradigm will follow.

#### *Pragmatic Approach to Research*

Pragmatism offers a research approach that capitalises on the strengths of both quantitative and qualitative methodologies by using fundamental principles generated from both paradigms (Feilzer, 2010). The approach seeks to employ research methods that provide workable solutions to the research problem. The practical utility of combined methodologies, conveys a sense of usability (Johnson & Onwuegbuzie, 2004) in addressing a research question. Pragmatism is referred to by some as a third paradigm, and a research method that is informed by the principles of pragmatism is the mixed methods research approach.

#### *Mixed Methods Research*

Mixed methods research draws on the principles of both quantitative and qualitative research approaches. Research methods can be mixed in several ways and selection of the specific research design within mixed methods is directly informed by the research question. Key aspects of mixing qualitative and quantitative methods include: the timing of the data collection; the methods used and; the timing and mixing of data analysis and interpretation (Creswell, 2014; Halcomb & Hickman, 2015). Depending on the design selected, data can be collected and analysed separately, one set of data can inform another, or merged for comparison. The choice of method will guide the process. Creswell (2014) describes several designs of mixed methods research that can be used. Three common designs include convergent parallel, explanatory, or exploratory sequential. These designs are based on the sequence of data collection, analysis and interpretation. Convergent parallel design collects and compares qualitative and quantitative data, analysing them separately to determine any difference in outcome. Exploratory sequential begins with qualitative data collection which helps inform the quantitative data collection process, whereas explanatory sequential design collects quantitative data first, which then highlights key aspects for further qualitative investigation.

The rationale for selecting mixed methods design is based on the need for multiple perspectives, where standalone approaches will not address all aspects of the research problem (Halcomb & Hickman, 2015). An example to demonstrate this could include a

study to determine how many staff use personal protective equipment (PPE) when caring for patients that are nursed in isolation, which is a quantitative study, but fails to explore the experience of a nurse using personal protective equipment when caring for a patient in isolation, which would be a qualitative study. The quantitative data could identify that 10 people entered an isolation room, 6/10 were 100% compliant with the use of correct PPE, 2/10 used partial PPE and the remaining 2/10 didn't use any PPE. A qualitative approach would seek to understand the experience of the healthcare workers entering the room who utilised partial PPE or none. The quantitative approach reports numeric results descriptively in contrast to the qualitative findings, which report narratively the experiences of the four healthcare workers who were non or partially compliant. Findings could explore the perception of being too busy to fully utilise PPE or not wanting to make the patient feel like 'a leper', or systematic failings identifying that the appropriate PPE was not readily available and the perceived risk was negligible. Each research approach addresses different aspects of the same problem i.e. non-compliance with PPE, separately they are interesting findings, but together they provide a more comprehensive understanding of the problem which provides guidance to resolve the issues of non or partial compliance.

This thesis, which explores HH practices of doctors and nurses in the ED, lends itself to mixed methods design. From the literature review it is known that HH practices of nurse and doctors is generally poor and interventions to improve HH do not sustain initial gains in compliance (Di Martino et al., 2011; Haas & Larson, 2008). HH, a task that appears relatively straightforward, based on empirical evidence, remains a challenge in EDs. The ability to utilise a survey design, that is theoretically based, will quantitatively explore perceived barriers and levers to HH. Additional opportunities to explain the survey findings, through focus groups, will develop a more in-depth qualitative understanding of the survey results. This combination of quantitative and qualitative designs i.e. mixed methods, will provide more detail than selecting one research approach.

### *Design*

Having established that mixed methods was the best fit for the research project, an explanatory sequential research method was used in this study. In Phase One, a quantitative questionnaire was used to survey nurses and doctors in ED, followed by focus groups with nurses and doctors in Phase Two. The rationale for this method was based on access to a theoretically driven questionnaire that had been designed to identify barriers

and levers to HH. The results of the questionnaire were then used to inform further exploration during the focus groups. The emphasis in the study was primarily on the results of the questionnaire using the findings of the focus group to explain in more detail the results from the questionnaire. Using the notation as described by Morse (1991) this can be represented as: QUAN→qual.

### Study Overview – An Explanatory Sequential Mixed Methods Study

An explanatory sequential mixed methods study was undertaken in two phases, QUAN→qual. The first phase, a survey, quantitatively collected data via an on-line survey about the views of emergency doctors and nurses in two New Zealand sites about HH practices. Following this, a second phase, a qualitative study using focus groups was undertaken in these sites in order to explain and provide insight into the survey results.

#### *Setting*

Two District Health Boards (DHBs) were approached requesting access to undertake the research within their EDs. Both hospitals provided lower level tertiary services, one situated in the North Island and the other in the South Island. The North Island DHB currently serves a population of approximately 394,000, with the South Island DHB providing health care to 309,000. An invitation for site participation was sent to the Chief Medical Officer and Director of Nursing at the selected DHBs. Both DHBs elected to participate and approval was given through their local governance authorities to participate (see Appendix A & B). Emergency department demographics are described in Table 3.1.

**Table 3.1:** District Health Board

DHB	Population	ED Nurses	ED Doctors
One	308,000	76	41
Two	390,000	138	40

#### *Sample*

The preferred method of sampling for quantitative research is random sampling, using a sampling frame that ensures the selected sample reflects the characteristics of the population. This method of sampling is called probability sampling and is used when generalisation to the population or replicability is desired. Alternatively, non-probability sampling is employed when probability sampling is impractical (De Vaus, 2002). The population to be surveyed in the first phase of this study included all doctors and registered

nurses employed by the DHB who worked in the ED at the time of the study. Direct access to individual contact details, and therefore specific knowledge of the study population was not available. All contact with the potential sample occurred via local gatekeepers. Therefore, a non-probability sampling technique called convenience sampling was employed (Robson, 2002). Convenience sampling in this study, acknowledged the limitations of access to, and understanding about the nurses and doctors working in the ED. It was the intention to purposively sample participants for the focus group, with participants selected from the survey. Due to the small number of expressions of interest to participate in the focus groups, a convenience sample was used. This was achieved by local advertising and supported recruitment within the DHB.

## Methods

### *Phase One – Survey Design*

#### *Questionnaire*

The questionnaire used in this study was developed by Dyson, Lawton, Jackson, and Cheater (2013) in the UK. The purpose of the questionnaire, which was based on the theoretical domains framework (Michie et al., 2005), was to assess the barriers and levers of HH of healthcare workers, and would guide interventional strategies to improve HH practices (Dyson et al., 2013). Permission was given to utilise the survey (J. Dyson, personal communication, October 10, 2014).

The theoretical domains framework developed by Michie et al. (2005) is underpinned by behaviour change strategies where implementation of evidence based practice is required. Twelve constructs that potentially explain behaviour change were identified by consensus of experts in the field of psychology. These included:

- Knowledge
- Skills
- Social/professional role identity
- Beliefs about capabilities
- Belief about consequences
- Motivation and goals
- Memory, attention and decision processes



- Environmental context and resources
- Social influences
- Emotional regulation
- Behavioural regulation
- Nature of the behaviour

Michie et al. (2005) argues that focusing on these constructs will promote behaviour change and support application of and engagement with evidence based practice.

Dyson et al. (2013) utilised the theoretical domain framework to develop a questionnaire that would identify barriers and levers to HH. For the purposes of this study, barriers can be defined as elements that inhibit healthcare workers HH practice e.g. constraints imposed by time, workload or access to hand basins. Levers are interpreted as mechanisms that facilitate HH and may include personal or collective engagement with HH or resourcing. The aim of Dyson et al. study was to identify, within the constructs, barriers and levers of HH, which would guide development of targeted strategies to improve HH practice. Dyson et al. streamlined the 12 constructs above into 10 by combining knowledge and skills into one domain, and the nature of behaviour and behavioural regulation were excluded, as Dyson et al. suggested that 'nature of behaviour', described behaviour rather than being seen as an element of behaviour. Social influences and professional role were also separated. Each construct was explored using three or four questions that were attributable to each construct. Instrument development included: construct validity, correlation and reliability testing.

In total 46 questions were included in Dyson et al. (2013) original questionnaire. There were four demographic questions, two questions focussed on perception of adherence to HH of self and others, 35 questions directly attributable to one of the ten domains of Michie et al. (2005) original theoretical domains framework and five knowledge questions. The 35 questions attributable to the constructs were framed to allow responses using an agreement scale in the form of a seven point Likert scale. The Likert scale ranged from 'Strongly Disagree' to 'Strongly Agree'. Numerical coding was applied to ensure that high scores equated to barriers and low scores to levers of HH. The higher the numerical response, the greater the barrier. Some questions were reversely coded to minimise the

risk of acquiescence bias. Acquiescence bias is described by De Vaus (2002) as the tendency to agree with the statement or answer with a socially acceptable response.

For the purpose of this thesis, the instrument developed by Dyson et al. (2013) was used to undertake this cross-sectional survey. Forty-six questions were used to collect data, they included: seven demographic, two regarding perception of adherence to HH of self and others, 35 questions attributed to ten domains and the final two offering an opportunity to participate in a focus group. The five questions that tested knowledge were excluded from this study as they did not contribute directly to the theoretical domains framework. The survey language was reviewed by the researcher for relevance to the New Zealand context. The demographics section was adjusted to accommodate wording associated with professional titles in New Zealand, length of service in healthcare and ED, gender, age group and ethnicity. The 35 items related to barriers and levers, and self and peer assessment against compliance with HH were retained with minor wording changes to reflect New Zealand health context. A seven-point Likert agreement scale was used, moving from strongly disagree, disagree, somewhat disagree, neither agree or disagree, somewhat agree, agree and finally strongly agree. Numerical coding was applied, as in Dyson et al. to ensure that high scores equated to barriers and low scores to levers of HH. The central numerical response i.e. neither agree or disagree was described as neutral. Whilst responses described as socially acceptable may be avoided by rephrasing the questions, changes to the instrument can potentially invalidate the survey; consequently, no changes (other than to enable applicability to the New Zealand setting) to the questions were made. Order effect can be mitigated by randomisation of the question order; however, this was not included in this survey design.

The survey was piloted using paper copy and an electronic version of the questionnaire, by four nurses and two doctors within the ED of the researcher's DHB. During the pilot the researcher observed the process of logging onto the electronic questionnaire and completing the questionnaire for each participant. Feedback was specifically sought on clarity of purpose, ease of response and phrasing of questions. Pauses and hesitation in responding were clarified by the researcher to help inform validity and reliability. Following feedback, minor wording adjustments were made as appropriate, without altering the intent or context of the questions. For example, the original question "Some government

targets make HH more difficult (such as high bed occupancy)” was changed to “Some Ministry of Health targets make HH more difficult e.g. shorter stays in ED”.

In conjunction with development of the survey, a participant information sheet was prepared to accompany the questionnaire (See Appendix C). The participant information sheet introduced the study, ethics approval number and questionnaire, identifying inclusion criteria which was nurses and doctors working in the ED at the time of questionnaire circulation. Participation was voluntary, anticipated completion time was 10 minutes and the participants could withdraw at any time. Privacy would be maintained by de-identification of responses, role and organisation in which they worked. Contact details of both the researcher and supervisor were provided. Submission of the questionnaire implied consent for this part of the project.

#### *Questionnaire Circulation*

The primary method of questionnaire circulation was via email, using Qualtrics software ‘Legacy’ platform. The questionnaire was optimised for mobile technology including cell phones and tablets. The survey link was tested during the pilot of the questionnaire and again prior to the ‘go live’ date. Optimisation was validated on all devices to test functionality and minimise the risk of incomplete questionnaires due to poor electronic interface.

Direct access to the population being surveyed was not feasible as confidentiality for the staff members working in the ED sites would be breached. In order to gain access to participants it was necessary to seek the support of a member of staff who was prepared to be the link person for the duration of the study. Identification of a link person was sought as part of the local area approval to undertake the study. The questionnaire was sent to work email addresses of the population being surveyed, by the link person. An email script was prepared for the link person, which included the same information as the participant information sheet, which was also an attachment in the email. Inherent risks associated with this strategy include the risk of being unable to gain support from a link person to distribute the invitation to participate, and secondly the risk that staff did not utilise their work email addresses. However, these risks were balanced against practical challenges of recruiting participants.

The questionnaire was distributed through the link person within each DHB. Contact was made via email with the link person and telephone communication was initiated. The questionnaire was in circulation for a total of three weeks. Reminders were distributed via the link person 7 -10 days after the initial mail out. Responses were poor from DHB Two and following further telephone conversations a paper copy of the questionnaire was prepared as was a poster to optimise exposure of the questionnaire to potential participants (See Appendices D & E respectively). These were circulated in both DHBs to provide equal opportunity. Hard copy responses were secured and returned to the researcher for electronic data entry.

### *Data Analysis*

Descriptive statistics were used to analyse the demographic section of the questionnaire. Each domain grouped three or four items that had previously been statistically validated to measure the domains within the framework. A seven point Likert agreement scale was used, and after adjustment for reverse coding the results were aggregated into one of three categories (Dyson et al., 2013); barriers, levers or neutral. Scores one to three were favourable to HH and were aggregated into the ‘lever’ category. Scores between five and seven were unfavourable to HH and were aggregated into the ‘barrier’ category. Responses that neither agreed or disagreed with the item were categorised as neutral i.e. the central score. Table 3.2 demonstrates coding, and Table 3.3, reverse coding. The coding could not be viewed by the respondents.

**Table 3.2:** Examples of coding used for agreement scale, demonstrating reverse coding

	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly agree
	Lever			Neutral	Barrier		
Coding of response for this item	1	2	3	4	5	6	7
I cannot be bothered with hand hygiene	X	X	X	o	W	W	W

**Table 3.3:** Example of reverse coding

	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly agree
	Barrier			Neutral	Lever		
Coding of response for this item (Reverse coding)	7	6	5	4	3	2	1
I feel guilty if I omit hand hygiene	W	W	W	0	X	X	X

At completion of the questionnaire, each item was analysed and responses coded to a category i.e. barrier, lever or neutral. Using the item ‘I cannot be bothered with HH’ as an example,  $n=X$  indicated that some level of disagreement with this item (lever) and  $W$  indicated a level of agreement with the item (barrier), as shown in Table 3.4.

**Table 3.4:** Item: I cannot be bothered with hand hygiene

Category	Responses % (n)
Lever	%(X)
Neutral	0
Barrier	%(W)

Following individual item analysis, each item was aligned to their relevant domains. The domain ‘Motivation and Goals’ had three items that included:

1. I cannot be bothered with hand hygiene
2. I feel complacent about hand hygiene
3. I disagree with some parts of the hand hygiene guidelines.

Each of these items were collated and presented as a summary depicted in Table 3.5.

**Table 3.5:** Domain: Motivation and Goals

Question	Lever %(n)	Neutral %(n)	Barrier %(n)
I feel complacent about hand hygiene	%(n)	%(n)	%(n)
I cannot be bothered with hand hygiene	%(X)	0	%(W)
I disagree with some parts of the hand hygiene guidelines	%(n)	%(n)	%(n)
Total score by category	%(n)	%(n)	%(n)

Following recoding, each question was sorted into one of the ten theoretical domains. The total scores for each question within each domain was combined and reported as a percentage of responses.

#### *Phase Two – Focus Group*

The second phase of this study was to seek an explanation of the questionnaire results through focus groups. The purpose of the focus groups in this study was to better understand and gain insight regarding HH practices of doctors and nurses in ED (Doody, Slevin, & Taggart, 2013).

#### *Participants*

Participants in this study were selected from a convenience sample of the population surveyed. As previously noted, expressions of interest to participate in a focus group were sought at completion of the questionnaire. Potential participants providing an email address, which was used by the researcher to make direct contact with the individual. Focus groups were planned two months in advance to maximise the opportunity for participants to attend. The intention was to conduct 1-2 focus groups at each DHB, however, due to the difficulty in recruiting participants in DHB Two, focus groups were not pursued in this DHB.

#### *Conducting the Focus Group*

In preparation for the focus groups, a participant information sheet was prepared which included the voluntary nature of participation and option to withdraw at any time (Appendix F). Emphasis was placed on respectful participation, noting that the session would be recorded and notes taken by the researcher to provide reminders and prompts to explore during the focus group. Contact details of the researcher and supervisor were provided. The participant information sheet was circulated to the group prior to the day of the planned focus groups and members were advised that written consent would be required on the day. The consent form sought agreement with awareness of voluntary participation, option to withdraw at any time without reason, anonymity, confidentiality, security of information e.g. transcripts and disposal (See Appendix G). The consent forms were signed prior to commencing the focus group.

Effective focus groups require planning in advance, with well-designed open-ended questions designed to cover areas of interest within the study. In this study, an indicative

guide was developed based on the results of the questionnaire (See Appendix H). The purpose of this is to provide both a checklist of potential areas of investigation and avenues to probe in more depth (Redmond & Curtis, 2009). For practical purposes the indicative guide prepares the researcher, also known as the facilitator, to work logically through a sequence of leads and probes in response to participants contribution, moving from general questions to more detailed questioning appropriate (Krueger & Casey, 2009; Ranney et al., 2015).

The focus groups were organised in consultation with the link person in DHB One. Two one-hour focus groups were planned during one afternoon, with agreement on date, time and venue, which was communicated to participants. All sessions were successfully recorded and the indicative guide was utilised within the time constraints. Field notes recorded after the focus groups served as reflections during analysis.

#### *Data Analysis*

The purpose of the focus groups in this explanatory sequential mixed methods study was to provide in-depth explanation of results generated in the questionnaire. Data analysis was therefore guided by the intent to explain those results. Braun and Clarke (2006) six phases of thematic analysis, which includes; familiarisation with data, generation of initial codes, searching and reviewing named and defined themes, and finally interpretation of results, were used as a framework to support analysis of the focus groups. This process is not linear, but rather evolves iteratively during analysis and interpretation (Thorne, Kirkham, & O'Flynn-Magee, 2004), reflecting insights generated beyond the literal data.

In this study, the researcher transcribed audio recording of the transcripts verbatim into NVivo Pro 11 software. Transcribing by the researcher is an opportunity that enhanced familiarisation with the data, contributing to early development of initial themes from the data (Thorne et al., 2004). The use of software as a tool to support analysis of data is longstanding and in this study, rudimentary aspects of NVivo such as coding and visualisation tools e.g. mind-mapping, were used to develop concepts. Initial codes, described as parent nodes, were supported by child nodes, which are sub-codes within a parent node (See Appendix I). Mind mapping allows visualisation of data to strengthen conceptual development (See Appendix J). Using an inductive process of analysis, these tools assisted with the iterative review of concepts (Braun & Clarke, 2006). Subsequent

analysis re-built concepts into themes balanced by checking and cross-referencing against coded data. This process ensured that the dataset fit within the concepts and themes that were identified (Braun & Clarke, 2006). Following confirmation and defining themes, the results were linked back to the questionnaire to interpret how the concepts informed or provided in-depth understanding of the results in the questionnaire (Creswell, 2014). Supervisory support provided guidance and testing of the developing themes throughout this process.

## Ethics

All research must be ethically sound. Ethical consideration of research, particularly in social sciences, requires deliberation of the benefits of the research and evidence of strategies to mitigate and manage risks that participants are exposed too (Moule & Goodman, 2014). Participants need to know that they can withdraw at any time without consequence, that if they choose to participate they will be treated with respect, their contribution will be de-identified and files will be held securely for a limited time (Creswell, 2014). Confidentiality of participants, their contribution and DHB will be maintained throughout the research. These expectations were clearly articulated in participant information sheets as were the contact details of both the researcher and supervisor (See Appendix C & F) and agreement is managed through consent to participate (See Appendix G). In this study, governance of the research project was achieved by approval through the Victoria University Human Ethics Committee #21605 on the 24th March 2015 (See Appendix K)

In the context of this project, local institutional review committees were approached indirectly through the chief medical officer and chief nursing officer. Following referral to appropriate site authorities, approval to undertake this research was gained (See Appendices B & C).

Additions or changes to the research process require application for amendments to the academic institution. This project required two amendments. The first was to notate DHB approval to the participant information sheet for local circulation and the second amendment was to allow paper-based questionnaires and posters to enhance recruitment for the survey (See Appendices L & M). These approvals were given by the Victoria University Human Ethics Committee on the 26th June and 22nd July 2015, respectively.



## The Treaty of Waitangi (Tiriti o Waitangi)

The Treaty of Waitangi identifies significance of the Maori people as Tangata whenua of Aotearoa. Underlying principles are those of partnership, participation and protection. Working within these principles, advice was sought from local Maori advisors to ensure that obligations under the Treaty of Waitangi were embedded in this research project.

## Rigour

Rigour in research is used to assess the quality of the study in question. In social science research, the term trustworthiness tends to be used to describe quality. Assessing trustworthiness in mixed methods research is an emerging issue that is largely unresolved as there is no apparent consistency or standardisation in how rigour is reported (Brown, Elliott, Leatherdale, & Robertson-Wilson, 2015). As a result of this gap, trustworthiness is commonly reported for both quantitative and qualitative components, as separate entities within a mixed methods study. Quantitative methodology uses terms such as internal and external validity (generalisability), reliability and objectivity to convey trustworthiness. These terms are highly applicable to scientific research, in qualitative research credibility, transferability, dependability and confirmability describe trustworthiness (Guba, 1981). Without a framework to guide the demonstration of rigour applicable to mixed methods, each will be discussed separately.

In the first phase of this study, rigour was addressed by utilising a previously validated questionnaire. During development of the questionnaire Dyson et al. (2013) demonstrated rigour during three phases. In the first stage face validity, variability of response and internal consistency within domains was tested. The second stage tested internal consistency and construct validity within domains and finally, a test-retest challenge completed instrument testing by Dyson et al. This degree of rigour provided a strong platform to support the use of this questionnaire. Minor changes as previously discussed were piloted prior to survey distribution and input from supervisors checking supported this process. This retained integrity and trustworthiness of the questionnaire.

Focus group rigour is underpinned by a qualitative approach and is described as a method to demonstrate trustworthiness. Guba (1981) identified core criteria to establish trustworthiness, credibility, transferability, dependability and confirmability. Within the context of this study, credibility of phase two was established by reflective engagement

with supervisors during the planning of the focus groups, debriefing after the interviews and iterative discussion and guidance. While working within the time constraints imposed during the interviews, an opportunity to seek clarification and follow-up was still manageable. One of the goals of this thesis is to support transferability and dependability by detailed description of how the focus groups were managed. With clear articulation of these descriptors transferability and dependability will be tested by resonance with readers and researchers alike (Lincoln & Guba, 1985). Confirmability is reflected in the lens that the researcher brings to the study, recognising that there will be some bias influencing interpretation. This was balanced by systematic audit trail and a reflexive approach that identified decision-making points, which were reviewed by skilled moderation with supervisors. Ultimately the aim is to ensure confidence of the reader that the phenomenon being studied is reflective of the participants' input or experience.

## Conclusion

The intention of this chapter is to provide the reader with a clear description of the methodology underpinning this research project and methods used to support investigation of nurse and doctors HH practices in the ED. An explanatory sequential mixed methods study is well suited to the subject of investigation and will be supported in subsequent chapters.

## 4. Results

### Introduction

This chapter presents results from both phases of this explanatory sequential mixed methods study. Results of the questionnaire from phase one will be discussed in the first section, followed by the findings from the focus groups in phase two. As discussed in the previous chapter, the purpose of the focus groups was to provide more in-depth understanding of the questionnaire responses.

#### *Questionnaire*

The questionnaire was divided into two sections. The first section contained demographic questions and the second had questions that elicited understanding of respondent's behaviour and attitudes about hand hygiene. The hand hygiene (HH) questions were linked to the theoretical domains in Dyson et al. (2013)'s original study. In addition, two questions about self-perception of HH practices and perception of other health care workers' HH were included. These were also included in the original questionnaire. The questionnaire results will be presented in this order.

#### *Survey Demographics*

The questionnaire was administered to nurses and doctors, working in the emergency department (ED) of the two participating DHBs for six weeks between June and July 2015. The sample included 37 nurses or doctors who started the questionnaire. Two respondents completed the demographic section only and one completed up to the fourth question of the second section. The incomplete data from these three respondents were withdrawn from the analysis as this did not contribute to the main body of the questionnaire. Thirty-four respondents completed the full questionnaire with the exception of one respondent, who withdrew with one question remaining. The results from all 34 respondents were included in the data analysis. The overall response rate was 12%, with some variability across the groups of doctors, nurses and DHBs (see Table 4.1).

**Table 4.1:** Response rates by Doctors, Nurses and Combined DHB

	Population (n)	Responses (n)	Response rate (%)
Doctors			
DHB (1)	41	5	12
DHB (2)	40	4	10
Combined total	81	9	11
Nurses			
DHB (1)	76	16	21
DHB (2)	138	9	7
Combined total	214	25	12
Combined			
DHB (1)	117	21	18
DHB (2)	178	13	7
Combined total	295	35	12

All respondents had worked in healthcare more than three years, 56% (n=19) of respondents had worked in health care for more than 20 years. Fifty-six percent of respondents had worked in ED for five years or less and there was a similar distribution across all age ranges. Seventy-one percent of respondents identified themselves as European, 14% (n=5) as Asian, and 14% (n=5) as other (Four New Zealanders and one British). Overall demographic of responses are shown in Table 4.2.

**Table 4.2:** Demographic of responses (n = 34)

Characteristic	Category	% (n)
Professional role	Nurse	74 (25)
	Doctor	26 (9)
Position title	Registered Nurse	67 (22)
	Associate Charge Nurse	3 (1)
	Nurse Educator	3 (1)
	Enrolled Nurse	3 (1)
	Registrar	12 (4)
	Senior Medical Officer	15 (5)
Gender	Female	80 (27)
	Male	20 (7)
Age group (yrs)	20-35	27 (9)
	36-50	41 (14)
	51-65	32 (11)
DHB	DHB 1	62 (21)
	DHB 2	38 (13)
Years worked in healthcare	≤ 1	0
	> 1 and ≤ 3	0
	> 3 and ≤ 10	32 (11)
	> 10 and ≤ 20	15 (4)
	> 20 and ≤ 30	35 (12)
	> 30	21 (7)
Years worked in ED	≤ 1	21 (7)
	> 1 and ≤ 5	35 (12)
	> 5 and ≤ 10	15 (4)
	> 10	32 (11)
Ethnicity	European	71 (24)
	Maori	0
	Pacific Peoples	0
	Asian	15 (5)
	Other	15 (5)

Nineteen respondents used electronic means to answer the questionnaire. Of these, six used a handheld devices. The remaining 15 used a hard-copy version of the questionnaire, which were entered into the survey software (Qualtrics) manually by the researcher.

#### *Theoretical Domains Framework*

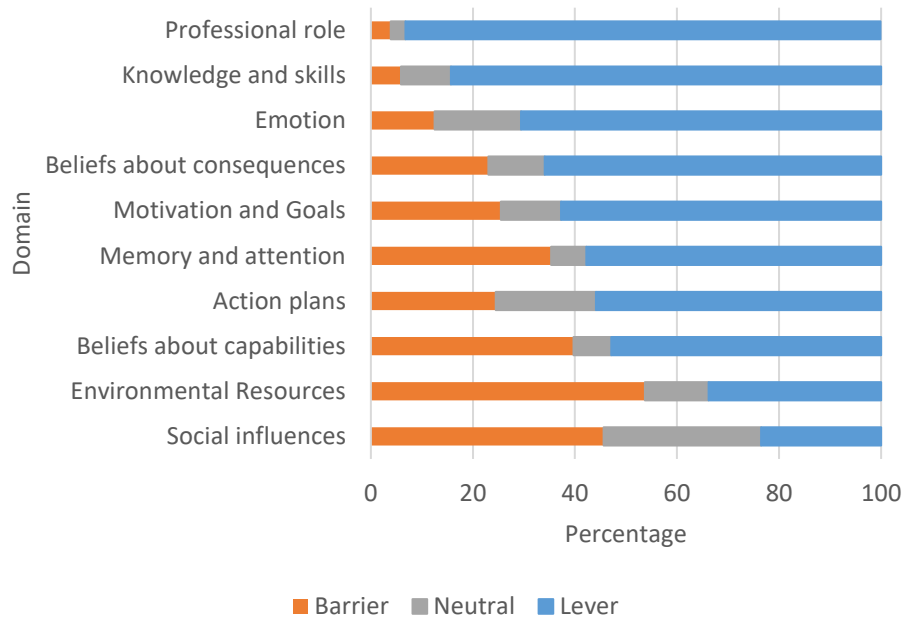
Ten domains were explored in the questionnaire. The domains were:

1. Knowledge and skills
2. Professional role/responsibility
3. Beliefs about capabilities
4. Beliefs about consequences
5. Motivation and goals
6. Memory and attention
7. Environmental resources
8. Social influences
9. Emotion
10. Action plans

#### *Domains*

The results for each domain will be discussed followed by the analysis across all questionnaire domains. As previously noted each domain comprised of either three or four items. Aggregated responses for each domain, detailed as either barriers, levers or neutral to HH practice, are presented in rank order, moving from highest proportion of levers to the lowest (Figure 4.1). This order will be used as a framework to present the results.

Results discussed by domain will use percentage, individual items within a domain will use % (n=number of respondents). All responses by item for all domains are included in Appendix N.



**Figure 4.1:** Domains by Summated Response (%)

Respondents to the survey rated professional role domain as the strongest lever for HH practice (92.6%), 3.9% as a barrier and 2.9% remained neutral. The three items in this domain were: I engage in HH out of respect for my patients; hand hygiene is a non-negotiable part of my role; and HH is part of my professional culture. All respondents indicated that HH was a non-negotiable part of their role and 91.2% (n=31) identified that HH was part of their professional culture. The majority of respondents (88.2%, n=30) undertook HH out of respect for their patients, although two respondents indicated this was not the case, and the remaining two respondents were neutral in their responses.

The knowledge and skills domain assessed sources of knowledge, and results identified that knowledge and skills was a strong lever (84.3%) of HH across all items in this domain. Only 5.9% (n=6) of respondents identified it as a barrier and 9.8% (n=10) of respondents were neutral. Promotional material supporting HH was readily available in the ED for the majority of respondents (94.1%, n=32) and 82.4% (n=28) could access HH guidelines easily. HH education was available to respondents (76.5%, n=26).

The emotion domain examined responses to four items, which explored respondent's emotional responses when others did not cleanse their hand or when they, themselves, did not cleanse their hands. Aggregated responses across all items identified this as a lever of HH (70.6 %). The remaining respondents had either no emotional response i.e. neutral

(16.9%, (n=23) or denied an emotional response in this area (12.5%, n=17). This suggests that approximately 30% of respondents were ambivalent about emotion having an impact on HH. By item the respondents were asked if they felt angry or frustrated if others failed to perform HH. There was an expression of anger by 61.8% (n=21) and 70.6% (n=24) reported feeling frustrated, indicating that these were levers of HH. In addition, two further items gauged emotional response to respondent's own omission of HH. In this, 73.5% (n=25) of respondents reported feeling guilty and 76.5% (n=26) felt ashamed when HH was not undertaken, again identifying emotional responses as strong levers when engaging with HH.

Overall, beliefs about the consequences of not performing HH were identified as a lever (65.9%). Of the remaining respondents, 11.1% had a neutral response and 23% of responses were a barrier to HH. Levers within this domain were identified and included: 85.3%, (n=29) of respondents believed that patient confidence improved when healthcare workers performed HH, 100% (n=34) of respondents agreed that they may acquire an infection if they did not perform HH and 64.7% (n=22) of respondents would blame themselves for an infection if they omitted HH. In contrast, 23.5% (n=8) of respondents reported that they would not take the blame for an infection and 66.7% (n=22) indicated that they would not be subject to disciplinary action. For this group, beliefs about consequences were actually a barrier to HH.

The domain identified as 'action plans' explored attitudes to national and local strategies e.g. hospital targets relating to infection to improve HH practise. Responses by category for this domain demonstrated that 55.3% perceived this domain as a lever, 19.4% were neutral and 25.2% perceived it as a barrier. Strategies designed to improve HH scored favourably as a lever (67.6%, n=23), as did hospital targets (55.9%, n=19). When seeking a response about the influence of government targets on HH, respondents were divided between this acting as a barrier and lever i.e. 38.2%, (n=13) as a barrier vs. 44.1% (n=15) as a lever to HH.

Within the 'motivation and goals' domain, two items explored attitude to HH, one item stated the 'I feel complacent about HH' and the other 'I cannot be bothered with HH'. Disagreement with these statements was considered a lever to HH, the results identifying that 61.8% (n=21) disagreed that they were complacent about HH and 97.1% (n=33) disagreed that they could not be bothered with HH. However, 44.1%, (n=15) of



respondents disagreed with parts of the HH guidelines, thereby identifying that this was a barrier to HH. Overall aggregated item scores for the motivation and goals domain suggests that this domain was a lever for HH (62.1%), 12.6% were neutral and 25.2% indicated that this domain was a barrier to HH.

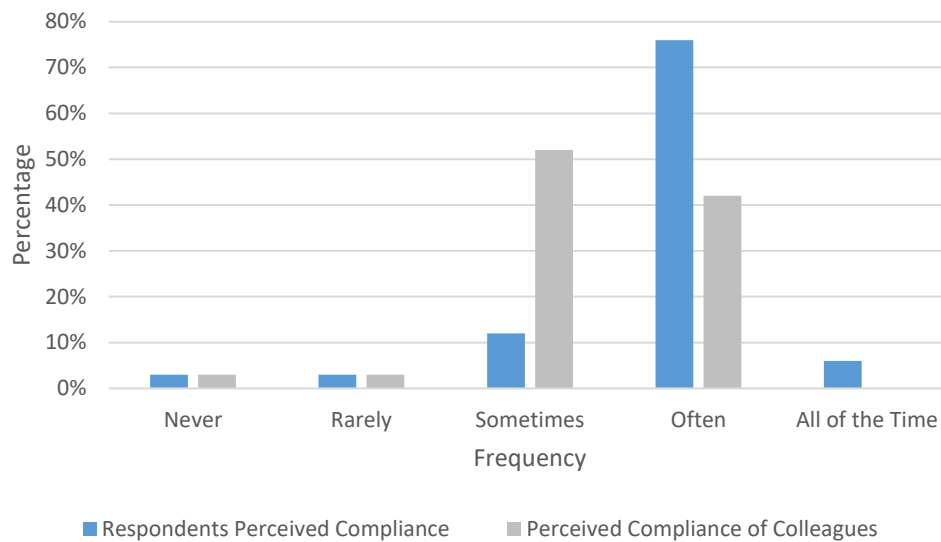
The domain termed 'memory and attention' measured responses about remembering to perform HH and if tiredness contributed as a lever or barrier to HH practice. Forgetting to perform HH was acknowledged by 55.9% (n=19) of respondents, and therefore perceived as a barrier to HH practice. Of those who responded to the statement 'I am more likely to forget HH if I am tired', 55.9% (n=19) disagreed which indicated this as a lever, versus 29.4% (n=10) who agreed, which was a barrier. Recognising tiredness as a barrier, suggests that there are other factors that influence memory and attention related to HH. The greatest leverage by item within this domain was indicated by the 76.5% (n=26) respondents who disagreed with the statement that 'HH was not second nature to me'. Aggregated responses across all items for this domain indicated that issues regarding memory and attention acted as a lever for 57.8% of respondents, 6.9% were neutral and 35.3% identified this as a barrier to HH.

Beliefs about capability explored not only the physical act of performing HH, but included perceived barriers to HH because of the respondent's role or ability to communicate the need for HH. Ninety-one percent (n=31) of respondents indicated that they were confident in their ability to perform HH, but the frequency of required HH in practice was seen as a barrier (70.6%, n=24). There was an equal distribution of respondents who indicated a willingness (47.1%, n=16) versus reluctance to ask others to perform HH (47.1%, n=16). Overall, beliefs about capabilities scored 52.9% as a lever, 7.4% were neutral and 39.7% as a barrier to HH.

Respondents indicated that environmental resources negatively impacted on HH practices with 53.7% deeming this as a barrier to HH. Only 33.8% indicated environmental resources were levers to HH practice with 12.5% of respondents neutral. Respondents indicated that their environment was cluttered (70.6%, n=24) and their area of work had poor staffing levels (70.6%, n=24), implying that both of these were barriers to HH. Difficulty in attending education was indicated by 55.9% (n=19). Surprisingly, 73.5% (n=25) identified that some Ministry of Health targets e.g. shorter stays in ED was a lever to HH practices.

The social influences domain explored barriers and levers to HH using statements about supervision by senior staff, feedback and the influence of 'team' culture on HH practice. Of the aggregated results across four items that measured this domain, 45.6% (n=62) of respondents indicated that social influences were a barrier to HH, 30.9% (n=42) were neutral and 23.5% (n=11) indicated leverage across this domain. By item, the greatest barrier was that staff were not praised when they engaged in HH (70.6%, n=24), followed by 58.8% (n=20) who indicated that supervision by senior staff did not positively influence HH. The greatest leverage within the social influence domain was the concept of not wanting to let the team down (47.1%, n=16), opportunities to capitalise on this may improve the impact of social influences on HH practice.

Two questions, not directly linked to the domains and therefore not specifically exploring barriers or levers to HH, asked about compliance with best practice HH guidelines. The purpose of these two questions in the original tool (Dyson et al., 2013) was to estimate respondents perceived frequency of performing HH i.e. their own HH, and how frequently they believed their colleagues performed HH. Self-reported HH compliance rate was higher than their colleagues as shown in Figure 4.2. One doctor indicated that he never complied with best practice HH guidelines and one doctor rarely complied with best practice guidelines. Nurses believed they were often compliant (57.6%, n=19) and the remaining doctors believed they were often compliant (18.2%, n=6), Table 4.3. When asked about colleague's compliance with best practice HH guidelines, 51.5% (n=17) of colleagues were perceived to be compliant sometimes, followed by 42.4% (n=14) who perceived to be often compliant, Table 4.4.



**Figure 4.2:** Perceived compliance with hand hygiene

**Table 4.3:** Self-reported perceived compliance with best practice hand hygiene guidelines

	Doctors %(n)	Nurses %(n)
Never	3 (1)	0
Rarely	3 (1)	0
Sometimes	0	12.1 (4)
Often	18 (6)	57.6 (19)
All of the time	0	6.1 (2)

**Table 4.4:** Perceived compliance with best practice hand hygiene guidelines of colleagues

	Doctors %(n)	Nurses %(n)
Never	3 (1)	0
Rarely	3 (1)	0
Sometimes	12.1 (4)	39.4 (13)
Often	6.1 (2)	36.4 (12)
All of the time	0	0

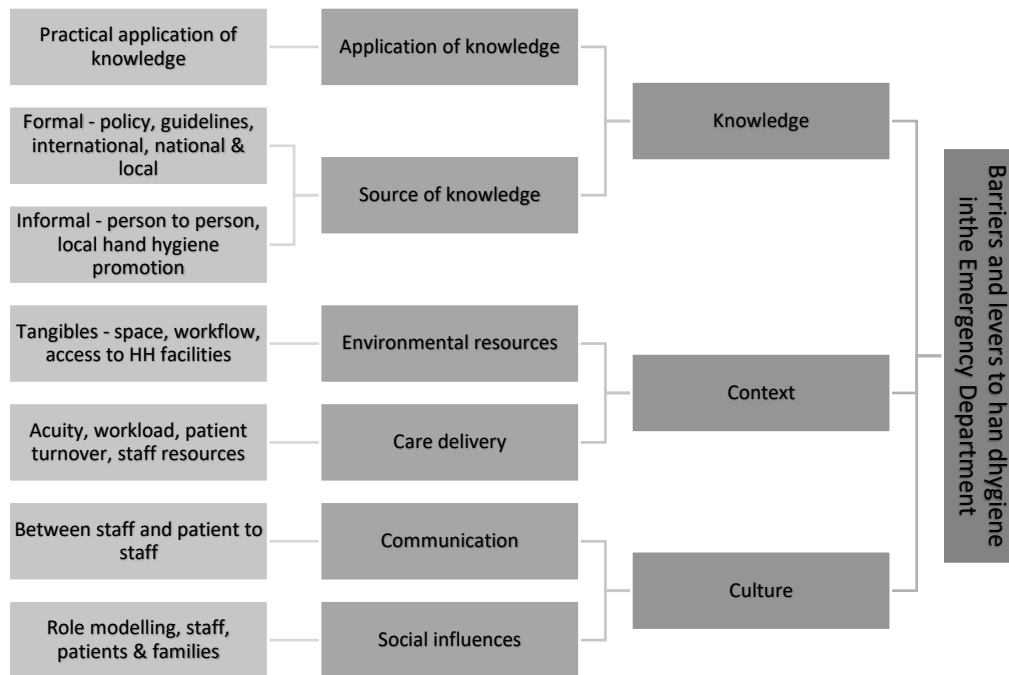
In summary, the survey responses based on the theoretical domains framework, suggest that levers (as percentage responses), in these study settings, far outweigh the barriers to HH. The domains with the strongest leverage on HH were professional role, and knowledge and skills. In spite of this, social influences were strong barriers to HH. Additional barriers to hand hygiene were particularly evident in environmental resources e.g. cluttered environment, poor staffing, however responses across several domains highlighted inconsistencies between domains e.g. availability of alcohol-based hand rub (ABHR) versus

difficult access to hand basins. To gain further insight and possible explanations of these results, focus groups were utilised to explore some of the inconsistent results and gain in-depth understanding of the reported hand hygiene barriers.

### Focus Groups

Focus groups were used to explore results from the survey on barriers and levers to HH in New Zealand ED. As detailed above, the primary aim of the focus groups was to understand barriers to HH practice in ED and to explore some of the potential contradictory results from the survey. Whilst the intention was to conduct focus groups with respondents who undertook the survey, due to challenges at the sites, the final focus group was a face-to-face interview as the participant wished to contribute but was unavailable at the time of the previously held focus group. Not all participants had completed the survey. Therefore, two focus groups and one face-to-face interview was conducted over a two-day period and for the purposes of this thesis shall be referred to as focus groups only. The focus groups were of 25-40 minutes duration. All participants were nurses with six participants in the first focus group, two in the second and one person in the third face-to-face interview. Although open invitations were extended, no medical staff participated in this phase of data collection. All participants were working a rostered shift at the time of the focus groups and six had completed the survey from phase one.

Three themes developed during analysis of the focus group findings: knowledge, culture and context (Figure 4.3). Knowledge about HH tended to be reported positively as a lever to HH, whereas both culture and context of HH in the ED predominantly acted as a barrier to HH practice. These themes are used as a framework to present the focus group findings. Quotes from participants are used in the text and are identified using (FG) for focus group and (L) to denote the interview line number.



**Figure 4.3:** Thematic framework developed during coding

### *Findings*

#### *Knowledge*

Knowledge in the context of this study included sub-themes that described both sources and application of knowledge that influenced HH practice. Sources of knowledge described formal documentation that guided HH practice and included guidelines, procedure and policy or informal local educational material such as promotional posters or quizzes. Application of knowledge about HH practice referred to how participants spoke about how they used their knowledge to rationalise their HH practice. The rationale for performing HH i.e. the motivation, and to a lesser extent frequency of required HH, were considered markers of theoretical understanding to perform HH, hence inclusion in this theme.

As previously reported knowledge and skills were highly rated as a lever, mainly as a consequence of access to education and educational material. In the focus group, when participants were asked about sources of information, they could identify that HH guidelines were on the hospital electronic document system, that there was educational and promotional material around the department and acknowledged participation in annual updates and quizzes (FG 1, L 15-24, FG 3, L 30). A new staff member recalled an orientation session specifically about HH (FG 2, L 22) and one participant referred to the World Health Organization HH guidelines, indicating that these underpinned her education with staff (FG 1, L 43). Interestingly no one referred to online HH education packages and

no one indicated that they had read the local HH guidelines (policy or procedure). Some aspects of the educational material were questioned, in particular, the use of posters in promoting HH:

*You don't want to see a big wordy poster in front of you, you are not going to read it.* FG 1, L47

It was reported that posters were not read if left on the notice boards for some time (FG1, L50) although staff toilets were seen as a good place for written material (FG1, L52). For some, the purpose and value of poster displays was uncertain:

*I wouldn't say they prompt you, they make you think, because they are not necessarily near where the hand basin is.* FG 1, L 27

In spite of educational material about HH being readily available, applying HH knowledge to clinical practice appeared to be confusing for some:

*I think also that if you take it to the strict letter of the guideline, you have washed your hands, and you come out of one [bed space] ... and you are going into another patient, theoretically then you do have to actually gel your hands again, even if you haven't touched anything.* FG 1, L 73

Whilst at times participants expressed confusion about when to perform HH, there was general understanding of HH and it was recognised that critical thinking was required in its application to clinical practice:

*If you have been doing something really dirty, absolutely you would quickly do something, but the reality is that if you saw someone collapse you would go and do what you needed to do.* FG 1, L 140

The concept of ABHR as a product, which has been in use for approximately 20 years, was problematic for some:

*I think that the gel, there are some nurse[s] who think that the gel isn't that good on their skin and I think there is still a huge issue around what hand washing and gelling does to your skin, I think there are still those concerns.* FG 1, L 79

Motivation to perform HH is prompted from multiple sources, which may include patient, self or family prompts. Participants mentioned specific motivators that prompted them to perform HH e.g. protection of oneself and family.

*I am very very conscious that I have six grandchildren and I do not want to take anything home with me, so I wash my hands religiously.* FG 3, L 16

*I think it's when you see people that are quite dishevelled, it just makes you think, 'Oh God', oh you know wash your hands.* FG2, L 121

One participant offered an insightful reflection on motivators for HH:

*I think it's more about reflecting on your safety. I guess we need to be thinking about everyone else's safety before your own.* FG 2, L124

Frequency of expected HH appeared to influence HH, particularly in relation to patient turnover, this had been identified as a barrier to HH in the beliefs about capabilities:

*I think it is reasonable [expected frequency of hand hygiene], however I don't think that the turnover of patients that we have sometimes, I can see what people think that it is onerous.*

FG 1, L 62

And:

*It is just the churn of the department, if you are going to be realistic about it, it makes it pretty difficult for people to do it [hand hygiene].* FG 1, L 68

Churn is a word used frequently in clinical practice to describe the fast turn-around of patients.

#### *Context*

In this study, context refers to sub-themes related to environmental resources and care delivery that impacted on HH practices. Environmental resources referred to the physical barriers that impacted on HH e.g. equipment, confined spaces that do not support patients, their family or staff to move seamlessly, and workflow. Care delivery represented the way that the participants talked about delivering nursing care and the influence on HH. Key elements of care delivery included: patient acuity and turnover, workload and staff resources to deliver patient care.

Access to hand basins was a common theme for participants with some conflicting views.

One participant felt that hand basins were accessible:

*I think that the sinks are accessible to the point they don't have things all around them, you can go straight up to a sink and wash your hands.* FG 1, L 89

Different locations within the ED may account for conflicting responses, as two participants expressed frustration trying to access hand basins:

*If there's a patient sitting at the triage getting assessed and there is a patient behind another curtain, you actually don't have a point, unless you actually completely go away from what you are doing* FG 2, L 137

*I think one of the reasons that people get fed up with trying to weave their way through to the hand basins is that there are so many procedure trolley's and so many people in the room, that trying to get to the hand basin is just problematic and that's the very time that you need it.* FG 3, L 148

Space in the patient cubicles was limited with clinical equipment reported to block access to hand basins. There were limited isolation rooms available and patients who required isolation were sometimes placed in areas that did not support safe removal of personal protective equipment and easy access to hand basins. This impacted on efficient workflows:

*Well there's not very much room in the cubicles, the curtains are problematic, cos often you come out of the room and you're touching things with gloves and not all isolation patients are in isolation rooms and even then you have to take your gloves off outside the room.* FG 3, L 65

*In fast track we shift the monitor when doing the obs, then we have to shift the light so that we can do the suturing and all those sorts of things each time. So you are increasing the frequency.* FG 1, L95

Alternatively, several participants spoke positively about access to ABHRs indicating an increased opportunity to perform HH and therefore considered to be a lever to HH (FG 3, L 74; FG 1, L 176).

Care delivery, which was characterised by patient acuity and turnover, workload and staffing resources impacted on HH. Participants described patient acuity and turnover as prioritisation of workload, by identifying lifesaving activities that provided justification for not getting “things” done, including performing HH:

*Stuff goes out the window as soon as the workload goes up. We prioritise saving people's lives and all the rest of it and pain management and stuff like that and things go.* FG 3, L 46.

*Also know that there are times when, because of procedures or when something is going down like a resus situation and stuff, things don't get done properly.* FG 3, L 18

Another participant indicated that while there were acute events that required intense clinical input they were not constant:



*I also know that there are times when, because of procedures or when something is going down like a resus situation and stuff, things don't get done properly. But those times are few and far between.* FG 3, L 18

When managing prioritisation of workload four participants spoke of taking short cuts:

*I think that nurses, they like to do a bit of a short cut, if they are going to do anything, it's not when they are touching the patient, it's not when they are doing the procedure, it's the environment, you know, when they touch the curtain, when they touch the monitor, that seems to be the lapse that I see.* FG 1, L 69

*You have got your gloves on and you are just going for it because it's about ABC, yea at that point infection isn't the priority unfortunately.* FG 2, L55.

Language used to describe patient turnover described a chaotic environment:

*Nurses are really really busy and you know they get their patients moved from left, right and centre and they never know it and that's not a fault.* FG 1, L 63

*But it is just the churn of the department, if you are going to be realistic about it, makes it pretty difficult for people to do it [HH].* FG 1, L 68

When asked if tiredness contributed to less frequent HH, one participant referred to the effect of tiredness as a distraction (FG 1, L 168), which was a barrier for 29.4% (n=10) in the survey. It was suggested that care delivery was fragmented due to:

*Multiple demands and interruptions and it is easy to get distracted.* FG 3, L 25

Another participant suggested that not performing HH was possibly more related to busyness, which posed a risk of care rationing:

*If tiredness is related to busyness and they cut some corners and one of those things is washing before and after and during, because they are busy. Yes, absolutely it is care rationing, yes they are care rationing because they are so busy.* FG 1, L 169

Poor staffing levels were reiterated by several nurses as a barrier to HH, one participant acknowledging the discomfort that resource team nurses (bureau nurses) experience when asked to work in the ED:

*More staff on each shift, yes, absolutely, its actually true its extra flexibility, so that you didn't feel like you had to jump from one cubicle to another without washing your hands.* FG 1, L 147

*I know there's been a lot of research done in EDs about predicting the workloads ... and I think this department manages very well and we are always looking at how we can staff at what times .... but it is so thin on the ground and the people who work*

*there [on the resource team] feel very scared about coming and working down here [emergency department].* FG 3, L 53

### *Culture*

Culture, in this study, refers to sub-themes of social influences and communication that impact on HH. Social influences are interpreted as the influence that doctors, nurses and patients have on each other in regard to HH e.g. role modelling. Verbal interactions related to HH, either between staff or between patients and staff, and the verbal or nonverbal responses defines communication as a theme in this study. In this context, communication is about a request for another person to cleanse their hands and the reaction to that request. Findings in this study indicated that communication is difficult and is represented by words that describe emotional responses when referring to HH practices.

Communication was identified as a barrier to HH in the survey results and was reinforced during the focus groups.

Participants were unable to recall encouraging their colleagues to perform HH (FG 1, L 102). Some had successfully asked their colleagues to perform HH (FG 1, L 108) and a patients request for their doctor to wash their hands was also favourably received (FG 2, L 70). Another participant recalled an unsuccessful request to adhere to some form of isolation requirements:

*A patient has had suspected SARS or something like that and this patient went up to ICU in the end, no gloves, no gown, touching the patient, no mask, here I am everything on saying guys, completely ignoring me!* FG 3, L 88

One participant who initially indicated that they were pragmatic (FG 2, L 87), followed up very promptly with:

*I think there is always awkward like, you know there's always that awkward barrier between, ...like the [other professional group de-identified] and stuff like that and there's you know it's, I don't think I would really approach them and tell them, no, I think I would probably not say anything at all to be honest.* FG 2, L 91

Others justified making a request for someone to perform HH:

*I guess I would only ever say it around a compromised person, I would, if they were a really compromised and they were coming in to do something.* FG 2, L 95

Reaction to requests to perform HH had mixed responses. Some participants used words to describe their emotional response such as embarrassment or being ashamed:

*I would feel quite embarrassed that I hadn't done it, it would be okay, it would be fine, cool but gosh I wish I had done that without them having to tell me to do it. FG 1, L 127*

*I think I would feel a little embarrassed, like a little bit 'oh', I probably should have done that, yea but I think ashamed. FG 1, L 117*

A third participant, in reflecting on her response, rationalised the justification for the request:

*I guess it's quite confronting, but I think if I was a patient I would want to know that it is okay to you know ask if, I mean if I was on chemo or you know immunocompromised or something like that I would want to know that it is not a difficult thing to ask the question, have you washed your hands. FG 2, L 64*

Another participant, in recognising her response, then used her communication skills to manage a potentially awkward situation:

*Yes again a little ashamed, embarrassed but not uncomfortable. I think if a doctor said you need to wash your hands I'd just laugh and say yep, okay – it would almost be funny wouldn't it, it would be terrible, then I would say excellent thank you for that, I would like to congratulate you for pointing that out. FG 1, L 120*

Several participants indicated that the method of communicating the request to perform HH was very important to them, regardless who the request came from:

*I think I would be willing to accept it from anybody. So long as it is constructive, it depends on how it is given to be honest.... anybody could give it, it depends how it is delivered. FG 1, L15*

*It would depend how the patient asked you, absolutely, again it is delivery, its situational, ... and the patient says 'Aren't you going to wash your hands? You know it is all about delivery. FG 1, L 142*

Creating a safe environment for staff and patients to ask a colleague or in the case of patients, their healthcare worker, to cleanse their hands is important. The survey identified that nurses and doctors were equally divided in their willingness to ask others to perform HH. Empowering patients to ask about HH was considered helpful, but one respondent recognised the vulnerability of patients:

*It is good when you are washing, like you know there's signs for patients to say 'it is okay to ask if the doctor or nurse has cleaned their hands', which I guess is something that jumps out at them cos that's something that they ask. FG 2, L 15*

*I know we are encouraging patients to speak out, but there is a lot of fear in telling us what they really want or how they are feeling about care and how we have*

*delivered it. So talking once again about culture, we have got to change that as well, it's got to be okay for everybody to say, have you washed your hands, can you wash your hands.* FG 3, L1 10

Having strategies in place to encourage appropriate responses to requests to perform HH would support a culture of patient safety. One participant, who relayed her personal experience as a support person in an ED at another DHB, relayed her experience of asking a doctor to wash his hands:

*I said excuse me, would you mind washing your hands? He said I don't need to. I said excuse me I am a nurse and you do need to, you have just come from another patient, please wash [your] hands.* FG 3, L 82

The patient in this situation later advised their support person:

*That she overheard him talking to the nurses about the horrible ... person that was sitting there.* FG 3, L 85

Social influences were identified by participants who suggested that colleagues, patients and their families exerted social influence. Role modelling, appeared to be an amenable strategy to support colleagues to perform HH:

*I think that there have been a few newer staff that have come in and I have to say they have got me into gelling my hands, because 'Oh I better gel my hands too'. I have got into the swing of it [HH] and they weren't intentionally role modelling.* FG 1, L 156

*It comes down to role modelling doesn't it from either patients, family members, staff, doctors everyone.... but it is a team approach isn't it, its role modelling, trying to get everyone, including the patient.* FG 1, L 213

Busyness, interpreted as the impact of workload, patient acuity and turnover, impacts on HH. Two participants suggested that behaviour, interpreted as 'engagement in HH', was an influencing factor on HH. This implied that poor HH practices occurred regardless of busyness:

*Do people when it is quiet gel their hands as much as they do when it is busy by comparison? Yea I think you would find that the same people that don't do their hands ... yea because often when it is quiet people do less.* FG 1, L162

*Same behaviour, yes it comes to behaviour and role modelling, yea because often when it is quiet people do less.* FG 1, L 164

Opportunities to improve and positively reinforce HH were offered, each sharing ideas:

*We trust each other and we work well together and if we were to introduce, ah, do a real big push well and truly integrating into everybody's individual practice, that 'it's okay to say hey have you washed your hands. Hey can you wash your hands, I don't think it would be a problem.* *FG 3, L 99*

*Just make it open, a really open topic. I think they make it quite open with all the signs and awareness around it. I think it is always going to be a bit awkward.* *FG 2, L 100*

*I think role modelling probably definitely does, its top of the list.* *FG 1, L 198*

## Conclusion

Findings from the focus group have identified three key themes that further explore barriers and levers to HH. Knowledge of HH, supports good practice in the clinical setting, acting as a lever for HH compliance. Conversely, culture and environmental context of health care delivery in ED, creates barriers that negatively impact on HH practice.

Results of phase one and two of this study identify that HH is considered a non-negotiable part of the participant professional role by doctors and nurses in ED, and this provides sound leverage to support good HH practices. Despite this, other responses in the survey and focus groups suggest that there are some barriers to, and contradictions in HH that need to be addressed. The biggest barrier is the cluttered physical environment and resources of ED which inhibits access to convenient hand basins; this obstacle to HH is exacerbated by high patient turnover and the perceived busyness of the ED.

Communication is also a barrier to HH practice. Clearly staff are challenged to comfortably communicate about HH or providing either positive or negative feedback. These key influencers on HH practices in ED, will be further discussed in the following chapter.

## 5. Discussion

### Introduction

There is a growing body of literature focussing on HH (HH) in emergency departments (ED), as explored earlier in this thesis. With adherence rates to HH well-recognised as part of HH improvement initiatives, adherence rates to HH continue to fall short of expected standards and sustained improvement is difficult to achieve.

The purpose of this study was to investigate HH practices in ED by identifying the barriers and levers to HH of doctors and nurses in this setting. This was undertaken using a mixed methods approach in two ED sites in New Zealand. This chapter will provide an integrated summary of the results of the survey and findings from the focus groups. These will be examined through discussion of the current literature in this area.

### Summary of Results

This mixed methods study set out to identify the barriers and levers of HH practice as reported by nursing and medical staff in two New Zealand ED.

Recognised levers were associated with the impact of professional role, knowledge and skill, and the emotional responses experienced by staff when HH was, or was not conducted. HH was perceived to be an important part of professional practice of doctors and nurses in ED with 100% of respondents agreeing that HH was a non-negotiable part of their professional role and 91.2% of respondents indicating that HH was considered to be part of their professional culture. Access to educational material was a further reported to lever for HH in this setting, as reported in both survey responses and reinforced during focus group discussion. Nearly 71%% of responses from doctors and nurses identified that the impact of observing others not undertaking HH generated strong emotional responses that acted as a lever to promote their own HH.

Reported barriers of HH were concerned with the ED environment, staffing levels, and communication within clinical teams about HH. The ED environment was a perceived barrier to HH due to a cluttered environment (70.6% of respondents) and poor staffing levels (70.6% of respondents). Qualitative focus group data identified that access to hand basins impeded HH due to clutter and small cubicles made it difficult to get access to hand basins. Shorter stays in the ED was not perceived to be a barrier to HH in the survey

(73.5%), although focus group participants emphasised the impact of high patient acuity, churn, and turnover, on HH practices. Busyness within the ED, suggested high workloads where prioritisation of care, resulted in shortcuts.

The area perceived by doctors and nurses to be a barrier to HH practice (45.6% of respondents) was supervision and feedback from senior staff, termed social influences. Social influences reflected the ED culture with regard to HH and were thought to be exerted between healthcare workers and within professional groups in ED. Respondents identified that HH was not praised (70.6%) and 47.1% experienced difficulty asking others in the ED to perform HH. Focus groups indicated reluctance to ask or prompt others to perform HH and proceeded to justify their behaviour by rationalising the level of risk to the patient versus unpleasant consequences. This difficult communication was a major barrier to HH practice, despite having the knowledge and skills to undertake HH competently.

Over 44% of respondents disagreed with some aspects of the HH guidelines within their workplace, although participants in focus groups were unfamiliar with them. Furthermore, there was a perception that the frequency of expected HH was onerous (70.6% of respondents) and acted as a barrier in this area; this was supported by focus group findings. Finally, 55.9% of respondents indicated that tiredness was a barrier to HH. When explored further in the focus groups, participants spoke about interruptions and distractions, rather than tiredness, as a barrier

The following discussion will now explore issues raised as barriers and levers in the context of current literature.

### **Levers of Hand Hygiene in Emergency Departments**

A key result identified in this study was that 100% of doctor and nurse respondents reported HH to be a non-negotiable part of their professional role with the majority (91.2%) reporting it to be an important part of their professional culture. Knowledge of HH is a prerequisite to support and enable improved HH compliance, and is gained through education (Kampf, 2004; Pittet, 2000). Knowledge of appropriate HH, does not necessarily predict HH compliance (De Wandel, Maes, Labeau, Vereecken, & Blot, 2010): a typical example in the literature is the use of gloves. Despite education, some healthcare workers are reported to omit HH prior to putting gloves on, or not changing their gloves when moving between patients (Scheithauer et al., 2013; Venkatesh et al., 2011).

Education about HH requires engagement by doctors and nurses. Indeed, doctors and nurses in this study identified that access to educational resources were available. However, whilst educational material may be accessible, this does not always result in uptake by staff. One study has reported that medical students perceived that learning about HH was considered a waste of time and inconvenient (Kaur, Razee, & Seale, 2014). The concern here is that failure to recognise the link between healthcare associated infections and HH practices undervalues the importance of HH practices and patient safety. A strategy to address this is to provide relevant, engaging education, supported by role models in clinical practice in order to address gaps in knowledge and attitudinal changes (Kaur et al., 2014).

Recognition of the importance of HH to professional practice is reassuring and was considered a lever in this study. In this study, this appeared to be reinforced by emotional responses triggered within doctors and nurses as a reaction to omission of HH. Motivation to perform HH, was considered a lever in this study by 62.1% of respondents. This is interesting given that knowledge of HH that develops during the formative years, can impact on HH in the healthcare setting. Whitby et al. (2007) describes HH as either inherent i.e. HH learnt in childhood, or elective HH. Both of these drivers can apply to doctors and nurses across community and healthcare settings. The cues or prompts for inherent HH are based on assessment of risk such as visibly dirty hands or awareness of having contact with something that is considered emotionally dirty e.g. contact with axillae or feet. Whereas, social interaction such as shaking hands with a person in a community setting, is considered an elective HH opportunity. In contrast, in healthcare settings HH is expected before contact with a patient, including prior to shaking hands with a patient, to minimise the risk of the patient becoming colonised with bacteria and viruses that are found in healthcare settings. Inherent and elective HH behaviours, applied in hospital settings, may not meet the recommendations of HH guidelines in hospital settings, providing an explanation for poor HH practices in healthcare settings (Whitby, McLaws, & Ross, 2006). In addition, these inherent responses may account for the reactions of anger, frustration, guilt or shame when HH is omitted, as identified in phase one of this study.

Workload has also been identified to have influence on elective HH, and healthcare workers are reported to prioritise HH according to perceived risk of infection to patients or themselves (Whitby et al., 2006). This risk assessment is self-regulated, based on perceived



level of risk, rather than evidence-based practice found in guidelines (Winship & McClune-Trust, 2016). Participants in this thesis spoke about the busyness of ED, describing patient churn and patients being moved within and transferred out of the emergency department as implied justification for omission of HH practices. They shared their strategies around prioritising HH, indicating that urgent clinical demand meant that HH was not a priority during some clinical procedures and was constrained by busyness; two participants noted that there were elements of care rationing. Interestingly Al-Damouk et al. (2004) study reported that clinical urgency did not appear to impact on HH compliance. Scheithauer et al. (2013) reduced the number of HH opportunities and consequently created efficiency of time by improving workflows. This was achieved through the introduction of standard operating procedures for clinical practices such as insertion of urinary catheters. Whilst acknowledging the opportunity to improve operating procedures that require HH, Shah, Castro-Sánchez, Charani, Drumright, and Holmes (2015) contends that time constraints and risk assessment can be used to condone shortcuts of expected infection prevention practices including HH practices. This is clearly not acceptable.

## **Barriers to Hand Hygiene in Emergency Departments**

### *Contextual Influences*

This study found that the physical environment in ED was perceived to impact on HH, mainly because of cluttered clinical environments, small cubicles that made it difficult to navigate between patients and hospital equipment, and difficult access to hand basins. This finding is consistent in the ED literature (Venkatesh et al., 2011) and is commonly reported in non-ED settings (Erasmus et al., 2010; Pittet, 2004). While such a finding maybe a reflection of older buildings that do not accommodate newer technology or equipment e.g. mobile ultrasound technology or mobility aids such as bariatric hoists, it is also possible that increased volume of patient presentations to ED, contributes to pressure within the environment and may result in crowding.

Crowding is generally considered to be a situation where demand on services exceeds resources (Moskop, Sklar, Geiderman, Schears, & Bookman, 2009). A marker of crowding in ED is frequently demonstrated by patients located in hallways and this is thought to impact on HH practices due to lack of accessible hand basins or ABHR (Carter et al., 2016; Venkatesh et al., 2011). Emergency departments experience higher patient contacts due to

the high volume of patient turnover, compared to other patient settings (Lowery-North et al., 2013). Focus group participants emphasised the 'busyness' they experienced and commented about the patient churn and turnover repeatedly. This suggests that while there are constraints attached to the physical environment, additional pressure such as crowding, influences HH practices. Findings in this study did not directly attribute crowding as a barrier to HH, however the perceived workload and descriptive wording used to describe busyness, patient churn and turnover suggests that this may be a contributing factor in this study and supports similar contention in other studies of ED (Carter et al., 2016; Muller & Detsky, 2010).

Closely associated with crowding is the effect of staffing levels. Both phases of this study identified either short staffing or tensions created when inexperienced 'pool' staff were asked to work in ED. Increased pressure in ED related to patient acuity or turnover would be reasonably expected to increase pressure on staff and subsequent staffing levels. Interestingly, the New Zealand Ministry of Health campaign to reduce waiting times in ED i.e. shorter stays in ED, was only reported as a barrier to HH by 16.6% of respondents. This finding is somewhat surprising and it is unclear what conclusions can be drawn from this. Possible explanation may be that timely discharge does not alter required HH requirements, rather, an occupied bed is simply just another occupied bed, therefore does not directly influence HH practices.

The number of hand basins and difficulty of access to hand basins is potentially a barrier to HH practice. Where access is achievable, some work has been done to identify hesitation in selection of HH products at the hand basin, and to make a recommendation for a standardised layout of HH products to support good HH practices (Stackelroth, Sinnott, & Shaban, 2015). However, in theory ABHR has the capacity to counter the lack of easy access to hand basins. In this study nurses consistently indicated that ABHR was readily available throughout the ED, which should enhance HH. Prior to the widespread introduction of ABHR, one study reported that compliance with hand washing i.e. using soap and water in ED, was 32.2% (Meengs et al., 1994). As the introduction and use of ABHR has become more common, HH improvement initiatives have reported increased use of ABHR in ED, particularly among doctors (Saint, Conti, et al., 2009), achieving between 40-50% compliance (Haas & Larson, 2008; Health Partners Consulting Group, 2014). Reticence to use ABHR due to perceived disadvantages of ABHR was raised in the focus groups of this

thesis, thereby expressing potential underlying reasons for preference to use soap and water. Disadvantages have been reported elsewhere and include unpleasant tactile sensations such as 'stickiness' of ABHR, skin intolerance and concern that ABHR has some carcinogenic properties (Saint, Conti, et al., 2009; World Health Organisation, 2009a).

There is clearly still some cultural change to be achieved in the use of ABHR over use of soap and water. Preference for using soap and water was reported by Stoner et al. (2007), who indicated that 68.8% of nurses thought that cleansing hands with soap and water was better than ABHR. Stoner et al. (2007) also reported that only 3% of healthcare workers, if they were themselves a patient, preferred their doctor to use ABHR versus soap and water (45.5%) or no preference at all (51.5%). These findings suggest that the underlying reticence to use ABHR, could be a barrier to HH. As discussed, previously inherent HH practices, associated with learnt behaviour in the formative years, suggests that dirty or sticky hands motivates HH (Whitby et al., 2007), indeed it is recommended that soiled hands are cleansed using soap and water (World Health Organisation, 2009a). If inherent HH is linked to cleansing with soap and water, it is possible that this may influence healthcare workers to choose washing with soap and water in preference to ABHR when hands are not soiled i.e. elective HH. However, cleansing with soap and water takes longer than using ABHR, therefore, compliance with HH may decrease if time is a constrained due to busyness. Given the results of this study, further education about the advantages of ABHR may promote their use in emergency departments and improve HH practices.

Frequency of expected HH and disagreement with some aspects of the HH guidelines were reported in phase one of the study. Perceived frequency of HH was discussed in the focus groups, findings suggesting that education and strategies to support efficient workflows as demonstrated by Scheithauer et al. (2013) may improve HH practices. Disagreement with some parts of the HH guidelines was unable to be explored as participants in the focus group did not acknowledge that they had read the guidelines. It is possible that compliance rates are reflective of disagreement with aspects of the HH guidelines and merits further investigation.

#### *Culture of Hand Hygiene*

Behavioural elements of HH practice, including social influences impact on decision making around HH. Social influences in this thesis were identified as a barrier to HH in ED in phase

one of the study and included lack of encouragement or positive reinforcement to perform HH, and lack of supervision by senior staff and role modelling. Social influences do not stand alone as the determinant of HH, but are one factor to be considered when implementing initiatives to improve HH. To address social influences, behavioural models or theories may be able to contribute to strategies to change HH behaviour.

Several behavioural models have been used to explain infection prevention and HH behaviour including: health belief model; operant models which rely on positive reinforcement; theory of planned behaviour; and theoretical domains framework (Srigley et al., 2015). The theory of planned behaviour was used to predict intention to perform HH (O'Boyle, Henly, & Larson, 2001). O'Boyle et al. (2001) study found that intention to perform HH did not predict observed HH behaviour. The health belief model identifies several concepts that could influence HH behaviour such as perceived susceptibility of the patient, seriousness of potential infection, benefits and barriers, social pressure, intention and self-efficacy (Pittet, 2004). Some of these concepts were discussed in the focus groups with participants identifying that patient susceptibility was an important motivator for them to ask others to perform HH, the perceived benefit of self-protection was mentioned, as were barriers such as busyness and physical constraints of the environment and social pressure/influences.

Similar concepts underpinned the theoretical domains framework, used in this thesis, including: beliefs about consequences and capability, social influences and motivation. Boscart, Fernie, Lee, and Jaglal (2012), used the theoretical domains framework, as developed by Michie et al. (2005), to scope barriers and facilitators to a specific HH improvement initiative. In Boscart et al. (2012) study, nurses believed they had a high degree of knowledge, their professional role as nurses was highly supportive of the intervention which retained their professional integrity, their self-efficacy was high and they were motivated to perform HH albeit by self-preservation and looking after their family. Common levers in Boscart et al.'s (2012) study and this thesis, included professional role and knowledge. Of interest, in Boscart et al.'s (2012) study, participants clearly articulated that they did not want to be seen as role models, or exert any social influence on others HH performance. Therefore similar to results explored in this study role modelling in HH was not supported in practice and hence perceived as a barrier to HH.

Other studies have reported contrasting findings regarding the impact of role modelling and social influences on HH practices. Dixit, Hagtvedt, Reay, Ballermaan, and Forgie (2012) study with paediatric residents (paediatric doctors) reported that role modelling was an important factor in prompting HH. In contrast, De Wandel et al. (2010) explored behavioural determinants of nurses in intensive care units and suggested that social influences did not appear to predict for HH. Peer pressure, was reported as a stronger determinant of HH adherence than focussing on patient safety (Sax, Uckay, Richet, Allegranzi, & Pittet, 2007). This is clearly an area that requires further understanding.

Motivation to perform HH is likely to correspond to how an individual perceives the benefits of HH. White et al. (2015) identified that a key motivation for nurses to perform HH was to protect peers from hospital-acquired infections. One of the motivators for HH, thought to be associated with inherent HH and therefore performed as a 'subconscious' act, is self-preservation i.e. an awareness that the healthcare worker may acquire an infection (Dixit et al., 2012). The concept of self-preservation may potentially account for higher HH compliance after patient contact versus before patient contact (Korniewicz & El-Masri, 2010). This self-regulated risk assessment may not support safe patient care if the underlying premise is self-preservation of healthcare staff. Therefore, in ED strategies to improve HH need to consider how to strengthen doctors' and nurses' decision-making strategies, in particular, elective HH prompts to support patient safety.

Clearly social influences and motivation have a major role to play in HH practices. However, closely linked to both concepts are the challenges around communication between staff both inter- and intra- professionally. Nurses in the focus groups indicated that there was a general reticence to engage in conversation about omission of HH with their colleagues including medical, nursing and other disciplines. This supported results in phase one where respondents were divided in their comfort level when asking others to cleanse their hands. There was however, genuine awkwardness expressed about asking someone to cleanse their hands. It is unclear what the actual cause of this reticence is, possibly the unpleasant consequences such as upsetting their colleague, creating tension that impacts on the patient, or concerns about retaliation or intimidation. Shah et al. (2015) study on healthcare workers non-compliance with infection prevention and control practices, describes a hierarchy of influence which created tension and apprehension for junior doctors who wished to challenge the senior staff about antimicrobial prescribing. This was

identified as a barrier to interprofessional communication which suggests that social norms within that setting, and which may act as a barrier in certain situation, maybe well embedded. It is unclear if this applies in ED, however it maybe an influencing factor requiring further research.

Tensions between professional groups, associated with hierarchal imbalances of power e.g. doctor-nurse relationships, can influence clinical practice and have been noted to have major adverse consequences for patients in other clinical settings, such as operating theatre. Given that communication or the lack of it, contributes to adverse outcomes for patients, several health care initiatives have been introduced to enable all staff to raise concerns. To address the traditional hierarchies in operating theatres, a safe surgery programme has been introduced into New Zealand public hospitals through the Health Quality and Safety Commission. The programme, based on the World Health Organisation (2009b) Safe Surgery guidelines is underpinned by the airline industry approach to safety, ensuring that all members of the flight crew work as a team and have tools to ensure that the plan for their flight is well communicated and agreed. Translating this into the operating theatre, the theatre team undertake time out and perform surgical safety checklists immediately prior to surgery. The effect of these programmes raise the profile of teamwork and good communication between team members. Given results from phase 1 and 2 from this study, the concept of team work and communication, applicable to HH in the emergency department, may well be a vehicle to strengthen HH compliance.

As demonstrated by this discussion, there are complex factors that act as barriers and levers to HH practice. This results in not one approach to address HH practice, but means that several approaches are required. This has led to the well-established multimodal initiatives to improve HH practice in health care. Multimodal strategies are layered throughout an organisation based on an organisational commitment to patient safety from chief executives to frontline staff (World Health Organisation, 2009a). A multimodal approach includes strategies such as ensuring access to HH facilities i.e. hand basins with running water and soap or ABHR, training and education, observation and feedback, and prompts used as reminders to perform HH. When considering such approaches, in light of results from this thesis, it is clear that healthcare workers reported many issues that promoted or hindered HH practices. Healthcare workers in this study perceived that they were short staffed, there were underlying concerns about the use of ABHR, that there was

very little senior staff support for HH hygiene, they did not feel comfortable providing feedback or requesting that healthcare workers cleansed their hands and that they had trouble attending education sessions. In order to address poor HH hygiene in ED, a comprehensive multimodal approach is required to attend to the range of issues identified.

There is no doubt that EDs are busy departments that have high patient turnover and are subject to rapidly changing environments that have clinical impact. Organisation commitment to patient safety requires careful consideration of, and attention to organisational policies, based on international evidence. This type of organisational approach sets a standard of care that healthcare workers are required to implement and that they should be resourced to achieve that standard. Without the appropriate resources to work to that standard healthcare workers are placed in an ethically compromised position.

This suggests that the profile of HH education needs to be raised to achieve greater awareness of HH requirements and needs to be reinforced with champions, at all levels of the organisation. This investment in time and energy will raise the value of HH as a mechanism to avoid harm.

#### *Normalisation of Deviance*

One potential lens to help us understand the reported HH practices of nurses and doctors in ED is the concept of normalisation of deviance. Normalisation of deviance (ND) describes breaches in safe practices over an extended period of time, that incrementally become routine standardised practice (McNamara, 2011). Vaughan (2005) work on the concept of normalisation of deviance examined the 'challenger' space shuttle disaster. Her investigations identified safety breaches over time that became acceptable risks or deviations from standard procedures, which contributed to the Challenger disaster where seven people died.

Healthcare delivery is prone to normalisation of deviance, and has been studied in the context of anaesthesia and perioperative settings (Odom-Forren, 2011; Prielipp, Magro, Morell, & Brull, 2010). Odom-Forren (2011) study suggests that 'production pressure' i.e. pressure associated with organisational expectation and commitment to maximising operating theatre utilisation to reduce waiting lists for elective surgery, can undermine patient safety. The effect of production pressure is observable in practice and has been

identified by Prielipp et al. (2010) and Odom-Forren (2011) who noted several practices that are applicable to anaesthesia, that should never be normalised. Some of these apply to infection prevention e.g. HH before and after patient contact, following recognised isolation practices, or wiping the intravenous hubs with alcohol and letting it dry before accessing the device to give medication. These breaches are not meant with malicious intent, their actions are perceived to create efficiencies and are even interpreted as being in the patients best interests (Banja, 2010). Contributing factors include poor communication, stress and fatigue, inadequate experience or familiarity with environment or equipment and fear of speaking up (Odom-Forren, 2011).

Findings in this study suggest that normalisation of deviance may apply to HH in ED. In both phases of this study identified that healthcare workers are reluctant to speak up about omission of HH or initiate a request for another healthcare worker to cleanse their hands. The volume of people attending ED does impact on HH, but other studies have demonstrated that HH compliance remains poor in non-urgent situations (Al-Damouk et al., 2004). In ED access to hand basins is difficult, but ABHR is readily available and provides an alternative for prompt HH. Participants indicated that there were times when they took shortcuts and there were no ramifications or professional consequences i.e. no collegial communication/challenge or disciplinary action. Phase one of this study also identified that there was disagreement with some aspect of the HH guidelines, which is a common trait of normalisation of deviance (Banja, 2010). As previously indicated, deviations from practice are mostly unintentional, but the risk is that the practice becomes the social norm for that setting, ultimately putting the patient at risk of healthcare associated infections and its sequelae.

Strategies to address normalisation of deviance include organisational and individual actions. At an organisational level commitment to patient safety is required, and must be translated into specific demonstrable actions. Patient safety needs to be well communicated and widely adopted from the chief executive to all healthcare workers. Policy and procedures are required to be evidence based and current, ensuring that staff have an opportunity to be educated on the expected standards of care. The culture of the organisation needs to support staff who identify deviations, ensuring that when deviations are reported that they are acted on. Within ED, the levers identified in this study i.e. professional role, knowledge and inherent HH behaviours, need to be harnessed to build an



environment that values HH, emphasising that it is the mandatory standard of practice. To address concerns about the aspects of HH that staff disagree with, clinical teams should be required to work together collaboratively to resolve their concerns.

At an individual level, healthcare workers need to become reflective thinkers, being prepared to review their approach to patient safety. Being engaged in HH means that their knowledge would be up to date and their professional role will support role modelling the social norms of the ED. To improve HH practices, healthcare workers need to learn how to conduct difficult conversations, to make the conversations less difficult and part of their social norm. Embedding these skills as part of the culture of ED will improve HH and positively influence infection prevention practices.

## Conclusion

This thesis has identified levers and barriers to HH. Levers such as professional role and knowledge can be utilised to build momentum for change, embracing inherent HH practices and enhancing elective HH skills to create a safe environment for patients and staff.

Capitalising on these levers will create new social norms around HH in ED. Barriers to HH including social influences and communication around HH in the context of ED, requires focussed attention. Multimodal strategies to support the HH programme in New Zealand have had its successes. If normalisation of deviance does apply to HH in ED, as suggested in this thesis, further work is required to support staff to work through this challenge. In addressing the symptoms of normalisation of deviance for HH, it is highly likely that there will be other positive benefits as previously indicated.

## 6. Conclusion

### Introduction

Hand hygiene (HH) during delivery of healthcare is recognised internationally as a clinically important action that reduces the risk of healthcare-associated infections for both patients and staff (World Health Organisation, 2009a). Healthcare-associated infections add significant burden for patients and the health care system, reducing access to hospital beds for elective surgery and patient flow for acute events requiring admission (Graves et al., 2003). Emergency Departments (ED) have a high volume of patients, high acuity and a vulnerable mix of patients e.g. the elderly and the very young, immunocompromised, all well recognised predictors of poor HH practices. Therefore, HH is essential to minimise harm to patients and keep the healthcare workforce well.

With HH in New Zealand ED noted to be poor (Al-Damouk et al., 2004; Health Partners Consulting Group, 2014), this study set out to identify barriers and levers to HH, from the perspective of doctors and nurses in two New Zealand ED.

### Summary of Findings

Professional role, knowledge and 'emotional' responses experienced by individuals when omitting HH were key levers for HH practice identified in this study. Doctors and nurses recognised that HH was part of their professional role and agreed that it was part of their clinical culture. There was strong acknowledgment that doctors and nurses perceived HH increased confidence of patients in their professional practice and that HH was performed out of respect for patients. Access to educational opportunities to inform knowledge of HH was strongly supported within the ED including visual cues such as posters, participation in quiz or more formal education sessions. Omission of HH by colleagues generated anger and frustration in individuals and when doctors and nurses forgot to perform HH this resulted in individuals experiencing shame or guilt. These were all described as levers for HH.

Perceived barriers to HH included a cluttered ED and understaffing which impeded attendance at HH education. This study clearly identified the challenge to staff of high patient turnover and busy work environments which hindered access to hand basins with perception of insufficient staff to cover the surge of patients during the day. HH was not overtly encouraged by others and very unlikely to be praised by peers. There was no corrective action associated with omission of HH. Communication with, and challenge of

others was perceived as a barrier to HH. Complacency toward HH was noted, as was disagreement with HH guidelines that were also a perceived barrier to HH.

### **Strengths and Limitations**

This is the first study that has explored barriers and levers in an ED in New Zealand. A strength of this work was the use of a theoretically underpinned questionnaire. This provided rigour to the survey tool used and a strong theoretical underpinning to inform development of customised implementation strategies, acknowledging the identified barriers and levers, to improve HH.

A further strength of this study was use of a sequential explanatory mixed methods design. Findings from the focus groups provided valuable insight and understanding of responses to the questionnaire. Themes developed from the focus groups such as the culture of HH, the context of healthcare delivery in the ED and knowledge, supported in-depth interpretation of the data.

This was a small study undertaken in two ED in New Zealand and application of results to other settings should be approached with caution. Response rates to the survey in this study were low. Access to participants through a work email address, via on site personal may have limited response rates. The subsequent hard copy circulation of the questionnaire led to a marginal improvement in response rates. Further limitations of this study included that focus groups were limited to one site, and no doctors were able to be recruited. This again further limits application to other settings and disciplines.

### **Significance of Study Findings**

The levers identified in this study, including professional role, knowledge, beliefs about capability and consequences, provide a platform from which to strengthen HH practice in ED. However, the identified levers are potentially undermined by barriers occurring in the context and culture of HH within ED. Within the environmental resources domain a cluttered environment and perceived short staffing as key barriers were identified as barriers to HH. Contextual limitations of the physical environment, impose constraints that are unresolvable in the medium- to long-term and strategies to manage workload and presentations to ED requires organisational support and management. Organisational commitment to patient safety, as identified in the multi-modal strategy to improve HH, can

be demonstrated by team work and commitment to HH across the organisation, clearly articulating expectations of standards of practice, addressing staffing shortages, and ensuring that education is mandatory and engaging.

The culture of HH within ED appears to detract from good HH practices. In the context of this thesis, culture refers to findings in the social influences domain and, as further explored in the focus groups, identified that communication was a major barrier to HH. Whilst doctors and nurses continue to be unable to challenge each other; in turn, this undermines the value and importance of HH in healthcare practice.

Poor HH practice is a marker of individual and organisational responses to HH. This may be seen as demonstrating aspects of normalisation of deviance which may contribute to the findings in this study. Safe patient care is mandatory, HH is part of the delivery of care and as such shortcuts and deviations in HH need to be appropriately managed. Healthcare workers need a voice to ensure that when they speak up to address deviations of practice, they are taken seriously and action is taken to avoid normalisation of deviation. This approach will set an organisational standard that will enhance HH practice and have positive synergy for other areas of practice, but most importantly, patients will be confident that the care they are given is safe care.

### Future Research

The aim of the questionnaire was to ascertain barriers and levers to HH to inform theoretically underpinned interventions could be tailored to the identified levers and barriers. Follow-on research is required to address building a HH culture that promotes a patient safety. It has been identified that communication is a strong barrier to HH, and while this barrier exists, patient safety remains compromised. Therefore, further research is required to explore communication about HH and identify specific strategies to enhance communication. Whilst this may be undertaken through survey of staff, more in-depth qualitative study in this area would bring greater understanding of the complex interactions and human factors involved.

Nurses in this study expressed some underlying concern about the safe use of ABHR and a similar sentiment was noted in the literature (Saint, Conti, et al., 2009). It is unclear if the concerns raised are contributing to HH compliance rates. Evaluation of a targeted education intervention in this area would provide valuable information for advancement of

the use of ABHR in ED, and potentially other settings. In addition, phase one of the study identified that several respondents disagreed with the HH guidelines. This was unable to be explored during the focus group and warrants further research in the ED setting.

This study identified reported barriers and levers, and it is recognised that barriers and levers experienced in practice, and staff's reactions to these, were not explored. In future, an observational study, potentially using ethnographic design, of HH practices in ED, could explore this further.

The emergence of the normalisation of deviance, associated in this study with HH practices, warrants further investigation. There are potentially wider implications for the delivery of health care but is particularly pertinent to infection prevention by addressing non-compliance with transmission-based precautions, application of aseptic technique in non-operating theatre settings e.g. insertion of and accessing intravenous catheters and central lines.

### Conclusion and Recommendations

HH is an essential element of healthcare delivery, the importance of which should not be underestimated in clinical practice. Results of this study could inform HH improvement initiatives to improve HH compliance. The strong leverage from professional role, knowledge and emotional responses should be harnessed to strengthen value attached to HH, using a multimodal approach when building HH interventions.

Engagement in patient safety activities, in this instance HH, is essential to ensure safe care of patients in ED. Support for HH needs to be embedded in practice, endorsed in a patient safety culture not only in ED but across the organisation. Therefore, policy and protocols need to reflect clear expectations around HH. Education of staff that emphasises the patient safety culture and how that is demonstrated in practice needs to be clearly articulated. Education needs to be inclusive, developing skill and expertise in positive communication strategies across all healthcare workers.

Appendices

Appendix A: Ethics approval DHB One

16/06/2015

Project ID 01154

Dr. J

Emergency Department, DHB

Dear

**REF: Exploring the barriers and the levers to hand hygiene of nursing and medical staff in E.D.s**

I am writing on behalf of Health Research to confirm that the project mentioned above has been granted approval to proceed.

According to our records:

This project is due to commence on:	16/06/2015
It is due to be completed by:	31/12/2015

If you have any questions with regards to this process, please contact me quoting the project ID shown above.

Yours sincerely

CLINICAL RESEARCH ADVISOR

cc.: DHB  
NURSING DIRECTOR,  
LORRAINE REES, VICTORIA UNIVERSITY

Appendix B: Ethics approval DHB Two

**DHB Approval of Research**

<b>RD015040</b>	Exploring the barriers and levers to hand hygiene of nursing and medical staff in Emergency Departments: A mixed methods study
<b>Project Personnel</b>	
<b>Principal Investigator:</b>	Mrs Lorraine Rees University of Victoria Wellington <a href="mailto:Lorrainef.rees@gmail.com">Lorrainef.rees@gmail.com</a> 021 129 0888
<b>investigators:</b>	N/a
<b>Primary contact name and details:</b>	Mrs Lorraine Rees
<b>Date Submitted:</b>	21/04/2015
<b>Type of Project:</b>	Other : Mixed Methods : Questionnaire & focus group
<b>Multisite?</b>	Multi-centre, DHB sub-site
<b>Department:</b>	Emergency Department
<b>Service:</b>	
<b>Project Description:</b>	
<p>Start: 01/06/2015 End: 30/10/2015 Sample Size: Drs &amp; Nurses in ED.</p> <p>Hand hygiene of healthcare staff in clinical settings is reported to be less than satisfactory. A national hand hygiene project, run by Hand Hygiene New Zealand and sponsored by the Health Quality and Safety Commission (HQSC) is working to improve hand hygiene in the health sector. An evaluation of the hand hygiene programme commissioned by the HQSC reports that ED compliance with hand hygiene is 42% across all District Health Boards. ED are areas where patients with infection congregate and are subject to crowding, high patient turnover in a rapidly changing environment. All these factors contribute to poor hand hygiene. This project seeks to identify barriers and levers to hand hygiene in Emergency Departments, which will ultimately identify strategies to potentially improve hand hygiene and patient and staff safety.</p> <p>Staff in participating ED will be asked to complete a questionnaire that will take approximately 10-15 minutes and a follow on focus group will develop and explore the issues that are noted in the questionnaire. Participants are asked to self-identify following submission of the questionnaire. It is anticipated that the focus group will be arranged 4-6 weeks post closure of the questionnaire. In consultation with a key link</p>	

from ED the focus group will be undertaken at a time and venue recommended and it is anticipated that will take less than one hour.

It is proposed that the participant information sheets and survey link will be circulated by a key link person within Emergency Department. An approach will be made once approval to progress the project has been granted

## Management and Resource Sign-offs

This study does not require HDEC review (University Ethics)

Locality Review – the undersigned agree to the following statements:

- The study protocol and methodology are ethical and scientifically sound.
- This researcher has identified that this study does not require Health & Disability Ethics Committee (HDEC) review.
- The local lead investigator is suitably qualified, experienced, registered and indemnified.
- Resources, facilities and staff are available to conduct this study, including access to interpreters if requested.
- Cultural consultations have occurred or will be undertaken as appropriate
- Appropriate confidentiality provisions have been planned for.
- Appropriate arrangements are in place to notify other relevant local health or social care staff about the study, and for making available any extra support that might be required by participants, where relevant.
- Conducting this research will have no adverse effect on the provision of publicly funded healthcare.
- There is a stated intent that the results of the study will be disseminated and where practical and appropriate the findings of the study will be translated into evidence based care.

Queries about this research must be made to the Primary Contact person listed.

Dept/Service/ Org	Role	Name (print clearly)	Signature	Date signed
Emergency Department	Asst Group Manager			1/5/2015
Hospital	Group Manager			2/5/15
	Service Development Manager		N/A	



Please note : [redacted] has given her approval for this study

## Clinical Support Services Sign-offs

### CROSS OUT/ADD SIGN-OFFS APPLICABLE TO THIS PROJECT

SIGNATORIES DECLARATION: We agree that appropriate resources are available in our service to support this project

Clinical Support Service	Name (print clearly)	Signature	Date signed
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DHB Pharmacy

Laboratory

Radiology

Medical  
Records

Please return to the Research Office (via [redacted]) along with required documents as identified in the checklist for final approval.

Office use only: Office of the Chief Operating Officer, DHB	Signature: [Handwritten Signature]	Date: 6/5/2015
Name: Interim Chief Operating Officer	Position:	

## Appendix C: Participant information sheet



### **PARTICIPANT INFORMATION SHEET**

#### **Research Project: Exploring the barriers and levers to hand hygiene of nursing and medical staff in Emergency Departments**

##### **Introduction**

This research project is being undertaken to explore your knowledge of, and attitudes towards barriers and levers of nurses and doctors hand hygiene in Emergency Departments in New Zealand District Health Boards (DHB). This study is being conducted through the Graduate School of Nursing, Midwifery and Health at Victoria University of Wellington and has been approved by the Victoria University Ethics Committee Number 21605. Locality authorisation to undertake this research has been received from Southern District Health Board via Health Research South.

##### **Participation**

As a nurse or doctor currently employed in an Emergency Department, you are invited to participate in this study. The survey will ask about your knowledge of and attitudes toward hand hygiene and will take approximately 10 minutes to complete. During the survey you will be able to indicate your willingness to participate in future research.

Your participation is voluntary and submission of the survey implies consent for this part of the project. There are no specific benefits or risk associated with participation in the survey. A summary of the findings will be made available to you on request.

##### **Privacy**

Your responses to the survey shall remain confidential and only combined data will be reported. Neither you nor your place of employment will be identified. Data collected will be stored securely and will be destroyed following completion of the study.

If you agree to participate in the study, please click on the link below which will redirect you to the survey online: [Hand Hygiene in Emergency Department](#)

If you have any further questions or would like to receive additional information about the project, please contact Lorraine Rees by phone at 06 350 8312 or email [reeslorr@myvuw.ac.nz](mailto:reeslorr@myvuw.ac.nz) or my supervisor, Dr Maureen Coombs, at the Graduate School of Nursing, Midwifery and Health at Victoria University by phone at:

04 463 5180 or email [Maureen.Coombs@vuw.ac.nz](mailto:Maureen.Coombs@vuw.ac.nz).

Thank you for contributing to this research project.

Lorraine Rees  
Research Student  
Graduate School of Nursing, Midwifery and Health  
Victoria University of Wellington

## Appendix D: Questionnaire



### **Hand Hygiene in Emergency Departments**

Please complete the following survey, place in an envelope provided  
and then into adjacent box by **Friday 31<sup>st</sup> July**.

What is your professional role?

- Nurse
- Doctor

What is your position title?

- Registered Nurse
- Associate Charge Nurse
- Charge Nurse
- Nurse Educator
- Clinical Nurse Specialist
- Nurse Manager
- House Officer
- Registrar
- Senior Medical Officer
- Other \_\_\_\_\_
- In which District Health Board ED are you employed? \_\_\_\_\_

To which ethnicity do you most closely align?

- European
- Maori
- Pacific Peoples
- Asian
- Other (please state) \_\_\_\_\_

How long have you worked in Health care?

- Less than or equal to 1 year
- More than 1 year and less than or equal to 3 years
- More than 3 years and less than or equal to 10 years
- More than 10 years and less than or equal to 20 years
- More than 20 and less than or equal to 30 years
- More than 30 years

How long have you worked in the ED in which you are currently employed?

- Less than or equal to 1 year
- More than 1 year and less than or equal to 5 years
- More than 5 years and less than or equal to 10 years
- More than 10 years

What is your gender?

- Male
- Female

Which age group do you belong to?

- 20 - 35 years
- 36 - 50 years
- 51 - 65 Years
- More than 65 years

When thinking about hand hygiene practices in your work place, to what extent do you agree or disagree with the following statements? (*Hand hygiene can refer to either washing with soap and water or using an alcohol hand rub*)

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Agree	Strongly Agree
I engage in hand hygiene out of respect for my patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Government targets have led to improvement in my hand hygiene	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hand hygiene is a non-negotiable part of my role	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel complacent about hand hygiene*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sometimes I forget to perform hand hygiene*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is difficult for me to attend hand hygiene education due to time pressure*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hand hygiene is not second nature for me*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel angry if hand hygiene is not carried out by others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When staff engage in hand hygiene they are praised	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am more likely to forget hand hygiene if I am tired*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hand hygiene education is available to me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are some practical barriers to hand hygiene because of my particular job/role*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I do not engage in hand hygiene I may acquire an infection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I cannot be bothered with hand hygiene	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Some Ministry of Health targets make hand hygiene more difficult e.g. shorter stays in ED*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I omitted hand hygiene I would blame myself for infections	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I engage in hand hygiene because I do not want to let the team down	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are advertisements or newsletters about hand hygiene in my work place	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am reluctant to ask others to engage in hand hygiene*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The frequency of required hand hygiene makes it difficult for me to carry it out as often as necessary*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I disagree with some parts of the hand hygiene guidelines*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am confident in my ability to carry out hand hygiene	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hospital targets relating to infection or hand hygiene has led to improvement in my hand hygiene	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel frustrated when others omit hand hygiene	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I engage in hand hygiene it improves patient confidence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel ashamed if I omit hand hygiene	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hand hygiene guidelines are easily accessible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hand hygiene is part of my professional culture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Agree	Strongly Agree
My environment is cluttered*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel guilty if I omit hand hygiene	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My area of work has poor staffing levels*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Supervision from senior staff means that carrying out hand hygiene is easier for me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Some strategies designed to improve hand hygiene influence my practice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My hand hygiene is encouraged by others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I miss hand hygiene I will be subject to disciplinary action	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

\*Denotes reverse coding

The following two questions ask about best practice guidelines for hand hygiene i.e the times hands are cleansed compared to the frequency they should be cleansed.

How often do you comply with best practice hand hygiene guidelines i.e. times you cleanse your hands compared with the recommended times that you should cleanse your hands?

Never	Rarely	Sometimes	Often	All of the Time
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How often do you think your colleagues comply with best practice hand hygiene guidelines i.e. times they cleanse their hands compared with the recommended times they should cleanse their hands?

Never	Rarely	Sometimes	Often	All of the Time
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Focus Group Participation

Are you interested in participating in a focus group that will further explore the results from this survey? A focus group is a small group interview with the researcher. It is anticipated that the focus group will be held in your region within 6-8 weeks following closure of this survey.

- Yes
- No

### Research Results

A summary of this research will be provided to your organization and the ED in which you work. You have the choice of being sent the same summary. To receive a summary it will be necessary to provide contact details. I would like to receive a summary of the final result of the research?

- Yes
- No

*If you have answered yes to either of the questions above, you will be required to provide your contact email. Your details can be provided by email to reeslorr@myvuw.ac.nz with 'Focus group' in the subject line, or by providing your preferred email address below. Providing your contact details does not commit you to participating in the focus group.*  
Contact email: \_\_\_\_\_

# Thank you for your participation



## EMERGENCY DEPARTMENT HAND HYGIENE

# SURVEY

Are you a doctor or a nurse

AND

Work in the ED?

You are invited to participate in a research project.

**The survey will take less than 10 minutes**

Have you got something to say about hand hygiene in your work  
place?

Share your thoughts by answering a survey

**Survey available until Friday 31<sup>st</sup> July**

Paper based copy in attached pocket

*Or Scan this Code using a QR Reader  
on your smart phone*





## Appendix F: Focus group participant information sheet



### **PARTICIPANT INFORMATION SHEET FOCUS GROUP**

## **Research Project: Exploring the barriers and levers to hand hygiene of nursing and medical staff in Emergency Departments**

### **Researcher**

Lorraine Rees, School of Nursing, Midwifery and Health, Victoria University of Wellington.

### **Introduction**

This information sheet provides details about the focus group on your knowledge of, and attitudes towards barriers and levers of nurse and doctors hand hygiene in Emergency Departments. This study is being conducted through the Graduate School of Nursing, Midwifery and Health at Victoria University of Wellington and has been approved by the Victoria University Ethics Committee Number 21605.

In the initial survey you indicated that you were willing to participate in the focus group. The purpose of the focus group is to explore in-depth results of the survey.

Please take a moment to read the information below and confirm your interest in participating by emailing me ([reeslorr@myvuw.ac.nz](mailto:reeslorr@myvuw.ac.nz)) with your name, best contact email and telephone number. You will not be contacted if you decline to participate.

### **Focus Group**

The focus group will include no more than six people from your area of work and topics discussed will be guided by responses from the survey. The focus group will be recorded and notes will be made as a reminder of points that may need clarification during the discussion. It is intended that the focus group will be no longer than one hour.

### **Privacy**

The information you share will be highly valued, respected and remain confidential. Real names used during the focus group will be replaced with a number when typed. The recording of the focus group will be typed by a professional transcriber and after typing, will only be accessible to myself and my supervisor. Data collected during the research project will be stored securely and will be destroyed at the end of the study. Participants and organisations will not be identifiable or disclosed.

In view of this we need your consent to participate. The researcher will explain the study before starting the focus group and you will have the opportunity to ask questions. You will then be asked to sign a consent form agreeing to participate in the study and for the discussion material to be used for research purposes. This Information Sheet is for you to keep. You will also be given a copy of the signed Consent Form.

**Participation**

Your participation is voluntary and you may withdraw from the focus group at any time, however timely advice of your intention to draw will help with preparation for the focus group.

If you have any questions or would like to receive further information about the project, please contact Lorraine Rees by phone at 06 350 8312 or email [reeslorr@myvuw.ac.nz](mailto:reeslorr@myvuw.ac.nz) or my supervisor, Dr Maureen Coombs, at the Graduate School of Nursing, Midwifery and Health at Victoria University by phone at:

04 463 5180 or email [Maureen.Coombs@vuw.ac.nz](mailto:Maureen.Coombs@vuw.ac.nz).

Thank you for contributing to this research project.

Lorraine Rees  
Research Student  
Graduate School of Nursing, Midwifery and Health  
Victoria University of Wellington

Appendix G: Focus group consent form



**CONSENT FORM FOCUS GROUP**

**Research Project Title: Exploring the barriers and levers to hand hygiene of nursing and medical staff in Emergency Departments – Focus Group**

- |                                                                                                                                                                           | <b>YES</b>               | <b>NO</b>                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| • I have been given and have understood an explanation of this research project.                                                                                          | <input type="checkbox"/> | <input type="checkbox"/> |
| • I have had an opportunity to ask questions and have them answered to my satisfaction.                                                                                   | <input type="checkbox"/> | <input type="checkbox"/> |
| • I understand that I may withdraw myself without having to give reasons.                                                                                                 | <input type="checkbox"/> | <input type="checkbox"/> |
| • I understand that any information I provide will be kept confidential to the researcher, the supervisor and the person who transcribes the recordings of our interview. | <input type="checkbox"/> | <input type="checkbox"/> |
| • I understand the published results will not use my name, and that no opinions will be attributed to me in any way that will identify me.                                | <input type="checkbox"/> | <input type="checkbox"/> |
| • I understand that the recording of interviews will be destroyed at the end of the project.                                                                              | <input type="checkbox"/> | <input type="checkbox"/> |

**Preferred method of contact:**

Email address:

Postal Address:

Street:

Suburb:

Post Code:

City:

I agree to take part in this research.

Signed:

Name of participant:

Date:

## Appendix H: Focus group indicative guide



### INDICATIVE GUIDE FOR FOCUS GROUP

#### Preparation

Room, refreshments, seating comfortable, seating arrangement, recording apparatus checked for function (part of pilot).

#### Introduction

1. Housekeeping – keep to a minimum as they will be familiar with the environment. i.e. bathroom facilities, emergency preparedness, refreshments, cell phones.
2. Participants –, reminder of topic and establish purpose of the focus group i.e to explore responses to previously completed survey and to better understand their hand hygiene practices.
3. Obtain written consent.
4. Clearly articulate ground rules i.e. All comments will be valued and everyone will have an opportunity to contribute and share their perspectives, personal information stays within the group.
5. **Turn on recording devices.**
6. Ask them to introduce themselves to you, providing name, role and length of time in ED. **Remember** – this is a chat over a cup of tea – except you let them do the talking, you guide!

#### Conduct Focus Group

Introduce focus group outlining some of the themes Questions guided by response to survey and probing of themes as they arise during the focus group. Anticipated topics may explore knowledge of and attitudes related to hand hygiene, environmental and professional influences, and education and practice issues.

#### Conclude

Thank participants for time. Offer certificates of participation. Copy of study

## Discussion Prompts for Focus Groups

1. To warm into this discussion about hand hygiene I would like to start with a chat about some of the hand hygiene information that is available to you.
  - a. Survey results indicated that there is some information available to them. I was wondering if you could tell me what you are aware of and how this information influences your hand hygiene.
  - b. I am interested to explore your thoughts about the hand hygiene guidelines and particularly your opinion of them and how they impact on you?
  - c. A number of respondents indicated that the required frequency of hand hygiene makes it difficult for them to carry it out as often as necessary. What is your experience of this?
2. Respondents indicated that staffing levels had an impact on hand hygiene and their environment was cluttered.
  - a. What are your thoughts about the influence of staff levels on hand hygiene?
  - b. When thinking about your environment, is there anything that you think has a direct impact on your hand hygiene?
3. Social Influences
  - a. It appears that hand hygiene isn't positively reinforced, or encouraged by others. What is your view on that? If hand hygiene was encouraged, how would a person provide encouragement and who would provide that encouragement?
  - b. Could you describe your experience of senior staff influence on your hand hygiene practices?
  - c. A number of staff report that they are reluctant to ask others to engage in hand hygiene. What do you think the reasons for that might be?
4. Some respondents indicated that they forgot to perform hand hygiene and a small number indicated that tiredness contributed.
  - a. What are your thoughts about this?
5. In closing, is there anything you would like to share about hand hygiene that we haven't covered?

## Appendix I: Coding in NVivo

The screenshot displays the NVivo interface with the following components:

- Left Panel (Nodes):** A tree view showing a hierarchy. 'Source of knowledge' is the parent node, and 'Formal' and 'Informal' are its child nodes. Red boxes and arrows point to these nodes with labels 'Parent Node' and 'Child Node' respectively.
- Center Panel (Nodes Table):** A table listing nodes and their reference counts.
 

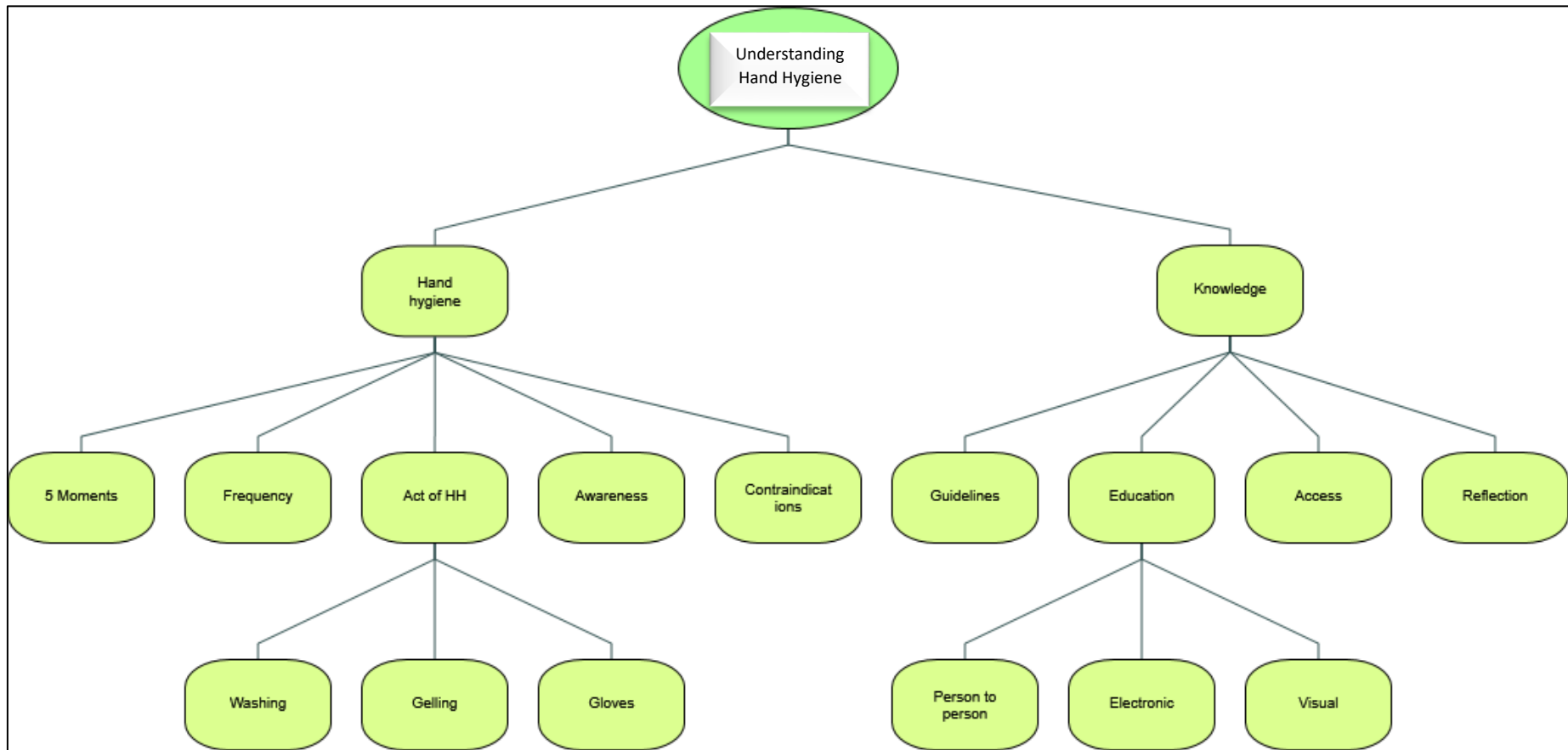
Name	Sources	References
Application of knowl	1	18
Communication	1	12
Enablers	1	17
Environmental Issues	1	12
Influence on Nursing	1	20
Social influences	1	16
Source of knowledge	1	19
Formal	1	4
Informal	1	15
- Right Panel (References):** A list of references for the selected node.
  - Reference 1 - 0.19% Coverage:**

Participants: I wouldn't say they prompt you, they make you think, because they are not necessarily near where the hand basin is. There are some near the hand basins, but it does make you aware, I don't think it says wash your hands. The accessibility of the gels being in the cubicles and on desks, on just about on every corner, attached to walls, makes a difference, prompts you more than the posters, because it is there, it is more visual, oh yeah gel my hands.
  - Reference 2 - 0.78% Coverage:**

Participants: I wouldn't say they prompt you, they make you think, because they are not necessarily near where the hand basin is. There are some near the hand basins, but it does make you aware, I don't think it says wash your hands. The accessibility of the gels being in the cubicles and on desks, on just about on every corner, attached to walls, makes a difference, prompts you more than the posters, because it is there, it is more visual, oh yeah gel my hands.
  - Reference 3 - 0.55% Coverage:**

Participants: What she means is wash your hands wash your hands, wash your hands (laughter). Before patient contact, before procedure, after a procedure, after touching a patients surroundings, after touching patient, as you are going in and leaving.

Appendix J: Initial mind mapping using NVivo



Appendix K: Victoria University of Wellington Human Ethics Committee approval



Phone 0-4-463 5676  
Fax 0-4-463 5209  
Email Allison.kirkman@vuw.ac.nz

## MEMORANDUM

TO	Lorraine Rees
COPY TO	Maureen Coombs
FROM	Dr Allison Kirkman, Convener, Human Ethics Committee
DATE	24 March 2015
PAGES	1
SUBJECT	<b>Ethics Approval: 21605</b> Exploring the barriers and levers to hand hygiene of nursing and medical staff in Emergency Departments: A mixed methods study

Thank you for your application for ethical approval, which has now been considered by the Standing Committee of the Human Ethics Committee.

Your application has been approved from the above date and this approval continues until 31 August 2016. If your data collection is not completed by this date you should apply to the Human Ethics Committee for an extension to this approval.

Best wishes with the research.

Allison Kirkman  
Human Ethics Committee

A handwritten signature in blue ink that reads 'Allison Kirkman'.



Appendix L: Victoria University of Wellington Human Ethics Committee, amendment one



Phone 0-4-463 5480

Email [susan.corbett@vuw.ac.nz](mailto:susan.corbett@vuw.ac.nz)

## MEMORANDUM

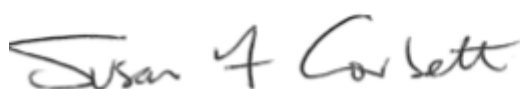
TO	Lorraine Rees
COPY TO	Maureen Coombs
FROM	AProf Susan Corbett, Convener, Human Ethics Committee
DATE	26 June 2015
PAGES	1
SUBJECT	<b>Ethics Approval: 21605</b> Exploring the barriers and levers to hand hygiene of nursing and medical staff in Emergency Departments: A mixed methods study

Thank you for your request to amend your ethics approval. This has now been considered and the request granted.

Your application has approval until 31 August 2016. If your data collection is not completed by this date you should apply to the Human Ethics Committee for an extension to this approval.

Best wishes with the research.

Kind regards



Susan Corbett  
Convener, Victoria University Human Ethics Committee

Appendix M: Victoria University of Wellington Human Ethics Committee, amendment two



Phone 0-4-463 5480

Email [susan.corbett@vuw.ac.nz](mailto:susan.corbett@vuw.ac.nz)

## MEMORANDUM

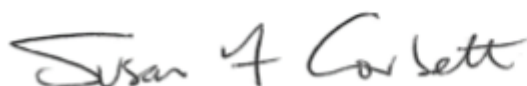
TO	Lorraine Rees
COPY TO	Maureen Coombs
FROM	AProf Susan Corbett, Convener, Human Ethics Committee
DATE	22 July 2015
PAGES	1
SUBJECT	<b>Ethics Approval: 21605</b> Exploring the barriers and levers to hand hygiene of nursing and medical staff in Emergency Departments: A mixed methods study

Thank you for your request to amend your ethics approval. This has now been considered and the request granted.

Your application has approval until 31 August 2016. If your data collection is not completed by this date you should apply to the Human Ethics Committee for an extension to this approval.

Best wishes with the research.

Kind regards



Susan Corbett

Convener, Victoria University Human Ethics Committee

## Appendix N: Responses by Domain

### Domain: Knowledge & Skills

Item	Lever % (n)	Neutral % (n)	Barrier % (n)
Hand hygiene education is available for me	76.5 (26)	14.7 (5)	8.8 (3)
There are advertisements or newsletters about hand hygiene in my work place	94.1 (32)	5.9 (2)	0
Hand hygiene guidelines are easily accessible	82.4 (28)	8.8 (3)	8.8 (3)
Total score by category	84.3 (86)	9.8 (10)	5.9 (6)

\*34 responses for each item = Total of 102 for this response for this domain

### Domain: Professional Role

Item	Lever % (n)	Neutral % (n)	Barrier % (n)
I engage in hand hygiene out of respect for my patients	88.2 (30)	5.9 (2)	5.9 (2)
Hand hygiene is a non-negotiable part of my role	100 (34)	0	0
Hand hygiene is part of my professional culture	91.2 (31)	2.9 (1)	5.9 (2)
Total score by category	93.1 (95)	2.9 (3)	3.9 (4)

\*34 responses for each item = Total of 102 for this response for this domain

### Domain: Beliefs about Capability

Item	Lever % (n)	Neutral % (n)	Barrier % (n)
There are some practical barriers to hand hygiene because of my particular job/role	52.9 (18)	8.8 (3)	38.2 (13)
I am reluctant to ask others to engage in hand hygiene	47.1 (16)	5.9 (2)	47.1 (16)
The frequency of required hand hygiene makes it difficult for me to carry it out as often as necessary	20.6 (7)	8.8 (3)	70.6 (24)
I am confident in my ability to carry out hand hygiene	91.2 (31)	5.9 (2)	2.9 (1)
Total score by category	52.9 (72)	7.4 (10)	39.7 (54)

\*34 responses for each item = Total of 136 for this response for this domain

### Domain: Beliefs about Consequences

Item	Lever % (n)	Neutral % (n)	Barrier % (n)
If I do not engage in hand hygiene I may acquire an infection	100 (34)	0	0
If I omitted hand hygiene I would blame myself for infections	64.7 (22)	11.8 (4)	23.5 (8)
If I engage in hand hygiene it improves patient confidence	85.3 (29)	11.8 (4)	2.9 (1)
If I miss hand hygiene I will be subject to disciplinary action	12.1 (4)	21.2 (7)	64.7 (22)
Total score by category	65.9 (89)	11.1 (15)	23 (31)

\*34 responses for three items and 33 responses for last item = Total of 135 for this response for this domain

**Domain: Motivation & Goals**

Item	Lever % (n)	Neutral % (n)	Barrier % (n)
I feel complacent about hand hygiene	61.8 (21)	8.8 (3)	29.4 (10)
I cannot be bothered with hand hygiene	97.1 (33)	0	2.9 (1)
I disagree with some parts of the hand hygiene guidelines	29.4 (10)	26.5 (9)	44.1 (15)
Total score by category	62.1 (64)	12.6 (12)	25.2 (26)

\*34 responses for each item = Total of 102 responses for this domain

**Domain: Memory & Attention**

Item	Lever % (n)	Neutral % (n)	Barrier % (n)
Sometimes I forget to perform hand hygiene	41.2 (14)	2.9 (1)	55.9 (19)
Hand hygiene is not second nature for me	76.5 (26)	2.9 (1)	20.6 (7)
I am more likely to forget hand hygiene if I am tired	55.9 (19)	14.7 (5)	29.4 (10)
Total score by category	57.8 (59)	6.9 (7)	35.3 (36)

\*34 responses for each item = Total of 102 responses for this domain

**Domain: Environmental Resources**

Item	Lever % (n)	Neutral % (n)	Barrier % (n)
It is difficult for me to attend hand hygiene education due to time pressure	29.4 (10)	14.7 (5)	55.9 (19)
Some Ministry of Health targets make hand hygiene more difficult e.g. shorter stays in Emergency Department	73.5 (25)	8.8 (3)	17.6 (6)
My environment is cluttered	26.5 (9)	2.9 (1)	70.6 (24)
My area of work has poor staffing levels	5.9 (2)	23.5 (8)	70.6 (24)
Total score by category	33.8 (46)	12.5 (17)	53.7 (73)

\*34 responses for each item = Total of 136 responses for this domain

**Domain: Social Influences**

Item	Lever % (n)	Neutral % (n)	Barrier % (n)
When staff engage in hand hygiene they are praised	11.8 (4)	17.6 (6)	70.6 (24)
I engage in hand hygiene because I do not want to let the team down	47.1 (16)	20.6 (7)	32.4 (11)
Supervision from senior staff means that carrying out hand hygiene is easier for me	2.9 (1)	38.2 (13)	58.8 (20)
My hand hygiene is encouraged by others	32.4 (11)	47.1 (16)	20.6 (7)
Total score by category	23.5 (32)	30.9 (42)	45.6 (62)

\*34 responses for each item = Total of 136 responses for this domain

**Domain: Emotion**

Item	Lever % (n)	Neutral % (n)	Barrier % (n)
I feel angry if hand hygiene is not carried out by others	61.8 (21)	26.5 (9)	11.8 (4)
I feel frustrated when others omit hand hygiene	70.6 (24)	20.6 (7)	8.8 (3)
I feel guilty if I omit hand hygiene	73.5 (25)	11.8 (4)	14.7 (5)
I feel ashamed if I omit hand hygiene	76.5 (26)	8.8 (3)	14.7 (5)
Total score by category	70.6 (96)	16.9 (23)	12.5 (17)

\*34 responses for each item = Total of 136 responses for this domain

**Domain: Action Plans**

Item	Lever % (n)	Neutral % (n)	Barrier % (n)
Government targets have led to improvement in my hand hygiene	44.1 (15)	17.6 (6)	38.2 (13)
Hospital targets relating to infection or hand hygiene has led to improvement in my hand hygiene	55.9 (19)	20.6 (7)	23.6 (8)
Some strategies designed to improve hand hygiene influence my practice	67.6 (23)	20.6 (7)	11.8 (4)
Total score by category	55.3 (57)	19.4 (20)	25.2 (25)

\*34 responses for each item = Total of 102 responses for this domain

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