Queensland University of Technology
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An investigation of the assumptions that inform contemporary hospital infection control programs.

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This thesis is submitted to fulfill the requirements for the award of the Doctor of Philosophy at Queensland University of Technology.

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KEYWORDS

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Antisepsis
Health Geography
Space
Infection Surveillance
Clinical Governance
Data Awareness
Data Ownership
Clinical Culture
Technology
Environmental Cues
Emergency Context
ABSTRACT

The purpose of the study was to investigate the assumptions that underpin contemporary hospital infection control programs from the perspective of the influence of clinical culture on the integration and ownership of the infection control program.

The results of numerous studies have linked low levels of adherence with infection control principles amongst health care providers as the most significant factor contributing to nosocomial infection. Despite early successes in reducing nosocomial infection rates, results derived from current research demonstrate that nosocomial infection has remained a challenge to healthcare providers and patients alike and outbreaks are regularly reported in the infection control literature.

Serious economic and social impact has resulted from the increasing levels of antibiotic resistance that have been reported amongst pathogens associated with nosocomial infection.

This interpretive study takes an ethnographic approach, using multiple data sources to provide insight into the culture and context of infection control practice drawing upon clinicians’ work and the clinician’s perspective.

There were three approaches to data collection. A postal survey of surgeons was conducted, a group of nurses participated in a quality activity, and a clinical ethnography was conducted in an intensive care unit and an operating theatre complex.
Data were analysed in accordance with the qualitative and quantitative approaches to data management.

Findings indicate that the clinical culture exerts significant influence over the degree to which the infection control program activities change practice and that rather than imposing the infection control program on the clinical practice setting from outside, sustained practice change is more likely to be achieved if the motivation and impetus for change is culturally based. Moreover surveillance, if it is to influence clinicians and their practice, must provide confidence in its accuracy. It must be meaningful to them and linked to patient care outcomes.

Contemporary hospital infection control programs, based on assumptions about a combination of surveillance and control activities have resulted in decreased nosocomial infection rates. However, sustained infection control practice change has not been achieved despite the application of a range of surveillance and control strategies. This research project has utilized an ethnographic approach to provide an emic perspective of infection control practice within a range of practice contexts. The findings from this study are significant within the context of spiraling health costs and increasing antibiotic resistance associated with nosocomial infection.
LIST OF PUBLICATIONS FROM
THE RESEARCH PROGRAMME

Publications


Conference Presentations


Research Grants

Queensland Nursing Council research grant awarded to D. Macbeth in 2001 for the project: ‘An investigation of the cultural and procedural factors that influence hospital infection rates’.

Other


STATEMENT OF ORIGINAL AUTHORSHIP

The work contained in this thesis has not been previously submitted for a degree of diploma at any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signed………………………………………….

Date……………………………………………..
DECLARATION OF ENROLMENT

I, Deborough Macbeth, a candidate for the degree of Doctor of Philosophy at Queensland University of Technology, have not been enrolled for another tertiary award during the term of my PhD candidature without the knowledge and approval of the Research Degrees Committee.

Candidate’s Signature…………………………………………………………

Date…………………………

vii
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<tbody>
<tr>
<td>ACHS</td>
<td>Australian Council on Healthcare Standards</td>
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<tr>
<td>AICA</td>
<td>Australian Infection Control Association</td>
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<tr>
<td>AIDS</td>
<td>Acquired Immunodeficiency Syndrome</td>
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<tr>
<td>APIC</td>
<td>Association for Professionals in Infection Control</td>
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<tr>
<td>AS</td>
<td>Australian Standard</td>
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<tr>
<td>ASA</td>
<td>American Society of Anaesthesiology</td>
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<td>BSI</td>
<td>Blood Stream Infection</td>
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<td>CDC</td>
<td>Centers for Disease Control and Prevention, Atlanta, USA.</td>
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<td>CHICA</td>
<td>Community and Hospital Infection Control Association</td>
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<td>CHRISP</td>
<td>Centre for Health-Related Infection Surveillance and Prevention</td>
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<td>CI</td>
<td>Clinical Indicator</td>
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<td>Creutzfeldt-Jakob Disease</td>
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<td>Clinical Nurse</td>
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<tr>
<td>CVC</td>
<td>Central Venous Catheter</td>
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<td>Enrolled Nurse</td>
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<td>ETT</td>
<td>Endotracheal Tube</td>
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<td>HAI</td>
<td>Healthcare-Associated Infection</td>
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<td>HISS</td>
<td>Hospital Infection Standardised Surveillance</td>
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<td>ICP</td>
<td>Infection Control Practitioner</td>
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<td>ICU</td>
<td>Intensive care Unit</td>
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<td>Intravascular</td>
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<td>IVC</td>
<td>Intravenous Catheter</td>
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<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>MRSA</td>
<td>Multi-antibiotic Resistant <em>Staphylococcus aureus</em></td>
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<td>National Health Service</td>
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<td>NINSS</td>
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<td>National Nosocomial Infection Surveillance</td>
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<td>NUM</td>
<td>Nurse Unit Manager</td>
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<td>New Zealand Standard</td>
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<td>OR</td>
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<td>Registered Nurse</td>
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<td>Severe Acute Respiratory Syndrome</td>
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<td>Study on the Efficacy of Nosocomial Infection Control</td>
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<td>Surgical Site Infection</td>
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<td>VRE</td>
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Chapter One

Introduction

1.1 Background

Nosocomial infection is a significant problem faced by health care facilities around the world (Australian Infection Control Association Expert Working Group, 2001). It can result in increased hospitalisation, slower recovery and delayed return to the workforce. At times it may result in additional surgery such as debridement or amputation. It may even result in the patient’s death. In addition, nosocomial infection increases the cost of medical care, increases the length of surgery waiting lists and can result in litigation for the health care service provider or facility. Therefore it is an undesirable, costly and adverse outcome of health care provision.

Advances in medical technology have resulted in extensive use of invasive techniques and devices, facilitating microbial entry into normally sterile body sites. Additionally, advances in the development of pharmaceutical agents are extending the life-span of people with illnesses such as diabetes, chronic obstructive airway disease and renal disease resulting in an increase in the frail aged population. This population, together with patients who are hospitalised repeatedly or for extended periods of time such as oncology patients or those recovering from multi-trauma, are at risk of nosocomial infection (Kaiser, 1982; Australian Infection Control Association Expert Working Group, 2001; Exner et al, 2001).

These advances have also increased healthcare delivery options to include outpatient clinics such as haemodialysis centres and oncology day units and the patient’s own home. The result is that invasive therapies such as intravenous antibiotic infusions,
haemodialysis and chemotherapy may now be administered in a variety of settings. In recognition of these increased care delivery options the term nosocomial infection is increasingly being replaced in the Australian literature with a new term: healthcare-associated infection (HAI). This term incorporates infections that arise as a direct result of healthcare whether the care is provided in the traditional clinical context of the tertiary healthcare facility, an outpatient or community health setting, or in the privacy of the patient’s home. Despite increasing use of HAI within Australia, the term nosocomial infection will be used throughout this study in recognition of its continued widespread use in the international literature.

Primum non nocere or ‘first do no harm’ is the basic tenet underpinning the provision of healthcare. This is the expectation of the patient and the credo of the healthcare provider. In spite of this, many patients receiving healthcare acquire an infection as a direct result of the healthcare they receive (Taskforce on Quality in Australian Health Care, 1996; American Institute of Medicine, 2000).

1.2 History of Hospital Infection Control and Prevention

In earliest times, infections and the diseases they cause were viewed as forms of punishment meted out by the gods like drought or famine. Similarly, isolation practices designed to prevent the spread of disease have been used for centuries. Isolation resulted in exclusion from the rest of the community, loss of social position, at least temporarily and an inability to contribute to the community or support families (Ayliffe and English, 2003; Goffman, 1968). Those isolated became entirely reliant on the benevolence of other members of the community for the most basic necessities to sustain life. Even so, from ancient times, the potential impact of disease on a
society was acknowledged and the diseased person was excluded from the community in order to protect the rest of its members.

Until the causes of infection were identified, theories regarding the cause of disease included spontaneous generation and miasmas or mists that arose and spread disease amongst a population. Eventually a connection, albeit tenuous, was made between contact with humans and disease transmission. Lacking the means to identify modes of disease transmission, certain members of the community were ascribed the ability to cause illness and disease by giving the ‘evil eye’. (Ayliffe and English 2003:1-9). These persons were viewed with fear, suspicion and awe. They were seen as representatives of evil and the occult and at various stages throughout history were tortured or executed because of the powers they were believed to possess.

Major advances in infection control and prevention include the invention of the microscope by Van Leeuwenhoek in 1673, which allowed visualisation of microbes for the first time (Lee and Bishop, 1997). Jenner, pioneered the development of vaccines in 1796, and Semmelweis’ use of epidemiological principles in 1840 established the link between handwashing and infection prevention (Exner, 2001). Louis Pasteur made several contributions to infection control including development of the process of pasteurisation (Lee and Bishop, 1997).

In 1854, Nightingale recognised and demonstrated the role of the environment in infection control and prevention (Larson, 1997). Lister’s use of antiseptics in surgery in 1867, decreased morbidity and mortality associated with post-operative wound infection and Koch, in 1876, developed a protocol that proved the germ theory of
disease dismissing forever the theory of spontaneous generation. The twentieth century saw the discovery and development of antibiotics. (Lee and Bishop, 1997; Exner, 2001)

Antibiotic resistance was seen amongst previously sensitive strains of microorganisms soon after widespread use of penicillin commenced (Cohen and Tartasky, 1997) and led to the establishment of the first infection control programs to assist in the management of outbreaks of these antibiotic resistant bacteria in healthcare facilities (Larson, 1997). According to Wenzel (1970), outbreaks of staphylococcal infection in healthcare facilities in the United Kingdom, Europe and the United States in the 1950’s, led to renewed interest in infection control issues resulting in the establishment of the Infection Control Nurse (ICN) position in healthcare facilities. Infection control as a separate, specialised nursing practice began in England in 1960. The first ICN was appointed in the United States at Stanford University Hospital in 1963 (Wenzel, 1970).

Around the same time the Centers for Disease Control (CDC) began recommending that healthcare facilities undertake nosocomial infection surveillance to obtain data on which to base rational control measures. At first the CDC recommended that the surveillance be undertaken by a physician with specialised training in hospital epidemiology however, by the 1970’s based on several studies, it was accepted that the surveillance could best be undertaken by a “specially trained infection control nurse.” (Haley et al, 1985, p.183).
The CDC initiated a study in 1974 to evaluate the efficacy of nosocomial infection control programs throughout the United States. The results of the Study on the Efficacy of Nosocomial Infection Control (SENIC), demonstrated that hospitals with established infection control programs, coordinated and implemented by an ICN and a physician with training in epidemiology, had nosocomial infection rates 32% lower overall, than those hospitals without such programs (Haley et al, 1985). These findings validated the success of formalised infection control programs and the role of the ICN, and as a result, infection control programs incorporating a combination of surveillance and control activities, such as those described by the SENIC project were established in hospitals around the world. The results of this project are quoted to this day as evidence of the effectiveness of infection control programs.

Surveillance was the cornerstone of the earliest infection control programs. It remains the cornerstone of contemporary infection control programs that are directed and overseen by multi-disciplinary Infection Control Committees although the range of activities falling under their purview has increased significantly (Stamm, 1976; Haley, 1985; Scheckler et al, 1998; Department of Health and Ageing, 2004). The scope of practice of the infection control practitioner (ICP) has also developed considerably in order to keep pace with and meet the demands of the changing face of healthcare (Turner et al, 1999; Jones et al, 2000).

Newly emerging pathogens such as the Acquired Immunodeficiency Syndrome (AIDS) epidemic in the United States (US) in the 1980s and more recently, Severe Acute Respiratory Syndrome (SARS), have resulted in the need for rapid dissemination of information and the development and implementation of practices
and precautions to prevent transmission. The discovery of novel pathogens such as the prions that cause Creutzfeldt-Jakob Disease (CJD) have also challenged healthcare providers not only in terms of developing treatments but also to discover how the spread of these pathogens might be controlled within healthcare facilities (Department of Health and Ageing, 2004). The re-emergence of infectious diseases such as tuberculosis, now in multi-drug resistant forms, along with increasing levels of antimicrobial resistance amongst pathogens such as multiresistant *Staphylococcus aureus* (MRSA), multiresistant Gram-negative bacteria and vancomycin resistant enterococci (VRE) also confront contemporary infection control programs (Eickhoff, et al, 1969; Cohen and Tartarsky, 1997; Larson et al, 1997; Levy, 1998; Gerding and Martone, 2000). More recently, the threat of bioterrorism has resulted in ICP’s revising and increasing their knowledge of diseases such as anthrax and smallpox and developing bioterrorism preparedness plans (Lazarus et al, 2002).

The infection control community has responded rapidly to the changing patterns of infectious diseases, discovering and implementing strategies such as the use of Standard and Additional Precautions, designed to interrupt the various modes of disease transmission within the healthcare facility. However the success of these strategies in preventing cross-infection has been mitigated by healthcare workers’ poor adherence to infection control precautions. Widespread adherence to basic infection control principles such as handwashing and the application of Standard and Additional precautions has not yet been achieved (Dubbert et al, 1990; Kibbler et al, 1998; Angelilli et al, 1999; Feather et al, 2000; Karabey et al 2001) allowing transmission of infection from patient to patient via the hands of healthcare workers and/or the use of contaminated equipment to continue. The need to ensure that basic
infection control principles are consistently incorporated into everyday clinical practice provided the impetus for this research project.

1.3 The Context
The majority of the project was undertaken in a large regional acute care facility with greater than five hundred beds. The facility is situated in south-eastern Queensland and provides public healthcare services for patients as far south as Northern New South Wales and north to the outskirts of Brisbane, the State capital. The service district’s western border is the mountainous hinterland behind the Gold Coast. The facility provides a range of services including surgical and medical, peri-operative and paediatric, oncology, dialysis, mental health, maternity, emergency, orthopaedic, neurosurgery, urology, cardiology and intensive care. It serves a relatively unique population with a significant proportion of aging persons due to the area’s popularity as a place for retirees to settle. The tourism industry also impacts on the health service in so far as the area is a popular tourist destination.

While many factors influenced the healthcare industry at the time this project was undertaken, three have direct bearing on the significance of this project to the delivery of healthcare at this time. These three factors are safety and quality in healthcare, risk management and clinical governance.

The Quality in Australian Health Care Study (QAHCS) aimed to quantify the incidence of preventable adverse events associated with healthcare provision. The findings indicated that 16% of patients were involved in an adverse event during that admission and that half of these adverse events were deemed preventable (Wilson et
al, 1995). Dr Carmen Lawrence to the Minister for Human Services and Health stated
that:

“if the study results were generalised to Australia as a whole 230,000 public
and private hospital admissions in 1992 would have involved an adverse event
which was preventable.....and between 25,000 and 30,000 people
experiencing an adverse event that resulted in some degree of permanent
disability and between 10,000 and 14,000 people would have died”.

(Lawrence, 1995, p.3)

The findings of the Quality in Australian Health Care Study received media attention
and raised the general public’s awareness of the incidence of such adverse events
thereby creating a political imperative to address the issue. The Australian
Government was keen to demonstrate that measures were being taken to address the
issue and restore public confidence in the healthcare system. To oversee this process
the Council for Safety and Quality in Health Care was established in January 2000
with the aim of incorporating key issues such as safety and quality into the healthcare
culture.

The risk management literature also stresses the need for cultural change as evidenced
by the following statement drawn from the Australian/New Zealand Standard on Risk
Management (AS/NZS 4360:1999) which states:

“Risk management is recognised as an integral part of good management
practice. To be most effective, risk management should become part of an
organisation’s culture. It should be integrated into the organisation’s
philosophy, practices and business plans rather than be viewed or practiced
as a separate program. When this is achieved, risk management becomes the business of everyone in the organisation.” (p. iii)

According to its guideline on risk management (2001), Standards Australia considers nosocomial infection to be one of the healthcare risks that need to be managed citing the QAHCS previously mentioned and a similar study conducted in the United States (American Institute of Medicine, 2000). These studies identified a number of adverse outcomes including patient falls, medication errors, and nosocomial infection, that caused disability and sometimes death and were a direct result of healthcare provision.

Clinical governance, a concept that originated in the United Kingdom, is the third component of the trinity of forces focused on improving outcomes of healthcare service delivery. Masterton and Teare (2001, p.25) stated:

“...clinical governance is the process by which organisations will ensure the provision of quality clinical care through every individual being accountable for setting, maintaining and monitoring performance standards”.

They argued that according to the principles of clinical governance, every member of the healthcare team must be responsible for ensuring the provision of safe healthcare (Masterton and Teare, 2001).

Due to the findings of studies such as Quality in Australian Health Care Study (QAHCS) (Wilson et al, 1995), and the study undertaken by the American Institute of Medicine (2000), governments, consumers and administrators have demonstrated renewed interest in issues of safety and quality in healthcare.
In Australia, the Federal Government through the Australian Council for Safety and Quality in Health Care (2003) has funded education, accreditation, research, and practice initiatives to address the most common preventable adverse events identified by the QAHCS. Clinical governance and risk management frameworks have been identified as the means by which adverse outcomes such as nosocomial infection should be managed. The basic tenet of these frameworks is that each person in the healthcare team must be accountable for the provision and maintenance of safe and quality healthcare (Scally and Donaldson, 1998). Consistent application of infection control principles is vital to the provision of safe and quality healthcare provision. The Australian Council for Safety and Quality in Health Care (2004) identified the need for cultural change within the healthcare setting if these initiatives are to be successful. This project is therefore timely in that it investigates the influence of clinical culture on infection control practice.

1.4 The Research Problem

Contemporary infection control programs established on the basis of the findings of the SENIC project (Haley et al, 1985), incorporate a combination of surveillance and control activities. These activities are based on two main assumptions. It is assumed that if nosocomial infection rates are calculated and disseminated to clinicians then clinicians will base decisions regarding their practice on such data (Gaynes et al, 2001). Further, it is assumed that education supported by policy and appropriate facility design, will result in consistent application of infection control principles in clinical practice (Department of Health and Ageing, 2004). While the results of the SENIC project (Haley et al, 1985) support these assumptions to some extent, the
results of the QAHCS clearly indicate that some preventable nosocomial infections still occur and result in increased morbidity and mortality (Wilson et al, 1995).

This interpretive study takes an ethnographic approach, using multiple data sources in order to understand the social, cultural and procedural factors that influence clinicians’ infection control practice. This approach signals a departure from methods used previously in studies researching issues associated with infection control. Traditionally, such studies have aimed to describe outbreaks of infection (Manning et al, 2001), or quantify poor infection control practice (Feather et al, 2000; Karabey et al, 2001). The effectiveness of various strategies such as education (Dubbert et al, 1990; Pittet, 2001), surveillance (Emori et al, 1981; Gastmeier et al, 2000), and engineering controls (Harvey, 1998; Hobson et al, 1998; O’Connell and Humphreys, 2000) have been investigated in terms of increasing compliance with basic infection control principles. Some researchers have sought the clinician’s opinion about reasons for breaches in infection control practice through survey or questionnaire (O’Boyle et al, 2001a; O’Boyle et al, 2001b; Regina et al, 2002). However, none have placed themselves in a position to learn what infection control means to the healthcare worker within the clinical context as they go about their everyday work, or more importantly, to consider the influence of culture on infection control practice. Instead, efforts to improve infection control practice have specifically focused on infection control in isolation from the context in which it is practiced thereby failing to understand the imperatives imposed by the complexities of the clinical culture, and the meaning and value infection control practice has for the clinician.
This project aims to redress this by investigating the cultural and procedural factors that influence infection control practice.

1.5 The Research Questions

This project sought to investigate two assumptions that are the basis of surveillance and control activities comprising contemporary hospital infection control programs. The research was structured around three distinct phases.

Phases one and two, investigated assumptions regarding infection surveillance activities, to examine more closely how feedback of infection rate data, derived from surveillance activities, influences clinicians and their infection control practice. In phase one, a postal survey was used to investigate the beliefs and attitudes of surgeons regarding aspects of the infection rate data they receive. A quality improvement activity was used in phase two to investigate the usefulness of a supported transfer of responsibility for collecting and reporting surgical site infection rate data to nursing staff.

Phase two investigated assumptions underpinning control activities such as education and policy development to identify how the clinical culture of various practice contexts might influence infection control practice within those contexts. This was achieved by undertaking a clinical ethnography in an Intensive Care Unit (ICU) and an operating theatre complex. The following questions guided the research:

1. How do surgeons rate the value of infection rate data in terms of accuracy and usefulness?
2. What are acceptable infection rates for “clean” and “contaminated” categories of surgery according to a group of surgeons?

3. Will nurses on a surgical ward develop ownership and awareness of infection rate data when they are involved in the surveillance process?

4. How does the culture of the clinical environment influence infection control practice?

1.6 The Researcher

I am a nurse and have spent the past 13 years, and the majority of my nursing career, working in the specialist practice of infection control. During that time I have worked with healthcare professionals in a variety of practice contexts providing advice on infection control issues specific to that context. The practice contexts include a tertiary care facility, community health settings, outpatient settings, private day surgeries, oral health, sexual health, mental health and I have taught infection control at both undergraduate and post-graduate level.

The challenge of my career and the basis of this project is that despite the implementation of tested and novel surveillance and control strategies healthcare workers do not consistently demonstrate best practice in relation to infection control (Larson et al, 1997; Kim et al, 1999; Lynch et al, 2001; Manning et al, 2001; Lundstrom et al, 2002). Therefore I sought to develop an understanding of infection control practice from the perspective of the clinicians as they go about their daily work. I sought to identify factors that influence their practice positively and negatively, within the clinical context.
I have not nor am I capable of setting aside my infection control knowledge and experience in this project. To the clinicians I observed during this study, I personify infection control because, I am known to them as an ICP. I have audited their practice, provided education on infection control and infectious diseases and provided advice on clinical practice issues such as patient isolation and staff vaccination. This prior relationship had both positive and negative influences on the project. Positively, I was a familiar figure within the clinical environment and yet my presence changed the clinical environment by raising the clinicians’ awareness of infection control issues. However, this heightened awareness was not sustained as clinicians were continually drawn back to focus on issues at hand. Therefore, the effects of my presence were intermittent and reduced as participant observation continued and the clinicians realised that there was no hidden agenda such as practice audits that would negatively impact on them. In some ways making myself available to provide advice and information validated my presence for the clinicians in so far as they received something in return for accepting my continued presence in their space.

Field notes recording conversations and comments associated with my visits and contacts with the nurses participating in the quality activity provided me with greater insight and understanding about their perceptions and attitudes towards infection rate data and infection control practice generally. The nurses’ willingness to participate in the project was an acknowledgement of my interest in their problems and concerns and this assisted in cementing a positive relationship between us throughout the project.
I saw my presence in the field of study not only as potentially influencing the
behaviour of the participants as described above but I also recognised that my reading
of the cultural environment would be influenced by my own values, beliefs,
knowledge, perception and orientation. (Hammersley and Atkinson, 1995)
Recognition of these influences signaled the beginning of reflexivity, that is,
development of sensitivity to these potential influences, and led to the instigation of
specific strategies to ensure I remained reflexive such as keeping a research journal,
remaining responsive to the data and ensuring that assumptions drawn were supported
by the data.

1.7 Thesis Outline
This thesis deviates from the traditional monograph format in that manuscripts
published/ submitted to peer-reviewed journals replace the traditional results chapters.
The length of the literature review and methodology chapters is reduced because each
manuscript contains a review of the literature relevant to the research reported and a
method section describing the study undertaken and the research process.

Chapter Two provides a review of the current literature in relation to nosocomial
infection and previous research into strategies for prevention and control, although as
previously mentioned, this chapter is somewhat shorter than the traditional
monograph thesis format due to the literature review sections in each of the published
papers and submitted manuscripts. The success to date of the various strategies in
controlling and preventing infection is also discussed in Chapter Two.
An overview of the methodological approach and design of the research process is presented in Chapter Three and a detailed description of method is presented in each research report.

Chapter Four, “Surgeons’ perspectives on surgical wound infection rate data in Queensland, Australia”, is a complete report of the surgeon survey. This survey was designed to test assumptions associated with surveillance activities comprising infection control programs. The surgeon survey investigated the perceptions of a group of Queensland surgeons regarding the usefulness and accuracy of the infection rate data they receive and seeks their opinions regarding acceptable infection rates associated with categories of surgery.

The ability and degree to which infection rate data is able to influence nurses was also investigated through data collected during a Quality Improvement Activity. The activity tested a supported transfer of responsibility for the collection, collation and reporting of infection rate data to nurses on an orthopaedic unit. This phase of the project was designed to identify factors that influence the clinicians’ ownership of surveillance data and the findings provided some insight into cultural factors that affect data ownership. This phase of the project and the findings are reported in Chapter Five, “Testing a supported transfer of responsibility for infection surveillance using a quality improvement framework”.

Findings from an investigation of the clinical culture and the ways it can influence infection control practice are reported in Chapters Six and Seven. Chapter Six, “Silent Practices: Imperatives of a culture of urgency”, reports on the dynamic nature of the
clinical environment of the Intensive Care Unit and the practice imperatives it imposes.

Chapter Seven, “Clinical Geography and its Influence on Infection Control Practice: An Ethnography”, describes the findings of a deeper exploration of the influence of clinical culture on infection control practice. The findings reported in this chapter build upon those reported in Chapter Six.

The findings from each phase of the project are discussed in terms of their interrelatedness in Chapter Eight and the practice implications of these findings are also discussed.

Recommendations based on the findings of the research project are made in Chapter Nine and conclude the thesis.

1.8 Conclusion

This introductory chapter described the background to the research project outlining the advances that have been made in relation to preventing and controlling healthcare associated infection whilst acknowledging that these advances have been offset by other factors such as increasing levels of antibiotic resistance amongst pathogens and spiraling healthcare costs. This chapter has also identified that although the results of the SENIC project established the success of infection control programs in decreasing nosocomial infection rates overall, success has been limited due to poor adherence to infection control principles in clinical practice. It is this opportunity for improved practice that provided the impetus for this research project.
The social, economic, moral and political imperative to prevent nosocomial infection has increased due to the publication of results of studies into the quality and safety of healthcare in countries including the United States, Australia and the United Kingdom and the media attention these reports have generated. The need for cultural change within healthcare has been recognised and espoused by the Australian Council for Safety and Quality in Healthcare and is embodied in the clinical governance and risk management frameworks developed and implemented to address adverse healthcare outcomes such as nosocomial infection. Recognition of the need for cultural change implicitly acknowledges that issues of safety and quality such as infection control are not currently central to clinical culture. However despite these calls for cultural change the issue of culture and its influence on infection control has not been explored to date. This research project is undertaken to provide new insight into factors associated with the clinical culture that influence infection control practice.
Chapter Two
Literature Review

2.1 Introduction
The term nosocomial or hospital-acquired infection can and should be applied to any disease or infection acquired in a hospital. As such, infections acquired by healthcare workers as a result of contact with infected patients, body fluids or contaminated equipment are also considered nosocomial infections. Examples of such nosocomial transmission would include varicella zoster virus – responsible for chickenpox – hepatitis viruses A, B, and C and bacterial infections such as *Mycobacterium tuberculosis*. The term healthcare associated infection tends to narrow the focus to iatrogenic infections, that is, those infections that are a direct result of a medical treatment or procedure (Department of Health and Ageing, 2004). These infections are largely due to the procedure or treatment bypassing one or more of the body’s natural defence mechanisms allowing the pathogen – usually bacterial - a portal of entry into normally sterile body sites. Therefore, healthcare associated infections are usually associated with an invasive device or procedure such as intravenous catheter (IVC), endotracheal tube (ETT), urinary catheter, or surgical incision. The other feature of healthcare associated infection is that it often involves bacteria that have developed resistance to multiple antibiotic agents thus reducing treatment options possibly to the point where either the only treatment available requires intravenous administration or there is no available treatment. The term nosocomial infection has been used predominantly throughout this project for two reasons. The first is that the infection control literature predominantly uses this term and secondly, the focus of
this study is hospital infection control programs thereby excluding other healthcare settings in which care provided may result in infection.

This chapter will provide an analysis of the scientific literature structured around four main headings relating to surveillance and control activities designed to improve infection control practice. Examples from the literature will also be used to demonstrate that these activities while of proven effectiveness, have not been integrated into clinical practice. As a result the issue of nosocomial infection has not been adequately addressed thereby creating an imperative to develop a greater understanding of infection control practice from the clinician’s perspective.

2.2 Surveillance Activities

Initiatives aiming to quantify the incidence of nosocomial infection have been undertaken in several countries for many years. According to Haley et al (1985, p.183) in the United States the Centers for Disease Control (CDC) was recommending as early as the 1960s, that hospitals undertake surveillance to determine the incidence of nosocomial infection which would provide epidemiological evidence on which to ‘base rational control measures’. Surveillance is defined as,

> ‘the ongoing, systematic collection, analysis, and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know”. (Gaynes et al, 2001)

Infection surveillance initiatives are used to identify infection problems, defining risk populations and factors and evaluating intervention strategies (Vandenbroucke-Grauls
and Schultz, 2002). The effectiveness of surveillance strategies as a key component of infection control programs was established by the findings of the SENIC project (Haley et al, 1985) and therefore research associated with infection surveillance has been directed towards the evaluation and refinement of surveillance techniques (Vandenbroucke-Grauls and Schultz, 2002). The scientific literature identifies data dissemination and aggregation and benchmarking and as key issues relating to surveillance activities.

2.2.1 Data dissemination

In relation to reducing surgical wound infection rates, the SENIC findings repeatedly emphasised the strong correlation between feedback of surveillance data to practising surgeons and a reduction in infection rates. Haley and his colleagues identified that this correlation was based on the observations of investigators in the 1950s. These investigators,

“found that the seriousness of a hospital’s infection problems and the need for preventive efforts were often not apparent to hospital administrators, physicians and nurses until they were given quantitative measures of the problem derived from surveillance data” (Haley et al, 1985:199).

This view was supported by Condon and co-workers (1988:251) who asserted that the, “key factor (in reducing surgical wound infection rates) is feedback to the clinicians”. Gaynes and co-workers (2001), identified that clinicians will make decisions based on infection rate data and may alter their behaviour in ways that will reduce nosocomial infection rates if they perceive value in the data. The aim of disseminating infection rate data to clinicians is to influence practice thereby reducing
infection rates. Condon and colleagues (1988, p.251), argued that “only by using a statistical aggregate view will clinicians know if they are doing well” (p. 251). This statement suggests a link between the promulgation of data that demonstrated the extent of the infection problem and the impetus to change practice by initiating preventive measures. Performance can be measured by comparison of infection rates however valid comparison requires control for variations in patient populations and the application of standardised infection definitions and data collection processes (Vandenbroucke-Grauls and Schultz, 2002). A number of surveillance systems designed to meet these criteria have been established to monitor infection rates across a variety of areas ranging from a small group of healthcare facilities such as the system described by McLaws and Caelli (2000), to a system designed to monitor the incidence of nosocomial infection for an entire country (CDC, 2003). The development of these data aggregation systems represents a significant commitment of health resources but is also congruent with increasing interest in ensuring the identification and rectification of adverse healthcare outcomes (Australian Council for Safety and Quality in Healthcare, 2004).

2.2.2 Benchmarking

Benchmarking infection rate data makes it meaningful for clinicians, allowing them to gauge the outcomes of the care they provide against previous performances or in comparison with other services or facilities. However benchmarking with other healthcare facilities is reliant on the ability to make accurate comparisons. Efforts to achieve comparability have resulted in the development of standardised definitions of infection and also attempts at controlling for variables associated with diverse patient populations through risk stratification (Gaynes, 2001). Large patient samples are
required to offset the relatively smaller numbers derived through risk stratification resulting in the establishment of infection rate data aggregation systems and centres.

In 1970 the CDC established the National Nosocomial Infection Surveillance (NNIS) system in the United States, to monitor the incidence of healthcare associated infection nationally. Acute care general hospitals participate on a voluntary basis. Data are collected by infection control personnel and submitted routinely to CDC where they are entered into the database and aggregated. Confidentiality is assured for participating hospitals and only aggregated data are published. Infection rate data are collected in relation to urinary catheter related infection, surgical site infection, ventilator-associated pneumonia and catheter-related bloodstream infection. Due to risk adjustment made possible by the large sample that comprises the NNIS dataset, (more than 300 hospitals contributed data as of June 2001) individual hospitals are able to use the infection rates as a benchmark thereby identifying areas that require further investigation (NNIS, 2001:404).

Hospitals in England have the opportunity to participate in a similar program, the Nosocomial Infection National Surveillance Service (NINSS) established in 1996 under the auspices of the Public Health Laboratory Service (PHLS). The stated aims of the NINSS are similar to those of NNIS in that the hospital infection data is collected using standardised surveillance methods that provide national data that may be used by hospitals to measure their own performance. (PHLS, 2002a; PHLS, 2002b) One hundred and fifty-two hospitals participated in the program between 1997 and 2001. Their participation is voluntary and confidentiality is assured. The NINSS program collects data in relation to surgical site infection and hospital-acquired
bacteraemia. Systems such as this and NNIS in the United States have assisted in developing an overview of the problem of nosocomial infection.

Based on NNIS system reports, surgical site infections (SSIs) are the third most frequently reported infection (14-16% of all healthcare associated infections) among hospitalised patients. In the period 1986 to 1996 15,523 infections were reported following 593,344 procedures performed in hospitals participating in NNIS. When surgical patients with SSI died, 77% of the deaths were associated with the infection. (CDC, 1999:100)

Data from NINSS identifies that in the period between October 1997 and September 2001, the 152 participating hospitals “reported 3151 SSI resulting from 74734 operations in twelve categories of clinically similar surgical procedures”. (PHLS, 2001a, p.2) Further, NINSS data collected in 84 participating hospitals in the period between May 1997 and March 2001 identified that 3.5 patients per 1000 admissions developed healthcare associated blood stream infection (BSI) and that almost two thirds of BSI where the source was identified were associated with an intravascular device. The fact that over 40% of the isolates causing BSI were staphylococci (25% S. aureus and 17% coagulase-negative staphylococci) and that over half of the S. aureus isolates were resistant to methicillin, that is they were MRSA, demonstrates the degree of resistance among pathogens associated with HAI. (PHLS, 2001(b), p.2)

In Australia, while many hospitals conduct surveillance, aggregated national data are not readily available. In 1984, an Australian national prevalence study was conducted (McLaws et al 1988). This study found that 6.3% of 29,000 patients acquired an
infection during hospitalisation. The most common infections were SSI, urinary tract infection (UTI) and respiratory tract infection however SSI was associated with the greatest increase in length of stay and increased costs. Based on extrapolation of the figures from this study, the impact of nosocomial infection in Australia in 1988 was $500,000 per day ($180 million per year) and 20,000 occupied bed-days. (McLaws et al, 1988)

The Australian Council on Healthcare Standards (ACHS) undertook data aggregation through its Care Evaluation Program. The Care Evaluation Program was established in 1989 with the aim of developing measures of quality of patient care in acute healthcare settings. Clinical indicators (CI) were developed in consultation with clinicians, and healthcare facilities accredited by ACHS were able to submit data to the Care Evaluation Program. Definitions were developed for SSI and BSI (ACHS, 1993). Initially benchmarks were arbitrarily determined and later revised (increased) on the basis of data submitted (ACHS, 1998) and the benchmarks were then stratified on the basis of hospital size determined by bed number. The program was criticised because clinicians believed the definitions were too broad and did not allow risk stratification therefore reducing its usefulness as a benchmark. In 2002 the ACHS adopted definitions for the clinical indicators SSI and BSI developed by the Australian Infection Control Association (AICA) Expert Working Group (AICA, 2000). These new definitions are consistent with NNIS definitions.

In 1998, ten public hospitals in New South Wales enrolled in the Hospital Infection Standardised Surveillance (HIS) program. Data were collected regarding SSI following vascular surgery, hip prosthesis and knee prosthesis surgery. Risk
adjustment was undertaken on the basis of duration of procedure, degree of contamination of the surgical site and the American Society of Anaesthesiology (ASA) score. Data were collected from December 1998 through November 1999. Infection rates associated with specific surgical procedures were 11.0% (95% CI 5.4-19.3) vascular surgery, 0.7% (95% CI 0.02-3.9) hip prosthesis, and 8.0% (95% CI 1.0-26.0) knee prosthesis. The aggregate intravascular device-related BSI rate was determined to be 4.7% (95% CI 0.1-2.9). (Mclaws and Caelli, 2000:403)

Victoria also undertook infection data aggregation through the Victorian Infection Control Surveillance Project (VICSPA) using NNIS methods. Eleven hospitals in Victoria collected data on 1,349 patients having hip or knee replacement between August 1998 and October 1999. (AICA 2001)

In Queensland the Centre for Health Related Infection Surveillance and Prevention (CHRISP) was established in 2001 under the auspices of Queensland Health. Unlike the stated aims of the previous initiative to aggregate infection surveillance data, CHRISP objectives have a more regulatory tone. They include:

- Establishing a process that continuously monitors performance of health care facilities in regard to health care related infection
- Providing the tools for assessment of the cost of health care related infection
- Standardising infection control practice within Queensland health care facilities
- CHRISP also aims to establish benchmarks for infection control practice.

Participating hospitals submit data in relation wound infections associated with specific surgical procedures, intravascular catheter-related BSI, occupational exposure to body fluids and infections caused by specific multi-antibiotic resistant organisms. Data from the CHRISP initiative have not yet been published.

Debate is currently underway regarding the feasibility of establishing a national aggregation centre for Australian healthcare associated infection data. The desire to quantify the incidence of nosocomial infection and the subsequent economic burden imposed on the healthcare system is strong (Australian Infection Control Association Expert Working Group, 2001).

2.2.3 Limitations of surveillance

The value of surveillance activities has been demonstrated in terms of quantifying the incidence (Ehrenkranz, 1981) and impact of nosocomial infection (Australian Infection Control Association Expert Working Group, 2001). According to Haley et al (1985) data derived from surveillance activities has provided a basis for the development and implementation of control measures. The findings from research into surveillance activities have resulted in refinement of processes in order to facilitate comparison of infection rates across systems while maintaining data accuracy. Standardisation of infection definitions and data collection processes has occurred in response to clinicians’ needs and concerns. This level of responsiveness is designed at least in part, to ensure clinicians have confidence in the data accuracy and accept the data derived from the systems as indicators of the standard of care provided (Australian Infection Control Association Expert Working Group, 2001; Australian Council on Healthcare Standards, 2002a). Clinicians’ confidence in surveillance data
according to Gaynes and colleagues (2001) has resulted in its use as a basis for decision making.

However while surveillance activities can increase infection control awareness and identify infection problems any reduction in infection rates is dependent upon the application of infection control principles in clinical practice. Outbreaks of infection when identified, result in immediate action to find the cause and remedy the situation (Harbath et al, 1999). However as Gaynes et al reported (2001, p.295), “only 5% to 10% of hospital-acquired infections occur in recognised outbreaks.” Therefore the vast majority of nosocomial infection is not readily associated with a specific source such as a specific clinician, procedure or practice and consequently, the surveillance data may not exert such a motivating force in relation to improving infection control practice (Haley, 1985). As Lovett and Massanari (1999:136) reported:

“In spite of successes where measurement of health care has been used to improve care, many of us who are charged with the day-to-day conduct of surveillance report anecdotally that our best efforts have little impact on changing health care delivery. Our experience is more often one in which information tends to be ignored; or if not ignored, the changes that are needed to improve care are never accomplished. Although considerable effort is expended gathering, analyzing, and reporting information, we are unable to raise the level of concern regarding current practice sufficiently to drive improvement in care processes.”

Infection control practitioners continue to collect and collate data and report infection rates to surgeons, administrators and clinicians. Despite technological advances such
as computerised data-bases and hand-held computers, surveillance remains resource intensive. Allocation of precious and shrinking health resources to surveillance activities is justified if the activity results in a positive change in patient outcomes such as reduced infection rates. However, as discussed previously, this will only be achieved if the clinicians perceive the data to be valuable and use the knowledge gained through surveillance activities to guide clinical practice.

The other mandatory component of a successful infection control program identified by the SENIC project was the implementation of ‘active control efforts’. These were identified as the development of infection control policies and ongoing infection control education. (Haley, 1985, p.199).

2.3 Control Activities

2.3.1 Education

Infection control education has been a core component of infection control programs since they were established (Streeter et al, 1967; Wenzel, 1970; Scheckler et al, 1998; Department of Health and Ageing, 2004) and remains a constant feature of the modern healthcare context. While debate continues regarding the extent and quality of infection control education as a component of undergraduate healthcare professional curricula, it is a requisite element of the orientation process in each healthcare facility (Department of Health and Ageing, 2004). This process ensures that all members of the healthcare team are provided with basic infection control education and training on entry to the healthcare organisation. In this forum, basic infection control principles such as standard and additional precautions, safe use and disposal of sharps,
waste segregation and minimisation and staff health issues such as vaccination are discussed.

Education is a pivotal strategy used to address problems identified through infection surveillance activities or to improve infection control practice generally (Dubbert et al, 1990; Scheckler et al, 1998; Turner et al, 1999). Research efforts relating to infection control education as a control measure, have focused on evaluating the effectiveness of a variety of strategies (Kim et al, 2001). Studies often describe the effects of educational initiatives in combination with dissemination of data derived from surveillance initiatives such as practice audits was described by Goetz et al, (1999) and Chandra and Milind, (2001). Education is often used as an adjunct to other control activities such as the a change in the placement of dispensers of handwashing solution described by Connolly (1998). Research reports describe the success of the intervention in terms of practice outcomes or staff satisfaction (Dubbert et al, 1990; Dorsey et al, 1996; Hobson et al, 1998). Infection control education may also take the form of awareness campaigns targeting issues such as handwashing and handcare or appropriate use of protective attire. To date the research demonstrates that educational initiatives have not been successful in achieving sustained improvement in infection control practice, even when combined with other strategies (Kretzer and Larson, 1998).

2.3.2 Policy Development

In the context of contemporary healthcare systems infection control policy development and implementation is a multi-layered affair. All healthcare facilities are required by accrediting agencies to have well documented policies and procedures to
ensure a safe environment for patients, healthcare workers and visitors (ACHS, 2002b). These policies and procedures serve to locally operationalise international and national guidelines, and embody standards such as relevant Australian Standards and legislative requirements.

Policy development has long been a feature of infection control programs and was identified in the SENIC project as one of the control activities associated with a lower nosocomial infection rates (Haley et al, 1985). Infection control guidelines have been developed to incorporate new knowledge gained through research. The most recent guideline for hand hygiene requirements incorporates recommendations regarding the use of alcohol-based hand-rubs that have been demonstrated to improve hand hygiene compliance rates amongst healthcare workers (CDC, 2002a).

Implementation of the clinical governance framework within the National Health Service (NHS) in the United Kingdom has seen renewed focus on the importance of evidence-based policy development and implementation. The reason for this is the government’s desire to standardise practice across the service and ensure that policies are evidence-based and reflect best practice guidelines (Scally and Donaldson, 1998; Masterton and Teare, 2001). In Australia, the Taskforce on Quality in Australian Health Care (1995) recommended the development of nationally produced clinical guidelines going as far as recommending that institutional and individual health care providers funding be linked to “the degree to which their care provision conforms to best practice once national guidelines have been produced” (p.21). Congruent with the recommendation of the Taskforce, the Australian Council for Safety and Quality in Health Care (2004), identified its intent to implement standardised approaches to
specific areas of patient harm including nosocomial infection. Thus the role of policy
development as an integral component of contemporary infection control programs
has not diminished.

One control activity not identified in the SENIC project was facility design. These
strategies recognise the role of the physical environment in preventing nosocomial
infection.

2.3.3 Engineering Controls
Engineering controls introduced to prevent nosocomial infection are many and varied.
The CDC in the Guideline for Prevention of Surgical Site Infection (CDC, 1999) made
recommendations regarding the design of operating rooms as a means of preventing
infection. The recommendations were related to ventilation systems, temperature and
humidity levels.

The design of the physical environment in all clinical areas incorporates infection
control principles such as minimising the number of horizontal surfaces in order to
reduce dust accumulation and facilitate cleaning. Impervious surfaces on work benches,
floors and walls again facilitate cleaning and prevent pooling and accumulation of body
fluids. Similarly, the specifications for handbasins as well as recommendations for the
number required and their placement in the clinical area are prescribed in various
Engineering controls include isolation facilities used to accommodate patients with
infections or infectious diseases and the number and type of isolation rooms required is
calculated on the basis of hospital size.
O’Connell and Humphreys (2000) reviewed the role of the intensive care unit design and environmental factors in the acquisition of infection. They noted that patients within this environment are at risk of acquiring nosocomial infection and therefore recommended similar engineering controls as those associated with operating theatres at least in terms of ventilation and the composition of environmental surfaces. Harvey (1998) reviewed the literature regarding the design of the critical care unit. She cited reports of decreased rates of nosocomial infection when patients were transferred from a unit with an open design to one with individual patient rooms and argued for consideration of traffic flows, placement of handbasins, toilets and waste disposal facilities on the basis of these research findings.

The clinical environment can, if poorly designed or inadequately maintained or cleaned, harbour microorganisms, in essence acting as a reservoir of infection. The link between epidemics of nosocomial infection associated with the combination of environmental contamination and poor infection control practice is well established.

Sandoe and colleagues (2001, p.79), described an outbreak of vancomycin-resistant enterococci (VRE) associated with major ward refurbishment. Whilst in the temporary ward one renal patient was diagnosed with VRE peritonitis. The patients were moved out of their temporary ward and back into the refurbished renal unit and within a matter of months two more patients were diagnosed with VRE. The results of an investigation into the outbreak revealed poor handwashing facilities. Handbasins had not been plumbed, some had no taps, those with taps and plumbing had no handwashing solution because the solution used was contained in cartridges that did not fit into the newly
installed dispensers. Paper towel dispensers had not been installed so paper handtowel was balanced on the edge of handbasins subjecting it to splashing and contamination. In addition the cleaner’s room was being converted to an office and the cleaning equipment had been temporarily relocated into the dirty utility room where it was stored near the bedpan washer. Floor polisher buffer pads were being cleaned with a toilet brush in the sluice. Addressing these issues resulted in control of the epidemic.

Overcrowding is also associated with nosocomial infection. Kibbler and co-workers (1998) reported the results of a prospective survey that demonstrated that an increase in the number of beds in a fixed area resulted in an increased risk of cross-infection with methicillin resistant *Staphylococcus aureus* (MRSA). This cross-infection risk is related to the propensity for staff members to move between patients without attending to basic infection control principles such as handwashing and this demonstrates the link between cross-infection and the clinical environment. Manning et al (2001) report that an epidemic of *Serratia marcescens* in a paediatric intensive care unit was due to a number of factors. They included poor asepsis, reduced frequency of handwashing, decreased attention to infection control practices and environmental contamination.

Guidelines have been developed to ensure facilities are designed to minimise potential reservoirs of infection and be easy to clean and maintained. In addition, design elements such as availability and accessibility of handbasins, protective attire, waste handling and disposal systems facilitate adherence with infection control principles (Queensland Health, 2001; Department of Health and Ageing, 2004).
While design elements can influence infection rates, the pathogen harboured in the environment requires a mode of transportation to the susceptible host – the patient. Transportation, or in infection control terms, transmission is most often achieved via the hands of healthcare workers or via contact with contaminated equipment. So once again, the engineering controls are designed to support infection control practice which remains the most significant factor influencing nosocomial infection rates and therefore the effectiveness of infection control programs.

2.3.4 Other Strategies

To date, the discussion has focused on the strategies designed to provide the clinician with knowledge through education, information through surveillance, motivation through policy and data dissemination supported by engineering controls. The aim of all these strategies is to influence clinician behaviour in ways that ensure stringent application of infection control principles in clinical practice. Dixon alluded to the difficulty in achieving this aim when he said:

“We do not need to ask what shall we do? That we largely know. Instead, we need to ask: Knowing what needs to be done, how can we assure that it is done?” (Dixon, 1991, p.7S)

Eickhoff, (1981) asserted that a ‘convincing scientific database’ was the only requirement (p.384). However Larson (1997, p.345) acknowledged that Eickhoff’s approach was over-optimistic and that realisation of the limitations of such a database in influencing practice has resulted in “increasing concern about behavioural components of infection prevention and control”. This concern seems well-founded when you consider even the most basic infection control practice: handwashing. Considered to be
the most important measure in preventing the spread of infection (Department of Health and Ageing, 2004) compliance rates amongst healthcare workers are very low (Risi and Tomascak, 1998; Boyce, 1999) despite ongoing educational and promotional efforts.

Kretzer and Larson (1998), suggested that both environmental and personal factors should be considered in relation to achieving best practice in relation to infection control. They discussed the possible advantages of applying various behavioural theories to achieve practice improvement. O’Boyle et al, (2001a) investigated nurses’ motivation in relation to handwashing and in a later study (2001b), applied the theory of planned behaviour aiming to improve compliance with handwashing procedures with little success. Pittet (2004, p.1), made passing reference to the influence of cultural factors when he argued that “cognitive determinants that shape behaviour are acquired through the socialisation process and are susceptible to change” and recognised that behaviour “both influences and is influenced by the social environment”. However the influence of clinical culture on infection control practice has not been investigated.

2.4 Conclusion

The SENIC project, set in the context of healthcare in the 1970s in the United States, became the template and the justification for infection control programs throughout the United States and around the world. The real value of the study is related to the fact that it took place at a time when infection control programs were not an integral component of all healthcare service providers. Therefore comparisons could be drawn between the infection rates in facilities with active infection surveillance and control programs and those facilities that had not established such programs and clearly
demonstrated that active infection control and prevention programs were associated with lower infection rates. Despite this success, nosocomial infection continues to challenge contemporary infection control programs and compliance with basic infection control principles remains low. Now, some thirty years after the SENIC project was conducted, it is timely to critically reflect on the assumptions that underpin contemporary infection control programs.
3.1 Introduction

As demonstrated in the preceding chapter, previous research into infection control programs and practice have largely excluded the cultural and social dimensions of this topic. This chapter will describe the methodological approach taken in this project and outline the suitability or “fit” of an ethnographic approach. The questions guiding the project will be stated and the research methods for each phase of the project will be described as will the research sites and participants. Congruent with the format of theses by publication this chapter will be shorter than the traditional monograph format as the methods used for each phase of the project are described in detail in each of the manuscripts that comprise Chapters Four, Five, Six and Seven.

3.2 Ethnography

The focus of ethnography is the description of culture. Ethnography is based on the assumption that “any human group of people interacting together for a period of time will evolve a culture”. (Patton, 2002, p.81) Goodenough (1971), defined culture as:

“...that collection of behaviour patterns and beliefs that constitutes standards for deciding what is, standards for deciding what can be, standards for deciding how one feels about it, standards for deciding what to do about it, and standards for deciding how to go about it”. (p.21-22)

According to Patton (2002) ethnography is the principal method used in anthropology and as such is “the earliest distinct tradition of qualitative inquiry” (p.81).
Hammersley and Atkinson (1995, p.6) summarise its two distinctive characteristics thus:

“first, that it focuses on understanding the perspective of the people under study. Second, ethnography observes their activity in everyday life, rather than relying on experimental simulations, or personal accounts of this behaviour”.

Today anthropologists use ethnographic methods to study contemporary social issues such as education, addiction and border conflicts. (Patton, 2002) Ethnography has also found application in the study of organisational culture particularly as it influences change and in program evaluation, power relations between groups, and based on race or gender. (Hammersley and Atkinson, 1995; Patton, 2002; Taylor, 2002) Despite this diversity of subjects and applications there are certain factors common to all these orientations. Taylor (2002) argued that “the study of people and aspects of their lives and social worlds” (p.1) and the production of a research test that is “full, nuanced and non-reductive” (p.1) are common aspects of all these approaches.

Fieldwork including participant observation incorporates the data collection methods traditionally used by ethnographers (Patton, 2002), however according to Taylor (2002) contemporary approaches can involve multiple methods of data collection and analysis.

Hammersley (1992) identified a number of criticisms that are often made in relation to ethnography. They relate to issues about the researcher’s imposition of his/her own knowledge, values and beliefs on the group he/she is studying. Also concern has been expressed regarding generalisations about the value of findings regarding “natural”
settings based on data collected in settings designed by the researcher such as the data collected during formal interviews. Criticism has also been leveled regarding reliance on what participants say they believe and do without observing what they do, or conversely of observing without talking to participants to prevent misrepresentation. Issues have been raised relating to qualitative analysis that fails to consider the processes by which social phenomena develop and change or ignores the place of individual cognition and group interaction. As a result of these criticisms, ethnographers are careful to acknowledge and describe their place within the context of the field and describe the strategies they use to ensure reflexivity.

Reflexivity is a common theme in contemporary ethnographic texts. It refers to the measures an ethnographer may use to ensure he/she remains aware of the frame of reference he/she brings to the field. The reflexive researcher actively seeks to remain responsive to the data, giving it pre-eminence over his/her own cultural framework and the preconceptions, beliefs, and values it comprises. Some strategies used to ensure reflexivity include maintaining a research journal which is used by the researcher to discuss thoughts, feeling, beliefs and assumptions about the data collected. The development of an ethnographic text is very important according to Rudge (1996) as it allows the researcher to critically review the data collected evaluating the tone and language used by the researcher for signs of bias, preconceptions, value judgements and assumptions that are not supported by the data. The design of the study can also assist with reflexivity by using a combination of data collection methods such as observation and interviews. This combination of methods allows the researcher to check the accuracy of analysis of data collected during
observation through the questions posed at interview. These strategies were all used to ensure reflexivity throughout this ethnographic project.

The reflexive ethnographer will also declare his/her place within the research context describing in detail how he/she gained entry to the field and his/her relationship with the participants. The aim here is to identify the possible influence the researcher’s physical presence may have on the behaviours observed. Therefore many ethnographic texts describe the researcher as complete participant, participant observer or complete observer. (Hammersley and Atkinson, 1995; Taylor, 2002)

In relation to this project, rather than describing my place in terms of a concrete and static position within the field I agree with Hammersley and Atkinsons’ assertion (1995, p.125) that “everyone is a participant observer, acquiring knowledge about the social world in the course of participating in it”. The various phases of this study resulted in different levels of contact with the participants in each phase. However, even in relation to the surgeon survey phase of the study that involved a postal questionnaire and no direct visible contact with the respondents, I became a participant in the world of those surveyed through the questions posed on the survey. I gained knowledge about their world through reading and analysing their responses. Similarly, during the other phases of the study I influenced the world of the participants and involvement in their world influenced me. It was this element of participation that I sought and that made ethnography an appropriate methodological approach for this project. As an ICP I was intimately familiar with the infection control program, its underpinning assumptions and the strategies and activities derived from them. From my perspective as an ICP everything was in place to ensure
excellence in infection control practice however, through the data derived from surveillance activities I knew that best practice was not always achieved. As a researcher I wanted to understand why and I believed that an understanding of the culture that exists within the clinical context would provide a different perspective: the clinician’s perspective.

3.2.1 Research Approaches in Infection Control

Ethnography is a relatively novel approach to research into infection control practice although it has been widely used in health and nursing research. (Rudge, 1996; Taylor, 2002) The only work reported in the literature specifically linking ethnography with infection control in Australia to date, was undertaken by Gardner (1996 and 1997) and Gardner and Cooke (2004), who explored healthcare-associated infection from the perspective of the patient, specifically patients’ experiences of healthcare-associated wound infection. This work provides unique insight into the devastating social, economic and psychological and emotional consequences of wound infection from the patient’s perspective.

The epidemiologic methods usually employed in infection control research, although providing useful information, leave the researcher in the position of outsider measuring clinical outcomes and clinicians’ performance against the infection control principles, quantifying failures and breaches in terms of infection rates and levels of adherence. The application of ethnographic methods in this project took the researcher into the world of the clinicians and provided the opportunity to discover what else is happening when infection control practice is not exemplary. This new understanding of the clinician’s perspective of infection control practice gained within the milieu
they inhabit provided contextualised data. Observing their clinical practice and interactions as they occurred amongst the other cultural elements they shared such as language, knowledge, clinical practice, patient care and physical environment demonstrated how and where infection control practice “fits” within the clinical context and how it is influenced by clinical culture. This is congruent with Hammersley and Atkinson’s (1995, p.9) assertion that the “value of ethnography…is founded upon the existence of…variations in cultural patterns across and within societies and their significance for understanding of social processes”. Wolcott’s suggestion (1990, p.64) that the ethnographer “explore the ways a cultural ethos is reflected in selected aspects of everyday life and focus on particular behaviours in particular settings rather than attempts the portrayal of a whole cultural system” provides further support for this approach. It is this notion of exploring the influence of the clinical culture on infection control practice that is critical in setting this project apart from previous infection control research initiatives.

The data collected through participant observation over an extended period of time allowed me to gradually become part of the research context, experience increasing acceptance by the participants and develop an understanding of the cultural meanings associated with certain sounds, sights, places and relationships. Over time the cultural nuances expressed through language, tone, movement and gesture became apparent. The conversations, actions and activities of the participants were documented either during or immediately following each interval of participant observation and I reflected on what I had seen and heard, remaining sensitive to the data and checking assumptions against the data collected through observation and during formal and informal interviews. (Hammersley and Atkinson 1995; Taylor, 2002) Hammersley
and Atkinson (1995, p.9) refer to Schutz’s description of the immigrant’s arrival in a new country and how for sometime following his/her arrival things s/he thought about the new society may prove to be only partially accurate or possibly even inaccurate. This was my experience throughout the project.

As infection control principles are informed by the findings of positivist research, the tendency has been to apply positivist principles in response to any infection control challenge. Thus to date infection control research activities have focused on quantifying the incidence of a phenomenon or evaluating the effectiveness of an intervention. These initiatives have yielded important information but have been less effective in identifying strategies that result in sustained improvement in infection control practice.

The need to develop new approaches specifically related to behaviour and infection control practice if sustained practice change is to be achieved, has been recognised by the infection control community. (Larson and Olmstead 2001; Pittet, 2004). Lovett and Massanari (1999) identified the limitations of surveillance and data feedback strategies and identified the need for cultural change to improve care outcomes.

This call for cultural change in healthcare is congruent with the principles of clinical governance, the framework adopted by the National Health Service in the United Kingdom to address adverse events including nosocomial infection. The clinical governance literature consistently refers to the need for cultural change in order to address adverse events and ensure positive health outcomes (Onion, 2000; Wilkinson et al, 2004.) Masterton and Teare (2001) argued that infection control must be
everybody’s business. This change in the way we think about infection control problems requires the support of new knowledge derived from methods of inquiry that will facilitate a more holistic and contextual investigation of the complexities associated with infection control practice. The application of ethnographic methods is congruent with the recognition that the prevailing clinical culture influences infection control practice and its usefulness as a methodological approach in the healthcare setting has been well established through nursing research.

3.2.2 Ethnography and Nursing Research

Ethnography has been used in health research for many years and has been one of the methodologies often chosen for nursing research projects particularly over the past decade. The application of this methodology to a wide range of situations and a diversity of cultural contexts associated with the provision of nursing care is evident in the nursing literature.

Ethnography has been used to identify and describe the cultural aspects of different patient groups and nursing practice contexts. (Barton, 1991; Magilvy and Congdon, 2000; Sterling and Peterson, 2003). It has also been used in nursing research to explore the relationship between the culture and other phenomena associated with particular patient groups such as gender (Thompson, 1991), ethnicity (Rosenbaum, 1991) and the impact of role change within families (Lackey and Gates, 1997). Findings from these studies informed nursing practice in relation to the provision of support and assistance for patients and care-givers.
Researchers have also explored the cultural aspects of various groups of nurses including urban public health nurses. (Schulte, 2000) Davies and Atkinson (1991), explored how student midwives managed the transition from experienced nurse to novice midwife and the coping strategies they adopted. Johnson and Webb (1995) shed light on the judgmental nature of the nursing process in a specific clinical setting and Gibb and O’Brien (1990) explored the impact of different conversation styles between nurses and elderly residents during morning care activities and discussed the implications for nursing practice. These studies are but a few examples drawn from the nursing literature demonstrating the widespread application of ethnographic methods in nursing research. In all these examples, the authors cite the depth of information garnered and the contextualised view of the participants’ experience in all the diversity of their settings. Hence ethnographic research can play an important role in building knowledge and can inform practice across a range of contexts.

3.3 Research Process

This research project was somewhat evolutionary in that the data collected in the Intensive Care Unit demonstrated the influence of the physical environment on infection control practice and the need to collect data in a different clinical context in order to gain a deeper understanding of the issue became apparent. This evolution of study design is congruent with ethnographic methods and demonstrates my responsiveness to the data and my desire to understand the influence of all aspects of clinical culture. Each new insight drew the researcher further and further into the world of the participants as my understanding of the clinicians’ perspective of infection control practice developed.
The study commenced with a critical evaluation of the value of infection control surveillance activities and examined the assumption that decreased infection rates results from feedback of infection rate data to clinicians. This investigation was informed by the premise that the ability of infection rate data to influence clinicians’ practice is dependent on their confidence in its accuracy and its usefulness as a basis for clinical decision-making. A further premise was that the need for practice change was dependent on the clinicians’ ability to recognize aberrant or excessive infection rates. Investigation of this assumption was undertaken via a postal survey of surgeons throughout Queensland.

The influence of infection rate data on surgical nurses was also considered, recognising that nurses would have to be willing to recognize the data as an indicator of the care provided and accept that they could influence those infection rates if feedback of infection rate data was to result in changes to nursing practice. They would also need to be able to recognize excessively high infection rates and be willing and able to initiate practice change. Factors influencing awareness and ownership of infection rate data amongst nurses were investigated through a quality improvement activity that tested a supported transfer of responsibility for collection, collation and reporting infection rate data to nurses on an orthopaedic unit. The nurses’ participation in this quality activity will provide opportunities to identify factors that influence how and to what degree infection rate data inform clinical practice.

Investigation of the role of control activities such as education, policy development and engineering controls was undertaken through a clinical ethnography conducted in the Intensive Care Unit (ICU). Triangulation of the ICU data was required so I
collected data in another closed clinical context, the operating theatre complex. This phase of the project involved closer and more prolonged contact with the participants than that undertaken in previous phases. Therefore the data derived from this phase of the project provided a more in-depth examination of the topic.

3.3.1 Ethics

Ethics approval for the survey was provided by the University Committee for Ethics in Human Research and the Ethics Committee responsible for the clinical facility where phase two and phase three of the study were conducted.

3.4 Methods

This ethnographic study was conducted in three phases. Recruitment processes for each phase are described in the manuscripts/published papers (Chapters Four, Five, Six and Seven). The specific methods used to investigate the assumptions that underpin contemporary infection control programs are discussed below. Figure 1 links the focus of the research with the research questions.

Figure 1 depicts the components of the infection control program and the assumptions that drive them and illustrates the relationship of the research questions to practice outcomes. The overarching nature of the hospital infection control program comprising a combination of surveillance and control activities seeks to ensure best infection control practice at the clinical level. The activities are based on two assumptions: first that feedback of infection rate data to clinicians will result in decreased infection rates and second, that control activities will ensure excellence is consistently demonstrated in infection control practice. The research questions are
depicted as potential barriers, if not addressed, diffusing the influence of the infection control program on clinical practice.

Figure 1: The link between the research questions and assumptions underpinning infection control programs.

**INFECTION CONTROL PROGRAM**

<table>
<thead>
<tr>
<th>Surveillance activities</th>
<th>Control activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumption: Feedback of infection surveillance data to clinicians will result in decreased infection rates.</td>
<td>Educating healthcare workers about infection control practice and supporting the education with policy and engineering controls will ensure consistently appropriate infection control practice.</td>
</tr>
</tbody>
</table>

1. How do surgeons rate the value of infection rate data in terms if usefulness and accuracy?
2. What are acceptable infection rates for “clean” and “contaminated” categories of surgery according to a group of surgeons?
3. Will nurses on a surgical ward develop ownership and awareness of infection rate data when they are involved in the surveillance process?
4. How does the culture of the clinical environment influence infection control practice?
3.4.1 Research Questions

The following research questions guided the project:

1. How do surgeons rate the value of infection rate data in terms of usefulness and accuracy?
2. What are acceptable infection rates for “clean” and “contaminated” categories of surgery according to a group of surgeons?
3. Will nurses on a surgical ward develop ownership and awareness of infection rate data when they are involved in the surveillance process?
4. How does the culture of the clinical environment influence infection control practice?

3.4.2 Surveillance Activities

The association between infection rate data derived from surveillance activities and a reduction in nosocomial infection rates, is reliant on the data exerting an influence on clinicians that results in improved infection control practice. Therefore infection rate data are collected, analysed and disseminated to clinicians. Dissemination of infection rate data to healthcare providers is considered a key factor in reducing infection rates (Haley et al, 1985, Scheckler et al, 1998). Gaynes et al (2001) argued the importance of clinicians perceiving value in the data.

A postal survey of Queensland surgeons was conducted seeking the respondents’ perceptions regarding the accuracy and usefulness of the infection rate data they receive. The postal survey also sought information regarding acceptable infection rates for “clean” and “contaminated” categories of surgery because it is likely that
surgeons will not see the need to change practice if they do not think an infection rate is unacceptably high.

A two-page questionnaire was developed to gather data including demographic information. Respondents were asked to rate the infection rate data they received in terms of its usefulness and accuracy using visual analogue scales. They were also asked to nominate what they considered to be acceptable rates of infection for “clean” and “contaminated” categories of surgery respectively. They were asked how the usefulness and accuracy of infection rate data could be improved.

Once developed, the questionnaire was sent to three experienced and qualified ICPs who checked the instrument for face and content validity through review. The instrument was then pilot-tested with a sample of 12 surgeons at a major metropolitan hospital in another Australian State. Minor adjustments were made to the language of some items in response to their feedback. A copy of the instrument is included (Appendix V).

Initially attempts were made to obtain access to Queensland members of the Royal Australasian College of Surgeons (RACS) which had approximately 700 members in 2000 (personal communication with RACS representative: 18/6/2002). However requests for support from the RACSQ were denied.

A medical colleague provided assistance in accessing a sampling frame for the study drawn from members of the Queensland branch of the Australian Medical Association (AMAQ) identifying as surgeons. The AMAQ membership directory (2002) listed
510 members identifying as practicing surgeons. A questionnaire was posted to each of these members in August 2002 with a covering letter (Appendices V, VI) explaining the purpose of the survey and requesting their participation. A reply-paid, pre-addressed envelope was provided to facilitate return of the completed questionnaire. As the survey form comprised only two pages, a short response time of two weeks was allowed.

Two weeks after the original survey forms were mailed out, a reminder letter was sent to all the surgeons on the database. The letter thanked those who had already responded and served to remind those who hadn’t responded to do so. Consent to participate in the project was demonstrated by return of the completed questionnaire. The questionnaire did not enable identification of the respondent.

Responses were coded numerically and analysed using the Statistical Package for the Social Sciences (SPSS) computer software (version 10: SPSS Inc., Chicago, IL). Responses to open-ended questions were coded according to themes. Descriptive statistics were applied to the data to determine frequencies, means and standard deviations. A Spearman Rank correlation was performed on the accuracy and the usefulness rating scales data.

According to Smyth and Emmerson (2000) total staff involvement in surveillance initiatives is required in order to establish clinician ownership of the surveillance program. A total quality improvement framework was used to test the usefulness of a supported transfer of responsibility for the collection, collation and reporting of surgical site infection rate data to nurses working in an orthopaedic unit. Issues
relating to nurses developing ownership and awareness of infection rate data were investigated through their involvement in the surveillance process.

Nursing staff members working on the orthopaedic unit in a large regional acute-care facility in Queensland agreed to assume responsibility for collecting surgical site infection data relating to patients on their unit. The University Committee on Ethics in Human Research and the District Health Service Ethics Committee responsible for the study site granted ethics approval for the project. Consent was obtained from the participants. A copy of the consent form is included (Appendix VII). Data relating to the project were stored in a password-protected Microsoft Word file according to National Health and Medical Research Council ethics guidelines.

The nurses used standardised forms for data collection. Information collected on the forms comprised patient demographic data, admission, surgical procedure and discharge dates. The operative procedure was also recorded along with the name of the surgeon and information regarding any antibiotics administered peri-operatively. Finally, space was provided on the forms for comments regarding post-operative wound observations until discharge. A copy of the data collection form is included (Appendix VI). The privacy of the participants was protected through the use of pseudonyms.

The Nurse Unit Manager (NUM) assumed responsibility for collating and analysing the data each month to calculate infection rates. Where data were inconclusive, absent or a wound infection was identified, the NUM reviewed the patient’s medical record to identify any hospital readmission or diagnosis of infection through attendance at
the outpatient clinics. Medical record review also facilitated identification of any factors that may have contributed to infection such as co-morbidities.

The method and frequency of data reporting was left to the discretion of the nursing staff members.

The researcher, known to the participants in her role as infection control practitioner, was responsible for providing data collection forms and providing support for all phases of the activity as required. The interactions associated with this support provided opportunities for participation observation and investigation of the relationship between the nursing staff and the surveillance data.

The quality activity was conducted in a 30 bed orthopaedic unit in a large (500 bed), regional, publicly funded, acute-care health facility in Queensland, Australia. While patients both with and without private medical insurance are admitted to the unit the majority of patients are publicly funded.

The unit is staffed by nurses, medical staff, allied health staff such as physiotherapists, social workers, occupational therapists and support staff including porters, cleaners and a ward clerk.

The nursing staff members on the orthopaedic unit were the participants. They comprised the Nurse Unit Manager (NUM), Clinical Nurses (CNs), Registered Nurses (RNs), and Enrolled Nurses (ENs).
Observational qualitative data were collected rather than numerical data because the study sought to investigate the factors that influence clinicians’ ownership of surgical site infection rates as an outcome indicator of the care provided. Data were collected through participant observation and records of informal meetings and interviews over a period of one year. Field notes were written immediately following each meeting between the researcher and the nursing staff.

Data were analysed by grouping passages of text together according to subject matter. The text was then coded into categories of meaning according to the primary idea conveyed in each sentence. Inductive analysis of these coded data was undertaken to evaluate its meaning in terms of data ownership, data awareness and ownership of the surveillance process. Findings from this study identified a number of factors that influence nurses’ ownership and awareness of infection rate data. These findings will inform various aspects of the infection surveillance process.

3.4.3 Control Activities

A clinical ethnography was conducted to gain insights into the practice of infection control within the context of two clinical settings. The assumption that infection control education supported by policy and engineering controls will result in good infection control practice within the clinical setting was investigated, in terms of the influence of clinical culture on infection control practice.

The study was conducted in the intensive care unit (ICU) and the operating theatre complex within a large, acute-care, public healthcare facility in Queensland. All staff members comprising nurses, medical officers, allied health and support staff within
the ICU and the operating theatre complex were involved during participant observation. Key informants were identified during participant observation and approached to participate in interviews. In-depth interviews were conducted with nurses, medical officers and allied health staff members. The University Ethics Committee on Human Research and the District Ethics Committee responsible for the study site granted ethics approval for the study. Consent was obtained from participants. A copy of the consent form is included (Appendix VIII).

Overt participant observation was conducted in the ICU across all shifts and on different days including weekends over a 12 month period from October 2000 until September 2001. Field notes were written during the observation period and immediately thereafter. Overt participation was also undertaken in the operating theatre complex over a one-month period in March 2001, and included all shifts. Semi-structured interviews with key informants were audio-recorded. Field notes and interview transcripts were stored into a password-protected Microsoft Word file. Participants’ privacy was protected through the use of pseudonyms.

The researcher was also known to the participants in her role as infection control practitioner within the study site. Thus while my presence in the field, especially ICU, was not uncommon, it was likely to have influenced the participants’ behaviour by increasing their awareness of infection control practice issues.

The field notes were transcribed and passages of text were grouped together according to subject matter. Inductive analysis of these coded data was undertaken. The broad themes that emerged from the coding process were used to inform questioning in the key informant interviews. Deductive analysis was used to code the interview
transcripts thereby achieving the first level of analysis. These themes were then collapsed into conceptual entities, an analytical process that identified two dimensions of cultural influence on infection control practice: the spatial dimension and the practice dimension. Each dimension had two categories of meaning which in turn are defined through a number of storylines. Findings from this study have identified a number of factors within the clinical environment that influence infection control practice that are not addressed by the control activities that comprise infection control programs.

3.6 Conclusion
This chapter has provided an overview of the methodology and research process used throughout the project. It was designed to assist the reader in linking the information presented in the manuscripts/published papers presented in Chapters Four, Five, Six and Seven in terms of how they fit together and provide a comprehensive investigation of contemporary hospital infection control programs. It has also discussed traditional research approaches to infection control and their limitations and the rationale for taking an ethnographic approach to this topic.
‘Surgeons’ perspectives on surgical wound infection rate data in Queensland, Australia’ American Journal of Infection Control, 33, 97-103.
This journal is not available online. Please consult the hardcopy thesis available from the QUT Library.
Chapter Five

PUBLICATION 2: TESTING A SUPPORTED TRANSFER OF RESPONSIBILITY FOR INFECTION SURVEILLANCE USING A TOTAL QUALITY IMPROVEMENT FRAMEWORK.

Publication Status: Accepted for publication

(see Appendix IX)

This journal is not available online. Please consult the hardcopy thesis available from the QUT Library.
Chapter Six

PUBLICATION 3: SILENT PRACTICES: IMPERATIVES OF A CULTURE OF URGENCY.

Publication Status: Published

Introduction
This chapter consists of a manuscript reporting on one aspect of the clinical culture that influences infection control practice unaltered from the version in which it was submitted for publication. The chapter reports some of the preliminary findings of phase two of the research project and provides a discussion of the background, method and discusses the findings and their implications for practice.

Contribution of authors
This manuscript presents the preliminary findings of an ethnographic study conducted by D. Macbeth under the supervision of G. Gardner. The manuscript was written by D. Macbeth. G. Gardner critically reviewed the document and her comments were considered and incorporated as appropriate by D. Macbeth prior to the final submission of the manuscript.
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Abstract
Despite advances in both technology and the delivery of health care services, healthcare-associated infection (HAI) continues to exact a significant cost from both the patient and the health care provider. Studies monitoring practice and investigating outbreaks of HAI indicate that many of these infections are preventable if clinicians comply with basic infection control principles. Success in improving infection control practice has to date, been poor.

This study sought to identify the impact of the clinical culture of the intensive care unit (ICU) on infection control practice. A clinical ethnography was undertaken at a large regional acute care facility. Data were collected through participant observation and individual interviews.

This paper reports a part of the findings specifically, an issue conceptualised as silent practices. These are constructions that reflect imperatives of the intensive care environment and how these interact with infection control practice. The findings reported here confirm that, in the ICU, environmental dynamics construct imperatives and priorities that have a negative impact on infection control practice.

6.1 Introduction
The contemporary healthcare environment reflects rapid changes in the delivery of health care. With the advent of technology, the widespread use of antibiotics and other chemotherapeutic agents, and advances in surgical techniques, the face of health care has changed.
These changes, as well as initiatives such as early discharge, day of surgery admission for elective surgery cases and services that facilitate care provision in the patient’s home, have resulted in an inpatient population with higher acuity in general. However, despite shorter hospital stays, the demand for hospital beds remains high. Therefore any complication that results in an increase in the patient’s length of stay adds to the burden of a health care system already stretched. One such complication is health care associated infection (HAI).

Health care associated infection is a significant problem faced by health care facilities around the world. For the patient it can result in increased hospitalisation, slower recovery and delayed return to the workforce. At times HAI may result in the patient’s death. In addition, it increases the cost of medical care, increases the length of surgery waiting lists and can result in litigation for the health care service provider or facility. Therefore, no matter your perspective, HAI is an undesirable and costly outcome of health care provision (Wong, 1999; Mahieu et al, 2001; Nichols, 2001; Plowman et al, 2001).

Based on principles identified by Semmelweis, Lister and Nightingale (Lee and Bishop, 1997), strategies to reduce HAI have been developed over the decades. These principles - handwashing, antisepsis and environmental hygiene - are now embodied in standards, policies, and guidelines. Nevertheless, although the effectiveness of these principles in preventing infection is accepted, HAI continues to occur due, for the most part, to the failure of health care workers to comply with these principles (Dorsey et al, 1996; Connolly, 1998; Arenas-Jiminez et al, 1999; Harbath et al, 1999).
The problem is best stated by Dixon who said: “We do not need to ask what shall we do? That we largely know. Instead, we need to ask: Knowing what needs to be done, how can we assure that it is done?” (1991, p. 7S) Strategies to improve infection control practice over the years while varied, generally focus on one or more of the following approaches: surveillance, education, and engineering controls. However, as Kretzer and Larson report, “No single intervention has been successful in improving and sustaining such infection control practices as universal precautions and handwashing by healthcare professionals” (1998, p.245).

Failure to improve practice, combined with the increasing antibiotic resistance developing amongst common pathogens has, at times, resulted in HAI caused by organisms so resistant that clinicians are left with few, if any, treatment options. Thus prevention remains the best cure (Cohen and Tartasky, 1997).

At a minimum, health care workers are educated regarding infection control principles, their application and efficacy during orientation to the healthcare organisation and during regular inservice sessions. Ongoing surveillance initiatives are a key component of modern infection control programs. Such initiatives facilitate the identification of outbreaks of infection and allow feedback of infection rate data to the clinicians providing care as well as assisting the identification and refinement of education needs. Some of the engineering controls used to improve infection control practice and reduce cross-infection include reducing the number of beds in each room, convenient placement of handbasins and the implementation of alcohol-based hand-rubs.
It is therefore difficult to understand why the integration of basic infection control principles into clinical practice remains so poor. Clearly, the failure of the above-mentioned strategies to improve infection control practice indicates that knowledge, ability and feedback regarding patient outcomes are not the only factors necessary.

This project was designed to examine the role of culture in infection control practice. In this project the term ‘culture’ refers to the similarities and differences between people in the same clinical setting, the norms and values they share and the meanings they attribute to the concept of infection control practice. Specifically, how the practice of infection control ‘fits’ within the clinical context of the ICU is considered.

6.2 Method

This project was guided by the following research question: How does the culture of the clinical environment influence infection control practice? A clinical ethnography was the method chosen to investigate the role of the clinical culture in infection control practice within the ICU. Ethnography requires the researcher to immerse him/herself in the culture he/she is studying. According to Rice and Ezzy (1999, p.165), ethnography requires that the researcher learn from the informants. In this study, the informants teach the researcher about infection control practice as it applies to them in their world.

6.2.1 Principal Researcher

As the principal researcher, I am an experienced and credentialled infection control practitioner and in the course of this project I did not set aside my infection control knowledge but rather sought to develop and understand infection control from the
perspective of the informants. This is significantly different to methodological approaches previously used to quantify and explain poor infection control practice.

As Van Maanen (1988, p. ix) asserts, ethnography is the “peculiar practice of representing the social reality of others through the analysis of one’s own experience in the world of these others”. Hammersley and Atkinson (1995, p. 6) agree, summarising the two distinctive characteristics of ethnography as being “first, that it focuses on understanding the perspective of the people under study. Second, ethnography observes their activity in everyday life, rather than relying on experimental simulations, or personal accounts of this behaviour”. The use of ethnographic methods, especially participant observation, allowed the researcher to identify the imperatives of the intensive care environment and how they interact with infection control practice. Data collection commenced once approval was obtained from the two relevant ethics committees.

6.2.2 Data Collection

The combination of data sources, collection and validation methods including, participant observation, individual interviews and member checking, allowed triangulation. In other words, the results of each method were used to test the validity of the information gathered (Hammersley and Atkinson, 1995; Holloway and Wheeler, 1996). Data collection methods are discussed below.

Participant observation

Participant observation involved the researcher being physically present in the ICU, collecting data in the form of field notes whilst inhabiting the context familiar to the
informants. Observation was conducted across all shifts and on different days including weekends from October 2000 to March 2001, thus ensuring the data gathered were truly representative of the activity within the unit. All aspects of activity within the unit were documented including the physical environment, the number and category of staff, the time and day the observation was conducted and conversations, actions, and demeanour conveyed through body language and tone. In addition, the field notes contain the ethnographer’s interpretation and perceptions of what is seen and heard.

As Rice and Ezzy (1999, p.163) explain:

‘Fieldnotes contain not only a passive account of the facts of an event, but also the active process of sense-making, of the ethnographer’s feelings and interpretations of what they see and experience during the participant observation. This will guide them to enquire further, hence obtaining more in-depth understanding of the community group.’

Participant observation was overtly conducted with the researcher sitting at either a desk or bench in the ICU documenting conversations and actions. Immediately following the period of observation, additional information was added to the field notes including the researcher’s perceptions and questions.

Interviews

Key informants identified during the participant observation phase were approached and, once they had consented, were interviewed. A range of staff members were interviewed including medical officers, allied health staff and nurses. Once again the
choice of informants from a variety of disciplines was designed to ensure comprehensive representation across the health care team within the unit.

Individual interviews were tape-recorded on a one-on-one basis. The face-to-face, in-depth interviews were unstructured. Informants were asked an opening question regarding their perceptions about the priority given to infection control in clinical practice within the ICU; the influence of the amount of clinical experience on infection control practice; and what may contribute to poor practice. The open-ended nature of the questions had the effect of opening the dialogue between interviewer and interviewee with the answer to the first question determining the direction of the dialogue. Thus as Fontana and Frey (Denzin and Lincoln [eds], 1994, p. 366) identify, the use of unstructured interviews such as these is “an attempt to understand the complex behaviour of members of society without imposing any a priori categorization that may limit the field of inquiry”.

*Feedback*

Themes identified from the data collected through participant observation and interviews were presented to a group of ICU nurses at a workshop. The nurses work together and are therefore familiar with each other. Their well-established relationships facilitated frank discussion of the themes presented. The discussion allowed refinement of the themes and ensured rigour.

*6.2.3 Analysis*

The field notes and interviews were transcribed into a password protected Word file. Analysis involved coding the text under broad headings that embodied recurring
themes. On completion of coding, the themes were collated and analytical dimensions were identified.

The culture of the ICU is identified in the nexus formed by the following three dimensions: clinical practice, interpersonal interactions and environmental context. Each of these dimensions individually and in combination, influences infection control practice.

6.3 Findings

The findings from this study are extensive and complex. This paper will report on one small section of these findings, a theme identified as silent practices. The concept of silent practices refers to the practice imperatives imposed by specific aspects of the ICU culture. These include the need to investigate the cause of alarms and take action to ensure patient safety as well as the clinician’s need to demonstrate clinical competence to colleagues and peers, reassure visitors and maintain one’s own sense of professional self-esteem.

These imperatives determine practice priorities and consequently displace infection control as a priority, leading to poor practice. The resultant poor practice has potentially insidious outcomes and yet goes unnoticed and unremarked. The immediacy of the action and the level of attention concerned with silencing alarms are in stark contrast with the silence surrounding poor infection control practice. Consistent with the standard in qualitative research reporting results and discussion will be presented simultaneously.
6.3.1 Silent Practices

Data analysis revealed that the cultural dictates of the ICU assert a necessity for clinicians to silence alarms associated with the medical technology, thus contributing to a culture of urgency. In turn the culture of urgency displaces the importance of infection control issues. Additionally, the technological imperative caused by the strident nature of the alarms draws the attention of the clinicians and distracts them from infection control practice. Thus the practices slip silently by unnoticed and, because the symptoms associated with any resultant cross-infection do not appear for some hours or even days afterwards, the infection is not linked to the incident or the clinician and no-one can be held accountable.

Clinicians working in the context of the ICU are required to provide complex health care to critically ill patients who may present with a variety of conditions. The ICU clinician must react and respond to multiple stimuli in order to meet the challenges associated with patient care within this dynamic, technology driven environment.

6.3.2 Technology

Medical technology including ventilators, cardiac monitors, and intravenous (IV) infusion pumps form a large part of the landscape that is the environmental context of the ICU. These items of medical equipment stand like sentinels around the patient. They support the patient’s airway, deliver fluid and nutrition and maintain and electronically monitor and measure the patient’s vital signs. The following field notes provide an example of the technological nature of the ICU landscape.
Alf (patient) is being dialysed. There are seven, five litre bags of fluid associated with his dialysis alone. In addition, around the bed is the ventilator, the ventilator circuit, IV poles associated with the fluid and parenteral nutrition that is being delivered via a central venous catheter; an IV infusion pump and the dialysis machine.

Given technology’s prominent place within the environmental context of the ICU, it is not surprising that managing the technology is also a dominant feature of the clinical practice within the unit. To the novice clinician, the medical equipment represents challenges to be met, skills and knowledge to be acquired and competence demonstrated. These demands determine the focus of the clinician as they provide care, thus displacing the infection control issues that should be an integral component of care provision. An excerpt from the interview with Mardi, a senior and experienced ICU nurse illustrates this challenge.

*Mardi: When beginning practitioners and novices come into ICUs it’s very skill oriented. You know there’s a national shortage of ICU nurses and all you can attract now is novices and beginning practitioners and you are skilling them up to look after the patient and the skill is how to look after the central line, how to look after the ventilator, how to look after the arterial line...It’s like the patient is broken down into these bits and at the bottom of the bits is washing your hands.*

The debate regarding the role of technology in health care, at least in nursing, has focused on whether technology has depersonalised and dehumanised the provision of health care services. Some nursing scholars have argued that technology is at odds
with the provision of nursing care which is based on notions of caring, nurturing and touch (Fox et al, 1990; Manias and Street, 2000). In other words, the personal nature of care provision is interrupted by the technology so that care is provided through the intermediary of the medical equipment, distancing the clinician from the patient. Clinicians become technicians rather than care providers.

More recently though, Barnard and Sandelowski (2001, p. 371-2) have argued that the two concepts are not mutually exclusive. They argue that nurses have identified themselves “as the bridge spanning the divide between technology and humane health care thereby claiming professional ownership of the space between technology and patient and the responsibility for maintaining humane care in technological environments”. Therefore according to them, rather than allowing the technology to distance them from the patient, nurses have placed themselves between the technology and the patient, ensuring that the information provided by the technology is used to enhance the care delivered by their hands. To date, the impact of technology on infection control practice has not been discussed, however, the findings of this study identify some of the tensions that exist between the two.

While the technologies are useful and necessary tools for the clinician, they have the power to demand action, drawing the clinician’s attention by means of lighted screens, coloured moving lines and a variety of alarms. The alarms are strident and designed to alert the clinician to a problem or abnormal reading. When an alarm sounds in the ICU, especially a ventilator alarm, the clinician caring for the patient connected to that ventilator is singled out. The alarm draws attention to that particular area and the longer the alarm continues unchecked, the more attention is focused on
the clinician, placing the clinician’s performance under review. The clinician is placed under pressure because this technological imperative demands a demonstration of competence and establishes a culture of urgency. This is illustrated by the following excerpt from an interview with Noelle, an ICU nurse.

Noelle: You know everything in ICU has an alarm system to it. Either the ventilator alarms or the monitor alarms, you know something’s always alarming and the real focus is to identify what the cause of the alarm is and get it off.

For the visitor and patient (if conscious) the technologies reaffirm life and the alarms may represent a physical crisis. Apart from the imperative to ensure the patient’s safety, clinicians appear to be influenced by the need to reduce the visitors’ anxiety evoked by the alarms. Therefore silencing the alarm is not only a visible demonstration to peers and colleagues of the clinician’s ability to care for the patient and an expression of concern for the relatives and visitors, it also reassures the clinician about his/her own clinical competence. As the clinician reaches to silence the alarm he/she is also seeking to diagnose the cause of the alarm and is often already taking action to control the symptom that triggered the alarm, thus ensuring the patient’s safety. At the same time, the clinician’s action serves to reassure relatives and visitors that everything is under control, the patient is receiving competent and professional care and there is no danger. The crisis passes and order is restored.
In the field notes below Peter and Joan (visitors) demonstrate the anxiety they experience when an alarm sounds while another set of visitors, Ely and James, appear reassured by the technological competence implied in the nurses’ conversation.

_Peter and Joan (visitors) appear wary of the machines that support the patient’s life, starting at every alarm and anxiously scanning the nurse’s face seeking reassurance that the alarm does not mean the patient is dying._

_Ely and James (visitors) listen to the conversation between Helen and Georgie (nurses) regarding ventilation. The discussion is very technical covering issues such as inspiratory pressure. The visitors seem enthralled with the conversation and the nurses seem to be aware of the impression they are making on the visitors._

6.3.3 _Peer Pressure_

The clinician’s need to demonstrate his/her competence to peers and colleagues also drives the culture of urgency. The open nature of the ICU environment places the clinicians on view, making their performance very public. Therefore the clinician is under pressure to appear in control and unflustered, shouldering the responsibility for the care they provide without having to add to the burden of other members of the multi-disciplinary team. Consideration of other team members as a motivating factor for silencing the alarms is expressed in the following interviews with Noelle and Deann, ICU nurses.

_Noelle: When it (the alarm) would go off…the quicker you could identify it and get it off and stop bothering everyone else around you was a major feat._
Deann: It (the silence button) is the first button anybody learns on the ventilator because it’s noisy, people don’t like it so you’ve got to know where that one is.

Demonstrations of competence inspire confidence and result in approval from colleagues as well as enhancing the clinician’s self-esteem. The less supervision and assistance required by the individual clinician, the greater their value to the team, and those who demonstrate the ability to problem-solve and manage the technology are ascribed additional status. Therefore novice clinicians quickly learn that increasing their knowledge and skill will assist them to increase their status amongst the group.

The desire to demonstrate proficiency using medical technology is not limited to the ICU context as Barnard and Sandelowski point out, (2001, p. 372) nursing has “turned to technology to advance our profession”. Thus for nurses, the ability to manage technology provides a visible demonstration to those outside the profession that they possess specialised knowledge and skills. In the ICU this is especially evident and, apart from the convenience and assistance to clinical practice, is one of the reasons for technology’s value to clinicians. In contrast, the excerpts from the ICU nurse’s interview below indicate that knowledge and skill in relation to basic infection control principles is not valued by the group, rather it is considered almost ‘commonsense’.

Noelle: …if you are seen as someone who can trouble-shoot and manage the technology, you’re seen as someone to aspire to rather than if you’re someone who can use the best aseptic technique. No one wants to aspire to that.
My focus was to get the alarm off and identify what the problem is and think about infection control things afterwards when everything has simmered down and the patient is quiet and the heart rate is normal and the ventilator is back within normal range and all that sort of stuff.

The field notes from participant observation indicate the clinicians’ propensity for contaminating the immediate environment. This was most often achieved by handling environmental surfaces and equipment with gloves contaminated with body fluids following contact with the patient. Most of the infection control breaches occurred when one of the items of medical equipment such as the ventilator alarmed while the clinician was engaged in a patient procedure and therefore wearing disposable gloves. Almost without exception the clinician would respond immediately to the alarm and turn it off, thus contaminating the equipment.

As Noelle identified, the clinician’s focus is to identify the cause of the alarm and deal with it so the alarm is silenced. The clinician does not even consider whether the gloves he/she wears are contaminated or even that he/she is wearing gloves. The sole aim is to silence the alarm and restore order, thus demonstrating clinical competence. This is the outcome expected by everyone else in the vicinity as well, so no-one notices the poor infection control practice. Unlike the alarms signalling a change in the patient’s blood pressure or an interrupted ventilator circuit, there is no audible or visual cue indicating poor infection control practice.

Compounding this is the fact that any resultant cross-infection will not be evident for some time, so that the connection between the poor practice and the infection is never
made and the individual’s reputation for clinical competence remains intact, reinforcing the behaviour.

Clinicians process the alarm as a signal that the patient’s safety may be compromised. They acknowledge, when asked, that breaches in infection control practice also pose a risk to patient safety; however, observation indicates that this knowledge is not carried through into practice. Excerpts from interviews with nursing, medical and allied health staff demonstrate how priorities are determined in the clinical environment and how risk is perceived. Noelle identifies the contrast between the immediate response to visible and audible cues associated with technology and the lack of response in the absence of cues associated with poor infection control practice. If the clinician does not respond quickly when an alarm sounds, other clinicians will investigate and take action because they too are aware that there is a potential problem. In contrast, poor infection control practice tends to go unnoticed.

Noelle (Nurse): You know it’s very important to have a quiet patient, have a quiet alarm system and to be seen to be in control and not flustered are very important issues and if you can do that... for eight hours, you know people will think you are fantastic!

Deann (Nurse): Like I feel that it’s more important that they (the patient) maintain their airway than whether I’ve washed my hands.

Chris (Physiotherapist): You have a perceived risk, so if someone’s trachy (sic) tube’s come off a ventilator and you don’t want to go and pull your
gloves on and wash your hands, you just want to slip the thing on, so it’s a perceived risk. What’s more important them getting a little bit of an infection, or their not being able to breathe?

Noelle (Nurse): You don’t see what washing your hands does so by the time the consequence has happened, they (patients) have left ICU. Whereas if someone loses their ET (endotracheal) tube, you know straight away that’s happened. You know you can’t see bacteria, you can’t see the direct link with infection.

Bruce (Medical Officer): I was bronch-ing someone and the ventilator alarmed, I reached over and touched the ventilator. It’s not something I would have thought of, it was just one of those, you know, I’ve used it as a fomite, I’ve used it as a transmitter.

As the above data demonstrate, maintaining control of the situation in a calm, confident manner is highly regarded by clinicians who perceive themselves to be constantly working on the threshold of an emergency heralded by the alarms. The focus is to silence the alarm to ensure the patient’ immediate safety, maintain one’s own professional confidence and not irritate or inconvenience clinical colleagues.

The findings of this study indicate that if this is achieved, the clinician is accepted and admired by colleagues, patients and visitors alike and the infection control issues are considered to be of secondary importance, something to be dealt with once the crisis has past. Poor infection control practice is not recognised and therefore goes unchallenged, never linked to the cross-infection that results. The perception that
infection is not necessarily life threatening is one explanation for the discrepancy between the value ascribed to managing the technology as opposed to that ascribed to infection control knowledge and skill.

6.4 Conclusion

The ICU is a dynamic clinical environment in which clinicians respond to a variety of practice imperatives imposed by the culture of urgency. These practice imperatives include the clinician’s need to provide immediate care to the patient, reassure relatives and visitors of the patient’s safety, demonstrate clinical competence and proficiency, maintain their own sense of self-esteem and professionalism and be considered a valued member of the team. These practice imperatives determine practice priorities and, in this culture of urgency, the importance of prioritising infection control practice is displaced.

Acceptance by the other members of the ICU team is conveyed explicitly through greater autonomy in practice, and therefore the need for less intervention and assistance from other members of the team. It is conferred on the basis of the clinician’s demonstrated conformity with the beliefs and behaviours shared by the other members of the group and this is communicated tacitly. Such beliefs and behaviours reflect the shared values (culture) of the group.

When asked, clinicians state that they believe infection control is a necessary and integral component of their practice. However, participant observation and interview data indicate that, while poor infection control practice occurs, it generally goes unnoticed and without remark. The environmental dynamics that construct
imperatives and dictate priorities must be surfaced and challenged in order to make visible those processes that negatively influence infection control practice. The findings reported in this paper demonstrate the value of ethnography as a method of investigating infection control from the perspective of clinicians within the clinical context and raises important infection control practice issues for consideration and debate.
Chapter Seven

PUBLICATION 4: CLINICAL GEOGRAPHY AND ITS INFLUENCE ON INFECTION CONTROL PRACTICE: AN ETHNOGRAPHY.

Publication Status: Under Review

(see Appendix X)

This journal is not available online. Please consult the hardcopy thesis available from the QUT Library.
Chapter Eight
DISCUSSION OF FINDINGS

8.1 Introduction

Contemporary infection control programs comprise a combination of surveillance and control activities and are based on two assumptions. The first relates to surveillance activities and is reliant on dissemination of surveillance data to clinicians with the expectation that clinicians will respond to the data by changing practice to reduce infection rates. The second assumption relates to control activities and relies on education supported by policies resulting in clinicians consistently applying infection control principles in daily practice. This research project was designed to explore these assumptions.

8.2 Surveillance Activities

Authors such as Lovett and Massanari (1999) have identified that despite the findings of SENIC, surveillance has not been as successful as predicted. The complex nature of the relationship between surveillance activities and care providers is exemplified by the fact that the outcomes of care provided by one group (the clinicians) are evaluated by another group (the infection control practitioners) who are ostensibly removed from the clinical context. Exploration of the assumption that dissemination of surveillance data to clinicians will result in decreased infection rates focused on two discrete studies involving two clinician groups. As surgery was the clinical focus common to both these groups, processes relating to surgical site infection surveillance data were explored.
Surgeons throughout Queensland, Australia were surveyed by means of a postal questionnaire designed to measure beliefs and attitudes about the accuracy and usefulness of infection rate data, and how accuracy and usefulness might be improved. They were also asked to nominate what they considered to be acceptable rates of infection for clean and contaminated categories of surgery respectively.

The second study explored issues relating to nurses’ ownership and awareness of infection rate data within an acute orthopaedic unit in a large regional acute health care facility in Queensland, Australia. A Total Quality Improvement (TQI) framework was used to test the usefulness of a supported transfer of responsibility for collection, collation and reporting surgical site infection data to the nurses responsible for care provision. Observational qualitative data were collected to explore the factors influencing nurses’ ownership and awareness of surgical site infection data. Participant observation undertaken during meetings, informal interviews and ward visits was the means of data collection.

8.2.1 Significance of Findings

Results from both studies identified that infection rate data must be contextualised in order to have meaning for clinicians. Surgeons responding to the postal survey identified the need for some means of benchmarking the data they received to make it meaningful. The finding that more than 30% of respondents were willing to accept infection rates in excess of 10% for “contaminated” surgical procedures reinforces the importance of benchmarking infection rates so that excessive rates can be identified and addressed. The wide variation among surgeon responses regarding acceptable infection rates for both clean and contaminated categories of surgery also
demonstrates the need for benchmarking. Results of the second study also identified the need to contextualise infection rate data. The nurses asked, “how are we doing” and “are these rates normal” demonstrating the importance of a benchmarking process that facilitates comparison of rates and gives meaning to the data. Bradley and co-workers (2004) supported this, finding that benchmarking improves the meaningfulness of data feedback. However, difficulties associated with benchmarking infection rates have been described in the literature (Gaynes, 1997; Campos et al, 2001; Coello et al, 2001; Gaynes, 2001). Such difficulties relate to comparison of infection rates between diverse patient populations and the ability to control for risks associated with co-morbidities, patients’ health status and length of procedure time. These difficulties all add to the complexity of the data-clinician relationship which is also influenced by issues associated with data dissemination.

The association between dissemination of infection rate data to surgeons and a reduction in surgical site infection rates has been supported by number of authors (Haley et al, 1985; van de Mortel et al, 2000; Rosenthal et al, 2003; Rosenthal et al, 2004; Bradley et al, 2004). However, there are a number of factors associated with data dissemination processes that can influence the strength of this connection. The survey of surgeons found that 12% of respondents believed that the usefulness of infection rate data could be improved if the frequency of reports was increased. This finding is supported by Mannion and Goddard (2001) who identified timeliness as a key factor in data dissemination. A further 35.2% of respondents suggested that reports would be more useful if additional information such as types of infection, organism causing infection and its antibiotic sensitivities were included.
Factors associated with data dissemination also influenced the nurses’ awareness and ownership of infection rate data. Comments made by the nurses on the orthopaedic unit identified that infection rate data are poorly disseminated amongst nursing staff. Participants indicated that they did not receive information regarding analysis of the data they collected throughout the project either formally or informally. Further, they were unfamiliar with infection rates from previous surveillance periods. Lack of confidence in relation to calculation of infection rates and application of infection definitions is also likely to have contributed to poor data dissemination amongst nurses. The Nurse Unit Manager always sought verification of any infection she identified and the rates she calculated thereby demonstrating a lack of confidence in her knowledge and understanding of the data and definitions. She actively sought my assistance in data collation and therefore is likely to have doubted her ability to respond to any questions about the data presented to the nurses and other clinicians on her unit. Her concerns regarding her skills in the area of data analysis are not unique. They are supported by the findings of Sullivan and co-workers (2003) who found that Nurse Managers identified data analysis skills amongst their educational needs. Recognition of these needs will assist in designing and implementing data feedback strategies that are meaningful to clinicians and will therefore have maximum impact on clinical outcomes.

An important finding from the study of surgeons was concern regarding standardisation of definitions for surgical site infection. Almost 46% (n=52) of survey respondents identified that accuracy of surgical infection rate data would be affected by the exclusion of infections diagnosed after the patient was discharged from hospital. Further, they were concerned that accuracy may also be affected by the
application of non-standardised definitions if a range of personnel were involved in the diagnosis of surgical site infection. Confidence in the accuracy of infection rate data is important because according to Gaynes et al (2001, p. 297) “patient-care personnel must perceive value in the data; if they do, they will rely on the data for decisions and alter their behaviour in ways that should reduce the incidence of nosocomial infection”. Bradley and co-workers (2004) found that physicians must perceive data as valid in order to motivate change. Post-discharge surgical site surveillance has been advocated by a number of bodies (Mangram et al, 1999; ACHS, 2002) although the ACHS recommends separate reporting of infection rates that include infections diagnosed post-discharge. The reason for this is reflected in the surgeon’s concerns regarding the ability of other clinical staff such as General Medical Practitioners (GPs) and nurses to diagnose wound infection and the surgeons’ recommendation for standardized infection definitions.

A study by Whitby et al (2002) supports these concerns highlighting the differences in infection diagnoses when undertaken by different staff using different review methods. Patients responding to post-discharge postal surveys also demonstrated difficulty recognizing clinical symptoms resulting in an over-estimation of infection incidence (Whitby et al, 2002). This may be a contributing factor in the wide range of surgical site infections (14%-71%) apparently manifesting following discharge (Brown et al, 1987; Reimer et al, 1987; Manian et al, 1990; Delgado-Rodriguez et al, 2001).

Identified in the study of nurses was the difficulty associated with establishing a link between the infection rates and the care provided. A number of the nurses
participating in the orthopaedic unit study made a clear distinction between patient care and surveillance activities and the data they generate, indicating that patient care and surveillance activities placed competing demands on scarce resources. Further, nurses expressed feelings of frustration at the prospect that the product of infection surveillance activities would result in pressure to address any infection issue. This outlook contravenes the philosophy underpinning quality improvement and clinical governance and supports the findings of the study by Bradley et al (2004) that identified the need for data feedback to be “an imbedded part of the process of caring for patients” (p.32).

8.3 Control Activities – Education and Policy Development

The findings of the SENIC project (Haley et al, 1985) demonstrated that surveillance activities were necessary but insufficient to reduce infection rates. Rather, successful rate reduction required the addition of control activities such as clinician education and policy development. These activities now also constitute core components of contemporary infection control programs.

Infection control education is provided for clinicians on entry to health care organizations through orientation programs, and, on an ongoing basis through in-service education programs. These educational initiatives are supported by infection control policies based on national and international guidelines (Scheckler et al, 1998; APIC/CHICA, 1999; Masterton and Teare, 2001; Department of Health, 2001; Department of Health and Ageing, 2004). Nevertheless, the incidence of nosocomial infection continues to present public health, political and fiscal challenges to contemporary healthcare providers (Smyth and Emmerson, 2000; Masterton and
A clinical ethnography was conducted to investigate the assumption that control activities such as infection control education supported by policy development would result in clinicians consistently applying infection control principles in clinical practice.

Data were collected through participant observation and interviews conducted in the operating theatre complex and the intensive care unit (ICU) of a large regional, acute care health facility in Queensland Australia.

8.3.1 Significance of Findings

Analysis of the data demonstrated that spatial elements within the clinical environment exert an influence on infection control practice due to the common cultural meaning ascribed to the elements by the clinicians. Further, these spatial elements reflect the practice imperatives associated with each clinical context.

Within the clinical context of the ICU studied, clinicians identified that they constantly work under emergency conditions. This is consistent with the acuity of the patients admitted to the ICU and supported by the imposing presence of life-support technology. Spatial elements such as the relatively “open” design of the unit serve to blur boundaries between patient spaces and this blurring of boundaries, along with the practice imperatives to support life, result in displacement of infection control principles and activities. As discussed in Chapter 7 an area within the ICU, which was used to isolate patients with infections, was named “Siberia” by the clinicians. This label specifically evokes an association of this space with notions of isolation,
punishment and exile. Hence, clinicians working in this ICU associate patients in Siberia with infection risk and the need to apply infection control precautions. The meaning Siberia holds for them acts as a behavioural cue reinforcing infection control practice requirements associated with the care of patients in that space.

When interviewed, ICU clinicians associated poor infection control practice with emergency situations indicating that infection control imperatives took second place behind the need to sustain life. They indicated that they believed the two were mutually exclusive. In the ICU many of the spatial cues that reinforce behaviour are auditory and relate to the life-support technology. The alarms signal a problem and provide an imperative to take immediate action. Staff members indicated that they felt compelled to take immediate action in order to reassure their colleagues, patients, and visitors that they were in control of the situation even when they knew the reason for the alarm and that the patient was not in any danger.

Principles of hygiene and sterility are embedded in the design of the operating theatre from the point of entry and reinforced by its separation from the rest of the hospital. According to Fox (1997) the design of the operating theatre reflects advances in asepsis and acts almost as a guarantor against contamination. Within the operating room, spatial elements such as walls and doors enclose and separate each patient and procedure, eliminating distractions and allowing clinicians to focus on the procedure and patient at hand. Focus is directed and maintained on the sterile site by the placement of coloured drapes that delineate the sterile field and gowns that serve to identify sterile persons. The ritualistic nature of behaviours such as handwashing makes the behaviours visible and facilitates identification of any infection control
breaches so that they can be addressed (Riley and Manias 2002). These and other spatial cues allow ready discrimination between “clean” and “dirty” items and persons, and the geographical design ensures separation of clean from dirty thus supporting infection control imperatives within the clinical context.

The concept of mapping the environment, while only described in this study as it relates to the operating theatre and ICU, is likely to have wider application. This process facilitates identification of the practice imperatives of the clinical context as well as identifying the spatial elements that displace infection control practice requirements. It could be applied routinely throughout healthcare facilities to map the geographical space and the information could then be used to determine strategies to enhance or embed infection control cues within the space. In addition, the concept would be an important component of any plan to address infection problems or epidemics.

Application of the theory of practice geography supports and supplements the surveillance and control activities espoused by Haley et al (1985) by recognising the complex nature of contemporary healthcare provision as well as the constant clamour for a clinician’s time and attention by multiple claimants. Further, it recognises that these factors influence infection control practice moment by moment, and seeks to restore balance by embedding cues that reinforce appropriate practice within the clinical context. In a way these strategies could be considered a form of engineering control.
8.4 Engineering controls

One component of contemporary infection control programs was not included in the findings or recommendations of the SENIC project but has developed since the project was completed. This component - referred to in this document as engineering controls - encompasses initiatives related to building design and construction elements aimed at engineering out, controlling for or reducing infection risks. Such initiatives include high efficiency particulate air (HEPA) filtration used in operating theatre complexes, negative pressure isolation facilities, workflow patterns that guide clinicians from clean areas to dirty areas, and the evaluation and selection of environmental surfaces on the basis of imperviousness to fluid and equipment selected for ease of cleaning. The number and placement of handwashing facilities, the choice of solutions used for handwashing and more recently for rapid, waterless hand disinfection, the selection and placement of personal protective equipment (PPE) and sharps and needles designed with safety features that reduce the risk of occupational exposure to body fluid are also considered engineering controls designed to enhance infection control practice.

While these engineering controls have been introduced and are now commonplace in modern healthcare facilities (American Institute of Architects, 2001; Standards Australia, 2003), they have not succeeded in meeting the challenge of nosocomial infection even in combination with the surveillance, data dissemination, education and policy development, the traditional infection control activities recommended on the basis of the SENIC project findings (Eck and Vannier, 1997; Pugliese and Favero, 1997; Harvey, 1998). However, findings from this study provide new knowledge in relation to infection control programs.
8.5 New Knowledge About Infection Control Programs

So far, the flow of discussion regarding surveillance, data dissemination, ownership, education, policy and engineering controls reflects the evolution of infection control programs. The evolution of these programs has involved increasing levels of detachment from clinical involvement to the point where infection control practitioners (ICPs) stand outside the clinical context and fix their gaze on those actively engaged in care provision assessing and reporting the standard of care provided. The findings from this study illustrate that clinicians transfer responsibility for infection control to ICPs. This is illustrated by the comments made by nurses’ participating in the quality activity… “I figured that was your job, and you’d tell us if there was a problem”. Their comments signify the perception that ICPs have a policing role in the healthcare setting and this perception is reinforced by the delegation of outcome measurement and reporting to ICPs. Further support for this assertion is found in the language surrounding the specialized discipline of infection control. Terms like “surveillance”, “audit”, “compliance”, and “breach” all convey the perception of an external gaze with potentially punitive results. Whilst traditional ethnographic methodology (Hammersley and Atkinson, 1995) was used for this study it is useful to consider some of the components of contemporary infection control programs from a Foucauldian perspective in light of the findings of this study. For example Foucault referred to three “disciplinary techniques” (1977, p. 183), namely hierarchial observation, normalised judgement and examination that may be applied to subject, use, transform and improve individuals (1997, p.136). Riley and Manias (2002, p. 318) define these techniques as follows:
“Hierarchical observation …...is the process whereby those with greater authority and responsibility maximise the visual or auditory access over those with less authority. ..... Normalised judgement is the practice whereby individuals are required to conform and maintain standards. Examination (is the process) in which the competence, knowledge and skill of a person are compared.”

The findings from this study, when considered in light of the disciplinary techniques described by Foucault, shed light on the conflicting demands placed on the healthcare worker. The surveillance activities undertaken by the infection control practitioner, while not requiring direct visual or auditory access to the clinician may be considered a form of hierarchical observation because they are conducted by persons considered outsiders to those providing care. The clinicians have no direct input into the compilation of reports disseminating infection rate data throughout the facility. These reports convey information regarding the outcomes of the care the clinicians provide and these outcomes are measured according to criteria that are essentially a mystery to the clinicians providing care as evidenced by the results of the surgeon survey and comments from the orthopaedic nurses. Surgeons seemed unaware of the fact that standardised definitions for infection had been developed and were in general use. Nurses and surgeons participating in the studies investigating the assumptions underpinning surveillance activities, were unaware of benchmarking mechanisms such as infection rate thresholds relating to specific categories of surgery. Techniques such as practice audits, used to address infection outbreaks identified through surveillance activities might also be considered a form of hierarchical observation and this assertion is supported by the terminology used by infection control practitioners.
described previously. Gerberding (2001, p.364) commented on the potentially negative connotations associated with terms such as “audit”, “surveillance” and “compliance” as well as the use of terms such as “nosocomial” the meaning of which she suggested “remains obscure to many within the health-care system and to most outside of it”. This punitive and policing subtext is inherent in the surveillance activities that comprise infection control programs, activities that require one group of workers (ICPs) to assess and report on the outcomes of care provided by others (clinicians). Such a subtext is at odds with the “no blame culture” and principles of accountability deemed fundamental to clinical governance and advocated by the Australian Council for Safety and Quality in Health Care (Australian Council for Safety and Quality in Health Care, 2004).

The specialization of infection control practice has unwittingly resulted in the external development of an infection control program imposed on the clinical area with the expectation that it will be welcomed and adopted by clinicians. This has not been the aim of ICPs. Indeed, the infection control literature constantly advocates the development of collaborative relationships, and partnerships between clinicians and ICPs. With this in mind, infection control programs are developed and implemented under the direction of multidisciplinary Infection Control Committees, with the explicit aim of fostering clinician investment in the programs (Australian Government Department of Health and Ageing, 2004). However, the real test of the success of any program is the extent to which it is owned by those directly involved in care provision (Smyth and Emmerson 2000; Masterton and Teare, 2001).
Control activities such as education and policy development could be considered practices consistent with the disciplinary technique identified by Foucault as “normalised judgement”, whereby the clinicians are required to conform and maintain standards. However, the findings from this study indicate that the influence of the clinical culture in determining practice imperatives may place the clinician in situations where he/she opts to forego appropriate infection control practice, preferring to meet the conflicting expectations of his/her peers. One example would be the compulsion ICU clinicians have to silence the ventilator alarms even when the cause of the alarm is known and the patient’s safety is assured, ignoring the fact that they are wearing gloves contaminated with body fluid. Participants in this study indicated that it was preferable to appear competent and professional by silencing the alarm rather than allow it to continue while gloves are removed and hands washed. This pressure to conform might also be considered a form of “examination” in that the clinicians’ believe that their competence, knowledge and skills are being judged.

Practice audits and other surveillance activities might also be considered consistent with examination as a disciplinary technique however, because these activities are intermittent and conducted by those external to the clinical context, their influence on infection control practice is also intermittent. Further, if the infection control practices are not embedded in the practice imperatives associated with the specific clinical context, the clinician is more likely to be swayed by the pressure exerted by the constant and inescapable gaze of their peers. This is supported by Riley and Manias who stated:
“Someone who cannot escape the gaze of power can think about how to turn the gaze into an advantage by learning from the responses their behaviour provokes” (2002, p.321).

The findings of this study suggest that rather than becoming embedded in the clinical culture, and therefore influencing infection control practice, the elements of the infection control program and the principles it embodies remain superimposed over rather than embedded in the clinical culture. Principles such as asepsis and Standard Precautions are applied in the clinical context if time allows and when the clinicians believe there is a specific infection risk.

Further, the findings of this study demonstrate that when infection control issues are not embedded in the clinical culture and infection control principles are not entrenched in clinical practice they are considered separately during care activities and easily displaced by other imperatives. Application of these principles becomes an after-thought, an optional extra in clinical practice, something to be considered when the other practice imperatives have been met. The clinical environment that is the exception is the operating theatre and in this context infection control principles are embedded in clinical practice through ritualized behaviours and cued by geographical elements within the environment (Fox, 1997). Similarly, in the ICU, the spatial cues reinforce life-support as the practice imperative, communicated by the imposing nature of the technology, and its continuous demands for attention as it signals potential life-threatening emergencies through alarms, lights and lines on LCD screens. It is within this context that infection control programs based on the findings
of the SENIC project (Haley et al., 1985) have struggled to prevent and control infection.

Time and space may also be used as disciplinary techniques of power. Riley and Manias stated that “expenditure of time has important symbolic value and co-exists with space to control social activity” (2002, p.320-321). The use of time is heavily regulated for most clinicians. Nurses, for example, must perform patient observations and administer medications at set intervals. Expectations exist regarding the specific tasks that must be performed on each shift such as patient hygiene and other procedures such as dressing and intravenous catheter changes. All must be documented so that time can be accounted for and evidence of the care provision is at hand. Even meal breaks are regulated due to the need to ensure some staff members remain available for patient care all times. Nurses participating in the quality activity cited workload demands as a reason for delineating between patient care activities and participation in data collection. Laura, one of the ICU nurses also alluded to time as one of the factors motivating her clinical behaviour when she said, “My focus is to get the alarm off and identify the problem and think about infection control things afterwards”. Clearly, the pressure of time is one of the factors influencing her decisions regarding prioritisation of care.

The significance of space in relation to infection control practice was discussed in detail in chapter seven. Foucault also espoused the belief that space can be used to control individuals (Foucault, 1997, p.143). The connotations associated with Foucault’s example of the panopticon, a tower within a circular prison, illustrates power relationships, and provides a largely negative view of the use of space to
control behaviour. However, some authors (Fox, 1997; Riley and Manias, 2002) have identified advantageous use of spatial cues in contexts such as the operating theatre. Here space is used to cue behaviours that support infection control practice. Riley and Manias (2002, p.319) identified that status may be defined on the basis of space allocation within organisations stating that those with lower status are usually allocated spaces subject to constant surveillance and a corresponding lack of privacy. This is consistent with the constant gaze of one’s peers and colleagues within the clinical context of the ICU and the resulting influence this can have on infection control practice. Thus, in terms of infection control practice, allocation and delineation of space can have positive or negative effects.

Contemporary hospital infection control programs if they are to successfully influence clinical practice, must eschew activities that connote the external gaze and language that reinforces the concepts of judgement and policing. Instead, activities that are congruent with clinical governance and risk management principles must be developed, forming partnerships with clinicians in order to assist them to achieve and maintain standards of excellence based on ownership of the program. The program must therefore become embedded within clinical practice and be supported by spatial cues, rituals and awareness of the “clean” versus the “contaminated”. Surveillance activities rather than being activities conducted from outside the clinical area, must meet the needs of the clinicians providing patient care.

8.6 Conclusion

This chapter has discussed findings of the research that investigated the assumptions underpinning contemporary hospital infection control programs. These assumptions
were based on the findings of the landmark SENIC project that demonstrated the effectiveness of hospital infection control programs in reducing nosocomial infection by 32% overall (Haley et al, 1985). The findings of this research demonstrate that now, almost thirty years since the SENIC project commenced, it is necessary to adjust to conditions, pressures and imperatives of healthcare provision in the new millennium. Now, our hospitals are filled with clinicians trained and expected to critically evaluate and dynamically respond to the patients’ needs, using constantly evolving technologies to treat and support patients with higher acuity. If contemporary hospital infection control programs are to remain relevant, a number of changes are required. Infection surveillance processes will need to promote more active clinician involvement at every stage, and control activities will need to be augmented with strategies that utilise spatial cues embedded in the environment to reinforce good infection control practice.
Chapter Nine

RECOMMENDATIONS AND CONCLUSION

9.1 Introduction

Increasing levels of antimicrobial resistance amongst pathogens associated with nosocomial infections along with spiraling health costs, and the publication of results of studies examining safety and quality in healthcare, have combined to focus attention once again on the issue of nosocomial infection (Wilson et al, 1995; American Institute of Medicine, 2000; Australian Council for Quality and Safety in Healthcare, 2004). Recognition that this is a preventable, adverse outcome of healthcare and is associated with significant morbidity and mortality has created a moral and political imperative to consider novel methods to address the issue (Lawrence, 1995; Taskforce on Quality in Australian Healthcare, 1996).

Strategies designed to address the issue have been based on risk management and clinical governance frameworks that confirm the importance of every member of the healthcare team taking responsibility for infection control and playing their part in improving care outcomes (Scally and Donaldson, 1998; Standards Australia, 1999). Advocates of this approach have recognised that achievement of this goal will require cultural change within the healthcare industry (Masterton and Teare, 2001; Australian Council for Safety and Quality in Healthcare, 2004).

Based on the findings of the SENIC project (Haley et al, 1985) contemporary infection control programs have relied on a combination of surveillance and control activities to prevent and control nosocomial infection. The success of these strategies was demonstrated by the findings of SENIC and in the intervening three decades since
the study commenced, infection control research has focused on refinement of these strategies rather than seeking new approaches to improving infection control practice. Thus the scientific literature relating to infection control programs is dominated by reports of the results of epidemiological studies (Chandra and Milind, 2001), comparison of surveillance methodologies (Cadwallader et al, 2001), the effectiveness of engineering controls (Connolly, 1998), educational and surveillance initiatives (Dorsey et al, 1996; Gaynes et al 2001) and healthcare workers’ knowledge, beliefs and attitudes regarding policies, guidelines and practice issues (Kim et al, 1999). However, there is a growing sense within the infection control community that the application of broader methods of inquiry may provide new knowledge that can inform practice (Kretzer and Larson, 1998; Pittet, 2004). The ethnographic approach used in this study is a relatively novel method of inquiry in infection control research and the findings of this study demonstrate its value in providing insight into infection control surveillance processes and practice issues from the clinicians’ perspective.

9.2 Summary of Findings

Investigation of the assumptions that underpin infection surveillance activities demonstrated that while the effectiveness of feedback of infection data to clinicians in reducing infection rates has been established (Gaynes et al, 2001), clinicians participating in this study identified factors that will enhance the outcomes of surveillance processes. Surgeons responding to a questionnaire raised concerns about the need to used standardised infection definitions in surgical site surveillance and identified the need to ensure accuracy of data by including post-discharge infection rates. However, the findings indicate that some surgeons will have doubts about the accuracy of these data if post-discharge infection rates are included. Therefore
infection rate reports need to include information regarding the definitions used to diagnose infection and data validation processes used.

Survey respondents also identified that the infection rate data would be more useful if it included some means of comparing the reported rates against a benchmark. This need to contextualise infection rate data was underscored by an overestimation by some respondents of acceptable rates of infection.

Nurse clinicians participating in a quality activity also demonstrated the need for infection rate data to be contextualised. Findings from this component of the study identified factors that impede data dissemination that need to be addressed if nurses are to develop ownership and awareness of infection rate data.

9.2.1 Implications for Practice – Surveillance Activities

The findings of these studies identified the inherent tensions in the relationship between surgical site infection surveillance processes and clinicians. Common to both clinician groups was the need to contextualise infection rate data and also the need to consider data dissemination processes.

Recommendation: Surgical site infection reports include a benchmarking mechanism to make the data meaningful for clinicians receiving the report.

Recommendation: Surgical site infection reports cater to the needs of the target group taking into consideration the information provided, timing of the report
and the need to provide the data in a manner that facilitates clarification of the results, such as face-to-face reporting.

Surgeon perceptions regarding data accuracy can be improved by including post-discharge infections in the reports and a description of the methods used to validate their diagnosis such as the standardised infection definition used.

**Recommendation:** Surgical site infection reports include post-discharge infection rates and distinction drawn between in-hospital infection rates and rates that include infections diagnosed post-discharge.

**Recommendation:** Surgical site infection reports outline the standardized definitions used for infection diagnosis and describe efforts taken to validate infections diagnosed post-discharge.

Findings from the study with nurses demonstrated that the ability to link infection rates to patient care influences nurses’ attitudes towards infection rate data derived from surveillance activities. Infection rate data must be linked to patients or they are likely to be overlooked or ignored by clinicians. Dissemination of data that are ignored by the clinicians providing patient care will have little effect on patient care practices or outcomes.

**Recommendation:** Nurses receive infection rate reports on a regular basis.
Recommendation: The infection control practitioner communicate infection rate data to clinicians in an interactive forum.

Implementation of these recommendations will assist in maintaining awareness of infection rates and continually reinforce the link between the surveillance data and care outcomes. It will also facilitate a deeper understanding of the data and their implications for nursing practice by promoting discussion and allowing clarification of the data presented.

The recommendations are designed to ensure care providers find infection rate data understandable and meaningful so that they will invest themselves in further efforts to reduce infection rates. A number of authors support this need for clinician ownership of care outcomes (Masterton and Teare 2001; Smyth and Emmerson, 2000). Failure to link care and infection rates can only result in a continuation of the situation described by Lovett and Massanari (1999, p.135) in which ICPs, “are unable to raise the level of concern regarding current practice sufficiently to drive improvement in care processes”.

Recommendation: Infection control practitioners form partnerships with care providers, actively fostering their participation in every step of the surveillance process.

The results of these studies support the assertion by Bradley et al (2004) that data feedback is a complex and textured concept. If the efforts expended collecting, analyzing and disseminating infection rate data are to result in reduced infection rates
then the factors influencing the relationship between the data and care providers will need to be addressed.

9.2.2 Implications for Practice – Control Activities

Investigation of the assumptions that underpin control activities provided insight into the influence of the clinical environment on infection control practice. These findings demonstrated how it is possible to map the clinical environment and identify the practice imperatives that can displace infection control practice requirements. Dominance of the technological devices in the landscape of the ICU created a sense of urgency which, when combined with the practice imperative of patient life-support displaced the importance of infection control considerations. The use of environmental and spatial cues that support infection control practice such as those incorporated into the landscape of the operating theatre may redress this type of practice imbalance. The strident nature of the alarms associated with life-support technology and the displacement of infection control imperatives that result from the need to silence the alarms may be mitigated by cues embedded in the clinical environment that silently reinstate the infection control components of care provision.

The operating theatre complex design has evolved over approximately 200 years and has progressively incorporated advances in asepsis with the aim of eliminating infection (Essex-Lopresti, 1999). Specialised intensive care units first established around the 1960’s (Wiles and Daffurn, 2002), reflect the technological advances that have made it possible to sustain life while a patient has the chance to recover and heal. These technological advances have been progressively incorporated into the design and function of contemporary ICUs. The infection risks associated with the invasive
nature of life-support and therapeutic equipment in ICU are equal to those of the operating theatre, however the practice imperatives in the ICU all relate to life-support. These imperatives are reinforced by the spatial cues evident in the alarms, lights and liquid crystal display (LCD) screens of the technology. They draw the eye and attention of all, signaling any change in the patient’s condition and requiring an immediate response, thereby displacing and concealing the infection control practice imperatives. The findings from this research indicate that spatial cues, body awareness and body rituals are dominant features of the ICU geography and that these cues form the template for a geography of practice. This template may be altered such that elements within the environment become cues that elicit the desired infection control practice. These cues should be embedded in the environment and communicate specific meaning to the clinicians.

**Recommendation:** Patient spaces be physically delineated to clearly define boundaries between patients.

**Recommendation:** Infection risks associated with activities, invasive devices and specific spaces be identified and defined through the use of strategies such as colour.

**Recommendation:** The use of visual cues that identify staff involved in invasive procedures and signal the increased infection risk.

Physical barriers that define the boundaries of patient bed spaces will circumvent the easy movement of staff from one patient to another. Such barriers could be moveable
allowing for increased space when invasive procedures are in progress. The use of colour especially if it is associated with specific infection risk would reinforce the behavioural requirements associated with specific activities, invasive devices and specific spaces. The use of colour to identify staff members involved in invasive procedures and to link those staff members with the clearly delineated sterile field will lead to an expectation that the staff member will exhibit certain behaviours. Failure to do so will be more visible and therefore more likely to be addressed. This increased visibility and awareness of increased infection risk will in turn support the ritualisation of good infection control practice enshrining them in daily practice (Riley and Manias, 2002).

Implementation of these recommendations will simply augment the spatial cues, body awareness and body rituals that, according to the findings of this study, are already inherent components of the cultural environment of the ICU. Therefore, while their implementation should not be onerous, these simple measures can serve to balance the practice imperatives within the unit, such that life-support and infection control imperatives are no longer considered mutually exclusive, rather they are seen as symbiotically related.

9.3 Conclusion
This study has provided new knowledge that can improve infection control practice by identifying ways to enhance infection surveillance and reporting processes and by identifying the need to consider cultural influences when planning and implementing infection control activities.
Rather than renouncing the value of the surveillance and control activities that comprise contemporary hospital infection control programs, the findings from this study have demonstrated ways to enhance their effectiveness and potentially improve patient outcomes. Further research involving empirical testing of the recommendations using epidemiologic methods is necessary.

Findings from this study demonstrate that the application of broader methods of inquiry such as the ethnographic approach used in this study can provide new knowledge to inform infection control programs and practice issues.
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APPENDIX 1
Ethics approval: Ethics Committee for Human Research, University of Canberra.
APPENDIX II

Ethics Approval: Ethics Committee for Human Research, University of Canberra.

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APPENDIX III

Ethics Approval: Gold Coast Health Service District Ethics Committee

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Dear Colleague,

The Study on the Efficacy of Nosocomial Infection Control (SENIC) was conducted under the auspices of the Centers for Disease Control in the United States in 1974. The results of that study indicated that those facilities with an established infection control program had 32% less nosocomial infections than those facilities that did not have such a program. Haley et al (1985) when reporting on the SENIC study identified that one reason for this reduction is that an infection control program includes nosocomial infection surveillance, an essential component of which is reporting these data to clinicians. This is believed to result in a reduction in infection rates.

Primarily as a result of the SENIC study infection control programs have become an integral component of healthcare provision today. As part of my PhD research project I am trying to determine what value clinicians place on infection rate data.

I would be very grateful if you would assist me to obtain some meaningful data on this topic by completing the attached survey. I estimate the survey will take less than five minutes to complete and a reply paid, self-addressed envelope has been provided for your convenience. My deadline for receipt of your completed survey is August 10th 2002.

Thank you for your assistance.

Yours sincerely

Deborough Macbeth
PhD Candidate
University of Canberra
APPENDIX V
Surgeon Survey Form

Surgeon’s Survey
The utility of surgical wound infection rate data.

Thank you for your participation in this project.
Please tick the box beside your preferred answer for multiple choice questions; circle your preference on the visual analogue scales; and provide short answers to questions where space has been provided.
The following questionnaire will take approximately 10-15 minutes to complete.

1. Please indicate the capacity in which you are employed.
   ( ) VMO  
   ( ) Staff Specialist  
   ( ) Private Specialist  
   ( ) Other (specify) 

2. How long have you been performing surgery in this specialty?
   ( ) 1 - 5 years  
   ( ) 6 – 10 years  
   ( ) 11-15 years  
   ( ) 16-20 years  
   ( ) > 20 years  

3. Is your practice situated in the private or the public health care sector?
   ( ) Exclusively Private  
   ( ) Exclusively Public  
   ( ) More Private than Public  
   ( ) More Public than Private  
   ( ) Half in each sector  

4. Do you currently receive surgical wound infection rate data?
   ( ) Yes  
   ( ) No  

5. How would you rate the accuracy of the infection rate data?
   (Please indicate the response that best describes your opinion) 

   Very accurate | Inaccurate

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6. If you doubt the accuracy of the data how do you think the accuracy could be improved?

7. How would you rate the usefulness of the infection rate data in your practice?

---

Very useful  Not useful

8. How do you think the data could be made more useful for you?

9. What do you think is an acceptable infection rate for:
   a) Clean surgery   
   b) Contaminated surgery

10. What changes if any would you like to see in relation to collection and reporting of surgical wound infection rate data?

11. Do you wish to make any further comment on this topic?

Thank you.
ORTHOPAEDIC UNIT

SURGICAL WOUND SURVEILLANCE PROGRAM

PLEASE AFFIX PATIENT ID LABEL HERE

ADMISSION DATE: ____________
DISCHARGE DATE: ____________

CONSULTANT SURGEON: ______________________________________

SURGEON(S) PERFORMING OPERATIVE PROCEDURE:
______________________________________________________________________________

OPERATION: ___________________________ DATE: ____________

ANTIBIOTICS ADMINISTERED INTRA-OPERATIVELY YES/NO (CHECK ANAESTHETIC SHEET)

IF YES, SPECIFY TYPE & DOSE: __________________________________________

SUTURE LINE OBSERVATION

In this section please describe the appearance of the wound including type and amount of any exudate (e.g. serous, haemoserous, purulent) and note any inflammation.

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APPENDIX VIII
GOLD COAST DISTRICT HEALTH SERVICE
CONSENT FORM FOR RESEARCH STUDIES

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APPENDIX 1X

Letter of acceptance of manuscript for publication - Testing as supported transfer of responsibility for infection surveillance using a total quality improvement framework. Email received 18/2/05

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APPENDIX X

Letter of acceptance of manuscript for review - Clinical geography and its influence on infection control practice: An ethnography. Email received 26/11/04.