AUSTRALIAN NURSING STUDENTS’ INFECTION CONTROL KNOWLEDGE AND PERCEPTIONS: EXPLORING THE ROLE OF MICROBIOLOGY EDUCATION AND CLINICAL PLACEMENT EXPERIENCES

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Certificate of authorship

I hereby declare that this submission is my own work and, to the best of my knowledge and belief, understand that it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at Charles Sturt University or any other educational institution, except where due acknowledgement is made in the thesis. Any contribution made to the research by colleagues with whom I have worked at Charles Sturt University or elsewhere during my candidature is fully acknowledged.

I agree that this thesis be accessible for the purpose of study and research in accordance with normal conditions established by the Executive Director, Library Services, Charles Sturt University or nominee, for the care, loan and reproduction of thesis, subject to confidentiality provisions as approved by the University.

Name: Jennifer Cox

Signature: Jennifer Cox

Date: 23 October, 2015
Acknowledgements

For me, undertaking a PhD is somewhat akin to running an ultra-marathon. Completing the marathon is a great personal achievement that requires years of dedication and training; it is a journey filled with many opportunities and challenges that will test both the mental and physical stamina. To some extent, my journey through this PhD candidature has mirrored that of what I believe the journey for many nursing students studying science to be – believing in the necessity of the undertaking but feeling somewhat anxious because you have no real idea of the ‘so what’ of it all; then the elation (or relief) when the ‘light bulb’ finally comes on, when the ‘so what’ becomes apparent and suddenly all of the dots start joining together.

To my supervisors, Professor Heather Cavanagh, Assoc. Professor Will Letts and Assoc. Professor Maree Simpson, my sincere thanks to each of you for your guidance, patience and support over many years. My thanks also to all the students and healthcare professionals who gave of their time to participate in the interviews, focus groups and/or surveys. Without your contributions, this project would not have been possible. To my friends and colleagues who have helped in any way, whether that be reading chapters for me or simply answering one of my many questions about research, I would also like to say thank you.

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Professional statistical analysis

Helen Nicol (biometrician) provided paid data analysis of the student surveys (including selection and use of statistical techniques).
Ethics approval

Ethics approval was sought and obtained from the Charles Sturt University School of Biomedical Science Ethics in Human Research Committee, protocol number 406/2009/19.
Publications arising from this thesis

Abstracts for conference presentations

Cox, J.L., Cavanagh, H.M.A. & Letts, W. (2010). ‘They just don’t understand how important it is’: Infection control professionals’ views on infection control and microbiology training in undergraduate nursing programs. CSU Ed Conference, Bathurst, NSW.

Peer-reviewed journal articles

Abstract

Healthcare-associated infections (HAIs) have become the most common, preventable complication of healthcare delivery in the modern era. These infections have substantial health, social and economic consequences. Despite the increased awareness of HAIs and the crucial role of infection control (IC) procedures, there is a substantial body of evidence to indicate that healthcare workers (HCWs) are inconsistent in their application of IC precautions and that hand hygiene practice, in particular, is sub-optimal in many healthcare settings. The ability to apply microbiology knowledge to assess a situation and respond appropriately has been identified as a component of IC competency. The guidelines for accreditation of Australian pre-registration nursing programs, however, do not stipulate the level or amount of microbiology to be included in the curriculum. The effect of variations in microbiology content on graduates’ IC practice is relatively unknown. The central premise of the study was to gain further insight into the role of microbiology education and the influence of clinical placement experiences on Australian nursing students’ IC perceptions and behaviours.

A parallel mixed methods design was utilised for this project. Student perceptions and conceptions of microbiology were assessed using a longitudinal survey while semi-structured interviews with IC professionals (n=8) and a single focus group of final-year students (n=9) were employed to gain insight into the cultural and social influences on nursing students’ IC perceptions and behaviour. Analysis of the longitudinal survey data indicated a persistent perception of microbiology being ‘difficult’ or ‘very difficult’ to learn and being less relevant than other nominated areas of the curriculum, with the exception of sociology. Although nursing students became more familiar with IC procedures, particularly hand hygiene, as they progressed through their pre-registration program, their knowledge and understanding of underlying microbiological concepts was not necessarily enhanced. The qualitative data further highlighted that students’ ability to transfer microbiology knowledge to practice was limited; suggesting the presence of a ‘theory-practice’ gap in relation to microbiology and that placement of theoretical microbiology content within the first-year bioscience subject potentiated the perceived irrelevance of microbiology to practice. Safety culture of the ward and poor role modelling of IC practice by clinical
supervisors were found to have a significant influence on students’ IC intentions and behaviours.

Without an ability to apply microbiology knowledge to IC decision making (i.e. apply the knowledge in context) there is an inherent risk of incorrect application of IC practices and thus a risk to patient (and nurse) safety. The findings and recommendations of the study will inform microbiology curriculum development, to ensure graduates are equipped with a strong foundation upon which to base their professional practice. The thesis concludes with a proposal for re-conceptualising the definition and assessment of IC competence. If adopted, these approaches would potentially enhance students' understanding and synthesis of microbiology knowledge and help build students’ IC self-efficacy to apply that knowledge to practice.
**Abbreviations and shortened forms**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AHPRA</td>
<td>Australian Health Practitioner Regulation Agency</td>
</tr>
<tr>
<td>ACSQHC</td>
<td>Australian Commission on Safety and Quality in Health Care</td>
</tr>
<tr>
<td>ANMAC</td>
<td>Australian Nursing and Midwifery Accreditation Council</td>
</tr>
<tr>
<td>BN</td>
<td>Bachelor of Nursing</td>
</tr>
<tr>
<td>CA-MRSA</td>
<td>Community-acquired methicillin-resistant <em>Staphylococcus aureus</em></td>
</tr>
<tr>
<td>CDC</td>
<td>Centers for Disease Control and Prevention</td>
</tr>
<tr>
<td>CBE</td>
<td>Competency-based education (CBE)</td>
</tr>
<tr>
<td>DE</td>
<td>Distance education (study mode)</td>
</tr>
<tr>
<td>EN</td>
<td>Enrolled Nurse</td>
</tr>
<tr>
<td>HAI</td>
<td>Health care-associated infection</td>
</tr>
<tr>
<td>HBM</td>
<td>Health Belief Model</td>
</tr>
<tr>
<td>HCW</td>
<td>Health care worker</td>
</tr>
<tr>
<td>HE</td>
<td>Higher Education</td>
</tr>
<tr>
<td>HH</td>
<td>Hand hygiene</td>
</tr>
<tr>
<td>HHA</td>
<td>Hand Hygiene Australia</td>
</tr>
<tr>
<td>IC</td>
<td>Infection prevention and control</td>
</tr>
<tr>
<td>ICP</td>
<td>Infection control professional</td>
</tr>
<tr>
<td>MDR-TB</td>
<td>Multi-drug resistant Tuberculosis</td>
</tr>
<tr>
<td>MM</td>
<td>Mixed methods</td>
</tr>
<tr>
<td>MRSA</td>
<td>Methicillin-resistant <em>Staphylococcus aureus</em></td>
</tr>
<tr>
<td>NHHI</td>
<td>National Hand Hygiene Initiative</td>
</tr>
<tr>
<td>OC</td>
<td>On-campus (study mode)</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal protective equipment</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
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<tr>
<td>------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>RN</td>
<td>Registered Nurse</td>
</tr>
<tr>
<td>SARS</td>
<td>Severe Acute Respiratory Syndrome</td>
</tr>
<tr>
<td>SEFS</td>
<td>Self-efficacy for Science Scale</td>
</tr>
<tr>
<td>SID</td>
<td>Student identification number</td>
</tr>
<tr>
<td>SSI</td>
<td>Surgical site infection</td>
</tr>
<tr>
<td>TAFE</td>
<td>Technical and Further Education (college)</td>
</tr>
<tr>
<td>TPB</td>
<td>Theory of Planned Behaviour</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>UP</td>
<td>Universal precautions</td>
</tr>
<tr>
<td>US</td>
<td>United States of America</td>
</tr>
<tr>
<td>VRE</td>
<td>Vancomycin-resistant enterococci</td>
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<tr>
<td>XDR-TB</td>
<td>Extensively drug-resistant Tuberculosis</td>
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Chapter 1: Introduction

1.1 Overview: How my research journey began

When I moved into academia, some eleven years ago, my first lecturing role was teaching human bioscience – subjects incorporating anatomy, physiology, chemistry and microbiology to first year pre-registration nursing students. Prior to becoming an academic I had worked as a medical scientist in both public and private pathology laboratories. In the public setting, I was employed at a base hospital in New South Wales that served a very large rural and regional population. My role involved blood sample analysis (haematology, biochemistry) and reporting, processing of microbiological specimens (identification, antibiotic sensitivity testing, etc.). Through this role I not only developed a fascination with microbiology but also gained an understanding of the hospital environment and the workload pressures that health care workers (HCWs) operate under on a daily basis. Whilst working in this hospital setting, I had certainly witnessed poor IC practices and there were often reports from the nursing staff about particular doctors who were renowned for having persistently higher infection rates in their patients.

Whilst working in pathology I was also doing some casual marking and bioscience lecturing in the nursing program at the local university. I then was offered an opportunity to take up a full-time lecturing position. As a scientist, the fundamental role of science to nursing practice seemed to me to be self-evident. Over my first two years of lecturing, however, it became obvious that many nursing students not only entered their program with a pre-existing anxiety and fear of ‘all things science’, but also genuinely struggled to understand the relevance of the bioscience subjects and concepts to nursing practice. More importantly, I observed the profound effect that these perceptions of science can have on student engagement and achievement in the bioscience subjects. I quickly realised that addressing these fears and concerns, reducing the science anxiety was going to be key to my role as a lecturer and to helping these students engage with and succeed in the bioscience subjects.

My lecturing role also included delivering a microbiology lecture at the compulsory residential school attended by the nursing students undertaking these introductory bioscience subjects by distance education. The majority of the students undertaking the BN program by DE mode had some form of previous nursing qualification (commonly
as an Enrolled Nurse or Assistant in Nursing) and were working in a healthcare setting whilst undertaking their studies. My lecture was delivered as a ‘show and tell’ presentation with a focus on the ‘scary things about bugs’ – what can these microbes actually do, how they evade the body’s immune system and what harmful consequences there can be. This lecture format really got students engaged and more importantly seemed to have an ongoing effect after returning to their workplace:

…that’s disgusting. If I had known they [the microbes] could do that, I would have washed my hands more often.

My NUM knows your name now because since I came to the residential school I have been adamant about hand washing and have been making everyone else on the ward wash their hands.

Around this time, ‘superbug’ infections such as methicillin-resistant Staphylococcus aureus (MRSA) and vancomycin-resistant enterococci (VRE) had started to become more frequently reported in the media, yet, semester after semester it was a common occurrence for at least one student, at the completion of that lecture, to come and ask me about MRSA and/or VRE. They ‘had heard of it’ and ‘had nursed a lot of patients with an MRSA/VRE infection’, but they weren’t sure what it actually was nor ‘what it did’. Given the number of hospitalised patients then having serious infections caused by these microorganisms, I was always somewhat puzzled that people working in the healthcare environment, nursing these patients on a daily basis, did not understand what MRSA or VRE was, rather it appeared to simply be an acronym that they recognised but there was a real disconnect between the microbe and the infection. I began to ponder the nature of this disconnect. Was it due to a lack of microbiology knowledge or was an understanding of microbiology not seen as an important part of clinical practice? As a teacher, I had to wonder, was it related to what I was (or wasn’t) doing as a teacher? I began to reflect on the curriculum and my own pedagogies.

My observation of student attitudes indicated that, whilst IC was perceived to be highly important, microbiology was an interesting but not necessarily important part of the curriculum. In particular there seemed to be little, if any, recognition of the link between the two - that IC practices are underpinned by microbiological principles. I started to wonder what impact, if any, this disconnect might be having on students’ (and new graduates’) IC practices in the workplace. I also wondered what impact clinical
placement experiences had on this disconnect. Given the important role that clinical placement experiences play in helping students connect theory with practice, perhaps any variations in amount and timing of microbiology content in the curriculum were negated by students’ clinical learning experiences? What influence did these two factors ultimately have on student IC intentions and behaviours? Would a better understanding of microbiology enhance their understanding of the microbes causing these infections and the potential ramifications? More importantly, perhaps variations in microbiology education were something that had been overlooked as a potential contributor to the ongoing sub-optimal hand hygiene compliance of HCWs being reported in the literature.

1.2 Rationale for my research

Despite significant effort and interventions, the IC knowledge and practice of graduate HCWs remain sub-optimal, potentially compromising the health outcomes of both patients and themselves. As a result of my own teaching experiences, I wondered whether it was as simple as students needing to ‘know’ more but they did not see the links between microbiology and IC; I was moved to ask WHY? HOW? There was a large body of research exploring perceived barriers to HCW adherence to IC precautions, yet other factors that may influence graduates’ IC practice, such as students’ microbiology knowledge and the ability to apply that knowledge in practice, remained relatively unexplored. Furthermore, no studies could be found which explicitly examined the impact of clinical learning experiences on nursing students’ IC preparedness and intentions in the Australian context; despite these placements playing a key role in skill mastery and competency development. Thus there was a need to explore the influence of microbiology knowledge and clinical placement experiences on nursing students’ IC behaviours and intentions.

1.3 Framing the research topic, aims and significance

This research focuses on the potential role of microbiology education on the infection prevention and control knowledge of student nurses and their future ability to apply that knowledge to practice. The ability to apply microbiology knowledge to assess a situation and respond appropriately has been identified as a component of IC competency. The guidelines for accreditation of Australian pre-registration nursing programs, however, do not stipulate the level or amount of microbiology to be included
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in the curriculum. The central premise of the study was to gain further insight into the role of microbiology education and the influence of clinical placement experiences on Australian nursing students’ IC intentions and behaviours.

The specific aims of this project were:

1. To examine nursing students’ understanding and perceptions of microbiological concepts over the duration of a pre-registration nursing course.

2. To ascertain IC practitioners’ views on the importance of microbiology knowledge in compliance with IC practice and the perceived adequacy of students’ and new graduates’ microbiology and IC knowledge.

3. To explore the impact of clinical placements on final-year nursing students’ self-reported preparedness for the transition to IC practice.

Healthcare-associated infections (HAIs) are the most common, preventable complication of healthcare delivery; resulting in thousands of preventable deaths each year (Australian Commission on Safety and Quality in Health Care, 2012). IC professionals (ICPs) and nursing staff play a pivotal role in the control and prevention of HAIs. By exploring the research topic from multiple perspectives, a more comprehensive understanding of the role of microbiology education and impact of clinical placement experiences on students’ IC perceptions and behaviours was achieved. The findings and recommendations of the study will inform microbiology curriculum development, to ensure graduates are equipped with a strong foundation upon which to base their professional practice.

1.4 Overview of research approach

A parallel mixed methods design was utilised for this project. The research was situated within a pragmatist paradigm. Pragmatism focuses on the research question and selects research methods to best answer that question. A large body of literature exists in relation to IC knowledge, attitudes and practice. Most of the research around IC knowledge is located in the postpositivist paradigm using questionnaires to measure student and HCW knowledge of IC procedures and underlying concepts such as transmission of microorganisms. Conversely, a large body of qualitative research exploring IC attitudes and practice also exists.
Chapter 1: Introduction

Since this project aimed to explore student perceptions and knowledge, a combination of qualitative and quantitative research approaches was required; a parallel mixed methods study design was conceptualised. Three separate phases (one quantitative and two qualitative) were conducted to address the aims of the study. Students’ perceptions and conceptions of microbiology (research aim 1) were assessed using a quantitative methodology (surveys) while qualitative methods, namely semi-structured interviews and a focus group were employed to gain an understanding of the cultural and social influences on nursing students’ IC behaviour and intentions experienced during clinical placements (research aims 2 and 3).

In this parallel mixed methods study, each of the qualitative and quantitative strands were conducted and evaluated independently. This meant that each component could therefore “stand alone while also being linked conceptually to other parts” (Schneider, Whitehead, Elliott, Lobiondo-Wood, & Haber, 2007, p. 252); thus providing a more comprehensive understanding of the phenomena under research. Integration of the qualitative and quantitative data strands occurred at the meta-inference stage after analysis of the separate stages was complete (Cresswell & Plano Clark, 2011).

1.5 Structure of the thesis

This thesis contains ten chapters. Chapter 1 has provided an introduction to the background and scope of the project. Chapter 2 examines and critiques the relevant literature on healthcare-associated infections, IC knowledge and practice, pre-registration nurse education and putting knowledge into practice. Chapter 3 describes the methods and data analysis utilised for the study. Details of the participants and their recruitment, ethical considerations and data collection through interviews, surveys and a focus group are discussed in addition to a detailed account of the data analysis. Data management and issues of rigour and trustworthiness are also discussed.

The findings from this study have been placed into four chapters. The first chapter (Chapter 4) presents and discusses the findings from the interviews with IC professionals. The second and third chapters (Chapters 5 and 6) present and discuss the findings from the first year surveys (Chapter 5) and the second and third year student surveys (Chapter 6). The findings of the second qualitative phase (student focus group) are presented and discussed in Chapter 7. Chapter 8 provides a general discussion drawing together the findings of the qualitative and quantitative research components.
Chapter 1: Introduction

and explores the literature relevant to the findings of this study. Chapter 9 discusses the implications of the study and offers recommendations for pre-registration nursing curricula and educators. Chapter 10 concludes the thesis by noting the limitations of the study and future research required.
Chapter 2: Literature review

2.1 Introduction

Healthcare-associated infections (HAIs) have become the most common, preventable complication of healthcare delivery in the modern era (Australian Commission on Safety and Quality in Health Care, 2012). In fact some HAIs place patients at a three-fold increased risk of hospital death (Kollef et al., 2011). These infections are therefore a major risk to patient safety (Collignon, Wilkinson, Gilbert, Grayson, & Whitby, 2006) in addition to adding billions of dollars to health care budgets each year (Scott, 2009).

With the rapid rise of resurgent and emerging infectious diseases such as Severe Acute Respiratory Syndrome (SARS) and Ebola and the increasing virulence of microbes such as the Influenza A virus, the need for HCWs to be able to safely work with patients with transmissible diseases has become more important than ever. The ability of HCWs to appropriately apply infection prevention and control (IC) practices may, in fact, be a matter of life and death. Despite this impetus and the potential seriousness of the consequences, the IC knowledge and practices of health professional graduates globally have been found in many studies to be unsatisfactory (Lugg & Ahmed, 2008; Sax et al., 2005). This potentially exposes the HCWs themselves, their colleagues and their patients to life-threatening diseases.

2.2 The rise and rise of healthcare-associated infections

The term ‘nosocomial infection’ was originally used to describe an infection acquired during hospitalisation or shortly after discharge. This terminology was superseded by the term ‘healthcare-associated infection’ which was introduced as part of the 2007 revision of the Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings (Siegel, Rhinehart, Jackson, & Chiarello, 2007). HAIs are defined as “infections associated with healthcare delivery in any setting (e.g., hospitals, long-term care facilities, ambulatory settings, home care)” (Siegel et al., 2007, p. S76). Table 2.1 lists the microorganisms commonly associated with HAIs. These microorganisms are spread by direct (person-to-person) contact (including via contaminated hands of HCWS) and indirect contact (contact with environmentally contaminated surfaces).
Rapid advances in medicine in the last century led to the discovery of many life-saving surgical techniques and therapies. The resultant increased use of invasive procedures, however, combined with a higher number of elderly and immune-compromised patients in the population, has also led to increased susceptibility to infection (Weston, 2008). In 2011, for example, there were an estimated 722,000 HAIs in acute care hospitals in the United States (US) alone. Approximately 75,000 [of those] patients with HAIs died during their hospitalisation (Centers for Disease Control and Prevention, 2015).

Adding to this complexity is the added impact of an ever-increasing body of antibiotic-resistant microorganisms. Antibiotic resistance has been an ongoing issue since shortly after Alexander Fleming’s discovery of the first antibiotic, penicillin, in 1928. Prior to this discovery, *Staphylococcus aureus* infections were effectively untreatable. Widespread introduction of penicillin for treatment of *S. aureus* infections occurred in 1944. Within two years, however, penicillin-resistant *S. aureus* began to appear (Livermore, 2000). By 1959 methicillin (a synthetic penicillin-derivative) had been developed and, in 1961, introduced as standard treatment for penicillin-resistant *S. aureus* infection (Enright et al., 2002); however, the first strains of methicillin-resistant *S. aureus* (MRSA) were isolated that same year (Livermore, 2000). Resistant strains of *S. aureus* have now been reported for every antibiotic introduced into clinical practice to date (Daum & Spellberg, 2012), with MRSA being the predominant HAI in many countries for a number of years, including Australia (McLaws, Gold, King, Irwig, &
Simultaneously, genetically distinct strains of MRSA were originating in the community (CA-MRSA), with Australian data indicating that these isolates are becoming more prevalent than their hospital-acquired counterpart (Nimmo et al., 2013). Similar stories are apparent across the globe. For example, American surveillance data indicated that the proportion of enterococcal isolates from intensive care units showing resistance to the antibiotic vancomycin in the year 2000 were 31% higher than in the years 1995–1999. The World Health Organization (World Health Organisation, 2014) reported that, globally, almost half a million new cases of multi-drug resistant tuberculosis (MDR-TB) emerge each year, with 100 countries also now reporting cases of extensively drug-resistant tuberculosis (XDR-TB).

A substantial increase in Clostridium difficile HAIs has been noted over the past decade. Figure 2.1 displays the number of deaths attributable to C. difficile infection in the US between 1999 and 2010. In a 2013 survey of American hospitals (n=183) C. difficile was reported as the most prevalent pathogen, causing 12.1% of HAIs (Magill et al., 2014). C. difficile is classified as an ‘urgent threat’ by the CDC (Centres for Disease Control, 2013), with an estimated 500,000 infections across the US in 2011 alone. Moreover, 29,000 of patients with these infections died within 30 days of the initial diagnosis (CDC, 2015). Although not significantly resistant to antibiotics, C. difficile infection is directly related to antibiotic usage and can result in life-threatening C. difficile-related enterocolitis (Wozniak, Rubin, & MacIntyre, 2015). Further, there is evidence of a shift in the epidemiology of C. difficile infection with the emergence of new community-acquired strains of the bacteria (Wozniak et al., 2015). All of these infections are transmissible from person to person and therefore preventable.

![Figure 2.1. Age-adjusted rate of C. difficile as the primary (underlying) cause of death. Source: CDC National Center for Health Statistics (2012)](image)
Infection prevention practices and antibiotic stewardship are central to combating antibiotic resistance (Aldeyab et al., 2008). Effective IC programs have demonstrated a reduction in the prevalence of antibiotic-resistance microorganisms, such as vancomycin-resistant enterococci (VRE), by as much as 43% (Austin, Bonten, Weinstein, Slaughter, & Anderson, 1999).

HAIs can also substantially increase the length and cost of a patient’s hospital admission (Chen, Chou, & Chou, 2005). In Australia, for example, there are approximately 200,000 HAIs annually with a resultant loss of an estimated two million bed days (Cruickshank & Ferguson, 2008). Development of an orthopaedic surgical-site infection (SSI) can increase the direct cost of hospitalisation of a patient by as much as 300% compared to a patient without infection (Whitehouse, Friedman, Kirkland, Richardson, & Sexton, 2002). Central line-associated HAIs are among the most expensive, adding an estimated $US45,000 (approximately $A64,200 at the time of writing) to inpatient hospital costs. For a patient that develops multiple C. difficile infections, the additional hospital cost is estimated to be $US11,631 (approx. $A16,600) (Dubberke et al., 2014). Graves et al. (2008), however, argued that a substantial number of surgical site infections do not appear until after discharge; therefore, any economic models should also take into consideration post-discharge costs, including work and family time lost. These costs may be further compounded by the additional need for long-term community or home nursing and other intangible costs such as a reduction in health-related quality of life (Whitehouse et al., 2002). The magnitude of these extra costs was highlighted by Marchetti and Rossiter (2013) who estimated the combined direct medical, direct non-medical and indirect costs of HAIs in US acute care hospitals to be between $US96 billion and $US147 billion annually.

The need to ensure effective measures are in place to prevent the spread of these organisms, and thus reduce the associated patient and economic impact, increases each year. At least two million people become infected with antibiotic-resistant bacteria each year in the US, with more than 23,000 people dying as a direct result of these infections (Centers for Disease Control and Prevention, 2013). Indeed it has been estimated that the potentially catastrophic consequences of bacterial strains developing further resistance to the limited number of antibiotics currently available could lead to an additional 10 million preventable deaths by the year 2050 (Review on Antimicrobial
Resistance, 2015); thus, the importance of compliance with IC best practice, in the community and in the healthcare environment, cannot be overstated.

2.3 The importance of infection prevention and control

2.3.1 Historical context

Management of infection has always been underpinned and informed by the theories of infection prevalent at that particular time in history (Ayliffe & English, 2003). According to Selwyn (1991), the scientific study of nosocomial infections (acquired during hospitalisation or shortly after discharge) began in the eighteenth century with the largely unrecognised work of Sir John Pringle. Pringle, a medical practitioner and philosopher, asserted the ‘evils’ of overcrowding and poor ventilation after noting a lower occurrence of infections in military hospital wards where “by broken windows or other wants of repair, the air could not be excluded” (Selwyn, 1991, p. 14). In the nineteenth century, Ignaz Semmelweis recognised ‘dirty hands’ as potential vehicles of infection. He mandated washing of medical students’ hands in soap and water, followed by chloride of lime, before touching patients. Deaths from puerperal fever in that clinic fell from over 10% to almost zero within two years (Thurston, 2000). Another influential person in the history of IC was Florence Nightingale who, during the Crimean War (1854–1864), identified the importance of improving the patient’s physical surroundings (e.g. clean water and fresh air) to improve their recovery from illness. Improving the overall hygiene of war hospital wards and enacting previously unseen IC precautions, such as using fresh washcloths for each patient and keeping freshly laundered linen on hospital beds, significantly reduced the mortality rate of British soldiers from infection. Many of the practices introduced by Nightingale form the basis of IC practices today (Gill & Gill, 2005).

The 1940s saw the beginnings of formal IC programs with the appointment of the first ‘IC officers’ (doctors) in the United Kingdom (UK). In 1944, the British Medical Council implemented the establishment of an IC committee in all UK hospitals. The appointment of the first IC Nurses occurred in 1959 (Forder, 2007). The role of modern IC Professionals (ICPs) includes, but is not limited to, activities such as HAI surveillance, hand hygiene audits, development of IC policy, managing IC issues during outbreaks, providing IC education to departments or individuals and may also include overseeing staff immunisation (Tropea, Brand, & Roberts, 2008).
In 1970, publication of the CDC manual, ‘Isolation Techniques for Use in Hospitals’ saw the introduction of a category system whereby the recommended precautions for each category primarily related to the route of transmission of diseases in that particular category. In 1988, the increasing prevalence of bloodborne pathogens, particularly HIV, and associated increased risk for HCWs of exposure to blood from patients infected with HIV resulted in new CDC guidelines being published. These guidelines recommended “blood and certain body fluids of all patients be considered potentially infectious for human immunodeficiency virus (HIV), hepatitis B virus (HBV) and other bloodborne pathogens and introduced a new standardised system of isolation precautions known as Universal Precautions (UP). UP required that blood and body fluid precautions were applied to all patients. Along with hand hygiene and the wearing of gloves, UP included utilisation of personal protective equipment (PPE) such as gowns and masks (depending on procedure being performed) and safe handling of sharps. In 1996, the CDC revised their IC practice guidelines and UPs were superseded by a two-tiered approach to IC practice; Standard and Transmission-based precautions (Lam, 2011) (Table 2.2).

Table 2.2 Standard and transmission-based precautions

<table>
<thead>
<tr>
<th>Precaution</th>
<th>Definition</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Precautions</td>
<td>Work practices that are applied to all patients, regardless of their perceived or confirmed infectious status, ensuring a basic level infection prevention and control to minimise risk to both patients and HCWs.</td>
<td>Hand hygiene</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use of personal protective equipment (PPE)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appropriate handling and disposal of sharps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aseptic techniques</td>
</tr>
<tr>
<td>Transmission-based Precautions</td>
<td>Extra work practices in situations where standard precautions alone may be insufficient to prevent transmission - tailored to the particular infectious agent and its mode of transmission e.g. droplet precautions, airborne precautions</td>
<td>Isolation rooms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Patient cohorting (placing patients concurrently infected with same microorganism in same room)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wearing specific PPE</td>
</tr>
</tbody>
</table>

Source: National Health and Medical Research Council (2010)
Despite the advances in health care afforded by the advent of antibiotics and vaccinations, advances in sanitisation and data collection, new and emerging microbial pathogens still pose a major threat to public health worldwide (Gamage, Kralovic, & Roselle, 2010).

### 2.3.2 Contemporary infection prevention and control (IC) practice

In today’s climate of rapidly escalating HAIs and ever-growing number of immuno-compromised patients, IC has become a “fundamental aspect of clinical practice” (Prieto & Clark, 2005, p. 513). A landmark study by Haley et al. (1985) demonstrated that infection rates could effectively be reduced by as much as 32% with infection surveillance and control programs. Many strategies have been employed in an attempt to curb the rate of HAIs in the hospital environment, including national educational programs such as those in Scotland (‘Cleanliness Champions’), and England and Wales (‘cleanyourhands’ campaign) (Mathai et al., 2011). Despite these interventions a significant, sustainable reduction in HAIs has not been achieved.

In addition to hand hygiene, infection prevention and control in the healthcare environment encompasses a range of practices including environmental cleaning and aseptic technique, all of which have linked to a reduction in HAI rates (Rutala & Weber, 2013; Rosenthal, Guzman & Safdar, 2005) (Table 2.3)
Table 2.3 The range of IC measures used to prevent and control HAIs

<table>
<thead>
<tr>
<th>IC measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare environment hygiene</td>
<td>HCWs’ hands/gloves are just as likely to acquire micro-organisms such as MRSA and <em>C. difficile</em> from hospital room surfaces as from direct patient contact (Stiefel et al, 2011; Guerrero et al, 2012). Proper cleaning and disinfection of surfaces in hospital rooms therefore plays a key role in the prevention of transmission and infection of HAIs (Rutala &amp; Weber, 2013).</td>
</tr>
<tr>
<td>Intravascular and indwelling device management</td>
<td>Contemporary guidelines for the prevention of HAIs include comprehensive protocols for the appropriate use, selection, insertion and management of short-term indwelling catheters. Careful and ongoing assessment of the necessity of a catheter and education for patients, relatives and HCWs are also recommended (Loveday, 2014).</td>
</tr>
<tr>
<td>Aseptic technique</td>
<td>Asepsis refers to the absence of pathogenic or disease-causing organisms (Perry &amp; Potter, 2006). Aseptic techniques are methods employed to maintain asepsis by “preventing transmission of microorganisms to wounds and other susceptible sites” (Preston, 2005, p. 541). Aseptic non-touch technique (ANTT), for example, is a standardized approach to aseptic practice that prevents contamination by using sterile products and “ensuring that only the part of the equipment not in contact with the susceptible site is handled” (Hart, 2007, p. 44).</td>
</tr>
<tr>
<td>Surveillance</td>
<td>National surveillance systems were first introduced in the United States in 1970 (Jarvis, 2003). The CDC National Nosocomial Infections Surveillance system (NNIS) saw the implementation of a standardised approach to the collection, collation, analysis and dissemination of infection rate data and subsequent reduction in HAI rates (Jarvis, 2003). More broadly, Mitchell &amp; Gardner (2014) argued that surveillance should be viewed as an integral part of any HAI prevention framework as it can be used to “inform, influence and evaluate the physical, social and psychological aspects of HAI prevention” (p. 537). For example, hand hygiene compliance data collected as part of the national hand hygiene initiative in Australia can be used to inform healthcare workers of their adherence to correct hand hygiene and to correct assumptions that individuals may have about their own practices or the way interventions affect patient outcomes (Ryan et al., 2012).</td>
</tr>
</tbody>
</table>
Governance

Policies related to infection prevention and control are “evidence based and aim to inform best practice, thereby optimizing patient care and safety” (Pegram & Bloomfield, 2015, p. 38). Thus it is important that all HCWs have an understanding of these policies and how they apply to practice. At the national level, public reporting and target setting have been among the policy approaches used by healthcare institutions to improve healthcare quality. In the healthcare setting, these ‘targets’ are intended to provide a focus for action and subsequent improvement and are usually set nationally by government for a number of KPI's that reflect health policy priorities. HAI rates such as *C. difficile* (CDI) infection rates, for example, are used for performance management of hospitals to indicate healthcare quality (Fitzpatrick & Riordan, 2016). Allard & Bleakley (2016) warned that, in the healthcare setting, targets may “become a distraction, shaping practices of accommodation rather than implementation…as team members focus on throughput rather than quality of care” (p. 804). At a local level, infection control policies are used to inform direct patient care and to provide guidance on range of processes including clinical waste disposal, decontamination of equipment, of waste and care of indwelling devices (Pegram & Bloomfield, 2015).

Use of other methods to reduce the spread of infection, including decolonisation approaches

Patient surveillance and screening can provide early identification of HAI patients (Sexton et al., 2006). For example, universal admission screening programs for MRSA incorporating isolation and decolonisation, combined with antibiotic stewardship, have been found to significantly decrease the prevalence of *Staphylococcus aureus* bacteraemia (Lawes et al., 2012). These screening programs, however, are costly and the costs avoided by a reduction in MRSA infections does not always offset the cost of the screening program (Murthey et al. 2012).
Hand hygiene is widely recognised as the single-most effective means of reducing the spread of HAIs (Gould et al., 2007; Kampf, Löffler, & Gastmeier, 2009). A number of studies have identified a direct association between HCWs’ hand hygiene practices and HAI infection rates (Girou et al., 2006; Rosenthal et al., 2005). For example, Pittet et al. (2000) monitored hand hygiene compliance in a large Swiss teaching hospital, bi-annually, over a three-year period (1994–1997). Over the study period a total of 20,082 opportunities for hand hygiene were observed. Hand hygiene compliance increased significantly from 47.6% in 1994 to 66.2% in 1997 (p<0.001) and nosocomial infection rates concomitantly decreased from 16.9% to 9.9% (p=0.04). Compliance improvement, however, varied between HCW groups, with significant improvement noted in the nursing and nursing assistant staff but little improvement occurred in the medical staff. Moreover, while an overall increase in hand hygiene compliance was achieved; lower compliance rates were recorded for higher risk activities compared with activities associated with medium or low risk of (microorganism) transmission. The reason for this disparity was not explained; however, it is possible that the higher risk activities were occurring in higher demand wards. Similarly, a smaller French study by Girou et al. (2006) observed hand hygiene practices in a rehabilitation hospital over two consecutive years (2004 and 2005) and screened patients for MRSA during those periods. Multiple linear regression analysis identified a statistically significant association between hand hygiene compliance and MRSA rates, with higher rates of hand hygiene compliance resulting in lower rates of MRSA infection.

The Australian Guidelines for the Prevention and Control of Infection in Healthcare (Australian Medical Health and Research Council, 2010) state that “if successfully implemented, standard and transmission-based precautions prevent any type of infectious agent from being transmitted” (p. 21). So, in theory, it should be relatively simple to prevent many of these infections. Despite the increased awareness of HAIs and the crucial role of IC procedures, there is a substantial body of evidence to indicate that HCWs are inconsistent in their application of IC precautions (Gammon & Gould, 2005) and that hand hygiene practice, in particular, is sub-optimal in most healthcare settings (Allegranzi & Pittet, 2009). Gammon & Gould’s (2005) review of the published literature between 1990 and 2003 found hand hygiene compliance averaged 52%. Conversely, adherence to glove use precautions averaged 73% while compliance with sharps disposal policy could be as high as 91%. It could be hypothesised that these findings are directly related to the HCWs’ perception, and thus understanding, of risk. Sub-optimal knowledge
of IC principles and standards has also been reported in other healthcare settings. In a survey of Australian paramedics (Shaban, 2006), for example, only 41.6% (n=523) of the participants identified hand washing as the primary IC strategy to reduce the risk of cross-infection. More participants (43.6%) incorrectly chose ‘use of gloves’ as the primary strategy while some participants (n=71) reported that they ‘did not know’. These responses may have been reflective of and influenced by the practical difficulty for paramedics of hand washing while ‘out on the road’.

The majority of studies in this area, however, have used an overt observational methodology or self-reported questionnaire. It is therefore likely that these findings are an overestimate of the true compliance rates as participants are self-reporting (Donaldson, Fisher, Scharmer, Ng, & Tambyah, 2008). This is further compounded by the Hawthorne effect whereby awareness that trained IC personnel are acting as observers may cause participants to change their hand-hygiene practices (Haas & Larson, 2007). For example, Srigley, Furness, Baker, and Gardam (2014) reported a threefold increase in the rate of hand hygiene at hand-rub and soap dispensers that were visible to auditors compared with dispensers that were not visible to auditors. This has also been demonstrated when audits are conducted by staff members who are not part of the IC team. Donaldson et al. (2008), for example, utilised trained medical students rather than IC personnel to conduct hand hygiene audits in a Singapore hospital and reported a compliance rate of only 16% (355/2190; 95% CI, 14.7-17.8), much lower than the previously recorded 70% adherence for audits undertaken by IC staff.

2.3.3 IC in Australia

Prior to 1985, each state and territory in Australia had its own IC association. These were brought together under the banner of the Australian Infection Control Association in 1985 (Australasian College for Infection Prevention and Control, 2015). In 2008, the Australian Commission on Safety and Quality in Health Care (ACSQHC) established Hand Hygiene Australia (HHA) and the National Hand Hygiene Initiative (NHHI) as a national approach to improving hand hygiene and monitoring its effectiveness (Ryan et al., 2012). Part of this initiative was the implementation of the ‘5 Moments for Hand Hygiene’ campaign, a campaign based on the World Health Organisation initiative ‘My 5 Moments for Hand Hygiene.’ This initiative identifies five critical times when HCWs should perform hand hygiene to effectively interrupt microbial transmission during patient care (Figure 2.2).
A second component of the NHHI was development of an online learning package specifically aimed at clinical HCWs involved in direct patient care. In some hospitals and regions, the completion of the package has been introduced as a prerequisite for all HCWs prior to commencing employment. A review of the national Hand Hygiene Australia audit data reveals a steady increase in hand hygiene compliance since the inception of the ‘5 Moments’ initiative, with the average compliance rate rising from 68.1% in the first audit period in 2009 to 81.9% in 2014. Although the trend of increasing compliance is promising, these figures are still sub-optimal if 100% compliance is the goal. Closer examination of the audit data broken down by health worker group reveals that nursing and midwifery staff consistently record the highest rate of compliance, whilst medical practitioners consistently record much lower rates (Table 2.4); this is consistent with the data obtained in a systematic review of hand hygiene undertaken in 2010 (Erasmus et al., 2010). Moreover, the compliance rate of both groups of students is comparable with practitioners in their profession. These data suggest that the practising HCWs have a strong influence on the IC behaviours of healthcare students.
Table 2.4 Hand hygiene compliance rate by HCW group

<table>
<thead>
<tr>
<th>HCW group</th>
<th>Total moments observed</th>
<th>Correct moments observed</th>
<th>Compliance rate*</th>
<th>Moments observed</th>
<th>Correct HH moments</th>
<th>Compliance rate*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse/midwife</td>
<td>21055</td>
<td>16277</td>
<td>77.3%</td>
<td>265976</td>
<td>314035</td>
<td>84.7%</td>
</tr>
<tr>
<td>Student nurse/midwife</td>
<td>15979</td>
<td>11541</td>
<td>72.2%</td>
<td>18334</td>
<td>14754</td>
<td>80.5%</td>
</tr>
<tr>
<td>Student doctor</td>
<td>1885</td>
<td>1169</td>
<td>62.0%</td>
<td>2195</td>
<td>1640</td>
<td>74.7%</td>
</tr>
<tr>
<td>Medical practitioner</td>
<td>43457</td>
<td>25303</td>
<td>58.2%</td>
<td>64300</td>
<td>44314</td>
<td>68.9%</td>
</tr>
</tbody>
</table>

*Compliance rate = Correct moments as a percentage of total moments observed


According to the Australian Commission on Safety and Quality in Health Care (2009), the ‘underlying reason for undertaking the Hand Hygiene Initiative is to reduce the risk of healthcare providers inadvertently spreading infections between patients’ (p. 11). Despite this, the HHA ‘5 Moments’ audit data shows that HCWs are much less likely to practice hand hygiene before a procedure and before touching a patient than after (Table 2.5).

Table 2.5 Compliance rates of nursing and midwifery staff by Moment (2014 data)

<table>
<thead>
<tr>
<th>Moment</th>
<th>Action</th>
<th>Total moments</th>
<th>Correct moments</th>
<th>Compliance rate*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Before touching a patient</td>
<td>91569</td>
<td>74206</td>
<td>81.0%</td>
</tr>
<tr>
<td>2</td>
<td>Before a procedure</td>
<td>32290</td>
<td>27513</td>
<td>85.2%</td>
</tr>
<tr>
<td>3</td>
<td>After a procedure or body fluid exposure risk</td>
<td>40205</td>
<td>36323</td>
<td>90.3%</td>
</tr>
<tr>
<td>4</td>
<td>After touching a patient</td>
<td>91468</td>
<td>80788</td>
<td>88.3%</td>
</tr>
<tr>
<td>5</td>
<td>After touching a patient’s surroundings</td>
<td>58503</td>
<td>47146</td>
<td>80.6%</td>
</tr>
</tbody>
</table>


Similar patterns of increased hand hygiene compliance after patient procedures compared with before patient procedures have been reported internationally (Bota, Ahmed, Jamali, & Azeem, 2013; Jenner et al., 2006; Randle, Firth, & Vaughan, 2013). For example, Jenner et al. (2006) conducted a hand hygiene audit of practising nurses working on the acute medical and surgical wards of an English hospital. In that study, hand hygiene was
performed on only 14% of occasions before wound care compared with 86% of occasions after wound care.

2.3.4 Barriers to effective IC practice

There is a large body of research exploring barriers to effective IC practice. A litany of self-reported factors such as heavy workloads, skin-irritation by hand-hygiene agents and lack of belief in the impact of IC have been cited in the literature as contributing to poor hand hygiene practice (Table 2.6).

Table 2.6 Self-reported barriers to hand hygiene

<table>
<thead>
<tr>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand hygiene agents cause irritations and dryness</td>
</tr>
<tr>
<td>Sinks are inconveniently located/shortage of sinks</td>
</tr>
<tr>
<td>Lack of soap, paper, towels</td>
</tr>
<tr>
<td>Often too busy/insufficient time</td>
</tr>
<tr>
<td>Understaffing/overcrowding</td>
</tr>
<tr>
<td>Patient needs take priority</td>
</tr>
<tr>
<td>Hand hygiene interferes with HCW-patient relationship</td>
</tr>
<tr>
<td>Low risk of acquiring infection from patients</td>
</tr>
<tr>
<td>Wearing of gloves/belief that glove use makes hand hygiene unnecessary</td>
</tr>
<tr>
<td>Lack of knowledge of guidelines/protocols</td>
</tr>
<tr>
<td>Not thinking about/forgetfulness</td>
</tr>
<tr>
<td>No role model from colleagues or superior(s)</td>
</tr>
<tr>
<td>Scepticism</td>
</tr>
<tr>
<td>Disagreement with recommendations</td>
</tr>
<tr>
<td>Lack of awareness of definitive impact of improved hand hygiene on nosocomial infection rates</td>
</tr>
</tbody>
</table>

Source: Huggonet and Pittet (2000, p. 351)

The broader literature would suggest that the factors listed in Table 2.4 are further compounded by the HCWs’ professional attitudes and beliefs, perceived risk of infection and workplace culture (DeJoy, Gershon, & Schaffer, 2004; Loveday, Lynam, Singleton, & Wilson, 2014; Whitby, McLaws, & Ross, 2006). Statistical modelling undertaken by Whitby et al. (2006) found that one significant predictor of hand washing behaviour was a personal belief in the benefit of the activity. The perceived importance of hand washing was reportedly based on nurses’ assessment of the risk of infection:
Nurses believed that patients are a potential reservoir of infection because patients have little understanding of infection transmission. Nurses assessed the risk of infection due to contact with individual patients based on several criteria including the patient’s diagnosis, physical appearance, and perceived general cleanliness (p. 486).

These findings were supported by Wynaden et al. (2006) who interviewed Australian HCWs (doctors and nurses) about their perceptions of IC. For some HCWs, a self-perceived ability to accurately assess risk of infection based on patient factors (familiarity with the patient and the nature of known infectious disease diagnoses) along with knowledge and fear of “catching something” (Wynaden et al., 2006, p. 115) was used as an informal decision-making process for balancing the need for IC with heavy workloads. Therefore, it is feasible that any misperceptions about microorganisms (e.g. mode of transmission and/or potential pathogenicity) could result in incorrect assessment of risk and subsequent inappropriate or non-application of IC precautions, thereby posing a safety risk to both HCWs and patients. In a recent observational study, for example, Loveday et al. (2014) reported inappropriate glove use in 40% of occasions observed. Moreover, in almost 25% of the observations undertaken, HCWs’ gloved hands touched more than five objects in the patient’s surroundings before performing a clinical procedure. This is a particular concern given microorganisms MRSA, Clostridium difficile, and VRE can all survive on surfaces in the hospital environment for extended periods of time (Dancer, 2009). Inanimate surfaces in patient rooms frequently become contaminated with these micro-organisms and HCWs can easily contaminate their hands or gloves by touching any of these surfaces (Boyce, Potter-Bynoe, Chenevert, & King, 1997).

Despite a growing body of research in the area of IC practice, the evidence to identify the most effective strategies to improve hand hygiene compliance is inconclusive (Gould, Drey, Moralejo, Grimshaw, & Chudleigh, 2008). Pittet (2001) suggested that any intervention aimed at improving compliance with IC policies requires a multi-faceted approach, and factors such as education and behaviour need to be examined. The efficacy of education programs and interventions, however, has been extremely variable. Whilst some programs have seen an increase in hand hygiene compliance and/or reduction in infection rates (P. Johnson et al., 2005; Perkins, Wayne, Hopes, Corn, & Kim, 2009),
other studies have reported no significant post-intervention improvement in the IC
practices of nurses (Dorsey, Cydulka, & Emerman, 1996; Gould & Chamberlain, 1997).
The methodologies used by many studies in this area, however, have been criticised for
lack of rigour due to the absence of control groups (Backman, Zoutman, & Marck, 2008)
and failing to minimise bias in the research design (Huis et al., 2012). Further, whilst
many of the studies have reported a short-term improvement in compliance following the
intervention, long-term retention rates are relatively unquantified, although some longer-
term sustainable improvements have been reported. Pessoa-Silva et al. (2007), for
example, reported sustained improvement in hand hygiene compliance rates in a neonatal
ward for a nine-month follow-up period following implementation of an educational
campaign; however, the compliance rate, whilst improved, was still only 64%.
Conversely, a ‘safety stand-down’ intervention trialled in an American hospital
(Cunningham, Brilli, McClead, & Davis, 2015) reported an increase in hand hygiene
compliance, from less than 65% to greater than 95%, which was sustained for a three-
year period. The ‘safety stand-down’ involved a hospital-wide 15-minute-long cessation
of all nonessential activity across the hospital, during which time action plans to improve
hand hygiene compliance were discussed and an action plan completed. After the stand-
down, hand hygiene compliance monitoring was increased and non-compliers were
required to explain their non-compliance to senior hospital administration. Although the
intervention included additional components – such as increased availability of hand gel
dispensers – the authors of that study suggested that the behavioural motivation (holding
HCWs accountable for their actions) was central to the success of that intervention.

The multi-faceted nature of the aforementioned interventions makes it difficult to assess
the impact of individual components of the program; however, they do suggest that
simply improving HCWs’ knowledge of IC policies will not achieve the desired long-
term improvements in their IC intentions and behaviours.

2.4 IC knowledge

In a 2007 editorial, Collignon, Grayson, and Johnston (2007, p. 4) posed the question
“How many Australian health care workers and students, all with varying goals and
agendas, understand and practise IC principles well enough to protect their patients from
cross-infection?” It could be argued that a high standard of knowledge of IC precautions
will, in itself, minimise transmission of microorganisms and cross-infection of patients.

Few studies however, have found a correlation between knowledge of IC policies and
self-reported compliance (Chan et al., 2002). Several international studies have found HCWs’ knowledge of IC policies to be inadequate (M. F. Chan, Ho, & Day, 2008; Gammon & Gould, 2005; Roth, Parker, Wale, & Warrier, 2014; Shaban, 2006). R. Chan et al. (2002), for example, examined the knowledge and compliance of nurses in a Hong Kong hospital (n=306) and, while good knowledge regarding some aspects of IC – such as hand hygiene and correct disposal of sharps – was reported, there was a concerning level of misconception regarding appropriate application of universal precautions, particularly in relation to body fluids such as tears, saliva and urine/faeces. An Australian study by Roth et al. (2014) assessed HCWs’ (n=146) knowledge of risk factors, prevention and management of *C. difficile*, which established that only 2.7% of respondents correctly identified all major risk factors for *C. difficile* infection. In the same study, less than 70% of the nursing staff and 49% of doctors identified the correct IC practices required during and after patient interaction to prevent transmission of *C. difficile* spores. Similarly, variations in nursing students’ IC knowledge, including discrepancies between knowledge of standard and transmission-based precautions, have been reported in a number of different countries including Belgium, Wales and Australia (Hinkin & Cutter, 2014; Mitchell et al., 2014; Vandijck, Labeau, De Somere, Claes, & Blot, 2008; Wu, Gardener, & Chang, 2009). For example, Wu, Gardener and Chang’s (2009) survey of fourth-year Taiwanese nursing students (n=175) found that most respondents had good knowledge relating to the application of standard precautions, including use of mask and gloves and correct disposal of sharps. Less than one-fifth of the participants, however, recognised that additional precautions were required when in contact with patients with specific infectious diseases such as HIV. In their Australian study, Mitchell et al. (2014) reported a similar disparity final-year nursing students’ knowledge of IC precautions; while students were very familiar with standard precautions, their knowledge of transmission-based precautions was much weaker.

2.5 Pre-registration nursing education in Australia

Sherwood (2011) acknowledged the central role of undergraduate education in transforming safety practices in the health care profession:

> Education is regarded as the bridge to quality, the link to creating the changes needed in the system. Aims to improve quality and safety demand transformation of health professions education by integrating quality and safety science into curricula (Sherwood, 2011, p. 227).
In Australia, as in many other countries, the format and content of nurse education has changed dramatically over the years. Prior to the late 1980s, nurse education was hospital-based in the form of an apprenticeship system. Nurses in training were junior employees of the relevant health service and thus formed part of the workforce. Training was undertaken on the job and ‘supplemented by blocks of theory in a ‘school of nursing’ (Bentley, 1996, p. 131). The concept of a nurse education system being one where student nurses should be given student status and be under the control of the training authority rather than under the control of the health service was first recommended by the Working Party on the Recruitment and Training of Nurses (1947); however, it would be another 40 years before these recommendations would come to fruition (Bentley, 1996).

The implementation of Project 2000 in England in 1989 saw the primary responsibility of nurse education move from health providers to tertiary education providers. In Australia, the transfer of nurse education to the university sector was completed in 1993 (Beadnell, 2006). Australian pre-registration nursing courses are now based on a competency-based framework and are traditionally three years (six semesters) in duration, although other models (such as a two-year / six-semester fast-track program) are now being offered by some universities. To be eligible for registration as a nurse upon graduation, students must undertake their pre-registration training in a program accredited by the Australian Health Practitioner Regulation Agency (AHPRA) and, prior to graduation, demonstrate the achievement of the Nursing and Midwifery Board of Australia (NMBA) national competency standards for the Registered Nurse (NMBA, 2013). These standards for practice define competence as “the combination of skills, knowledge, attitudes, values and abilities that underpin effective and/or superior performance in a profession/occupational area” (p. 10). The competencies fall into four domains:

1. Professional practice
2. Critical thinking and analysis
3. Provision and coordination of care

One competency statement is specifically related to IC: ‘maintains standards for infection control’ (p. 8).
Chapter 2: Literature review

Competency-based models are now being utilised for the undergraduate/pre-registration education in a number of health professions including pharmacy, physiotherapy and dentistry. Competency-based education (CBE) “focuses on the desired performance characteristics of health care professionals … by establishing observable and measurable performance metrics that learners must attain to be deemed competent” (Gruppen, Mangrulkar, & Kolars, 2012, p. 43). The central tenet of CBE is that competency outcomes inform both the curriculum and assessment, in contrast to traditional curriculum models where the curriculum informs both the educational objectives and assessments. Figure 2.3 depicts the pyramid of competency development proposed by Miller (1990). The bottom section of the pyramid (‘knows’) reflects the knowledge base that is required by a health care professional. To develop competency, the learner must also ‘know how’ to use that knowledge. These two stages in competency development are feasible educational goals for early learners, whereas more advanced learners could reasonably be expected to demonstrate a skill (‘shows how’) and apply the skill in a variety of clinical practice scenarios (‘does’) (Gruppen et al. 2012).

![Miller's pyramid of competency assessment](image)

**Figure 2.3. Miller's pyramid of competency assessment**

Source: Miller (1990)

Table 2.7 depicts an adapted version of Miller’s (1990) pyramid of competency development as could be applied to IC. Theoretical microbiology and epidemiology form
the knowledge base and IC procedures such as hand hygiene and aseptic technique are the fundamental skills.

Table 2.7 Miller’s pyramid of educational states applied to IC

<table>
<thead>
<tr>
<th>Stage</th>
<th>Educational state</th>
<th>Educational goals/learner outcomes</th>
<th>Examples of IC competency*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Knows</td>
<td>Recitation of facts</td>
<td>Describe the normal microbial flora of the body</td>
</tr>
<tr>
<td>2</td>
<td>Knows how</td>
<td>Applied knowledge</td>
<td>Identify which type of precaution category is needed based on the route of transmission of various types of organisms</td>
</tr>
<tr>
<td>3</td>
<td>Shows</td>
<td>Demonstration of skill</td>
<td>Perform aseptic techniques correctly</td>
</tr>
<tr>
<td>4</td>
<td>Does</td>
<td>Performance/behaviour</td>
<td>Apply policies, procedures and guidelines relevant to infection control when presented with infection control cases. Act as a role model to HCWs, patients and visitors by adhering to IC principles</td>
</tr>
</tbody>
</table>

* Competency statements sourced from Liu, Curtis and Crookes (2014)

Competence is recognised as “multi-dimensional and dynamic ... [and] changes with time, experience and setting” (Frank et al., 2010, p. 641). As such, student competency development is likely to be influenced by multiple factors both internal and external to the curriculum.

2.5.1 Science in the nursing curriculum

Bioscience subjects, which commonly incorporate anatomy, physiology, microbiology, chemistry and pharmacology, are a central component of pre-registration nursing curricula. The importance of bioscientific knowledge as a foundation for safe and effective nursing practice is widely acknowledged in the literature (Benner, 2001; Birks, Ralph, Cant, Hillman, & Chun Tie, 2015; Clancy, McVicar, & Bird, 2000). The application and relevance of this knowledge to clinical practice has been illustrated in a number of qualitative studies (Jordan & Reid, 1997; Prowse & Lyne, 2000). Despite the
well-recognised role of bioscience in the preparation of nursing students however, the AHPRA accreditation guidelines do not currently define the amount or level of science-based content (including microbiology) to be included in Australian pre-registration nursing curricula. Consequently, there is considerable disparity in the proportion of the curriculum and teaching hours devoted to biosciences across different higher education institutions. For example, Logan and Angel (2014) calculated the proportion of explicit science content in Australian pre-registration nursing programs in 2012 to range from 8–25% of the curriculum, reflecting an estimated overall decrease of 4% compared with 2007. The authors did note, however, a trend towards incorporation of some bioscience content into nursing subjects over that time period that made it more difficult to explicitly identify science content in isolation from other generic nursing content. A similar scenario exists with pharmacology content in pre-registration nursing curricula. When Manias (2009) conducted a web-based audit of pharmacology content in Australian nursing programs, she found that of the 30 undergraduate programs offered, only seven presented pharmacology as a stand-alone subject. Conversely, seven programs integrated the pharmacology with other subjects such as microbiology and 16 programs appeared to not contain any pharmacology content. An earlier study by Bullock and Manias (2002) found that both the amount and timing of pharmacology content varied considerably among institutions.

According to Logan (2008, p. x), the “minimalist provisions for science within nursing programmes contrast with the detailed information regarding clinical practicums and sub-discipline areas of nursing that are expected to be included in an undergraduate programme.” Concerns about the limited time devoted to biosciences in the curriculum and associated implications for professional practice have been raised by nursing graduates and bioscience educators alike (Davis, 2010; Taylor et al., 2015). Davis (2010) surveyed registered nurses (n=42) about the different components of bioscience in the pre-registration curriculum (anatomy, physiology, microbiology, pharmacology and biochemistry) and the adequacy of bioscience content in relation to their preparation for nursing practice. A total of 40.5% of the respondents in that study perceived that the bioscience in their pre-registration training had not prepared them adequately for clinical practice. Furthermore, whilst the coverage of anatomy and physiology was perceived to be ‘adequate’ by the majority of participants (54.8%), the coverage of microbiology was reported as limited (52.4%) or very limited (26.2%).
2.5.2 Student perceptions of science

Nursing students’ ‘science-anxiety’ and perceptions of science being more difficult than other areas of the curriculum is an ongoing theme in nursing education literature (Caon & Treagust, 1993; Craft, Hudson, Plenderleith, Wirihana, & Gordon, 2013; Jordan, Davies & Green, 1999; Nicoll & Butler, 1996). Previous research has identified a variety of factors thought to contribute to the poor performance of nursing students in bioscience subjects. These include perceptions of difficulty and irrelevance (Caon & Treagust, 1993; Jordan et al., 1999; Thornton, 1997), low science self-efficacy (Andrew, 1998) and lack of previous biology study (McKee, 2002).

Student perceptions of science have been linked to academic achievement in their first bioscience subject. Caon and Treagust (1993) surveyed a cohort of Australian first-year nursing students about the perceived difficulty of the science course. Performance in the first nursing science exam was used to divide data into three student achievement groups (‘high’, ‘middle’ and ‘low’). Exam performance was then correlated with students’ perceptions of difficulty. Significant differences existed between the three groups with students who perceived science to be too difficult demonstrating significantly lower exam results. Students in the ‘low’ group also had much lower perceptions of the relevance of science to nursing. The authors concluded that unsuccessful students perceived science as being difficult and not particularly relevant, which may hinder their ability to study effectively. Most studies in this field have assessed student perceptions after studying one or more units of bioscience; thus, it is difficult to know whether these perceptions of difficulty existed prior to commencement of the subject. Data from a more recent Australian study, however, indicates that nursing students enter their program with pre-formed perceptions of bioscience being more difficult than other nursing subjects (Craft et al., 2013). No studies were found that elicited pre-registration BN students’ pre-commencement perceptions and understanding of microbiology specifically, nor how these perceptions and knowledge change over the duration of the pre-registration training (if at all).

Lack of background science knowledge is another factor which has been cited as an underlying reason for nursing students’ struggle with science subjects. The Australian education system has experienced a notable, steady decline in the proportion of students enrolling in science subjects (chemistry, biology and physics) in the final year of secondary school (Ainley, Kos, & Nicholas, 2008), indicating that there may be an
increasingly high proportion of students entering Australian pre-registration nursing programs with little or no previous science study. Whyte, Madigan, and Drinkwater (2011) found that, at one Australian university, less than half of the students entering the pre-registration nursing program had studied biology previously. Crane and Cox (2013, p. 30) argued that a poor pre-enrolment science background not only means a lack of background knowledge, but that “[t]he majority of [nursing] students will commence their degrees with little interest in science; lacking confidence in their abilities to do science; and having made conscious decisions to avoid science-based subjects in the past”, all of which can potentiate their science-anxiety and negatively influence all aspects of their science learning.

Student conceptions of science are an important consideration for science educators:

… students do not come into science instruction without any pre-instructional knowledge or beliefs about the phenomena and concepts to be taught. Rather, students already hold deeply rooted conceptions and ideas that are not in harmony with the science views or are even in stark contrast to them (Duit & Treagust, 2003, p. 671).

Student conceptions of the subject and/or content (i.e. what the student believes the subject/content will be about) can influence the learning approach adopted. When, for example, Minasian-Batmanian, Lingard, and Prosser (2006) examined first-year health science students’ conceptions of a compulsory service-taught biochemistry subject with no pre-requisite knowledge requirement, over half of the students in that study were identified as having ‘fragmented’ conceptions (simple ideas about chemistry and biology as unrelated, isolated parts, unrelated to the human body). Moreover, students with fragmented conceptions were more likely to adopt surface approaches to learning compared with students with a more cohesive understanding of the nature of biochemistry (p=0.014). This is particularly relevant for bioscience subjects in nursing programs as they are offered as service-taught subjects in many Australian higher education institutions (Logan, 2008). According to Davey (1997), “learning clinical nursing skills should involve the use of a deep learning approach where principles underlying the use of a given skill are clearly understood” (p. 106). It could therefore be argued that student conceptions of microbiology may influence the learning approach adopted and subsequent application of those principles in clinical practice.

Misconceptions about scientific concepts can pose a further barrier to the learning of science (Committee on Undergraduate Science Education, 1997). Student misconceptions
of scientific concepts such as heat, energy and astronomy are documented in the science education literature (Danaia, Fitzgerald, & McKinnon, 2013). So too are nurses’ misconceptions of scientific principles such as the relationship between height, pressure change and fluid flow (Wilkes & Batts, 1998). There is, however, a paucity of literature regarding nursing student conceptions and misconceptions of microbiology specifically.

2.5.3 Microbiology in the nursing curriculum

According to O’Brien, Richards, Walton, Phillips, and Humphreys (2009, p. 174) “appropriate knowledge is a starting point for improving practice and instilling the correct attitude to infection prevention”. This view is supported by the CDC Guidelines (Siegel et al., 2007), which state that HCWs need to understand the scientific rationale for the principles and practices of IC in order to apply procedures correctly. From this, it could therefore be extrapolated that an understanding of microbiology could be considered foundational knowledge for IC practice (Roark, 2005). As stated previously, the foundational microbiology component of undergraduate nursing curricula is commonly situated in the general bioscience subjects in the first-year curriculum (Birks et al., 2015; Logan, 2008). It has been reported that both nursing students and educators percieve microbiology to be less relevant and more difficult to learn than other bioscience disciplines. Courtenay (1991) surveyed a group of third-year nursing students (n=140) and nurse teachers (n=43) regarding their perceptions of subjects from the biological sciences. When asked to rank the subjects anatomy, physiology, psychology, pharmacology, microbiology and sociology in order of importance in the preparation of a registered nurse, over half of the nursing students (51%) considered anatomy to be the most important subject compared with 26% of their teachers. In contrast, just under half of the teachers (41%) considered psychology the most important subject. Both the teachers and the students ranked microbiology the least important subject area. Similarly, Davis (2010) surveyed practising nurses (n=42) perceived relevance of anatomy, physiology, microbiology, pharmacology and biochemistry to the pre-registration nursing program. Over 40% of the participants in that study (Davis, 2010) perceived both anatomy and physiology to be ‘highly relevant’, while only 19% of the participants perceived microbiology to be ‘highly relevant’. Moreover, the proportion of ‘not relevant’ rankings given for microbiology was more than four times higher than that for anatomy (10.1% versus 2.4%).
There is evidence to suggest that microbiology topics in bioscience subjects are being given limited priority within Australian nursing curricula compared with other bioscience components. Birks et al. (2015) conducted a survey of academics (n=30) teaching science to nursing students in Australian higher education institutions. Respondents were asked to indicate the priority given, in the program they are associated with, to a list of nominated bioscience areas and topics including anatomy, physiology, pathophysiology, microbiology and chemistry. All of the topics listed under the microbiology domain, including disease transmission and control of microbial growth, were reported by academics as being given ‘medium’ priority in contrast to the topics listed under the ‘anatomy’ domain, almost all (10/11) of which, were being given ‘high’ priority. In an already crowded curriculum (Dalley, Candela, & Benzel-Lindley, 2008), the areas considered lower priority are likely then to be given limited coverage which could make the applicability of microbiology to nursing practice seem less visible. The variation in breadth and coverage of microbiology across higher education institutions, as well as the impact of that variation on graduate preparedness for IC practice, remains relatively unquantified.

2.6 Putting knowledge into practice

If students cannot make use of the knowledge they have been taught, if that knowledge becomes inert and inaccessible, then why teach it in the first place? (D’Eon, 2006, p. 5)

Dreyfus and Dreyfus (2009, p. 1) asserted that nursing practice “encompasses both the scientific knowledge acquired during pre-registration training and the ‘rules of thumb’ that are largely acquired during on-the-job training and experience.” Pre-registration nurse education includes both conceptual and practical elements to prepare graduates for the transition to clinical practice. The combination of these learning experiences has an influence on their professional relationships and sense of self (Figure 2.4).
2.6.1 Clinical placements

The fundamental role of clinical placements in developing students’ confidence and competency in the clinical setting (Edwards, Smith, Courtney, Finlayson, & Chapman, 2004) is well recognized by educators and clinicians alike. According to Dall’Alba (2009), skillful practice requires not only knowledge and skills, but “transformation of the self through embodying the routines and traditions of the profession in question” (p. 37). The interactions that students undertake with staff and patients in an authentic healthcare setting provide not only a knowledge of the nursing profession but of themselves in the professional world (Danielson & Berntsson, 2007). Student experiences in the clinical setting, however, are not always positive. For some, the challenging nature of interactions with clinical supervisors (O'Mara et al., 2014), experiences of verbal and non-verbal bullying (Hakojärvi, Salminen, & Suhonen, 2014) and feelings of alienation can impact negatively on their self-esteem, motivation to learn and intention to enter the nursing profession (Levett-Jones & Lathlean, 2009).

Two international studies exploring nursing students’ experiences of IC during clinical placements (Gould & Drey, 2013; Ward, 2010) reported students frequently witnessing poor role modeling of IC practices, particularly hand hygiene, aseptic technique and
application of personal protective equipment (PPE) by clinical mentors and other HCWs. The most frequently reported example of poor practice in Gould and Drey’s (2013) UK study was failure of practicing nurses to clean hands between patients. Three quarters of the students in that study (292/388) also reported witnessing HCWs failing to apply appropriate isolation precautions such as PPE, with a similar proportion reportedly witnessing HCWs reusing items without cleaning between patients. Clinical placement experiences can have both positive and negative impacts on nursing students’ perceptions of IC practice. Some students report changing their own IC practices to ‘fit in’, while for others, witnessing poor IC practice can make them more aware of their own practices and instill a determination to ensure that their own practices are exemplary (Ward, 2010). It is feasible that a similar situation exists in Australia; however, no studies could be found which explicitly examined the impact of clinical learning experiences on nursing students’ preparedness and intentions, with regard to IC, in the Australian context.

2.6.2 Competency development

The ultimate aim of pre-registration nursing programs is to produce “clinically knowledgeable and competent graduates” (Stanley & Sherratt, 2010, p. 121). Since the transfer of nursing education into the higher education sector, however, there has been debate around graduates’ preparedness for the demands of the workplace (Candela & Bowles, 2008). New graduates have been reported as lacking both practice expertise and the confidence to deal with increasing acuity of illness (Duchscher, 2008). Concerns have also been raised about new graduates’ medication competence (Sulosaari, Kajander, Hupli, Huupponen, & Leino-Kilpi, 2012) and IC competence (Liu, Curtis, & Crookes, 2014). Parallels can be drawn between IC competence and medication competence. For example, IC practice is underpinned by microbiology knowledge. Similarly, medication competence is underpinned by pharmacology knowledge. Both pharmacology and microbiology are scientific disciplines and both are generally taught as part of larger bioscience subjects in the nursing curriculum. Limited pharmacology content in the nursing curriculum (Honey & Lim, 2008) and insufficient understanding of pharmacological principles (King, 2004) have been cited as factors which negatively impact on nursing graduates’ mediation competence. Similarly, it could be argued that limited microbiology content in the nursing curriculum may be a factor negatively impacting on IC competence.
Evans and Guile (2012, p. 113) claimed that “all forms of knowledge are contextual but not context-bound.” Thus, the ability to put knowledge generated in one context into practice in a new or different context relies on the re-contextualisation of that knowledge. These authors described four kinds of knowledge re-contextualisation that are central to the process of putting knowledge to work:

1. content re-contextualisation
2. pedagogic re-contextualisation
3. workplace re-contextualisation
4. learner re-contextualisation

Figure 2.5 shows how these re-contextualisation processes might apply to IC and microbiology education.

Figure 2.5. Putting microbiology knowledge to work framework
Source: Adapted from Evans and Guile (2012, p. 118)
Chapter 2: Literature review

The creation of curricula requires the movement of knowledge from its original context; that is, the healthcare setting into the higher education environment (content re-contextualisation). Pedagogic re-contextualisation then underpins the organisation of microbiology knowledge into structured learning activities. Workplace re-contextualisation allows students to see how that microbiology knowledge is “embedded in routines and [IC] protocols” (K. Evans & Guile, 2012, p. 119). Finally, learner re-contextualisation refers to the strategies that learners use to assimilate the theoretical knowledge (learnt in the classroom) with the applied knowledge learnt in the workplace as part of their clinical placements. Without these re-contextualisation processes, students’ ability to put their theoretical knowledge into work practice will be limited.

2.6.3 Microbiology: a theory–practice gap?

Whilst “graduate nurses begin their new career armed with a theoretical appreciation and beginner’s knowledge and understanding of what constitutes a competent clinical nurse” (Hengstberger-Sims et al., 2008, p. 70), they are not always able to apply the knowledge learnt to practice. The presence of a ‘theory–practice gap’, described by Burns and Poster (2008, p. 67) as “the dissonance between the knowledge and skills nursing students learn and use safely under supervision in the academic setting and those needed to function safely and independently in the practice setting” is widely acknowledged in nursing education literature (Billings & Kowalski, 2006; Cooper, 2007; Corlett, 2000; Flood & Robinia, 2014; Scully, 2011). Some authors, however, have contested the notion of a dichotomy between theory and practice arguing that both constructs coexist and are interdependent in practice settings; therefore, the two are inseparable (Higgs, Andresen, & Fish, 2004, p. 51). According to Mortell (2012), practice gaps arise when theory is perceived as “idealistic and impractical” (p. 1011) and as a result is ignored, as opposed to being unable to be applied to practice.

Thornton (1997) postulated that students’ integration and use of information is based on the perceived relevance of the content. Students tend to assess the relevance of science subjects in the curricula according to their interpretation of nursing itself, which for most is a hands-on practical profession. Thus, students often perceive an ‘artificial division’ between the science theory and clinical practice (Don, 2001, p. 6). Whilst there is some evidence of a theory–practice gap in the area of IC (Burnett, Phillips, & Ker, 2008; Mortell, 2012), there is a paucity of literature about the ability of students to apply microbiology knowledge specifically.
Workplace-based infection control professionals (ICPs) play a major role in supporting new graduates’ transition to practice and the provision of ongoing IC training. As experts in the field of infection control and the primary providers of ongoing IC education and training in the hospital setting, ICPs are well placed to provide information on graduate IC knowledge and practice. The majority of studies in this area, however, have ascertained the perceptions/perspective of nurse mentors. No study could be found that explored the adequacy of nursing students’ IC knowledge and practice from the perspective of IC professionals, a key stakeholder group, in light of their role in ongoing IC education and training of new nurse graduates.

It has been shown that HCWs’ capacity to implement appropriate IC precautions can be hampered by misconceptions about microbiological principles and inaccurate perceptions of risk (Gould, 1995; Prieto & Clark, 2005). A positive correlation (p<0.005) between knowledge of IC precautions and understanding of theoretical microbiology was suggested by the findings of Gould (1995) who utilised a combination of vignettes and a questionnaire to assess nurses’ theoretical microbiology and IC knowledge. Almost half of the participants (47.8%) had misconceptions regarding the mode of transmission of the HAI-associated microorganism MRSA and subsequently may have applied inappropriate IC precautions to safeguard themselves and other patients. Prieto and Clark (2005) explored the IC views, priorities and practices of nurses and healthcare assistants (n=18) in one English hospital. Although IC precautions were generally adhered to before and after patient care, there was consistent failure of participants to change gloves or wash hands during patient care, even if gloves had been in contact with a source of microorganisms. The authors concluded that these findings could be explained, at least in part, by a lack of basic microbiology knowledge and inaccurate perceptions of risk, but the small sample size makes it difficult to draw firm conclusions. These studies would, however, suggest that improved knowledge of microbiology may help nurses to practise more effective IC. Given that nurses’ initial microbiology education is generally undertaken during pre-registration training, if it is the case that nurses’ ability to assess risk and implement IC practices appropriately is hampered by a lack of microbiological knowledge, then determination of students’ perceptions and conceptions of microbiology at the commencement and across the course of their pre-registration training is urgently needed.
Chapter 2: Literature review

It has previously been argued that more medical microbiology and IC subjects should be included in undergraduate nursing curricula to improve graduate nurses’ understanding and knowledge of microbiological principles, particularly modes of transmission of medically significant microorganisms (Jenner & Wilson, 2000). There is, however, some debate about how much microbiology knowledge nurses actually need to know (Shuttleworth, 2004). In one English study, Ward (2011) interviewed nurse mentors (n=32) about their perceptions of the IC education needs of nursing students. Mentors in that study acknowledged that students had a basic knowledge of IC procedures such as standard precautions, but expressed a desire for students to have a more thorough understanding of microbiology (types of microorganisms and modes of transmission) prior to undertaking clinical placements.

2.7 Conclusion

In summary, the aim of pre-registration nurse education is to provide students with the appropriate skills, knowledge and attitudes to be competent and capable in all areas of clinical practice including IC. The literature identifies that HAIs remain a serious mortality risk for patients and, despite numerous interventions being trialled, the IC knowledge and practice of graduate HCWs such as nurses remain sub-optimal, potentially compromising patient health outcomes.

A review of the literature leaves the following questions unanswered:

- What are nursing students’ pre-commencement perceptions and knowledge of microbiology?
- How do those perceptions change over the duration of the program?
- What are IC professionals’ views on the role of pre-registration microbiology training in IC practice?
- How well are new graduates able to apply their microbiology knowledge in practice?
- In the Australian context, what impact do clinical placement experiences have on students’ preparedness for the transition to IC practice?

There is an obvious need to explore factors in the educational milieu, including microbiology knowledge and clinical placement experiences, which may influence nursing students’ IC perceptions and behaviour.
Chapter 2: Literature review

Chapter 3 explains how this project was designed to answer these questions by exploring the conceptions and perceptions of nursing students and industry professionals. The methodology and methods that were chosen for the study are outlined and explained.
Chapter 3: Methods

3.1 Introduction

A review of the current literature (Chapter 2) identified the need to explore the role of microbiology education (conceptual understanding and perceptions) and influence of clinical placement experiences on Australian nursing students’ IC knowledge and perceptions (Figure 3.1).

![Diagram](locating_files/figure-3.1.jpg)

Figure 3.1. Factors influencing nursing students' IC knowledge and perceptions

Student understanding and perceptions of microbiology prior to entry and the change in understanding and perception at the time of graduation are relatively unknown. The literature, however, clearly identifies that current post-graduation IC programs do not result in a significant or sustainable improvement in practice. It remains unclear whether this is related to a theory-practice gap or whether this is (also) influenced by the range of other confounding factors some of which may be the microbiology and/or IC education and training at undergraduate level.
The specific aims of this project were:

1. To examine nursing students’ understanding and perceptions of microbiological concepts over the duration of a pre-registration nursing course.

2. To ascertain IC professionals’ views on the importance of microbiology knowledge in compliance with IC practice and the perceived adequacy of students’ and new graduates’ microbiology and IC knowledge.

3. To explore the impact of clinical placements on final-year nursing students’ self-reported preparedness for the transition to IC practice

3.2 Research paradigm

To achieve congruence and coherence, it is important that the chosen research paradigm and approach align with the phenomenon under study and research questions (Trede & Higgs, 2009). In the broadest sense, the term ‘paradigm’ has been referred to as ‘worldviews’ or a set of assumptions about knowledge (Cresswell & Plano Clark, 2011). Other scholars have relied on a more narrow definition of paradigms as “systems of beliefs and practices that influence how researchers select both the questions they study and methods that they use to study them” (Morgan, 2007, p. 49). Paradigms differ in their ontology (nature of reality), epistemology (role of the researcher) and methodology used. The central tenet of positivism, for example, is the “belief that an objective reality exists that is independent of any individual’s subjective experience” (Hesse-Biber, 2010, p. 14); thus, there is a single, objective reality. In contrast, constructivism embodies a view that “social reality is created through social interaction of individuals with the world around them” (Hesse-Biber, 2010, p. 105); thus, there are multiple realities (Table 3.1).
Table 3.1 Comparison of positivist and constructivist research paradigms

<table>
<thead>
<tr>
<th>Paradigm</th>
<th>Postpositivism</th>
<th>Constructivism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontology (nature of reality)</td>
<td>Singular reality (researcher accepts or rejects hypothesis)</td>
<td>Multiple realities</td>
</tr>
<tr>
<td>Epistemology (role of the researcher)</td>
<td>Distance and impartiality (objective collection of data via instruments e.g. surveys)</td>
<td>Closeness (e.g., researcher may visit participants at work/home to collect data)</td>
</tr>
<tr>
<td>Methodology (research process)</td>
<td>Deductive</td>
<td>Inductive</td>
</tr>
</tbody>
</table>

Adapted from Cresswell & Plano Clark (2011, p. 42)

The research paradigm adopted by the researcher influences the research design, role of the researcher, data collection and data analysis. Postpositivism, for example, is most often associated with quantitative research where the aim is to test or generate theory through the use of empirical observation and measurement. Constructivism, on the other hand, is commonly associated with qualitative research as researchers aim to gain understanding of a phenomenon by exploring the subjective views of multiple participants (Hesse-Biber, 2014).

For many years, ‘the paradigm wars’ (Johnson & Onwuegbuzie, 2004) saw fierce debate between qualitative and quantitative researchers whereby the positivist and constructivist paradigms were seen as separate and distinct entities, distinguishable at three levels: study design; data collection and analysis; and interpretation of results. Thus, qualitative and quantitative paradigms were seen as incompatible and therefore should not and could not be combined (Howe, 1988). All researchers, however, did not share these views. Onwuegbuzie and Leech (2005, p. 377) argued that “researchers who ascribe to epistemological purity disregard the fact that research methodologies are merely tools that are designed to aid our understanding of the world.” In subsequent years, champions for mixed methods research (MMR) emerged, advocating the benefits of integrating both qualitative and quantitative paradigms (and associated methodologies) within a single study (Cresswell, 2010; R. B. Johnson, Onwuegbuzie, & Turner, 2007; Onwuegbuzie & Leech, 2005; Tashakkori & Creswell, 2007). The validity of combining qualitative and quantitative data in the same study (given that both of these forms of inquiry are said to be linked to distinctive philosophical paradigms) as advocated by mixed methods researchers was an area of debate for many years. MMR has evolved considerably in the last 20 years such that it is now well...
established as the ‘third research paradigm’ (Johnson & Onwuegbuzie, 2004, p. 14) alongside qualitative and quantitative research:

Mixed methods research is a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis and the mixture of qualitative and quantitative approaches in many phases of the research process. As a method, it focuses on collecting, analysing, and mixing both quantitative and qualitative data in a single study or series of studies. (Cresswell & Plano Clark, 2007, p. 5)

This study was conducted within a pragmatic paradigm. In contrast to other paradigms that are centred on the research method (as predetermined by a particular epistemological position), pragmatism has a clear focus on the research question:

Pragmatism does not require a particular method or methods mix and does not exclude others. It does not expect to find unvarying causal links or truths but aims to interrogate a particular question, theory, or phenomenon with the most appropriate research method (Feilzer, 2010, p. 13).

Morgan (2014, p. 1046) noted while the practical aspect of pragmatism (doing ‘what works’) is frequently advocated by researchers there has, in contrast to other paradigms, been limited discourse about the philosophical aspects of pragmatism. Morgan argued that “[k]nowledge is not about an abstract relationship between the knower and the known; instead, there is an active process of inquiry that creates a continual back-and-forth movement between beliefs and actions” (p. 1049). In this context, pragmatism replaces assumptions about the nature of reality with “an emphasis on experience as the continual interaction of beliefs and action” (p. 1049). Thus, rather than focusing on ontological and epistemological assumptions as “essential criteria for differentiating approaches to research … pragmatism treat[s] those differences as social contexts for inquiry as a form of social action, rather than as abstract philosophical systems” (p. 1049).

The pragmatic paradigm is congruent with and reflective of the “pragmatic, practice-based nature of nursing science” (Browne, 2000, p. 37) and thus well suited to this project, which explores nursing students’ IC intentions and behaviours. Adopting a pragmatic approach for this study enabled the use of both qualitative and quantitative methods to address the research aims. Research aim 1 (assessing students’ perceptions and conceptions of microbiology) required quantification of numerical data; thus, a quantitative methodology was necessary. Conversely, qualitative methods were deemed most appropriate to gain an insight into IC attitudes and behaviours through the eyes of
the participants (research aims 2 and 3). Combining the qualitative and quantitative data in a complementary manner enabled the research phenomenon to be explored from both the macro and micro levels. It also provided the ability to delve further into the dataset to further understand its meaning, thus achieving two of the advantages of pragmatist mixed methods research identified by Onwuegbuzie and Leech (2005).

### 3.3 Research design

This study utilised a mixed methods design (Cresswell & Plano Clark, 2011). MMR designs have become increasingly popular for research in the education and nursing disciplines (Andrew & Halcomb, 2006) and have been recommended as a research approach for assessing safety culture in healthcare settings (Pumar-Méndez, Attree, & Wakefield, 2014). The rationale for mixing or integrating both forms of data is that neither quantitative nor qualitative methods are sufficient by themselves to depict/explore the multiple components of this construct/research problem. Combining the two forms of data can help illuminate different aspects of a phenomenon, thus a mixed methods approach “offers a unique capacity for synergy, breadth and depth otherwise difficult to achieve with single methods” (Bronstein & Kovacs, 2013, p. 354).

Quantitative tools, such as surveys, can be distributed to a large number of participants and obtain data that is statistically comparable with other groups thereby being able to be generalised to the population. They are unlikely, however, to achieve deep insight into a particular phenomenon from the perspective of those experiencing it. Conversely, qualitative research methods give researchers the ability to gain a deeper understanding of a research problem or topic by examining multiple stakeholders’ perspectives (Pearce, 2012) and enabling participants to augment their stated values and beliefs with examples or illustrations. Interviews, for example, allow the researcher to gain further insight about the justifications for behaviours such as IC practice.

#### 3.3.1 Parallel mixed methods design

Implementation, integration and prioritisation of the data sets are the primary considerations of mixed method study designs. Implementation refers to the collection of the qualitative and quantitative data, which can occur either sequentially or in parallel. Similarly, the integration (or mixing) of the two data strands can occur throughout the study or at the meta-inference stage, after analysis of the separate stages
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is complete. A decision also needs to be made about the weighting (or priority) given to each of the data strands.

As stated in the previous section, the intent of this study was to explore the influence of microbiology education (perceptions and knowledge) and clinical placement experiences on nursing students’ IC perceptions and intentions. A parallel mixed methods design was used. Teddlie and Tashakkori (2009, p. 266) outlined the features of parallel mixed methods designs in the following way:

1. There are at least two parallel and relatively independent research strands.

2. Each strand of the project is designed to answer related aspects of the same overarching research question.

3. The qualitative and quantitative data are collected and analysed in a parallel and separate manner.

4. Inferences made on the basis of the results from each strand are then integrated or synthesized to form meta-inferences at the end of the study.

This means that each component can therefore “stand alone while also being linked conceptually to other parts” (Schneider et al., 2007, p. 252), thus providing a more comprehensive understanding of the research phenomenon. Creswell and Plano Clark (2011) describe four data collection decisions that must be made by researchers designing a parallel mixed method study: participants for the two (qualitative and quantitative) - the same or different individuals?, the size of the two samples - same or different?, design of the data collection questions, and the format and order of data collection. These authors recommend that, when the purpose of the study is to corroborate or directly compare the qualitative and quantitative data sets, the same individuals should participate in both data collection phases. If, however, “the researcher is trying to synthesise information on a topic from different levels of participants” (p. 180) then different individuals may be used for the two samples.

This study consisted of three distinct phases: one longitudinal quantitative phase and two separate qualitative phases. The quantitative data were collected via a series of paper-based surveys used to explore students’ microbiology knowledge and perceptions and short-term retention of microbiological principles being taught in the curriculum. The longitudinal aspect of the surveys (collected from the same student cohort over
three years) enabled changes to students’ microbiology perceptions and knowledge as they progress through the pre-registration program to be explored.

The qualitative component of the study was collected in two forms:

a. Interviews with a purposively selected group of Australian IC professionals. The goal of these semi-structured interviews was to examine participants’ perceptions of the role of microbiology knowledge in professional practice, their perceptions of graduate nurses’ microbiological/IC knowledge and graduates’ ability to apply that knowledge in practice.

b. A single focus group interview conducted with a convenience sample of final-year nursing students to explore their self-perceived preparedness for IC practice and the impact of workplace learning undertaken during their pre-registration training on that sense of preparedness.

By examining the perceptions of both groups of stakeholders, a more complete picture emerged than would have been possible by examining the perceptions of either group alone.

Table 3.2 displays the phases of data collection for this project. The quantitative data consisted of paper-based surveys whilst the qualitative data consisted of semi-structured interviews and a focus group.

**Table 3.2 Overview of qualitative and quantitative phases of the project**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Procedure</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUANTITATIVE Surveys</td>
<td>Longitudinal series of 4 student surveys</td>
<td>Descriptive statistics. Inferential statistics (Chi-square tests)</td>
</tr>
<tr>
<td>QUALITATIVE Semi-structured interviews</td>
<td>Individual semi-structured interviews with IC professionals</td>
<td>Interview transcripts, field notes and codebook containing main themes/categories</td>
</tr>
<tr>
<td>QUALITATIVE Focus group interview</td>
<td>Single focus group interview with convenience sample of final year nursing students</td>
<td>Interview transcripts, field notes and codebook containing main themes/categories</td>
</tr>
</tbody>
</table>
The parallel mixed research design was not undertaken for purposes of methodological triangulation; rather, to produce complementary data to achieve a more comprehensive understanding of the research phenomenon by “measure[ing] overlapping but also different aspects of a phenomenon” (Greene, Caracelli, & Graham, 1989, p. 258). Equal weighting was given to the qualitative and quantitative data.

### 3.3.2 Advantages and limitations of parallel mixed method design

Much has been written in the literature about the strengths and weaknesses of mixed methods designs (Greene & Caracelli, 1997; Teddlie & Tashakkori, 2009). Advantages of the parallel mixed design include limited time required for data collection and the ability to ask confirmatory and exploratory questions simultaneously. Merging or integration of the results from the different strands in a meaningfully way can, however, prove challenging particularly if the results are contradictory and/or different samples or samples sizes are used for the separate phases. According to Cresswell and Plano Clark (2011), unequal sample sizes are not problematic “if the intent of the data gathering is different for the two data bases: quantitative data aims toward making generalizations to a population while using qualitative data collection seeks to develop an in-depth understanding from a few people” (p. 184), as was the intent in this study.

### 3.4 Quantitative data collection

#### 3.4.1 Introduction

As stated previously, the aim of the quantitative phase of this project was to assess student conceptions and perceptions of microbiology over the duration of a pre-registration nursing program. Participants for the surveys were recruited from the cohort of Bachelor of Nursing (BN) program at a large regional university in Australia (Uni 1) commencing their program in 2010. At Uni 1, the BN is offered in two study modes: on-campus and distance education. The on-campus program, BN (OC), is offered at four campuses with an expected course completion time of 3 years (up to a maximum of four and a half years). Admission to the BN (on campus) course is based on a tertiary admission ranking (ATAR) gained through completion of secondary school. Non-Year 12 applicants are selected on the basis of educational and employment history.
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Admission to the Bachelor of Nursing distance education program, BN (DE), requires that applicants hold one of the following:

- Enrolled/Division 2 Nurse (TAFE NSW Certificate IV in Nursing Course)
  - Enrolled Nurse/Division 2 Nurse with a Certificate IV or Conversion to Cert IV Course
- Enrolled/Division 2 Nurse TAFE Diploma of Nursing Course
- Enrolled/Division 2 Nurse Diploma of Nursing Course
- Enrolled/Division 2 Nurses Advanced Certificate
- Enrolled/Division 2 Nurses Hospital Certificate
- completion of the equivalent of the first year of the BN (OC)

Thus, unlike the majority of students enrolling in the BN on campus (OC) program, most students enrolling in the BN (DE) course will have an Enrolled Nurse (EN) qualification and a number of years of experience in the healthcare environment. These EN students will commonly continue to work in the healthcare industry whilst studying (Cox, Logan, & Curtis, 2014).

Students in the on-campus BN program are required to study two compulsory bioscience subjects in their first year of study. The first of these subjects, called ‘Bio 1’ for the purpose of this study, introduces relevant chemistry, physics and microbiology concepts before beginning the study of normal structure and function of the human body and is taught entirely by science academics. As a common subject for students from other allied health programs – including Bachelor of Clinical Practice (Paramedic), Bachelor of Oral Health (Therapy/Hygiene) and students involved in a Bachelor of Nursing/Graduate Diploma of Clinical Practice (Paramedic) double degree program – Bio 1 is offered in both on-campus and distance modes, resulting in cohorts with a mixture of age, gender, educational backgrounds and entry qualifications. It was therefore important to establish any difference between these cohorts at the outset of the project.

By the end of the first year of their program, BN students at Uni 1 have completed their basic theoretical microbiology training as part of their first bioscience subject and have undertaken 160 hours of clinical experience placement. The stated learning outcome for the microbiology component of the first bioscience subject is that students will be able to demonstrate understanding of the basic principles of microbiology. Thus, the purpose
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of Survey S2 was to identify any changes to student perceptions and conceptions after their initial microbiology training and clinical placement experience.

By the end of the second year of their program, BN students at Uni 1 have undertaken two bioscience subjects (Year 1), two pathophysiology subjects (Year 2) and participated in 320 weeks of clinical placement/experience (in a healthcare setting). According to the stated learning objectives, upon completion of these two pathophysiology subjects, students should be able to:

- describe the involvement of microorganisms in disease
- name and describe the actions of the major classes of antimicrobial drugs.

Within these subjects, a total of five hours of teaching (four hours of lectures plus a one-hour tutorial) are devoted to infectious diseases and antimicrobial agents. The infectious diseases content is relatively generic and students are not required to learn the names of microorganisms. No bioscience or pathophysiology subjects are undertaken in their final year of the BN program.

As shown in Table 3.3, a series of four surveys (S1–S4) was developed and administered over the duration of the three-year program. Establishment of students’ baseline microbiology knowledge and perceptions at the commencement of their studies was an essential first step. Hence, the first survey (Survey S1) was administered at the commencement of the 2010 academic year, with the remaining three surveys distributed yearly and the final survey (S4) distributed in the final academic session (October, 2012). A duplicate baseline survey of commencing students, Survey S1(a), was undertaken in 2012 to ensure that the 2010 cohort was not an atypical cohort.

3.4.2 Survey instrument development

An established survey instrument specifically assessing microbiology knowledge and perceptions suitable for this project could not be identified. Drawing on the research literature, a survey instrument was developed in three sections: Section 1 contained demographic questions including about gender, age, post-secondary education, academic qualifications attained, previous clinical (hospital) experience and previous microbiology education. Section 2, drawing on Jordan et al. (1999), contained two questions about students’ perceptions of the relevance (Q9) and difficulty (Q10) of five core areas of study in pre-registration nursing curricula: anatomy; physiology; sociology; microbiology; and IC. The response format for Question 9 consisted of a
four-point Likert scale ranging from ‘very relevant’ (1) to ‘not relevant’ (4). The 
response scale for Question 10 ranged from ‘very easy’ (1) to ‘very difficult’ (4).
Section 3 contained a series of multiple-choice and true/false responses related to both 
theoretical and applied microbiology adapted from Sax et al. (2005) and Tavolacci et al. 
(2008). An additional question (Q15) was included to elicit respondents’ familiarity 
with the term ‘Universal/Standard precautions’. A ‘don’t know’ option was included as 
a response option for all questions to encourage participants to indicate if they did not 
know the answer to the question, rather than guessing the answer or leaving a blank 
response (Krosnick & Presser, 2010).

The survey instrument was pre-tested with a randomly selected group of first-year 
nursing and non-nursing students (n=20), IC professionals (n=3) and two general 
administrative (non-hospital) staff. Based on their feedback, minor changes were made 
to the microbiology knowledge questions to improve clarity and intent of the wording. 
No student participating in the pre-testing of the survey instrument formed part of the 
study sample. Surveys S2–S4 were in the same format as S1 with modifications to 
reflect an expected increase in students’ capacity to apply microbiology and IC 
knowledge in clinical contexts. These modifications are detailed in the subsequent 
chapters pertaining to individual surveys.

In order to match survey tools to participants across the project, on the final page of the 
questionnaire students were asked to volunteer their university student identification 
number (SID). Prior to data analysis, the final page of all completed surveys, with or 
without SID, was removed by an administrative assistant and sequentially allocated a 
generic number. This ensured that the researcher was able to trace back surveys to 
clarify/confirm a response that may have been an error during data entry whilst 
maintaining the confidentiality of participants.

3.4.3 Survey distribution

All surveys were distributed in person by the researcher, or nominated representative. A 
summary of the survey distribution is displayed in Table 3.3
Table 3.3 Survey administration schedule

<table>
<thead>
<tr>
<th>Survey</th>
<th>Date of administration</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Commencement of program (Feb 2010)</td>
<td>Uni 1</td>
</tr>
<tr>
<td>S2</td>
<td>End of first year (Nov 2010)</td>
<td>Uni 1 + Uni 2</td>
</tr>
<tr>
<td>S3</td>
<td>End of second year (Nov 2011)</td>
<td>Uni 1</td>
</tr>
<tr>
<td>S4</td>
<td>End of third (final) year (Oct 2012)</td>
<td>Uni 1</td>
</tr>
<tr>
<td>S1(a)</td>
<td>Repeated Feb 2012</td>
<td>Uni 1 (2012 cohort)</td>
</tr>
</tbody>
</table>

The distribution of individual surveys is detailed in sections 3.4.3.1 to 3.4.3.5.

3.4.3.1 Survey S1

Survey S1 was distributed to on-campus students on two of the large, geographically distant campuses. On both campuses, potential participants were approached at the end of a normal timetabled class for the Bio 1 subject in Week 1 of Session 1, 2010. All students present in the class on that day (including those from other health programs) were invited to participate. The survey was distributed at both campuses simultaneously. On one campus, the survey was distributed by the researcher, and on the other by an academic with no involvement in the bioscience subject. For all surveys (S1–S4) a verbal explanation of the purpose of the study was given and an information sheet regarding the project provided (Appendix B1). Students were given an opportunity to ask questions before the survey was distributed. Students were given time within the class to participate in the project by completing the survey. A volunteer student in the class collected returned surveys and sealed the surveys in an envelope before giving to an administrative assistant who forwarded it to the research assistant for data entry. Completion and return of the questionnaire was taken as consent to participate in the project.

Since the survey questions were an amalgamation of questions from other validated instruments and those designed by the researcher, comparison allied health student groups (paramedic, nurse-paramedic double-degree and oral health) were included in the study to confirm content validity of the survey instrument and contextualize the data. Similarly, because of the difference associated with program entry requirements, namely prior clinical experience, a BN (DE) student cohort was also recruited for
comparative purposes. The survey was distributed to these DE students whilst attending the compulsory residential school for another nursing subject held in their first week of study. Since the course structure and subjects studied differs between on-campus and DE students, DE students were recruited for Survey S1 only, to provide comparative data baseline data.

### 3.4.3.2 Survey S2

Survey S2 was administered in October 2010. To give a broader Australian perspective, first-year nursing students from the BN program at a second Australian university (Uni 2) with comparable course structure and entry requirements were also surveyed.

Uni 2 participants were recruited from the 2010 on-campus cohort of BN students at that institution. In contrast to Uni 1, full-time pre-registration nursing students at Uni 2 undertake 1 unit of bioscience in the first year of their program (rather than 2). That foundational bioscience unit, however, follows a similar structure and format to Bio 1 at Uni1. At both institutions, the foundational bioscience unit includes basic microbiology concepts.

At Uni 1, potential participants were approached at the end of a normal timetabled class for the second foundational bioscience subject (‘Bio 2’) in the penultimate week of Session 2, 2010. This is a common subject for nursing, paramedic and nurse-paramedic double-degree students. As in Survey S1, all of the students in the class on the day of the survey distribution were invited to participate. Since BN students at three of the four Uni 1 campuses were off-campus participating in clinical placements at any given time in the second half of year 1 of the BN program, this survey was conducted on one campus only.

At Uni 2, potential participants were approached at the end of a normal timetabled class for a nursing subject in the final week of Session 2 2010. The survey was distributed by a nursing academic from that institution who had no involvement in the teaching of the subject.

### 3.4.3.3 Survey S3

Potential participants were approached at the end of a normal timetabled class for the second pathophysiology subject in October 2011. The survey was conducted on three campuses. The researcher distributed the survey on one campus and on the other two
campuses the survey was distributed by academics with no involvement in the research project.

3.4.3.4 Survey S4

Potential participants were approached at the end of a normal timetabled class for a nursing subject in October 2012. The survey was conducted on three campuses. The researcher distributed the survey on one campus and on the other two campuses the survey was distributed by faculty academics with no involvement in the research project nor the teaching of that subject.

3.4.3.5 Survey S1(a)

Participants for this survey were recruited from the 2012 cohort of commencing BN (OC) and BN (DE) students at Uni 1 across two geographically distant campuses. Potential participants were approached at the end of a normal timetabled class for a compulsory nursing subject in Week 1 of Session 1, 2012. The survey was distributed at both campuses simultaneously. On one campus the researcher distributed the survey and on the other campus an academic with no involvement in the project distributed the survey.

3.4.4 Data analysis (quantitative)

Data were analysed using the GenStat Release v.16 software package (GenStat Release 16.2 VSN International Ltd.). Demographic data were described using frequencies, means and standard deviations as appropriate. Prior to the analysis, ‘age’ was condensed into three categories: ‘<24 years’, ‘25–31 years’ and ‘≥ 32 years’ due to a low number of respondents in the ‘39–45’, ‘45–51’ and ‘over 51’ categories of the non-nursing student groups. Surveys were analysed in three sections; namely Section 1 (demographic data), Section 2 (perceptions of relevance and difficulty) and Section 3 (microbiology knowledge). Except for the variable ‘test score’, which was continuous, all other data were coded and, as such, were nominal (Section 1) or ordinal in nature (Section 2). Ordinal data and data sourced from participant rankings are not appropriate sources for determining averages (mean values) as the coding is only an indicator of sequential value. Chi-square tests were used to compare categorical variables between and within student enrolment groups. A level of significance of 0.05 was adopted for the quantitative analysis.
For Section 3 (microbiology knowledge), a check for normality of the (continuous) ‘test score’ variable was conducted to determine whether to use parametric or non-parametric testing/analysis. Chi-square tests were used to compare proportions of correct and incorrect answers between student enrolment groups. For students that volunteered their SID for more than one survey (n=39), a paired t-test was conducted for Survey 1 and Survey 2 (pre and post microbiology content and first clinical placement) to test the hypothesis: $H_0$ – no difference in average test score. The raw data has been tabulated and presented in Appendix B6.

### 3.5 Qualitative data collection

#### 3.5.1 Semi-structured interviews

A descriptive qualitative design was employed for this component of the study. The semi-structured interviews were conducted over a six-month period. Purposive sampling was used to recruit IC professionals for the study. This sampling method involves the deliberate recruitment of “participants who are knowledgeable about the subject because of their sheer involvement and experience in the situation” (Nolan, 1998, p. 624) and can be used to achieve representativeness or comparability (Teddlie & Yu, 2007). A membership list of the Australian Infection Control Association was used to identify potential participants. The following selection criteria were applied:

a. Participant must be a qualified as a Registered Nurse.

b. Participant must be currently employed in a hospital-based IC practitioner role.

The aim of the ICP interviews was to gain an understanding of the perceived successes and difficulties in application of IC practice by newly qualified nurses in Australia. It was, therefore, important that the ICPs being interviewed were not commenting on the IC knowledge and practices of graduates from a single university. To ensure that the nursing graduates being referred to came from a wide range of universities both nationally and internationally, participants from a cross-section of metropolitan, rural/regional, public and private hospitals were invited by telephone and/or email to participate. Six to eight participants are considered adequate for homogenous purposive samples such as that used for this study (Kuzel, 1992). Romney, Batchelder and Weller (1986) calculated that samples as small as four individuals can render extremely accurate information with a high confidence level (.999) if they possess a high degree of competence for the domain of inquiry in question. The ICPs interviewed for this phase
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of the study were considered to have a high degree of competence in the area of infection control practice. Thus, a total of eight potential candidates across three Australian states and territories were identified. Consent to participate in the research was obtained in writing, following a full explanation of the purpose of the study via an information sheet and verbal explanation by the principal researcher. All potential participants approached were recruited.

The interview questions, developed specifically for the project and informed by the literature review (Ward, 2013; Wu, Gardner, & Chang, 2009), focused on the following areas: the role of an ICP, perceived adequacy of new graduates’ microbiology and IC knowledge; the degree to which these skills seem to transfer from their nursing education into the workplace; the importance of microbiology knowledge in compliance with IC practice; and other factors influencing new graduates’ transition to practice (Appendix A2).

Five (of the eight) participants elected to participate in a face-to-face interview, with the remainder conducted by telephone using the same interview guide. Each of these interviews was conducted in the participants’ workplace and took between 40 and 60 minutes for telephone interviews and 50 and 70 minutes face-to-face to complete. Each interview was digitally audio-recorded with the participant’s written permission.

3.5.2 Student focus group

This phase of the overarching study sought to elicit the students’ sense of preparedness for the transition to IC practice after graduation. Focus groups are particularly useful for eliciting perceptions and uncovering factors relating to behaviour or motivation (Kreuger & Casey, 2009). Therefore a focus group was identified as the most appropriate method of data collection for this phase of the study. A focus group brings together participants with similar experiences to generate detailed “descriptions of experiences and beliefs of the participants” (Morrison-Beedy, Côté-Arsenault, & Feinstein, 2001, p. 49) and can generate discussion to help identify key issues (Redmond & Curtis, 2009). The group interaction amongst participants enhances the richness of the data (Newton & McKenna, 2007) and, compared with single interviews, focus groups offer a time efficiency of data collection as responses can be gathered from multiple participants at once (Morgan, 1997).
Convenience sampling was used to recruit volunteers from the Uni 1 cohort being followed as part of the longitudinal quantitative phase of the overarching study. Students on one campus only were invited to participate, as final-year students on all other campuses were undertaking clinical placements off-campus at that time. Consent to participate was obtained in writing following a full explanation of the purpose of the study via an information sheet (Appendix C1) and verbal explanation by the principal researcher.

The key question for this focus group interview was:

‘Based on your clinical experience to date, how well prepared do you feel for your transition to professional practice in regards to infection prevention and control?’

The key question was deliberately kept broad to allow for fluidity, to encourage breadth of responses and to ensure that preconceived notions did not bias the responses from participants. Follow-up questions were asked according to participants’ responses, to seek elaboration and clarification on the issues they raised.

A total of nine participants were recruited. This number was within the recommended optimal range of 6–10 people for an effective focus group (Krueger & Casey, 2000). The focus group was conducted in a seminar room on campus during university hours. The focus group lasted approximately 45 minutes and was moderated by the researcher. With the participants’ consent, the focus group was digitally audio recorded and field notes were taken by an administrative assistant. The audio recording was transcribed verbatim by a research assistant. The completed transcript was subsequently audited against the original audio file for accuracy by the researcher (Tuckett, 2005). To ensure confidentiality, all participants were assigned a number (1–9) prior to data analysis occurring.

3.5.3 Data analysis (qualitative)

Audio-recordings of all interviews and the focus group were transcribed verbatim. For the ICP interviews, data were collected until it became evident that data saturation, the point when no additional themes or new information is being elicited, was reached (DePoy & Gitlin, 2005). In this case, data saturation was deemed to have occurred after interview 5. An additional 3 interviews were then conducted without new shared themes or ideas emerging. Completed transcripts were audited against the original audio file for accuracy (Tuckett, 2005) and then returned to participants via email for comments and
corrections as part of the member checking process. Only one participant chose to make corrections to their transcript, most of which were corrections of grammar.

All qualitative data were analysed using Braun & Clarke’s (2006) framework for thematic analysis (Table 3.4). The researcher undertook initial coding of the data. A table of the initial codes with relevant coded extracts and quotations from the transcript was constructed (Appendices A3 and C2). The table was then used to identify linkages and contrasts between different categories.

Table 3.4 Phases of thematic analysis

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description of the process</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Familiarisation with the data</td>
</tr>
<tr>
<td></td>
<td>Read and re-read the data, noting down initial ideas.</td>
</tr>
<tr>
<td>2.</td>
<td>Generate initial codes</td>
</tr>
<tr>
<td></td>
<td>Code interesting features of the data in a systematic fashion across entire data set; collate data relevant to each code.</td>
</tr>
<tr>
<td>3.</td>
<td>Search for themes</td>
</tr>
<tr>
<td></td>
<td>Collate codes into potential themes.</td>
</tr>
<tr>
<td>4.</td>
<td>Review themes</td>
</tr>
<tr>
<td></td>
<td>Check if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic ‘map’ of the analysis</td>
</tr>
<tr>
<td>5.</td>
<td>Define and name themes</td>
</tr>
<tr>
<td></td>
<td>Ongoing analysis to refine the specifics of each theme, generating clear definitions and names.</td>
</tr>
<tr>
<td>6.</td>
<td>Produce the report</td>
</tr>
<tr>
<td></td>
<td>Selection of vivid, compelling extract examples, relate analysis back to the research question and literature.</td>
</tr>
</tbody>
</table>

Adapted from Braun & Clarke (2006)

3.6 Addressing trustworthiness and validity

Trustworthiness of the qualitative data was enhanced by transcript auditing, member checking and independent review and coding of the transcripts by a member of the research supervision team, following which a discussion was undertaken to achieve consensus where any inconsistencies were identified. The survey questions for the quantitative phase of the project were drawn from established survey instruments in published research thereby enhancing their reliability. Face validity of the instrument was enhanced by pilot testing and subsequent revision based on that feedback.
3.7 Ethical considerations

Ethics approval for this project was obtained from the Charles Sturt University Human Research Ethics Committee on 8 December 2009 prior to recruitment of any participants (Protocol #406/2009/19). All study data, including the survey electronic files, interviews and transcripts were secured in a locked filing cabinet in the researcher’s office and will be destroyed after a specified period of time.

For the student surveys, a verbal explanation of the purpose of the study was given and an information sheet regarding the project provided by the researcher, or nominated representative. The researcher was not involved in teaching any subject that the potential participants were studying. Students were given an opportunity to ask questions before the survey was distributed. The information sheet for the longitudinal surveys can be found in Appendix B1. Students were reminded that participation in the project was entirely voluntary and they could withdraw from the project at any time. Students were asked to voluntarily provide their SID on the final page of the survey so that survey tools could be matched to participants across the project. In order to maintain the confidentiality of participants, this section of the page was removed by an administrative assistant and replaced with a generic number before any collation of data proceeded.

Survey data was entered into a spreadsheet/database for analysis in de-identified coded form for analysis on password protected computers and devices. The data was backed up to password-protected devices. The database containing the SID numbers and corresponding generic numbers was kept separate from the file containing the data and was only accessible to the administrative assistant. The researcher did not have access to that file for the duration of the study. In this way, participants could be assured that any information/responses given will in no way influence their final grades.

Consent to participate in the ICP interviews and student focus group was obtained in writing, following a full explanation of the purpose of the study via an information sheet and verbal explanation by the principal researcher. Consent forms were kept separate from the meeting transcript and no names were included in the tape transcript, instead, each participant was allocated a number. Participants were informed that any identifying information would be removed from transcripts to ensure confidentiality was
maintained. Focus group participants were also reminded to treat the responses they heard in the discussion as confidential.

3.8 Conclusion

This research project adopted a parallel mixed methods design to explore the influence of microbiology (conceptual understanding and perceptions) and clinical placements on Australian nursing students’ IC perceptions and behaviours. The project consisted of one longitudinal quantitative phase and two separate qualitative phases. The results from the qualitative and quantitative phases are reported and discussed separately in individual chapters, then the meta-inferences of the findings are discussed in Chapter 8.
Chapter 4: Views of IC practitioners

4.1 Introduction

Workplace-based ICPs play a major role in supporting new graduates’ transition to practice and the provision of ongoing IC training. As experts in the field of IC and the primary providers of ongoing IC education and training in the hospital setting, ICPs are well placed to provide information on graduate IC knowledge and practice. In order to gain an understanding of the perceived successes and difficulties in application of IC practice by newly qualified nurses in Australia, a qualitative study of ICPs’ perceptions of the importance of microbiology and IC training in pre-registration nursing curricula and the perceived transferability of that knowledge to practice was undertaken.

4.2 Methodology

Participant recruitment was as described in Chapter 3 (pages 49-50). The interview guide is presented in Appendix A2. The interview questions explored ICPs perceptions of new graduates’ microbiology and IC knowledge and practices, the importance of microbiology knowledge in IC practice and factors influencing new graduate IC practices. All respondents were asked questions in the same sequence, but the interview probed inductively on key responses. Data analysis methods were as described in Chapter 3 (pages 51–52).

4.3 Results

4.3.1 Participants

All participants were female, qualified as Registered Nurses (RNs) and had spent at least five years working as an RN before commencing their current ICP role. Half of the participants (4/8) were aged 35–39 years and had completed their initial (pre-registration) training in the university setting, while the other half were hospital-trained nurses aged 40 years or older. All but one participant had undertaken some postgraduate IC training.

4.3.2 Themes

Four main themes around participants’ perspectives on nursing graduates’ IC knowledge and practice emerged from the data analysis:
Chapter 4: Views of IC practitioners

1. Theory versus practice.
2. Peer attitudes and actions.
3. Disjunction between university curricula and the ‘real world’.
4. Learning in context.

These themes are explored in more detail below.

4.3.2.1 Theory versus practice

All participants indicated that they believed that many new graduates had deficits in their IC and associated microbiology knowledge, with some describing graduates’ level of IC knowledge as ‘very basic’ or ‘poor’. Conversely, one participant (P4) felt that new graduates’ IC knowledge was ‘not too bad’, instead saying that she sees a rapid decline in that knowledge (and subsequent IC practice) once graduates have been in the workplace for a relatively short period of time (as little as 12 months):

It’s a downhill run and it depends on what university they come from how quick it is … but it also depends on the stresses they are placed under in a ward situation but it is fairly rapid. (P4)

This comment illustrates a perception that once graduates move into the clinical environment there seems to be a backward movement in IC knowledge and its proper application, albeit at different paces, depending on the program they graduated from and the stressors in the work environment. There was a general acknowledgement by the ICPs that making the transition from university student to graduate nurse can be a challenging time and that new graduates ‘couldn’t be expected to know everything.’ Almost all participants did, however, express concern regarding new graduates’ ability to translate their undergraduate IC education into practice, highlighting the existence of a theory–practice gap in microbiology/IC:

It’s the basis of what they learn but it’s translating what they [new graduates] learn into good clinical practice. That’s where I find there is a huge gap. They go and learn the rules but actually don’t know how to apply them with the various scenarios that would be faced with. (P2)
Chapter 4: Views of IC practitioners

This theory–practice gap was reported to be particularly prevalent in areas such as asepsis and aseptic techniques:

Even how to glove and gown properly, you know, those basic aseptic techniques are just missing. (P6)

I know when they come in they have a fairly good basic understanding generally in IC. I can give them a questionnaire with 5 questions that will ask them about standard and additional precautions and hand washing and they will get all those right… but when you actually see them in practice…. Again, when I talk about cannulas or even emptying urine bags, they haven’t got their PPE gear on or anything like that, they’re not protecting themselves or they’re letting a patient walk along with their drain dragging on the ground. (P2)

Moreover, alongside the apparent lack of understanding of proper sterile techniques culminating in practices which had posed risks to patient safety, there was an apparent appreciation, by the graduates concerned, of the consequences of these practices:

We are certainly having issues with aseptic technique. We are having things happen like new grads disconnecting a drip and then putting the drip on the bed and then going to put it back up again. Now that is very basic. (P3)

We did a hand hygiene audit the other week and there was new graduate on the ward. She walked from room to room with the same pair of gloves on, doing the same sorts of things, for FIFTY minutes … oh no, actually she took her gloves off to answer the telephone – she took off one – then she put the same glove back on to keep going. (P7)

Some participants questioned whether graduates simply didn’t understand the importance of some IC practices:

Maybe they don’t understand why that is so important? Maybe they haven’t remembered from their studies why, if have you hooked that drip back up [after placing it on the bed] that you have increased your infection risk and why that is so drastic for your patient. (P3)

They [students] see people cut corners and they see that obviously IC isn’t as important so they can cut corners too…They are really looking for mentorship and peer appreciation, the ‘new ones’. (P2)

Participant 3 further suggested that there were fewer opportunities for students to see the application of microbiology in practice, while on clinical placements, compared with anatomy and physiology for example. Furthermore, it was difficult to get students
excited about microbiology whereas students would get excited about clinical events such as cardiac arrests and they were able to ‘see’ anatomy and physiology in practice.

Some participants cited an apparent ‘lack of ownership’ and sense of ambivalence towards HAIs as a significant barrier to staff compliance with IC policy. Despite computerised alerts being implemented on internal hospital systems, the ICPs felt they still needed to almost act as ‘policemen’ to ensure that both the infection alert had been noted by ward staff and that the appropriate course of action (in regards to IC) was going to be taken.

There was unanimous agreement that IC knowledge and practice varied considerably between and within the different groups of HCWs across the healthcare sector. Without exception, medical staff were considered by the participants to be ‘by far the worst’ group of HCWs when it came to adherence to IC precautions, particularly those relating to hand hygiene, as typified by the following comment:

Nurses work under the Five Moments of Hand Hygiene, doctors have one – ‘I’ll wash them as I leave the hospital’ … The doctors all think that it’s not their business. They don’t see it as their core business and they’ve always been like that. (P7)

### 4.3.2.2 Peer attitudes and actions

All participants spoke very strongly about the influence of peer attitudes and the safety culture displayed by those peers on graduate transition to practice. Poor safety culture was cited by some ICPs as a particularly powerful influence to counteract in their efforts to ensure adherence to IC protocols. Participant 4 described it as a ‘see one, do one, teach one’ mentality:

It’s a ‘see one, do one, teach one’ type of mentality. They see it being done the wrong way, you know, specimen taking or something being done the wrong way and they think that is normal and then they teach it to somebody else. (P4)

So if you [the ICP] are trying to say “this is the way you should do it”, yet everyone else on the ward isn’t doing it right, you have got then a cultural barrier to break through as well because they’re wanting to do things how others are showing them or how they’re seeing it done. (P3)
Chapter 4: Views of IC practitioners

The influence of clinical leadership shown by senior members of staff in regards to IC was considered particularly important in facilitating a positive safety culture and compliance with best practice. Application of IC practice relates to clinical leadership. If you have a ward with good clinical leadership then you will have good general IC practice. If you have a ward where the clinical leadership is lacking then IC practice, hand hygiene in particular, you will see its poor. (P5)

It’s got to be led from the top. You have to have a boss who is going to enforce it and understand it’s important. So the grads can come out with all the knowledge in the world but if the senior nurse is not interested, unfortunately the grads are going to sit back and do what the ward does. (P1)

One ICP believed that it was important to create a ‘reward culture’ to give staff a ‘bit of a pat on the back’ so they then know it’s right and want to continue doing the right thing, rather than simply looking for when they do it wrong.

4.3.2.3 Disjunction between university curriculum and the ‘real world’

A perceived disjunction between the IC profession and ‘the universities’ was clearly evident, with some participants referring to a division between the pre-registration curriculum and contemporary IC paradigms as the distinction between learning facts and authentic practice.

Both the universities and the TAFEs … they seem to go and teach something different to what’s actually happening on the ground. So it’s a huge transition, a huge transition for some of these people to come across into [the healthcare system]. (P2)

It became apparent that there was a perception held by at least some of the participants that the RNs working in academia were no longer nurses: they were ‘academics’ with different concerns and currency of knowledge in practice. In regards to IC training at university, one participant stated “it’s not being run by people that are practising in the area, its’ being run by educators or academics” (P5).

Interviewees frequently commented that they were unaware of exactly what was being taught in the universities but felt that new graduates exhibited a large variation in their demonstrated IC knowledge:
Chapter 4: Views of IC practitioners

I often ask what they are taught at uni because you can talk about hand hygiene and when to do it and they are sort of a bit miffed ... the amount of people that don’t know standard precautions is alarming. (P1)

Despite these misgivings, the pre-registration training was recognised as playing an important role and having the potential to improve graduates’ IC practices:

That’s what we want. We want people thinking ‘Why, why are you practising that way?’ This is where the underlying knowledge is really important because if they know the microbiology or they know the anatomy & physiology, well then they can say ‘This is what I know to be right – so that doesn’t fit’. (P3)

I do think it is a place to get it right. It’s like two nurses must check IV medications. If we drill it in there, we get a new wave of nurses coming out and we eventually break the bad habits. (P1)

One participant (P3) felt that students often were not able to see the relevance of the university curriculum to a nursing career. There was a perceived difference in the type of training the students were receiving and the training they [the students] thought they needed. She relayed the following comment from a student: “Why can’t we do all of our training in the hospital? I learnt so much here and uni is such a waste of time” (P3).

The ICP noted that she was able to relate to the student’s comments, having had similar feelings herself during her time as an undergraduate. She also noted, however, that, on a personal level, the relevance of subjects such as sociology did not become apparent to her until she had been in the workplace for a period of time:

I discovered a lot of the study I did at uni myself did make a lot of difference and did round off my education. It just may not have been useful the minute I got out. Sociology is very important and I have applied a lot of what I learned in my undergraduate studies over the course of time, a lot more than I thought I would. So I have changed my opinion over the duration of my career as to how important those things were. (P3)

These sentiments were echoed by another participant in regards to the relevance of microbiology:

I didn’t understand how important my microbiology was when I was doing my training or even in my intensive care experience, but the importance grew as I grew and developed. I think what you learn, the basics, it always comes back to me and I look at it and go ‘Yes, I do remember this, I do remember learning this’, but I was not sure what it all meant. (P2)
4.3.2.4 Learning in context

When asked whether increasing the amount of microbiology in the curriculum would improve graduates’ understanding and implementation of IC practices, participants generally agreed, but were very quick to clarify their response by saying that it had to be in a clinical context and not in too much depth:

They do need it but they need it in context and [to be] given context: ‘What does this actually mean in the workplace?’, ‘What does it actually mean in the clinical environment?’ ... seeing how it actually applies. (P8)

Of course they are not going to know all the little side microorganisms, you know they don’t have to have an in-depth knowledge of those, but the ones that are more commonly found within a hospital situation. (P4)

It’s good to understand gram-negatives and gram-positives and it’s good to understand differences between what type of testing we do or what we don’t, but it’s not overall significant to the bedside. What is important to the nurses at bedside is to have a basic understanding of microbiology but be able to understand that it means ‘cleaning my hands’, it means ‘wearing a mask’, it means ‘this is why it is important to clean the environment around the patient’. Because what they lose is where they think ‘it is not my job to clean’ or ‘why do I have to wear a mask’ because they actually haven’t translated the information across. (P2)

These responses were perhaps not surprising given that 3/8 participants acknowledged that, until they moved into the ICP role, they had only possessed a superficial understanding of microbiology themselves. Suggestions for improving the microbiology and IC education for nursing students centred on making microbiology more interesting by using clinical scenarios and, in particular, letting students see the consequences of poor IC practice for patients:

We teach hand washing but the fallout from bad infection control isn’t realised and I think that needs to be demonstrated and illustrated; an eye opener for what happens if you don’t do it. (P8)

Yes if they could understand how a bug is transmitted and grows, it’s going to help them put in precautions rather than me telling them ‘they have TB, you need airborne precautions’. (P1)
4.4 Discussion

The purpose of the interviews was to explore ICPs’ perceptions of the importance and role of undergraduate microbiology education and the adequacy of early career nursing graduates’ microbiology and concomitant IC knowledge and practice. Similar to Ward’s (2011) English study, the findings of this study indicate that, in the Australian context, new nursing graduates’ IC and microbiology knowledge is generally perceived by the ICPs to be below what is desirable, and their ability to apply that knowledge in practice somewhat limited. As discussed in Chapter 2, the ‘theory–practice gap’ is well documented in nursing education literature (Cooper 2007; Scully 2011). The problematic nature of this gap in particular areas of IC practice, such as aseptic technique, has been reported previously (Davey, 1997; McLane, Chenelly, Sylwestrak, & Kirchhoff, 1983). It was also highlighted in the present study with multiple participants describing situations where nursing students and new graduates had been witnessed applying inappropriate or incorrect IC procedures, thus posing a risk to patient safety.

Participants in the study questioned whether new graduates failed to appreciate the importance of adhering to IC precautions and, more importantly, the risks to patient safety resulting from poor IC practice. This finding raises the question of whether nursing students are also failing to see the importance and/or relevance of the underlying microbiological knowledge to IC practice and, if so, whether this could be in part due to the presentation of the foundational theoretical microbiology content; that is, in isolation rather than as case studies or in bioscience subjects rather than being embedded in specific IC subjects.

Although the ICPs in this study generally believed that increasing the amount of microbiology in the pre-registration nursing curriculum would help improve graduates’ compliance with IC policies, protocol-driven compliance appeared to take precedence over understanding the rationale behind IC practice. The exact level of microbiology required to improve IC practice was not precisely defined by any of the participants although there seemed to be an explicit focus on only needing to know the ‘important microorganisms’. If new graduates’ ability to understand and implement IC practices appropriately is in some way hampered by a lack of microbiological knowledge, then determination of students’ perceptions of the relevance and importance of microbiology
and assessment of actual level of microbiology knowledge and understanding is urgently required.

The perceived dichotomy between nurses ‘in the profession’ and nursing academics highlighted in the present study concurs with nursing education literature (Andrew & Robb, 2011; Astin, Newton, McKenna, & Moore-Coulson, 2005). Astin et al. (2005 p. 279) proposed that there is in fact a “two-way gap between RNs in clinical practice and academics in tertiary institutions, a gap that is often being widened by a lack of clinical currency on behalf of some nurse academics”. It is possible that this disjuncture between ‘the skilled’ and ‘the educated’ (Logan, 2008) has been enhanced by a perceived lack of input from ICPs into the development of IC content in undergraduate curricula and thus an absence of ‘ownership’.

Clearly, both nurse academics and clinical mentors have a significant role to play in reducing the theory–practice gap and enhancing graduates’ capacity to understand the applicability of theoretical knowledge to everyday nursing practice. According to Corlett (2000, p. 504) educationalists “must be pivotal in this process, creating relevance for students’ while understanding that preceptors … are the clinical experts, but can only help students reflect on their experiences effectively if they know what theory students have been taught”. Participants in the present study seemed to be unfamiliar with the current IC and microbiology content of undergraduate curricula but, based on the actions and understandings demonstrated by graduates, felt that it was not reflective of contemporary practice. These views were expressed by both hospital- and university-trained ICPs; thus, there was no demonstrable bias attributable to education style. This finding does reflect previous Australian research where practising nurses perceived that new graduates lacked sufficient general clinical skills to operate as a registered nurse (Hegney, Eley, & Francis, 2013). It has been argued that the amount of time dedicated to clinical placements in the Australian undergraduate curriculum is insufficient, resulting in limited clinical exposure (Hegney, Eley, & Francis, 2013) and widening of the theory–practice gap (Wolff, Regan, Pesut, & Black, 2010) which, ultimately, may limit students’ readiness for clinical practice (Hegney et al., 2013).

Some higher education institutions have successfully implemented human-patient simulation training/resources as a teaching strategy within pre-registration nursing programs (Elfrink, Kirkpatrick, Nininger, & Schubert, 2010). Advocates posit that simulation training offers the opportunity for clinical learning in a safe environment
without any risk to patient safety and, as such, lends itself to IC training. Implementation of simulation facilities and resources, however, comes with high technical costs and human time requirements (Elfrink et al., 2010). Educational interventions such as online IC modules and clinical seminars about IC for final-year nursing students (Riven et al., 2013) offer a less expensive alternative to simulation training and have been reported to improve IC knowledge (Dawson, Bennett, & Ongley, 2010). Consideration should be given to development of similar resources with an explicit focus on clinical microbiology and, most importantly, with input from practising ICPs. This may result in the development of resources for final-year BN students which have a theoretical microbiology focus to provide a more comprehensive understanding of the virulence and epidemiology of clinically significant microorganisms encountered in the healthcare environment, prior to graduation, and thus an improved ability to apply appropriate precautions in any given clinical scenario.

Whilst graduates’ level of knowledge will undoubtedly influence their performance in the workplace, it is widely acknowledged that there are a number of physical, emotional and socio-cultural factors which also impact on the transition experience and graduates’ ability to apply that knowledge in the clinical environment (Cooper, 2001; Duchscher, 2009). Continual interaction with other professionals underpins the transition process of students becoming professionals (Dall'Alba, 2009). The strong influence of these interactions and the behaviour of senior staff on graduates’ IC practice was a strong theme in the present study. Ongoing violations of IC policies and substandard IC practices by medical staff in particular are commonly reported in the literature (Brown, Crawford, Nerlich, & Koteyko, 2008; Hakko, Rasa, Karaman, Enunlu, & Cakmakci, 2011). New graduates are often frightened to question or challenge what they perceive as existing nursing rituals and traditions, instead feeling compelled to ‘choose sides’ and, more often than not, they will adapt their behaviour to mirror those of their counterparts and role models – even if they know those practices to be incorrect and/or contradictory to those taught to them as best practice (Levett-Jones & Lathlean, 2009). The importance of pre-registration education should not, however, be de-valued. Ward (2013) argued that regardless of poor role modelling or negative staff attitudes, new graduates still have the knowledge provided by their university training “on which to base their own decisions about performing IC and prevention” (Ward, 2013, p. 298). The decision-making process may, however, be enhanced by students seeing professional behaviour modelled by academics (Felstead, 2013) and by the provision of...
leadership training as an integral part of the curriculum from the beginning of their pre-registration training (Curtis, de Vries, & Sheerin, 2011).

4.5 Conclusion

Attention to the nexus between universities and the IC profession is needed to enhance student learning and understanding of microbiology and IC practices. Increased involvement of ICPs, as industry professionals and key stakeholders, in the curriculum development is likely to be advantageous to helping bridge the current theory–practice gap and assist with contextualising the microbiology content in the curriculum.
Chapter 5: Student perceptions and knowledge of microbiology – Year 1 surveys

5.1 Introduction

It has been reported that many nursing students have an inherent anxiety of ‘science’ and experience difficulty with bioscience subjects (Jordan et al., 1999; McVicar, Andrew, & Kemble, 2015). This, combined with misconceptions regarding scientific principles and the perceived importance of individual discipline areas can influence student learning outcomes (Caon & Treagust, 1993). It is therefore important to determine baseline knowledge and perceptions to reveal any potential change in this knowledge and perceptions over time.

To provide greater breadth of data, surveys were administered to students commencing a Bachelor of Nursing at Uni 1 in 2010 and 2012 and designated Survey S1 and Survey S1(a) respectively. With the majority of specific microbiology knowledge presented in the first year of study at Uni 1, it was also vital that any change in this knowledge was monitored data relating to perception and knowledge at the end of the first year of study was designated Survey S2. This chapter details the findings of the Year 1 surveys – S1, S1(a) and S2 – which relate specifically to pre-entry perceptions/knowledge and any change to these at the end of the first year of study.

5.2 Methodology

Surveys were constructed as described in Chapter 3, as was data analysis. To allow direct comparison of knowledge, before and after the Bio 1 subject and before and after the initial clinical placement experience, Survey S2 was a replicate of Survey S1 with the exception of those questions listed in Table 5.1.
Table 5.1 Survey S1 questions modified for Survey S2

<table>
<thead>
<tr>
<th>Question topic</th>
<th>Survey S1</th>
<th>Survey S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q17</td>
<td>Preventing transmission of infections</td>
<td>Hand hygiene protocol</td>
</tr>
<tr>
<td>Q19</td>
<td>Acquiring MRSA</td>
<td>MRSA transmission</td>
</tr>
<tr>
<td>Q20</td>
<td>Hand washing (T/F)</td>
<td>Acquiring MRSA (Q19 in Survey1)</td>
</tr>
</tbody>
</table>

One additional question about the purpose of hand hygiene (Q21) was also added to Survey 2, bringing the total number of knowledge questions to 10. Both survey instruments are shown in full in Appendices B2–B3.

5.3 Results

5.3.1 Survey S1

A total of 332 surveys were returned: 233 from the combined on-campus nursing and allied health student groups and 99 from the distance education (DE) nursing cohort, with response rates of 70.2% and 76.1% respectively. Of these, 10 surveys had missing data for three or more of the demographic variables and were excluded from analysis. The final sample consisted of 322 surveys with 19.9% (64/322) of respondents providing their SID. The majority of participants were nursing students with other participants coming from the paramedicine, oral health and nursing/paramedic double degree programs (Table 5.2).

Table 5.2 Distribution of Survey S1 participants by program

<table>
<thead>
<tr>
<th>Program</th>
<th>Nursing BN (OC)</th>
<th>Nursing BN (DE)</th>
<th>Paramedic (Paramed)</th>
<th>Nurse-Paramedic (NP-DD)</th>
<th>Oral Health (OH)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>144 (44.7)</td>
<td>99 (30.7)</td>
<td>28 (8.7)</td>
<td>34 (10.6)</td>
<td>17 (5.3)</td>
<td>322</td>
</tr>
</tbody>
</table>

71
5.3.1.1 Demographic profile – nursing student participants

The large majority (86.8%) of the BN (on-campus) students were females aged 18–24 years with no previous experience working in a hospital environment (Figures 5.1, 5.2).

![Figure 5.1. Age distribution of Survey S1 BN (OC) students](image)

![Figure 5.2. Previous hospital experience of Survey S1 BN (OC) students](image)

Compared with the OC students, participants from the DE nursing program were older (p < 0.001), and had more clinical experience (p < 0.001). Almost two-thirds of the participants in the DE group were aged 32 years or older. Of the 89 DE students who
had previously worked in a hospital, 38 (42.7%) had more than five years’ experience. Within the combined nursing cohort (both OC and DE students) there was a significant association between age and previous hospital experience (p< 0.001). The majority (72.6%) of the ‘≥ 32 years’ students from both programs indicated that they had previously worked in a hospital, whilst the youngest students (18–24 years) were most likely to disclose no hospital experience; with 68.9% of the 18–24 years age group indicating nil hospital experience.

Table 5.3 details the prior study of the BN (OC) and BN (DE) students. A significantly higher proportion of the DE students, as expected, had previously studied in a Technical and Further Education (TAFE) college program (p<0.001) and had undertaken ‘some’ microbiology as part of that previous study (p=0.005). Less than one-quarter of either student group, however, reported having studied microbiology for ‘more than 1 full semester’.

Table 5.3 Comparison of prior study characteristics of BN students, by mode

<table>
<thead>
<tr>
<th>Variable</th>
<th>BN (OC) n (%)</th>
<th>BN (DE) n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous tertiary/TAFE study</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAFE</td>
<td>65 (45.1)</td>
<td>72 (72.7)</td>
</tr>
<tr>
<td>University</td>
<td>15 (10.4)</td>
<td>18 (18.2)</td>
</tr>
<tr>
<td>Nil</td>
<td>55 (38.2)</td>
<td>6 (6.1)</td>
</tr>
<tr>
<td>Other</td>
<td>8 (5.6)</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>No answer</td>
<td>1 (0.7)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Previous microbiology study</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>45 (51.1)a</td>
<td>26 (28.9)a</td>
</tr>
<tr>
<td>Yes, &lt;1 semester</td>
<td>33 (37.5)a</td>
<td>49 (54.4)a</td>
</tr>
<tr>
<td>Yes, &gt;1 semester</td>
<td>10 (11.4)a</td>
<td>14 (15.6)a</td>
</tr>
</tbody>
</table>

*Calculated as a percentage of students who had previous tertiary/TAFE-level study and where ‘n’ = number (headcount) and (%) = (percentage of respondents)

5.3.1.2 Demographic profile – non-nursing participants

In contrast to the nursing students, the paramedic student group had a majority of males (57.1%). Most of the students in each of these allied health programs were aged 18–24 years, although it is noted that the paramedic and nurse-paramedic programs contained a higher proportion of students in that age group than the nursing (OC) and
oral health programs (p = 0.012). A significantly higher proportion of the BN (OC) students had previously studied at TAFE or university compared with the paramedic and nurse-paramedic students (p<0.001). Less than one-quarter of the participants in any of the allied health student groups reported any previous hospital experience.

5.3.1.3 Perceptions of microbiology (and other areas of the curriculum)

All student groups’ ranked anatomy, physiology and IC as ‘relevant’ or ‘very relevant’. A small number of combined student group perceived microbiology (3/322) and sociology (7/322) to be ‘not relevant’. The BN (DE) student group reported perceptions of relevance that mirrored those of the BN (OC) students (Appendix B6).

The perceived difficulty of the nominated curriculum areas (Q10) is displayed in Table 5.4. Overall, the rankings were relatively similar across all the student groups, with the exception of sociology, for which a higher proportion of the paramedic and nurse-paramedic students were ‘unsure’. The majority of students in each student group perceived anatomy, physiology and microbiology to be ‘difficult’ or ‘very difficult’. Conversely, IC was considered ‘easy’ or ‘very easy’ to learn by a similar proportion of the cohort. Comparison of the BN (OC) and BN (DE) student groups shows that the BN (DE) students were more likely to perceive the science components (anatomy, physiology and microbiology) to be ‘easy’ or ‘very easy’ to learn.
### Table 5.4 Responses to Survey S1 Q10 (perceptions of difficulty)

<table>
<thead>
<tr>
<th></th>
<th>Percentage of students who gave answer, by program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BN (OC) (n=144)</td>
</tr>
<tr>
<td><strong>Anatomy</strong></td>
<td></td>
</tr>
<tr>
<td>Easy/very easy</td>
<td>30.6</td>
</tr>
<tr>
<td>Difficult/very difficult</td>
<td>66.7</td>
</tr>
<tr>
<td>Not sure</td>
<td>2.8</td>
</tr>
<tr>
<td>No answer</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Physiology</strong></td>
<td></td>
</tr>
<tr>
<td>Easy/very easy</td>
<td>18.8</td>
</tr>
<tr>
<td>Difficult/very difficult</td>
<td>77.1</td>
</tr>
<tr>
<td>Not sure</td>
<td>4.9</td>
</tr>
<tr>
<td>No answer</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Microbiology</strong></td>
<td></td>
</tr>
<tr>
<td>Easy/very easy</td>
<td>13.9</td>
</tr>
<tr>
<td>Difficult/very difficult</td>
<td>80.6</td>
</tr>
<tr>
<td>Not sure</td>
<td>4.9</td>
</tr>
<tr>
<td>No answer</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Sociology</strong></td>
<td></td>
</tr>
<tr>
<td>Easy/very easy</td>
<td>50.7</td>
</tr>
<tr>
<td>Difficult/very difficult</td>
<td>42.4</td>
</tr>
<tr>
<td>Not sure</td>
<td>4.9</td>
</tr>
<tr>
<td>No answer</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>IC</strong></td>
<td></td>
</tr>
<tr>
<td>Easy/very easy</td>
<td>67.4</td>
</tr>
<tr>
<td>Difficult/very difficult</td>
<td>26.4</td>
</tr>
<tr>
<td>Not sure</td>
<td>6.3</td>
</tr>
<tr>
<td>No answer</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Note: Due to rounding, percentages may not always add up to 100%

### 5.3.1.4 Knowledge questions

Twenty participants (6.2%) did not respond to all of the questions in Section 3; 2.8%, 0.9% and 2.5% of the questionnaires had 1, 2 or ≥ 3 missing answers, respectively. Since the majority of participants with incomplete tests (2.8%) had only one answer missing and there was no obvious pattern to the missing answers, all data were included in the analysis.

Overall, the mean ‘test score’ was 5.89 (± 1.8) out of a maximum possible score of 9.
Enrolment (study) mode demonstrated a statistically significant effect on test score; with the average test score for DE nursing students (6.94 ± 1.79) being significantly higher than the other student groups (p < 0.001). Of these groups, the nurse-paramedic students had a better average test score (5.74 ± 1.34) than did the BN (OC) students (5.41 ± 1.79), the oral health students (5.35 ± 1.65) and the paramedic students (5.18 ± 1.66); however, these scores did not differ significantly from each other. The variables of age and previous clinical experience were found not to be independent of study mode; therefore, mean test scores for those variables were not reported.

The percentage of correct responses for each of the individual questions, by student group, is displayed in Table 5.5. For all questions (with the exception of Q20) the total average of correct responses (for the combined cohort) did not exceed 75%. Question 14 had the lowest percentage of correct responses overall, with less than 40% of any student group selecting the correct response. Conversely, Question 20 was answered correctly by more than 85% of each student group. For all but two of the knowledge questions (Q12 and Q20), the BN (DE) student group achieved the highest rate of correct responses overall. Similarly, a significantly higher percentage of BN (DE) students selected the correct response compared to the BN (OC) students, with the exception of questions 14, 18 and 20. For questions 14 and 20, no significant difference was detected between any of the student groups.

Table 5.5 Proportion of correct responses to Survey S1 knowledge questions (%)

<table>
<thead>
<tr>
<th>Question</th>
<th>BN (OC) (n=144)</th>
<th>BN (DE) (n=99)</th>
<th>Paramed (n=28)</th>
<th>NP-DD (n=34)</th>
<th>OH (n=17)</th>
<th>Total cohort average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q11</td>
<td>36.1</td>
<td>58.6*</td>
<td>35.7</td>
<td>50.0</td>
<td>35.3</td>
<td>44.4</td>
</tr>
<tr>
<td>Q12</td>
<td>56.3</td>
<td>68.7**</td>
<td>72.1</td>
<td>79.4</td>
<td>58.8</td>
<td>64.3</td>
</tr>
<tr>
<td>Q13</td>
<td>68.7</td>
<td>88.9*</td>
<td>67.9</td>
<td>62.8</td>
<td>70.5</td>
<td>74.8</td>
</tr>
<tr>
<td>Q14</td>
<td>36.1</td>
<td>39.4</td>
<td>28.6</td>
<td>38.2</td>
<td>27.4</td>
<td>36.3</td>
</tr>
<tr>
<td>Q16</td>
<td>70.8</td>
<td>92.9*</td>
<td>39.2</td>
<td>76.4</td>
<td>41.1</td>
<td>71.1</td>
</tr>
<tr>
<td>Q17</td>
<td>66.7</td>
<td>85.9*</td>
<td>57.1</td>
<td>64.7</td>
<td>41.1</td>
<td>70.2</td>
</tr>
<tr>
<td>Q18</td>
<td>61.1</td>
<td>77.8</td>
<td>71.4</td>
<td>70.5</td>
<td>76.5</td>
<td>68.9</td>
</tr>
<tr>
<td>Q19</td>
<td>56.9</td>
<td>87.8*</td>
<td>53.5</td>
<td>70.6</td>
<td>76.5</td>
<td>68.9</td>
</tr>
<tr>
<td>Q20</td>
<td>90.3</td>
<td>92.9</td>
<td>92.8</td>
<td>85.3</td>
<td>94.1</td>
<td>91.0</td>
</tr>
</tbody>
</table>

* Significantly higher than BN (OC) group (p<0.001)
** Significantly higher than the BN (OC) group (p=0.05)
Table 5.6 displays a further breakdown of the percentage of ‘incorrect’ and ‘unsure’ responses for each question. This data reveals some noteworthy trends. Generally speaking, students in the BN (OC) and allied health groups were more likely to select ‘unsure’ than select the incorrect response, with the exception of Q12 for which the reverse trend was seen. Overall, the BN (DE) students were less likely to indicate that they were ‘unsure’ of the correct response to individual questions compared to the other student groups, with the exception of Question 12 (first line of defence against infection) for which they recorded the highest rate of ‘unsure’ responses of any group. The paramedic student group gave the highest percentage of ‘unsure’ responses for five of the nine knowledge questions, namely Q11, Q14, Q16, Q18 and Q19. The NP DD and BN groups gave the highest proportion of incorrect answers for almost half (4/9) of the knowledge questions. For the attitudinal question (Q15), almost one-quarter of the BN (OC) and the oral health students indicated that the term Universal/Standard Precautions ‘means nothing to me’ while just over one-third of the DE nurses (53/99) declared that they ‘knew it well’ compared with only 12 students (12/223) from the remaining participant groups.
Table 5.6 Responses (%) to the Survey S1 knowledge questions

<table>
<thead>
<tr>
<th>Question</th>
<th>BN (OC) (n=144)</th>
<th>BN DE (n=99)</th>
<th>Paramed (n=28)</th>
<th>NP-DD (n=34)</th>
<th>Oral Health (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Which body location would NOT normally have microbes present?</td>
<td>Correct response</td>
<td>36.1</td>
<td>58.6</td>
<td>35.7</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>Incorrect response</td>
<td>20.1</td>
<td>10.1</td>
<td>7.1</td>
<td>8.8</td>
</tr>
<tr>
<td></td>
<td>Unsure</td>
<td>41.0</td>
<td>26.3</td>
<td>57.1</td>
<td>41.2</td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>2.8</td>
<td>5.1</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Q12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The body’s first line of defence against infection</td>
<td>Correct response</td>
<td>56.3</td>
<td>68.7</td>
<td>72.1</td>
<td>79.4</td>
</tr>
<tr>
<td></td>
<td>Incorrect response</td>
<td>36.1</td>
<td>24.2</td>
<td>25.0</td>
<td>17.7</td>
</tr>
<tr>
<td></td>
<td>Unsure</td>
<td>7.7</td>
<td>5.1</td>
<td>2.9</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>0.0</td>
<td>2.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Q13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A person can only get Hepatitis C if they are an intravenous drug user</td>
<td>Correct response</td>
<td>68.7</td>
<td>88.9</td>
<td>67.9</td>
<td>62.8</td>
</tr>
<tr>
<td></td>
<td>Incorrect response</td>
<td>6.3</td>
<td>6.1</td>
<td>7.1</td>
<td>8.8</td>
</tr>
<tr>
<td></td>
<td>Unsure</td>
<td>21.5</td>
<td>2.0</td>
<td>25.0</td>
<td>25.5</td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>3.5</td>
<td>3.0</td>
<td>0.0</td>
<td>2.9</td>
</tr>
<tr>
<td>Q14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rate of patients contracting HAIs</td>
<td>Correct response</td>
<td>36.1</td>
<td>38.4</td>
<td>28.6</td>
<td>38.2</td>
</tr>
<tr>
<td></td>
<td>Incorrect response</td>
<td>22.9</td>
<td>39.4</td>
<td>21.4</td>
<td>17.7</td>
</tr>
<tr>
<td></td>
<td>Unsure</td>
<td>38.9</td>
<td>19.2</td>
<td>50.0</td>
<td>44.1</td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>2.1</td>
<td>3.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Q15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you know the concept of universal or standard precautions?</td>
<td>Means nothing to me</td>
<td>22.2</td>
<td>1.0</td>
<td>17.9</td>
<td>8.8</td>
</tr>
<tr>
<td></td>
<td>Heard about it</td>
<td>45.8</td>
<td>4.0</td>
<td>53.6</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>General understanding</td>
<td>23.6</td>
<td>53.5</td>
<td>25.0</td>
<td>38.2</td>
</tr>
<tr>
<td></td>
<td>Know it well</td>
<td>5.6</td>
<td>38.4</td>
<td>3.6</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>2.8</td>
<td>3.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Q16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most common source of infections in the clinical setting</td>
<td>Correct response</td>
<td>70.8</td>
<td>92.9</td>
<td>39.2</td>
<td>76.4</td>
</tr>
<tr>
<td></td>
<td>Incorrect response</td>
<td>13.9</td>
<td>0.0</td>
<td>21.5</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>Unsure</td>
<td>13.9</td>
<td>4.0</td>
<td>39.3</td>
<td>17.7</td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>1.4</td>
<td>3.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
### Chapter 5: Student perceptions and knowledge of microbiology – Year 1 surveys

<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
<th>BN (OC) (n=144)</th>
<th>BN DE (n=99)</th>
<th>Paramed (n=28)</th>
<th>NP-DD (n=34)</th>
<th>Oral Health (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q17</strong></td>
<td>Most effective way to prevent transmission of infections in the clinical setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Correct response</td>
<td>67.0</td>
<td>85.9</td>
<td>57.1</td>
<td>64.7</td>
<td>41.1</td>
</tr>
<tr>
<td></td>
<td>Incorrect response</td>
<td>16.0</td>
<td>2.0</td>
<td>14.3</td>
<td>11.8</td>
<td>11.8</td>
</tr>
<tr>
<td></td>
<td>Unsure</td>
<td>15.6</td>
<td>8.1</td>
<td>28.6</td>
<td>23.5</td>
<td>47.1</td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>1.4</td>
<td>4.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Q18</strong></td>
<td>MRSA – type of organism</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Correct response</td>
<td>74.9</td>
<td>77.8</td>
<td>71.4</td>
<td>70.5</td>
<td>76.5</td>
</tr>
<tr>
<td></td>
<td>Incorrect response</td>
<td>17.4</td>
<td>13.1</td>
<td>7.1</td>
<td>11.8</td>
<td>17.6</td>
</tr>
<tr>
<td></td>
<td>Unsure</td>
<td>3.5</td>
<td>5.1</td>
<td>17.9</td>
<td>17.7</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>4.2</td>
<td>4.0</td>
<td>3.6</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Q19</strong></td>
<td>A patient can only get an MRSA infection from a hospital (or healthcare facility)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Correct response</td>
<td>56.9</td>
<td>87.8</td>
<td>53.5</td>
<td>70.6</td>
<td>76.5</td>
</tr>
<tr>
<td></td>
<td>Incorrect response</td>
<td>11.8</td>
<td>5.1</td>
<td>3.6</td>
<td>5.9</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Unsure</td>
<td>29.2</td>
<td>5.1</td>
<td>39.3</td>
<td>23.5</td>
<td>23.5</td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>2.1</td>
<td>2.0</td>
<td>3.6</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Q20</strong></td>
<td>Washing hands before and/or after caring for a patient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Correct response</td>
<td>90.2</td>
<td>92.9</td>
<td>92.8</td>
<td>85.3</td>
<td>94.1</td>
</tr>
<tr>
<td></td>
<td>Incorrect response</td>
<td>7.7</td>
<td>6.1</td>
<td>3.6</td>
<td>8.8</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Unsure</td>
<td>1.4</td>
<td>0.0</td>
<td>0.0</td>
<td>5.9</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>0.7</td>
<td>1.0</td>
<td>3.6</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

*aSignificantly different to BN Int students (p < 0.001)*

*bSignificantly different to BN Int students (p < 0.05)*
5.3.1.5 Discussion

In this baseline survey, the majority of students in the BN (OC) group were females aged between 18 and 24 years, with the majority of paramedic students in the same age group. Congruent with previous research (Whyte et al., 2011) the paramedic students, however, had a slight majority of males and were less likely to have had previous hospital experience than the nursing students.

The perceived relevance of the nominated subject areas to a career in nursing was high across all of the student groups. The perceived difficulty of subjects, however, was much more variable. Over two-thirds of the students in each student group, including the BN (DE) cohort, rated microbiology as ‘difficult or very difficult’. The same was true for the perceived difficulty of the other two ‘science’ disciplines (anatomy and physiology) in the BN (OC), paramedic and NP-DD groups. Conversely, IC was perceived to be ‘easy’ or ‘very easy’ to learn. The majority of BN (OC) students also considered sociology ‘easy’ or ‘very easy’ to learn. The pattern of disparity in the perceived difficulty of ‘science’ subjects compared with ‘non-science’ subjects resonates with the findings of Craft et al. (2013), although Craft et al. assessed student perceptions of bioscience as a whole, rather than individual components of bioscience such as anatomy and microbiology. In this survey, the perceived difficulty of anatomy and physiology was not evident in the BN (DE) students. This could possibly be related to familiarity with anatomical and physiological terms and concepts gained through their previous clinical experience.

The BN (DE) participants were older than the participants from the other (OC) student groups and, reflective of the program entry requirements, indicated having significantly more previous clinical experience. As such, the BN (DE) group could reasonably have been expected to have a higher level of baseline applied microbiology knowledge gained through previous study and clinical experience; this was generally reflected in the findings with these students obtaining a significantly higher test score than each of the other student groups. The BN (OC) students had a slightly better overall score than the oral health and paramedic students, although the difference was not significant.

Differences in nursing and allied health students’ knowledge of IC have previously been reported. Tavolacci et al. (2008) measured the IC knowledge of students from different healthcare curricula. Nursing students were found to have better overall knowledge of
standard precautions and hand hygiene than physiotherapy students, with medical students reported as having the weakest knowledge in these areas.

In the current survey, although the BN (DE) students generally showed higher levels of knowledge than the other student groups, there were some noteworthy trends in the responses for Questions 12, 14, 15 and 18. Question 12 (What is the body’s first line of defence against infection?) was included in the survey as a general knowledge question. Less than 80% of any of the S1 student groups, including the BN (DE) students, selected the correct answer for this question. Use of the phrase ‘first line of defence’ may have been problematic or confusing; however, concerns over new nursing graduates’ understanding of the importance of skin integrity, even after educational intervention, have previously been raised (Friedewald & Elwin, 2003). The Bio 1 subject that participants were about to undertake includes a module on the integumentary system (skin and associated structures); therefore, it is feasible to expect an increased rate of correct responses to that question in the survey conducted at the end of year 1 of the program (Survey S2).

Question 14 related to the frequency of HAIs in hospitals. Across all student groups, this question had the lowest percentage of correct responses of the nine knowledge questions. Despite their clinical experience, almost 20% of the BN (DE) students were ‘unsure’ of the correct answer. This response may be reflective of lack of literature and publicity about the overall prevalence of HAIs in Australia compared with other countries such as the US. Whilst the prevalence of HAIs is incorporated in medical school curricula in Europe (O’Brien et al., 2009), it is possible that the actual rate of HAIs is not explicitly taught as part of EN training program, nor as part of any hospital training.

The distribution of responses for Question 18 (what type of microorganism is MRSA) is also of interest. The proportion of correct responses across all student groups was approximately 70%. As a general knowledge question, that proportion is comparable to the findings of McLaughlin et al. (2008) who surveyed members of the public (n=345) and hospital visitors (n=176) regarding their awareness of MRSA. Sixty-nine per cent of respondents correctly identified MRSA as a bacterial microorganism. It would, however, have been expected that a much higher proportion of the BN (DE) students would have chosen the correct answer in line with their higher levels of clinical experience and the prevalence of MRSA as an HAI-causing pathogen. It may be that
whilst students are familiar with the abbreviation ‘MRSA’, there is a lack of understanding of the microorganism that the acronym describes (memicillin-resistant Staphylococcus aureus).

In contrast to the other questions in Section 3, which were designed to assess microbiology knowledge, Question 15 was attitudinal, designed to elicit students’ level of familiarity with the concept of Standard (or Universal) Precautions. Despite the entry criteria for the DE program (EN qualifications) and the majority of the DE students (89/99) reporting previous hospital experience, it is somewhat surprising that only half of the DE cohort indicated that they ‘knew the concept of standard/universal precautions well’, despite standard precautions being the fundamental IC practice applied to all patients. An additional question asking participants about their ‘confidence in applying’ standard/universal precautions (rather than ‘knowledge of’) may have added further insight to this data.

5.3.2 Survey S1a (2012 repeat)

A total of 61 surveys were returned, 34 from the OC cohort and 27 from the DE cohort, giving response rates of 30.0% and 30.7% respectively. All surveys contained complete demographic data and therefore were all included in the data analysis.

5.3.2.1 Demographic profile of participants

No statistically significant differences were detected between the 2010 BN (OC) and 2012 BN (OC) student groups with respect to gender, age and previous tertiary/TAFE education. Compared with the 2010 participants, however, a significantly higher proportion of the 2012 students indicated having previous hospital experience (26.5% versus 9.7%, p=0.015). The demographic profile of the 2012 BN (DE) students was not statistically significantly different to the 2010 BN (DE) students. As in Survey 1, the 2012 BN (DE) nursing students were older (p < 0.001) and had more clinical experience (p < 0.001) than their on-campus counterparts. All of the 2012 BN (DE) participants (n=27) had Enrolled Nurse qualifications and over half of the group were aged 32 years or older. Seventy per cent of the DE students (19/27) had previously studied at TAFE, with a further six participants indicating previous university level study. Two-thirds of the students with previous TAFE/university study had undertaken some microbiology as part of their previous study; only two of these students (both aged ≥ 32 years), however, reported having studied microbiology for more than one full semester.
5.3.2.2 Perceptions of microbiology (and other areas of curriculum)

Consistent with Survey S1 (2010), all students in both the BN (OC) and BN (DE) student groups ranked anatomy, physiology and IC as ‘relevant’ or ‘very relevant’. One DE student (1.6%) perceived microbiology ‘not relevant’ and another DE student perceived sociology to be ‘not relevant’.

The perceived difficulty of the nominated discipline areas in 2012 generally showed similar trends to 2010. As shown in Table 5.7, microbiology was the discipline considered to be ‘difficult’ or ‘very difficult’ by the highest proportion of BN students (OC and DE) in both the 2010 and 2012 surveys and IC had the least ‘difficult’ or very difficult rankings. In 2012, however, the proportion of students ranking IC as ‘difficult’ was approximately half that of the 2010 cohort. Sociology and physiology were rated ‘difficult’ or ‘very difficult’ by a slightly higher proportion of the 2012 BN (OC) and BN (DE) students respectively.

<p>| Table 5.7 Comparison of summed ‘difficult’ and ‘very difficult’ responses (%) of BN students |
|---------------------------------------------|------------------|------------------|------------------|------------------|</p>
<table>
<thead>
<tr>
<th>Percentage of students</th>
<th>BN (OC)</th>
<th>BN (DE)</th>
<th>BN (OC)</th>
<th>BN (DE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy</td>
<td>66.7</td>
<td>50.0</td>
<td>53.5</td>
<td>48.1</td>
</tr>
<tr>
<td>Physiology</td>
<td>77.1</td>
<td>64.7</td>
<td>52.5</td>
<td>59.3</td>
</tr>
<tr>
<td>Microbiology</td>
<td>80.6</td>
<td>79.4</td>
<td>66.7</td>
<td>66.7</td>
</tr>
<tr>
<td>Sociology</td>
<td>42.4</td>
<td>47.1</td>
<td>48.5</td>
<td>29.6</td>
</tr>
<tr>
<td>IC</td>
<td>26.4</td>
<td>17.6</td>
<td>28.3</td>
<td>11.1</td>
</tr>
</tbody>
</table>

5.3.2.3 Knowledge questions

Overall, the mean summated ‘test score’ was 6.59 (± 1.6) out of a maximum possible score of 9. Similar to the 2010 cohort (page 72), the average test score for 2012 BN (DE) students (7.52 ± 1.09) was significantly higher than for the BN (OC) students (5.85 ± 1.52, p <0.001), while the average test score for the 18–24 years age groups was significantly lower than that of the 25–31 and ≥32 age groups. Similarly, the average test score for students with nil previous hospital experience was significantly lower than for students with previous hospital or clinical placement experience. The percentage of correct responses for each of the individual questions is displayed in Table 5.8. Overall, question 14 remained the least correctly answered question in 2012, while question 20...
continued to have the highest rate of correct responses in 2012. For the BN (OC) students, the percentage of correct responses for question 12 was significantly lower in 2012 compared with 2010, whilst there were significantly more correct responses in 2012 for questions 17 and 19 (p<0.05). For the DE students, the percentage of correct responses was higher for all but one question (question 11) in 2012; however, this difference was only statistically significant for question 18 (p<0.05).

Table 5.8 Comparison of correct responses (%) to Survey S1(a) knowledge questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Percentage of students who gave correct answer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BN (OC)</td>
</tr>
<tr>
<td></td>
<td>2010</td>
</tr>
<tr>
<td>Q11 Where are microbes not normally present</td>
<td>36.1</td>
</tr>
<tr>
<td>Q12 First line of defence against microbes</td>
<td>56.3</td>
</tr>
<tr>
<td>Q13 Hepatitis C transmission</td>
<td>68.8</td>
</tr>
<tr>
<td>Q14 Rates of hospital infections</td>
<td>36.1</td>
</tr>
<tr>
<td>Q16 Most common source of infections</td>
<td>70.8</td>
</tr>
<tr>
<td>Q17 Preventing transmission of infections</td>
<td>66.7</td>
</tr>
<tr>
<td>Q18 What type of microorganism is MRSA</td>
<td>61.1</td>
</tr>
<tr>
<td>Q19 MRSA transmission</td>
<td>56.9</td>
</tr>
<tr>
<td>Q20 Performing hand hygiene</td>
<td>90.3</td>
</tr>
</tbody>
</table>

*p<0.05

The student responses to Question 15 are displayed in Table 5.9. The data shows an increased familiarity with the concept of Standard/Universal precautions in 2012 compared with 2010, although the proportion of students indicating they ‘know it well’ remained static. Less than half of the DE nurses (13/27) declared that they ‘knew it well’.

Table 5.9 Comparison of 2010 and 2012 BN student responses to Q15

<table>
<thead>
<tr>
<th>Response</th>
<th>BN (OC)</th>
<th>BN (DE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td>(n=144)</td>
<td>(n=34)</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td>(n=99)</td>
<td>(n=27)</td>
</tr>
<tr>
<td>No, means nothing to me</td>
<td>22.2</td>
<td>2.9</td>
</tr>
<tr>
<td>Heard about it</td>
<td>45.8</td>
<td>20.6</td>
</tr>
<tr>
<td>I have a general understanding</td>
<td>23.6</td>
<td>70.6</td>
</tr>
<tr>
<td>I know it well</td>
<td>5.6</td>
<td>5.9</td>
</tr>
<tr>
<td>No answer</td>
<td>2.8</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
</tr>
</tbody>
</table>
5.3.2.4 Discussion

As stated previously, baseline Survey S1 was replicated with the commencing cohort of 2012 pre-registration nursing students to ensure the cohort being tracked (2010 commencement) was not an atypical cohort. With the exception of ‘previous hospital experience’, the demographic profile of participants in the 2012 survey was similar to that of the 2010 cohort, thus the 2010 cohort were considered to be representative of a normal nursing student cohort at Uni 1. The increased level of previous hospital experience noted in the 2012 BN (OC) cohort could be explained a higher proportion of participants being aged 32 years or older. This may reflect greater life experience or may simply indicate that these people had worked in the healthcare industry for longer prior to commencing their studies.

The perceived difficulty of the nominated subject areas in 2012 were relatively consistent with 2010. The perceived difficulty of microbiology remained high across both years, although the proportion of students considering IC to be ‘difficult’ or ‘very difficult’ in 2012 was approximately half that in 2010. This difference may simply be reflective of the increased levels of hospital experience in the 2012 group and the IC training received as part of that previous clinical experience with the implementation of the HHA ‘5 Moments’ initiative in 2010. In the first four years after the launch of the ‘5 Moments’ initiative, almost 200,000 HCWs had completed the online training (Ryan et al., 2012).

The differences in microbiology knowledge/conceptions between the BN (OC) and BN (DE) students identified in the 2010 survey were also apparent in the 2012 cohort. Overall, the DE nursing students had higher score on the microbiology knowledge questions than BN (OC) students and the proportion of correct answers to individual questions in 2012 was similar to 2010. The pattern of increased responses to the applied microbiology questions, namely questions 16, 17 and 19, without concomitant increase in the theoretical microbiology questions may be linked to the increased prior clinical experience of the 2012 students and is suggestive of a continuing emphasis on clinical practice as opposed to theoretical knowledge. It is interesting to note, however, that the same hypothesis could not be applied to the responses for question 15 (familiarity with universal/standard precautions). Despite the vast majority of the 2012 DE students having EN qualifications and many likely working in the healthcare industry whilst
undertaking their studies, it is concerning that less than half indicated that they ‘knew standard/universal precautions well’, the basic IC practice that should be exercised with all patients in the healthcare setting.

A higher proportion of the 2012 BN (OC) students correctly identified MRSA as a bacterial microorganism (compared with the 2010 incoming cohort; page 73). This may be related to clinical experience (as identified in the demographic data) or could possibly be related to heightened public awareness via increased media reports of ‘superbugs’ such as MRSA in 2012.

### 5.3.3 Survey S2

A total of 171 surveys were returned, 133 from Uni 1 (60.5% response rate) plus 38 from Uni 2 (76% response rate). Student ID number was provided by 48.1% (64/133) of the Uni 1 students. Four of the Uni1 students were enrolled in ‘other’ non-nursing/paramedic programs and were excluded from analysis due to the low numbers. One survey in the Uni 2 cohort was missing almost all demographic data and was also excluded from analysis. The final sample consisted of 166 students (Table 5.10).

**Table 5.10 Distribution of Survey S2 participants by program**

<table>
<thead>
<tr>
<th>Program</th>
<th>Uni 1</th>
<th>Uni 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BN (OC)</td>
<td>Paramedic</td>
</tr>
<tr>
<td>n (% of combined cohort)</td>
<td>47 (28.3)</td>
<td>52 (31.3)</td>
</tr>
</tbody>
</table>

The demographic profile of the participants from both institutions is detailed in the following section.

### 5.3.3.1 Demographic profile – Uni 1 participants

A summary of student group demographics is shown in Table 5.11. With the exception of ‘previous hospital experience’ in the nursing student group and ‘post-secondary study’ in the paramedic group, there were no statistically significant differences in the demographic composition of the Survey S2 participants compared with Survey S1. A higher percentage of the Survey S2 nursing students indicated having worked in a hospital while on clinical placement (p< 0.001). Similarly, a statistically significantly higher percentage of the paramedic students indicated having previous university study
(p = 0.018). The question regarding pre-entry qualifications was answered by fewer than half of the participants. Of those who did respond (n = 63), over two-thirds (68.2%) had nil pre-entry qualifications.

Table 5.11 Descriptive statistics of Survey S2 participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>Uni 1</th>
<th></th>
<th>Uni 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BN</td>
<td>Paramedic</td>
<td>NP-DD</td>
<td>BN</td>
</tr>
<tr>
<td></td>
<td>(n=47)</td>
<td>(n=52)</td>
<td>(n=30)</td>
<td>(n =37)</td>
</tr>
<tr>
<td>Gender</td>
<td>n</td>
<td>(%)</td>
<td>n</td>
<td>(%)</td>
</tr>
<tr>
<td>Male</td>
<td>6</td>
<td>(12.8)</td>
<td>32</td>
<td>(61.5)</td>
</tr>
<tr>
<td>Female</td>
<td>41</td>
<td>(87.2)</td>
<td>20</td>
<td>(38.5)</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–24</td>
<td>31</td>
<td>(66.0)</td>
<td>45</td>
<td>(86.5)</td>
</tr>
<tr>
<td>25–31</td>
<td>9</td>
<td>(19.1)</td>
<td>5</td>
<td>(9.6)</td>
</tr>
<tr>
<td>≥ 32</td>
<td>7</td>
<td>(14.9)</td>
<td>2</td>
<td>(3.8)</td>
</tr>
<tr>
<td>Previous Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAFE</td>
<td>21</td>
<td>(44.7)</td>
<td>7</td>
<td>(13.5)</td>
</tr>
<tr>
<td>University</td>
<td>4</td>
<td>(8.5)</td>
<td>13</td>
<td>(25.0)</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>(4.3)</td>
<td>1</td>
<td>(1.9)</td>
</tr>
<tr>
<td>Nil</td>
<td>20</td>
<td>(42.6)</td>
<td>31</td>
<td>(59.6)</td>
</tr>
<tr>
<td>No answer</td>
<td>0</td>
<td>(0.0)</td>
<td>0</td>
<td>(0.0)</td>
</tr>
<tr>
<td>Prev micro study(^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>14</td>
<td>(53.8)</td>
<td>11</td>
<td>(52.4)</td>
</tr>
<tr>
<td>Yes, &lt;1 semester</td>
<td>8</td>
<td>(30.8)</td>
<td>8</td>
<td>(38.1)</td>
</tr>
<tr>
<td>Yes, &gt;1 semester</td>
<td>3</td>
<td>(11.5)</td>
<td>2</td>
<td>(9.5)</td>
</tr>
<tr>
<td>No answer</td>
<td>1</td>
<td>(3.8)</td>
<td>0</td>
<td>(0.0)</td>
</tr>
<tr>
<td>Pre-entry qual</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>0</td>
<td>(0.0)</td>
<td>1</td>
<td>(1.9)</td>
</tr>
<tr>
<td>Bachelor degree</td>
<td>0</td>
<td>(0.0)</td>
<td>0</td>
<td>(0.0)</td>
</tr>
<tr>
<td>Certificate III</td>
<td>1</td>
<td>(2.1)</td>
<td>0</td>
<td>(0.0)</td>
</tr>
<tr>
<td>EN</td>
<td>3</td>
<td>(6.4)</td>
<td>1</td>
<td>(1.9)</td>
</tr>
<tr>
<td>AIN</td>
<td>7</td>
<td>(14.9)</td>
<td>1</td>
<td>(1.9)</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>(0.0)</td>
<td>3</td>
<td>(5.8)</td>
</tr>
<tr>
<td>Nil</td>
<td>12</td>
<td>(25.5)</td>
<td>18</td>
<td>(34.6)</td>
</tr>
<tr>
<td>No answer</td>
<td>24</td>
<td>(51.1)</td>
<td>28</td>
<td>(53.8)</td>
</tr>
</tbody>
</table>

\(^a\) Calculated as a percentage of students who had previous tertiary/TAFE-level study and where ‘n’ = number (headcount) and (%) = (percentage of respondents)
5.3.3.2 Demographic profile - Uni 2 participants

Compared with Uni 1, there was a significantly higher percentage of male students ($\chi^2 = 5.92, p = 0.015$) in the Uni 2 group and as a whole, and they were older, with over half (20/37) being aged ≥32 years compared with only 14.9% of the Uni1 group ($\chi^2 = 16.30, p < 0.001$). Almost half of the Uni 2 students indicated having previous TAFE education. Of these, almost half (43%) had previously studied microbiology.

5.3.3.3 Perceptions of microbiology (and other areas of the curriculum)

All students in the Uni 1 nursing group and nurse-paramedic group disclosed that the discipline areas of anatomy, physiology and IC were ‘relevant’ or ‘very relevant’ to a career in nursing. Microbiology and sociology, however, were perceived to be less relevant, with 6.4% (n=3) of the Uni 1 nursing students and 21.2% of the Uni 1 Paramedic students (n=11) ranking microbiology as ‘not relevant’. The Uni 2 students ranked all disciplines ‘relevant’ or ‘very relevant’, with the exception of two students (5.4%), who ranked sociology as ‘not relevant’.

Table 5.12 displays the responses to Question 10 by student group. At both institutions, physiology had the highest percentage of ‘difficult’ or ‘very difficult’ rankings followed by microbiology and anatomy (Uni 1) and sociology and anatomy (Uni 2). Conversely, IC was perceived to be ‘easy’ or ‘very easy’ by the large majority (>80%) of students in all groups.
Table 5.12 Uni 1 versus Uni 2 responses (%) to Q10 (perceptions of difficulty)

<table>
<thead>
<tr>
<th></th>
<th>Uni 1 BN (n=47)</th>
<th>Paramed (n=52)</th>
<th>Uni 2 NP-DD (n=30)</th>
<th>Uni 2 BN (n=37)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anatomy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy/very Easy</td>
<td>38.3</td>
<td>44.3</td>
<td>40.0</td>
<td>37.8</td>
</tr>
<tr>
<td>Difficult/very</td>
<td>61.7</td>
<td>53.8</td>
<td>56.7</td>
<td>54.1</td>
</tr>
<tr>
<td>Difficult</td>
<td>0.0</td>
<td>1.9</td>
<td>3.3</td>
<td>8.1</td>
</tr>
<tr>
<td>Not sure</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Physiology</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy/very Easy</td>
<td>31.3</td>
<td>23.1</td>
<td>3.3</td>
<td>27.0</td>
</tr>
<tr>
<td>Difficult/very</td>
<td>76.8</td>
<td>75.0</td>
<td>93.6</td>
<td>70.3</td>
</tr>
<tr>
<td>Difficult</td>
<td>0.0</td>
<td>0.0</td>
<td>3.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Not sure</td>
<td>0.0</td>
<td>1.9</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Microbiology</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy/very Easy</td>
<td>36.1</td>
<td>30.8</td>
<td>40.0</td>
<td>40.5</td>
</tr>
<tr>
<td>Difficult/very</td>
<td>63.8</td>
<td>67.3</td>
<td>56.6</td>
<td>51.3</td>
</tr>
<tr>
<td>Difficult</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>8.1</td>
</tr>
<tr>
<td>Not sure</td>
<td>0.0</td>
<td>1.9</td>
<td>3.3</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Sociology</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy/very Easy</td>
<td>70.2</td>
<td>48.1</td>
<td>63.4</td>
<td>29.7</td>
</tr>
<tr>
<td>Difficult/very</td>
<td>27.7</td>
<td>38.5</td>
<td>23.3</td>
<td>62.1</td>
</tr>
<tr>
<td>Difficult</td>
<td>2.1</td>
<td>7.7</td>
<td>10.0</td>
<td>8.1</td>
</tr>
<tr>
<td>Not sure</td>
<td>0.0</td>
<td>3.8</td>
<td>3.3</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>IC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy/very Easy</td>
<td>89.4</td>
<td>82.7</td>
<td>90.0</td>
<td>81.0</td>
</tr>
<tr>
<td>Difficult/very</td>
<td>8.5</td>
<td>13.5</td>
<td>10.0</td>
<td>18.9</td>
</tr>
<tr>
<td>Difficult</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>2.7</td>
</tr>
<tr>
<td>Not sure</td>
<td>0.0</td>
<td>3.8</td>
<td>3.3</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Comparison of the BN student responses to Q10 shows that the proportion of BN students at Uni 2 ranking sociology and IC as ‘difficult’ or ‘very difficult’ was much higher than the proportion of BN students at Uni 1 (Table 5.13).
Table 5.13 Comparison of summed ‘difficult’ / ‘very difficult’ responses (%) of BN (OC) students

<table>
<thead>
<tr>
<th></th>
<th>Uni 1 (n=47)</th>
<th>Uni 2 (n=37)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy</td>
<td>61.7</td>
<td>54.1</td>
</tr>
<tr>
<td>Physiology</td>
<td>78.8</td>
<td>70.3</td>
</tr>
<tr>
<td>Microbiology</td>
<td>63.8</td>
<td>51.3</td>
</tr>
<tr>
<td>Sociology</td>
<td>27.7</td>
<td>62.1</td>
</tr>
<tr>
<td>IC</td>
<td>8.5</td>
<td>18.9</td>
</tr>
</tbody>
</table>

For those Uni 1 students who supplied their SID for both survey S1 and S2 (n=39), very few changed their perceptions of relevance of the nominated curriculum areas and, although a higher number did change their perceptions of difficulty, there was no discernable pattern to these changes and the sample size was too low to draw any conclusions (Appendix B6).

5.3.3.4 Knowledge questions

Ten participants (6%) did not respond to all 10 questions in Section 3 (i.e. the nine knowledge questions and one attitudinal question); 3.6%, 1.2% and 1.2% of the questionnaires had 1, 2 or ≥ 3 missing answers, respectively. Since the majority of participants with incomplete tests (3.6%) had only one answer missing and there was no obvious pattern to the missing answers, all data was included in the analysis.

The mean ‘test score’ for Uni 1 was 6.81 (± 1.74) out of a maximum possible score of 10. There was no significant difference in the mean ‘test score’ of each of the Uni 1 student groups (paramedic students: 6.81 ± 1.75; nurse-paramedic: 6.80 ± 1.69; nursing students: 6.77 ± 1.69). The mean test score for the Uni 2 students (nursing only) was 5.95 (± 1.8). Table 5.14 depicts the mean percentage of correct responses for the two student cohorts. With the exception of questions 16 and 21, the Uni 1 student group recorded a higher proportion of correct responses for all knowledge questions, although this difference was only statistically significant for questions 12, 13 and 14. Overall, Uni 1 recorded the highest rate of correct responses for question 17 and question 16 the highest for Uni 2. Question 14 recorded the lowest correct response rate in both groups.
Table 5.14 Comparison of BN student responses to Survey S2 knowledge questions

<table>
<thead>
<tr>
<th>Question Topic</th>
<th>Uni 1</th>
<th>Uni 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q11 Where are microbes not normally present</td>
<td>72.9</td>
<td>54.1*</td>
</tr>
<tr>
<td>Q12 First line of defence against microbes</td>
<td>90.7</td>
<td>62.2*</td>
</tr>
<tr>
<td>Q13 Hepatitis C transmission</td>
<td>75.2</td>
<td>51.4*</td>
</tr>
<tr>
<td>Q14 Rates of hospital infections</td>
<td>37.2</td>
<td>24.3*</td>
</tr>
<tr>
<td>Q16 Transmission of infections in clinical settings</td>
<td>75.2</td>
<td>86.5</td>
</tr>
<tr>
<td>Q17 Hand hygiene</td>
<td>93.0</td>
<td>81.1</td>
</tr>
<tr>
<td>Q18 What type of microorganism is MRSA</td>
<td>73.6</td>
<td>64.9</td>
</tr>
<tr>
<td>Q19 MRSA transmission (1)</td>
<td>55.8</td>
<td>62.2</td>
</tr>
<tr>
<td>Q20 MRSA transmission (2)</td>
<td>68.2</td>
<td>54.1</td>
</tr>
<tr>
<td>Q21 Purpose of hand hygiene</td>
<td>39.2</td>
<td>51.4</td>
</tr>
</tbody>
</table>

*p < 0.05

The knowledge question responses for Uni 1 are displayed in Table 5.15. For the majority of questions, there was a relatively even distribution of responses across the student groups. There was however, a disparity of responses for questions 11 and 13, where a higher proportion of incorrect responses were noted in the NP-DD group. Conversely, the percentage of incorrect answers for Question 16 in the BN and paramedic groups was almost twice that of the nurse-paramedic group. Over one-quarter of the paramedic and NP-DD students indicated they were ‘unsure’ of the mode of transmission of MRSA (Q19).
## Table 5.15 Responses to Survey S2 knowledge questions

<table>
<thead>
<tr>
<th>Question Topic</th>
<th>Percentage of students, by program</th>
<th>Uni 1 (OC) (n=47)</th>
<th>Uni 2 (n=52)</th>
<th>NP-DD (n=30)</th>
<th>BN (n=37)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q11 Which body location would NOT normally have microbes present?</td>
<td>Correct response</td>
<td>68.1</td>
<td>80.8</td>
<td>66.7</td>
<td>54.1</td>
</tr>
<tr>
<td></td>
<td>Incorrect response</td>
<td>10.7</td>
<td>7.7</td>
<td>23.3</td>
<td>13.5</td>
</tr>
<tr>
<td></td>
<td>Unsure</td>
<td>14.9</td>
<td>11.5</td>
<td>3.3</td>
<td>27.0</td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>6.4</td>
<td>0.0</td>
<td>0.0</td>
<td>5.4</td>
</tr>
<tr>
<td>Q12 The body’s first line of defence against infection</td>
<td>Correct response</td>
<td>91.5</td>
<td>90.4</td>
<td>90.0</td>
<td>62.2</td>
</tr>
<tr>
<td></td>
<td>Incorrect response</td>
<td>8.6</td>
<td>7.7</td>
<td>6.7</td>
<td>37.8</td>
</tr>
<tr>
<td></td>
<td>Unsure</td>
<td>0.0</td>
<td>1.9</td>
<td>3.3</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Q13 A person can only get Hepatitis C if they are an intravenous drug user (T/F)</td>
<td>Correct response</td>
<td>76.6</td>
<td>80.8</td>
<td>63.3</td>
<td>51.4</td>
</tr>
<tr>
<td></td>
<td>Incorrect response</td>
<td>19.1</td>
<td>15.4</td>
<td>33.3</td>
<td>48.6</td>
</tr>
<tr>
<td></td>
<td>Unsure</td>
<td>0.0</td>
<td>3.8</td>
<td>3.3</td>
<td>18.9</td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>4.3</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Q14 Rate of patients contracting HAIs</td>
<td>Correct response</td>
<td>40.4</td>
<td>36.5</td>
<td>33.3</td>
<td>24.3</td>
</tr>
<tr>
<td></td>
<td>Incorrect response</td>
<td>38.3</td>
<td>29.9</td>
<td>43.3</td>
<td>54.0</td>
</tr>
<tr>
<td></td>
<td>Unsure</td>
<td>21.3</td>
<td>34.6</td>
<td>23.3</td>
<td>21.6</td>
</tr>
<tr>
<td></td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Q15 Do you know the concept of universal or standard precautions?</td>
<td>Means nothing to me</td>
<td>0.0</td>
<td>3.8</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Heard about it</td>
<td>12.8</td>
<td>26.9</td>
<td>0.0</td>
<td>10.8</td>
</tr>
<tr>
<td></td>
<td>General understanding</td>
<td>55.3</td>
<td>53.8</td>
<td>73.3</td>
<td>62.2</td>
</tr>
<tr>
<td></td>
<td>Know it well</td>
<td>29.8</td>
<td>15.4</td>
<td>26.7</td>
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</table>
Chapter 5: Student perceptions and knowledge of microbiology – Year 1 surveys

<table>
<thead>
<tr>
<th>Questions</th>
<th>BN (OC) (n=47)</th>
<th>Paramed (n=52)</th>
<th>NP DD (n=30)</th>
<th>Uni 1</th>
<th>Uni 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q16 Most common source of infections in the clinical setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct response</td>
<td>74.5</td>
<td>69.2</td>
<td>86.7</td>
<td>86.5</td>
<td></td>
</tr>
<tr>
<td>Incorrect response</td>
<td>21.3</td>
<td>26.9</td>
<td>10.0</td>
<td>10.8</td>
<td></td>
</tr>
<tr>
<td>Unsure</td>
<td>2.1</td>
<td>1.9</td>
<td>3.3</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>No answer</td>
<td>2.1</td>
<td>1.9</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Q17 When hand hygiene should be performed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct response</td>
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<td>90.4</td>
<td>100.0</td>
<td>81.1</td>
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<tr>
<td>Incorrect response</td>
<td>6.4</td>
<td>9.6</td>
<td>0.0</td>
<td>18.9</td>
<td></td>
</tr>
<tr>
<td>Unsure</td>
<td>2.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>No answer</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Q18 MRSA – type of organism</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Correct response</td>
<td>76.6</td>
<td>73.1</td>
<td>70.0</td>
<td>64.9</td>
<td></td>
</tr>
<tr>
<td>Incorrect response</td>
<td>17.0</td>
<td>19.2</td>
<td>20.0</td>
<td>24.3</td>
<td></td>
</tr>
<tr>
<td>Unsure</td>
<td>4.3</td>
<td>7.7</td>
<td>10.0</td>
<td>8.1</td>
<td></td>
</tr>
<tr>
<td>No answer</td>
<td>2.1</td>
<td>0.0</td>
<td>0.0</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>Q19 MRSA-mode of transmission</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct response</td>
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<td>48.1</td>
<td>50.0</td>
<td>62.2</td>
<td></td>
</tr>
<tr>
<td>Incorrect response</td>
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<td>19.2</td>
<td>19.0</td>
<td>16.2</td>
<td></td>
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<tr>
<td>Unsure</td>
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<td>26.7</td>
<td>13.5</td>
<td></td>
</tr>
<tr>
<td>No answer</td>
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<td>1.9</td>
<td>0.0</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>Q20 Can only get MRSA from healthcare facilities (T/F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct response</td>
<td>66.0</td>
<td>65.4</td>
<td>76.7</td>
<td>54.1</td>
<td></td>
</tr>
<tr>
<td>Incorrect response</td>
<td>19.1</td>
<td>17.3</td>
<td>13.3</td>
<td>35.1</td>
<td></td>
</tr>
<tr>
<td>Unsure</td>
<td>12.8</td>
<td>17.3</td>
<td>10.0</td>
<td>8.1</td>
<td></td>
</tr>
<tr>
<td>No answer</td>
<td>2.1</td>
<td>0.0</td>
<td>0.0</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>Q21 Rationale for hand hygiene before patient care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct response</td>
<td>38.3</td>
<td>38.5</td>
<td>43.3</td>
<td>51.4</td>
<td></td>
</tr>
<tr>
<td>Incorrect response</td>
<td>59.6</td>
<td>59.6</td>
<td>56.7</td>
<td>51.3</td>
<td></td>
</tr>
<tr>
<td>Unsure</td>
<td>0.0</td>
<td>1.9</td>
<td>0.0</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>No answer</td>
<td>2.1</td>
<td>0.0</td>
<td>0.0</td>
<td>2.7</td>
<td></td>
</tr>
</tbody>
</table>
5.3.3.5 Comparison of S1 and S2 responses for Uni 1

The proportion of students ranking anatomy, physiology and IC as ‘relevant’ or ‘very relevant’ remained relatively static; however, the proportion of students who perceived microbiology and sociology as ‘not relevant’ was generally higher in Survey S2 (Table 5.16).

<table>
<thead>
<tr>
<th></th>
<th>BN(OC)</th>
<th>Paramedic</th>
<th>NP-DD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
<td>S2</td>
<td>S1</td>
</tr>
<tr>
<td>Anatomy</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Physiology</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Microbiology</td>
<td>0.7</td>
<td>6.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Sociology</td>
<td>1.4</td>
<td>10.6</td>
<td>7.1</td>
</tr>
<tr>
<td>IC</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Student responses for Q10 (perceptions of difficulty) are displayed in Table 5.17. With the exception of physiology, the percentage of ‘difficult’ / ‘very difficult’ rankings for each discipline area was lower in Survey S2 than Survey S1, with a noticeable decrease for IC.

<table>
<thead>
<tr>
<th></th>
<th>BN (OC)</th>
<th>Paramedic</th>
<th>NP-DD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
<td>S2</td>
<td>S1</td>
</tr>
<tr>
<td>Anatomy</td>
<td>66.7</td>
<td>61.7</td>
<td>71.4</td>
</tr>
<tr>
<td>Physiology</td>
<td>77.1</td>
<td>78.8</td>
<td>71.4</td>
</tr>
<tr>
<td>Microbiology</td>
<td>80.6</td>
<td>63.8</td>
<td>71.4</td>
</tr>
<tr>
<td>Sociology</td>
<td>42.4</td>
<td>27.7</td>
<td>32.1</td>
</tr>
<tr>
<td>IC</td>
<td>26.4</td>
<td>8.5</td>
<td>35.7</td>
</tr>
</tbody>
</table>

In Section 3 of the survey the number of correct responses for questions 11, 12, 13, 14, 18 and 19 in Survey 1 were compared with the number of correct responses to corresponding questions in Survey S2 (Note: Q19 in Survey 1 was compared with Q20 in Survey S2 as they were the same questions). For the nursing and paramedic student groups, a higher percentage of correct responses were recorded for all questions,
however this increase was only statistically significant for questions 11 and 12 (Figures 5.3 and 5.4).

**Figure 5.3. Correct responses (%) for questions replicated in S1 and S2 - BN students**

\* $p < 0.001$

**Figure 5.4. Correct responses (%) for questions replicated in S1 and S2 - paramedic students**

Statistically significant differences are indicated by an asterisk (*$p < 0.001$; **$p = 0.028$)
In the NP-DD group, a marginally reduced number of correct responses were noted for questions 13, 14 and 18; however, these differences were not statistically significant (Figure 5.5).

![Figure 5.5. Correct responses (%) for questions replicated in S1 and S2 – NP-DD students](image)

Further breakdown of the responses for each student group (Table 5.18) reveals some noteworthy trends for questions 13, 14, 15, 18, 19 and 20. For example, although the overall rate of correct responses for Question 13 (Hepatitis C) increased slightly, the general trend across all student groups was a shift from ‘unsure’ in Survey S1 to ‘incorrect response’ in Survey S2 such that, in Survey 1, at least 20% of students indicated they were ‘unsure’ if a person can only get Hepatitis C if they are an IV drug user. In Survey 2 however, 15.4%, 19.1% and 33.3% of the paramedic, BN and NP-DD students respectively selected the incorrect response. Similarly, for Question 18 (what type of organism is MRSA), whilst the proportion of BN students who chose the ‘incorrect’ response for Q18 remained relatively constant, there was a notably increased proportion of students in the other students groups who selected the incorrect response in Survey S2 compared with Survey S1. The vast majority of students who answered this question incorrectly (19/24) selected ‘virus’. The responses for Question 20 (‘can only get MRSA from healthcare facilities’) also showed a general shift from ‘unsure’ to ‘incorrect response’. For Question 15 there was an almost five-fold increase in the percentage of students indicating they ‘know the concept of universal or standard precautions well’. 

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Table 5.18 Comparison of responses to Survey S1 and Survey S2 knowledge questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Percentage of students who gave answer, by program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BN S1</td>
</tr>
<tr>
<td>Q13 Correct response</td>
<td>68.7</td>
</tr>
<tr>
<td>Incorrect response</td>
<td>6.3</td>
</tr>
<tr>
<td>Unsure</td>
<td>21.5</td>
</tr>
<tr>
<td>No answer</td>
<td>3.5</td>
</tr>
<tr>
<td>Q14 Correct response</td>
<td>36.1</td>
</tr>
<tr>
<td>Incorrect response</td>
<td>22.9</td>
</tr>
<tr>
<td>Unsure</td>
<td>38.9</td>
</tr>
<tr>
<td>No answer</td>
<td>2.1</td>
</tr>
<tr>
<td>Q15 Means nothing to me</td>
<td>22.2</td>
</tr>
<tr>
<td>Heard about it</td>
<td>45.8</td>
</tr>
<tr>
<td>General understanding</td>
<td>23.6</td>
</tr>
<tr>
<td>Know it well</td>
<td>5.6</td>
</tr>
<tr>
<td>No answer</td>
<td>2.8</td>
</tr>
<tr>
<td>Q18 Correct response</td>
<td>74.9</td>
</tr>
<tr>
<td>Incorrect response</td>
<td>17.4</td>
</tr>
<tr>
<td>Unsure</td>
<td>3.5</td>
</tr>
<tr>
<td>No answer</td>
<td>4.2</td>
</tr>
<tr>
<td>Q20* Correct response</td>
<td>56.9</td>
</tr>
<tr>
<td>Incorrect response</td>
<td>11.8</td>
</tr>
<tr>
<td>Unsure</td>
<td>29.2</td>
</tr>
<tr>
<td>No answer</td>
<td>2.1</td>
</tr>
</tbody>
</table>

*Equivalent to Q19 in Survey 1

5.3.3.6 Discussion

The findings from Survey S2 demonstrated that whilst the perceived relevance of anatomy, physiology and IC remained high across the first year of the program, the perceived relevance of microbiology and sociology declined.

It is noteworthy that the majority (11/14) of ‘not relevant’ rankings for microbiology in this survey were given by paramedic students. This could possibly be due to the wording of the survey question, which asked participants to rank the relevance of the
areas of the curriculum ‘to a career in nursing’; thus, the paramedic students may not have been able to accurately to assess the relevance of microbiology in that context. That said, however, an increase in the proportion of ‘not relevant’ rankings for microbiology and sociology (compared with Survey S1) was also noted in the BN student group.

The increased proportion of students perceiving sociology as ‘not relevant’ in this survey compared with the first survey was not unexpected. An Australian study by Birks, Cant, Motlaq, and Jones (2011) asked pre-registration nursing students (n=163) to rank enjoyment and value of the units of study undertaken in their first year semester of study. From the list of units, including bioscience, the sociologically focused subject was ranked the least valuable and least enjoyable by the majority of the cohort. The relevance of sociology to the pre-registration nursing program, more broadly, has been well debated in the literature (Aranda & Law, 2007; Edgley, Timmons, & Crosbie, 2009) and can be viewed by students as being of ‘secondary importance’ when their focus (and anxiety) “is to be competent, safe and efficacious practitioners” (Edgley et al., 2009, p. 20). For many nursing students, the relevance and professional applicability of sociology, like other science disciplines, only becomes apparent after they have been out clinical placement (Mowforth, Harrison, & Morris, 2005). It is possible, perhaps likely, that this would be the same for microbiology; however, this is a relatively unstudied area.

When asked about the perceived difficulty of the nominated disciplines, a higher proportion of nursing students ranked physiology as ‘difficult’ or ‘very difficult’ to learn than any of the other nominated areas of the curriculum. This theme was consistent across all of the student groups. Physiology is recognised by academics as a subject that students find academically challenging (Michael, 2007). Terminology has been highlighted as one of the factors contributing to the perceived difficulty of the subject. In particular, students feel they are having to learn “a whole new language encompassing new terminology and buzz words” (Sturges & Maurer, 2013, p. 7) at the same time as coming to terms with new conceptual knowledge. Students with limited or no exposure to anatomy and physiology at secondary school can find mastery of physiological concepts even more difficult (Reinke, 2014). Although in Survey S2 microbiology was ranked ‘difficult or very difficult’ by a smaller percentage of participants than physiology, the literature suggests that becoming conversant with the
terminology also poses a barrier for mastery of microbiology concepts (Lumpkin Allen, 1997).

In contrast to Uni 1, over half of the Uni 2 participants in Survey S2 perceived sociology to be ‘difficult’ or ‘very difficult’ to learn. The exact reason for this disparity is unknown but may relate to differences in teaching and/or content. It would be interesting to examine the learning and teaching materials of the sociology subject at both institutions to highlight any differences in subject structure (for example, depth in which the material is covered) and teaching methods; however, that was outside the scope of this study.

In this survey, a higher proportion of the Uni 1 BN students indicated having ‘previous hospital experience’ compared to Survey S1. This is most likely a reflection of those students having undertaken clinical placement in the time period between the first and second surveys. Despite having completed their initial microbiology module (as part of the Bio 1 subject) and participating in clinical placement, the percentage of correct answers given by the BN (OC) students for each of the knowledge questions in Survey S2 was only significantly increased for questions 11 and 12. A similar pattern was noted for the paramedic student group which, by contrast, had not yet undertaken any clinical placements between Surveys S1 and S2.

The findings of this survey suggest that clinical placements undertaken in the first year of the pre-registration nursing program do not necessarily enhance students’ knowledge and understanding of microbiology. It could be argued that this outcome is related to teaching quality or style and/or the theoretical nature of the concepts; however, the comparative survey undertaken by the Uni 2 nursing students found an even lower rate of correct responses for all but three of the knowledge questions.

Interestingly, two of these questions related to microorganism transmission. Nurses and allied healthcare practitioners alike require adequate knowledge of pathogens and their mode of transmission to care for infected patients and to protect themselves and others from infection. The misperceptions held by Uni 1 students, particularly, about the nature and transmission of MRSA is of a concern given the prevalence of HAIs caused by MRSA and suggests a need for review of the microbiology content for a clearer articulation of the curriculum required in relation to microbiology. Early identification of student conceptions of clinically relevant microbiological concepts (via a
microbiology diagnostic tool, for example) may help minimise misconception formation and allow academics to specifically address any misconceptions identified.

Re-assessment of student perceptions and understanding of microbiology at the end of year 2 of their program would be beneficial to determine changes in student perceptions and clinical application of microbiology after having studied two pathophysiology subjects.
Chapter 6: Student perceptions and knowledge of microbiology – Year 2 and Year 3 surveys

6.1 Introduction

The findings of the initial surveys indicate that there was little change in student perceptions and microbiology knowledge over the first year of the pre-registration program. In the second year of their program, Bachelor of Nursing students at Uni 1 study two pathophysiology subjects and participate in 8 weeks (320 hours) of clinical placement. As students’ progress through their program it would be expected that their level of understanding and knowledge would increase; especially following increased clinical exposure and experience. It was therefore important to determine any changes in student perceptions and knowledge gained over the second half of the program and how this related to their knowledge and understanding of IC. This chapter details the findings of the Year 2 and Year 3 surveys; designated S3 and S4 respectively.

6.2 Methodology

Surveys were constructed as described in Chapter 3 (page 46) and are presented in full in Appendices B4 and B5. To reflect the increased microbiology education and clinical placement experiences compared to Year 1, Section 3 of Survey S3 included a clinical vignette designed to assess students’ understanding of the application of standard and contact precautions in the clinical context, rather than simply asking students to rate their familiarity with the term ‘Universal/Standard precautions’ (Q15) as per S1 and S2.

In Survey S4, three additional questions were added to Section 2 (perceptions). The first additional question asked students to indicate, on a five-point Likert scale, the extent to which they think their undergraduate studies have prepared them for practice in the areas of anatomy, physiology, microbiology, sociology and IC. The second and third additional questions were free response questions asking students which subject areas of the pre-registration nursing curriculum should be increased and which areas should be decreased. Section 3 contained nine multiple-choice questions, related to both theoretical and applied microbiology plus one question (Q14) designed to elicit student perceptions of the relevance of different aspects of microbiology (e.g. names of microorganisms, transmission of microbes).
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Data analysis was as described in Chapter 3 (page 49). Data relating to perception and knowledge at the end of the second and third years of study was designated Survey S3 and Survey S4 respectively.

6.3 Results

6.3.1 Survey S3

A total of 82 surveys were returned (42.3% response rate). A SID number was provided by 64 students. Two students were enrolled in ‘other’ non-nursing/paramedic programs and were excluded from analysis due to the low numbers. The final sample consisted of 80 students (Table 6.1).

<table>
<thead>
<tr>
<th></th>
<th>BN (OC)</th>
<th>Paramedic</th>
<th>NP-DD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>49</td>
<td>21</td>
<td>10</td>
<td>80</td>
</tr>
<tr>
<td>(% of combined participant cohort)</td>
<td>(61.3)</td>
<td>(26.3)</td>
<td>(12.5)</td>
<td>(100.0)</td>
</tr>
</tbody>
</table>

6.3.1.1 Demographic profile of participants

Table 6.2 displays a summary of participant demographics by student group. Consistent with the findings of the previous surveys (S1 and S2), the nursing and nurse-paramedic student groups were predominantly female while the paramedic student group had a significantly higher proportion of males ($\chi^2 = 25.4$, $p < 0.001$). The majority of students in each student group were aged ≤ 24 years. Similar to S1 and S2, the nursing student group had a higher proportion of students aged >24 years than both the paramedic and nurse-paramedic student groups ($\chi^2 = 7.0$, $p = 0.030$). Approximately half of all students indicated no previous TAFE/tertiary education. The majority of students who did have previous TAFE education (17/19) were enrolled in the nursing program.
Table 6.2 Descriptive statistics of Survey S3 participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>BN n (%)</th>
<th>Paramedic n (%)</th>
<th>NP-DD n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>4 (8.2)</td>
<td>13 (61.9)</td>
<td>1 (10.0)</td>
</tr>
<tr>
<td>Female</td>
<td>45 (91.8)</td>
<td>8 (38.1)</td>
<td>9 (90.0)</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–24</td>
<td>34 (69.4)</td>
<td>19 (90.5)</td>
<td>10 (100.0)</td>
</tr>
<tr>
<td>25–31</td>
<td>10 (20.4)</td>
<td>1 (4.8)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>≥ 32</td>
<td>5 (10.2)</td>
<td>1 (4.8)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Previous education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAFE</td>
<td>17 (34.7)</td>
<td>2 (9.5)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>University</td>
<td>3 (6.1)</td>
<td>5 (23.8)</td>
<td>1 (10.0)</td>
</tr>
<tr>
<td>Other</td>
<td>3 (6.1)</td>
<td>3 (14.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Nil</td>
<td>26 (53.1)</td>
<td>11 (52.4)</td>
<td>9 (90.0)</td>
</tr>
</tbody>
</table>

Note: Due to rounding, percentages may not always add up to 100%

6.3.1.2 Perceptions of microbiology (and other areas of the curriculum)

As shown in Table 6.3, the curriculum areas of anatomy, physiology and IC were perceived to be ‘highly relevant’ by all students who responded to the question. The majority of students also perceived microbiology to be ‘relevant’ or ‘highly relevant’, although a very small proportion of the BN (OC) and paramedic students ranked microbiology as ‘not relevant’. Sociology, however, received the highest percentage of ‘not relevant’ rankings in each student group.
Student responses to Question 10 are displayed in Table 6.4. The majority of students in all groups perceived physiology and microbiology to be ‘difficult’ or ‘very difficult’ to learn with the reverse trend indicated for sociology and IC. Compared with the previous survey (S2), a higher proportion of the nursing students ranked microbiology as ‘difficult or very difficult’ to learn (75.5% versus 63.8%) and, whilst the majority of paramedic and nurse-paramedic students in S2 rated anatomy as ‘difficult’ or ‘very difficult’ to learn, in the present survey three-quarters (75.0%) of the paramedics and two thirds of the nurse-paramedic double degree students now rated anatomy as ‘easy or very easy’ to learn.
### Table 6.4 Perceived difficulty of nominated discipline areas (Q10)

<table>
<thead>
<tr>
<th>Discipline</th>
<th>BN (n=49)</th>
<th>Paramedic (n=20)</th>
<th>NP-DD (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td><strong>Anatomy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy/very easy</td>
<td>19 (38.3)</td>
<td>15 (75.0)</td>
<td>6 (60.0)</td>
</tr>
<tr>
<td>Difficult/very difficult</td>
<td>29 (59.2)</td>
<td>5 (25.0)</td>
<td>4 (40.0)</td>
</tr>
<tr>
<td>Not sure</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>No answer</td>
<td>1 (2.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td><strong>Physiology</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy/very easy</td>
<td>11 (22.4)</td>
<td>7 (35.0)</td>
<td>4 (40.0)</td>
</tr>
<tr>
<td>Difficult/very difficult</td>
<td>37 (75.5)</td>
<td>13 (65.0)</td>
<td>6 (60.0)</td>
</tr>
<tr>
<td>Not sure</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>No answer</td>
<td>1 (2.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td><strong>Microbiology</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy/very easy</td>
<td>11 (22.4)</td>
<td>7 (35.0)</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td>Difficult/very difficult</td>
<td>37 (75.5)</td>
<td>13 (65.0)</td>
<td>8 (80.0)</td>
</tr>
<tr>
<td>Not sure</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>No answer</td>
<td>1 (2.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td><strong>Sociology</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy/very easy</td>
<td>37 (75.5)</td>
<td>13 (65.0)</td>
<td>6 (60.0)</td>
</tr>
<tr>
<td>Difficult/very Difficult</td>
<td>9 (18.4)</td>
<td>6 (30.0)</td>
<td>3 (30.0)</td>
</tr>
<tr>
<td>Not sure</td>
<td>2 (4.1)</td>
<td>1 (5.0)</td>
<td>1 (10.0)</td>
</tr>
<tr>
<td>No answer</td>
<td>1 (2.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td><strong>IC</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy/very easy</td>
<td>42 (85.7)</td>
<td>19 (95.0)</td>
<td>9 (90.0)</td>
</tr>
<tr>
<td>Difficult/very difficult</td>
<td>6 (12.2)</td>
<td>1 (5.0)</td>
<td>1 (10.0)</td>
</tr>
<tr>
<td>Not sure</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>No answer</td>
<td>1 (2.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
</tbody>
</table>

### 6.3.1.3 Knowledge questions

All but two participants (2.5%) responded to all 10 knowledge questions in Section 3. One was a nursing student who omitted two questions and the other a paramedic student who did not respond to any of the 10 questions; thus, the paramedic student was excluded from this part of the analysis.

The mean ‘test score’ (out of a maximum possible score of 10) for the nursing students and nurse-paramedic groups was similar, 7.10 (± 1.3) and 7.3 (± 0.9) respectively, while the mean ‘test score’ for the paramedic students was lower (5.35 ± 1.3). Table 6.5
depicts the percentage of correct and incorrect responses for the three student groups. Overall, question 17 recorded the highest frequency of correct responses, whilst Question 19 recorded the lowest frequency in the nursing and nurse-paramedic groups. Question 12 recorded the least correct responses in the paramedic student group.
### Table 6.5 Responses to Survey S3 knowledge questions, by program

<table>
<thead>
<tr>
<th>Program</th>
<th>Q11</th>
<th>Q12</th>
<th>Q13</th>
<th>Q14</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The body’s first line of defence</td>
<td><em>Staphylococcus aureus</em> is an example of normal microflora (T/F)</td>
<td>Prevention of transmission of infection agents in clinical setting</td>
<td>PPE needed for nursing MRSA patients</td>
</tr>
<tr>
<td></td>
<td>against infection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Correct response</strong></td>
<td><strong>Correct response</strong></td>
<td><strong>Correct response</strong></td>
<td><strong>Correct response</strong></td>
</tr>
<tr>
<td></td>
<td><strong>n (%)</strong></td>
<td><strong>n (%)</strong></td>
<td><strong>n (%)</strong></td>
<td><strong>n (%)</strong></td>
</tr>
<tr>
<td>BN (OC)</td>
<td>(n=49)</td>
<td>(n=20)</td>
<td>(n=10)</td>
<td>(n=10)</td>
</tr>
<tr>
<td></td>
<td>44 (89.8)</td>
<td>19 (95.0)</td>
<td>10 (100.0)</td>
<td>10 (20.4)</td>
</tr>
<tr>
<td></td>
<td>4 (8.2)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>38 (77.6)</td>
</tr>
<tr>
<td></td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td></td>
<td>1 (2.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (2.0)</td>
</tr>
<tr>
<td>Paramedic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>22 (44.9)</td>
<td>2 (10.0)</td>
<td>6 (60.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14 (28.6)</td>
<td>15 (75.0)</td>
<td>1 (10.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11 (22.4)</td>
<td>3 (15.0)</td>
<td>3 (30.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 (4.1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
<td>NP-DD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 (100.0)</td>
<td>13 (65.0)</td>
<td>10 (100.0)</td>
<td>3 (30.0)</td>
</tr>
<tr>
<td></td>
<td>1 (2.0)</td>
<td>6 (30.0)</td>
<td>0 (0.0)</td>
<td>7 (70.0)</td>
</tr>
<tr>
<td></td>
<td>2 (4.1)</td>
<td>1 (5.0)</td>
<td>0 (0.0)</td>
<td>3 (15.0)</td>
</tr>
<tr>
<td></td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Q15</th>
<th>Most common mode of transmission of infections in the clinical setting</th>
<th>Correct response</th>
<th>Incorrect response</th>
<th>Unsure</th>
<th>No answer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>44 (89.8)</td>
<td>15 (75.0)</td>
<td>10 (100.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 (8.2)</td>
<td>2 (10.0)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 (0.0)</td>
<td>3 (15.0)</td>
<td>0 (0.0)</td>
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<tr>
<td></td>
<td></td>
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<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q16</th>
<th>When hand hygiene should be performed</th>
<th>Correct response</th>
<th>Incorrect response</th>
<th>Unsure</th>
<th>No answer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>46 (93.9)</td>
<td>17 (85.0)</td>
<td>9 (90.0)</td>
<td></td>
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<td></td>
<td></td>
<td>0 (0.0)</td>
<td>1 (5.0)</td>
<td>1 (10.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 (6.1)</td>
<td>2 (10.0)</td>
<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Q17</th>
<th>Wearing gloves makes hand hygiene unnecessary (T/F)</th>
<th>Correct response</th>
<th>Incorrect response</th>
<th>Unsure</th>
<th>No answer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>49 (100.0)</td>
<td>19 (95.0)</td>
<td>10 (100.0)</td>
<td></td>
</tr>
<tr>
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<td>1 (0.0)</td>
<td>0 (0.0)</td>
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<tr>
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<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q18</th>
<th>PPE for case study patient (Cynthia)</th>
<th>Correct response</th>
<th>Incorrect response</th>
<th>Unsure</th>
<th>No answer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>9 (18.3)</td>
<td>5 (25.0)</td>
<td>5 (50.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>36 (73.5)</td>
<td>15 (75.0)</td>
<td>5 (50.0)</td>
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</tr>
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<td></td>
<td></td>
<td>4 (8.2)</td>
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<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td>0 (0.0)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Q19</th>
<th>How is bacterial meningitis transmitted</th>
<th>Correct response</th>
<th>Incorrect response</th>
<th>Unsure</th>
<th>No answer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>9 (18.4)</td>
<td>6 (30.0)</td>
<td>2 (20.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>26 (53.1)</td>
<td>13 (65.0)</td>
<td>6 (60.0)</td>
<td></td>
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<td></td>
<td>13 (26.5)</td>
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<td></td>
<td>1 (2.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
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</table>

<table>
<thead>
<tr>
<th>Q20</th>
<th>Assumed cause of Cynthia’s illness</th>
<th>Correct response</th>
<th>Incorrect response</th>
<th>Unsure</th>
<th>No answer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>31 (63.3)</td>
<td>16 (80.0)</td>
<td>8 (80.0)</td>
<td></td>
</tr>
<tr>
<td></td>
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<td>18 (36.7)</td>
<td>3 (15.0)</td>
<td>2 (20.0)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 (0.0)</td>
<td>1 (5.0)</td>
<td>0 (0.0)</td>
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</table>
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6.3.1.4 Discussion

The findings of this survey indicate that nursing students’ perceptions of microbiology (and other nominated areas of the curriculum) at the end of the second year of their pre-registration program remain relatively consistent with their perceptions at the commencement of the program. The perceived relevance of anatomy and physiology remained high, whilst a small number of students perceived microbiology as ‘not relevant’ and approximately one-third (34.7%) of the cohort perceived sociology as ‘not relevant’. This trend was also noted in the paramedic and nurse-paramedic student groups.

Similarly, the clear distinction between the perceived difficulty of the science components (microbiology, anatomy and physiology) compared with sociology and IC evident in the previous surveys was still evident in this survey, with some noteworthy variations. A higher proportion of the nursing students in this survey ranked microbiology as ‘difficult’ or ‘very difficult’ to learn than did so in Survey S2. Whilst the majority of paramedic and nurse-paramedic students in S2 rated anatomy as ‘difficult’ or ‘very difficult’ to learn, in Survey S3 anatomy was rated ‘easy’ or ‘very easy to learn’ by the majority of students in those groups. This trend reversal was not seen in the nursing student group. It is difficult to explain this disparity, though perhaps the other professional practice/simulation classes in the paramedic curriculum focus on knowledge of anatomical structure and, thus, the paramedic students became more comfortable with learning anatomy as they moved through their program. Alternatively, students going into paramedic programs could have more of an interest in anatomy and learn it more readily because they perceive it to be more interesting or relevant.

In Survey S3, Questions 14 and a clinical vignette (questions 18–20) were included to assess students’ knowledge of transmission-based (contact) precautions by identifying the correct PPE required for patients with MRSA and suspected bacterial meningitis. The results indicate a limited knowledge regarding application of transmission-based precautions and support the findings of previous Australian research. Mitchell et al. (2014) assessed final-year Australian nursing students’ knowledge of standard versus transmission-based precautions. Participants in that study (n = 349) correctly answered a significantly higher proportion of questions about standard precautions compared with questions about transmission-based precautions (88.9% versus 27.2%; p < 0.001).
Over one-quarter of the nursing student group indicated they were ‘unsure’ of the mode of transmission of bacterial meningitis; thus, the limited number of correct responses to Question 18 may be reflective of a limited understanding of the causative microorganism. Similarly, the low rate of correct responses in the nursing student group to Question 12 indicates a possible deficit of knowledge regarding microorganisms which are considered normal microflora (e.g. *S. aureus*). IC precautions are predicated on the epidemiology of pathogens; such deficits of knowledge could therefore have implications for IC behaviours. If students are unable to differentiate between microbes that are harmless and normally occurring on or in the body and those that are pathogenic, they are at the ‘mercy’ of IC protocols to stay safe and consequently could result in IC practice that promotes infection rather than prevents it.

### 6.3.2 Survey S4

#### 6.3.2.1 Demographic profile of participants

A total of 33 surveys were returned (38% response rate). No student volunteered his or her SID number. The final sample consisted of 28 BN and five nurse-paramedic double-degree students. Due to the low participant numbers, no inferential statistical testing was attempted. Data from both student groups were combined and results are presented as raw numbers or percentages only.

Table 6.6 displays a summary of participant demographics by student group. In line with the findings of the previous surveys, the participants were predominantly females aged 18–24. Almost half of the participants indicated no previous TAFE/tertiary education.
Table 6.6 Descriptive statistics of Survey S4 participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1 (3.0)</td>
</tr>
<tr>
<td>Female</td>
<td>32 (97.0)</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td></td>
</tr>
<tr>
<td>18–24</td>
<td>23 (69.7)</td>
</tr>
<tr>
<td>25–31</td>
<td>5 (15.2)</td>
</tr>
<tr>
<td>≥ 32</td>
<td>5 (15.2)</td>
</tr>
<tr>
<td>Previous education</td>
<td></td>
</tr>
<tr>
<td>TAFE</td>
<td>11 (33.3)</td>
</tr>
<tr>
<td>University</td>
<td>2 (6.1)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (6.1)</td>
</tr>
<tr>
<td>Nil</td>
<td>18 (54.5)</td>
</tr>
</tbody>
</table>

6.3.2.2 Perceptions of microbiology (and other areas of the curriculum)

All participants ranked each area of the curriculum as ‘relevant’ or ‘very relevant’ to a career in nursing with the exception of sociology which was perceived to be ‘not relevant’ by 21.2% (7/33) of the participants. The majority of students perceived anatomy, physiology and microbiology to be ‘difficult’ or ‘very difficult’ to learn while sociology and IC were perceived to be ‘easy’ or ‘very easy’ to learn.

Most students felt that their pre-registration training had prepared them well in the nominated curriculum areas. There were a small proportion of students who felt unprepared in the areas of microbiology, sociology and physiology (Table 6.7).

Table 6.7 Student perceptions of preparedness (Q11)

<table>
<thead>
<tr>
<th>Number of students</th>
<th>Prepared me well/very well</th>
<th>Did not prepare me well</th>
<th>Did not prepare me at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy</td>
<td>33</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Physiology</td>
<td>31</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Microbiology</td>
<td>28</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Sociology</td>
<td>27</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>IC</td>
<td>33</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Chapter 6: Student perceptions and knowledge of microbiology – Year 2 and Year 3 surveys

Figure 6.1 displays the open-ended responses to Question 12 (which subject areas of the curriculum should be increased). Bioscience-related subject areas (anatomy, physiology, pathophysiology) were most frequently cited, followed by practical/laboratory classes and pharmacology.

Figure 6.1. Areas of the curriculum that should be increased

When asked to provide a reason for their response to Question 12, almost all respondents who nominated anatomy, physiology or pathophysiology as an area of the curriculum that should be increased indicated that there was an excessive volume of science content to learn in the allocated time and that it should be spread more evenly across the curriculum:

Need more or same levels of work but spread out so there is a chance to fully understand what we are learning instead of a lot of content on a vast majority of topics.

Interestingly, those students who nominated pharmacology, specifically, felt that there was insufficient coverage of this subject area in the curriculum:

One of the most important areas of nursing and we don’t even have on subject dedicated to this. Crazy! It would help heaps.
For Question 13, the subject in the curriculum most frequently cited as needing to be decreased was sociology (Figure 6.2).

![Figure 6.2. Areas of the curriculum that should be decreased](image)

The majority (13/18) of students who nominated one or more subject areas to be decreased also provided a reason for their response. Of these, perceived lack of relevance to nursing practice was the most common theme, as illustrated by the comment below:

Waste of time, things learned are not relevant to practice largely. e.g. - McDonaldisation!

### 6.3.3.3 Knowledge questions

All participants provided answers to the nine questions in Section 3. The percentage of correct answers for each question is displayed in Table 6.8. Student knowledge regarding hand hygiene and sources of infection transmission (questions 15, 17 and 18) was high, while knowledge of appropriate PPE for nursing MRSA patients was relatively low.
Table 6.8 Responses to Survey S4 knowledge questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Topic</th>
<th>Percentage of correct answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q15</td>
<td>Most common mode of transmission of infections in the clinical setting</td>
<td>90.9</td>
</tr>
<tr>
<td>Q17</td>
<td>When hand hygiene should be performed</td>
<td>100.0</td>
</tr>
<tr>
<td>Q18</td>
<td>When alcohol rub should not be used</td>
<td>100.0</td>
</tr>
<tr>
<td>Q19</td>
<td>Environmental decontamination</td>
<td>24.2</td>
</tr>
<tr>
<td>Q20</td>
<td>MRSA colonisation</td>
<td>97.0</td>
</tr>
<tr>
<td>Q21</td>
<td>PPE for nursing MRSA patient</td>
<td>54.5</td>
</tr>
<tr>
<td>Q22</td>
<td>Standard precautions</td>
<td>93.9</td>
</tr>
<tr>
<td>Q23</td>
<td>Psoriasis and skin integrity</td>
<td>72.7</td>
</tr>
</tbody>
</table>

Question 16 asked students about their familiarity with the ‘5 Moments of Hand Hygiene’. Over half (51.5%) of the students indicated that they ‘knew it well’, with 39.4% (13/33) indicating that they ‘had a general understanding’. The remaining students (3/33) indicated that they ‘had heard of it but didn’t know the details’.

6.3.3.4 Discussion

The findings of this survey indicate that students were more familiar with ‘5 Moments of Hand Hygiene’, as reflected in questions 16 and 17. The responses to Question 21 regarding PPE for MRSA patients indicate potential deficiencies in students’ knowledge of transmission-based precautions. This finding resonates with other studies from Australia (Mitchell et al., 2014), Taiwan (Wu et al., 2009) and Jordan (Darawad & Al-Hussami, 2013). Despite low participant numbers, the data also provides some interesting insights into student perceptions. Student perceptions of sociology as being somewhat irrelevant to nursing practice were still evident in Survey S4, with sociology being the only curriculum area to be ranked ‘not relevant’ by any of the participants.

The pattern of student responses to Question 11 regarding perceptions of the preparedness for practice (in the nominated curriculum areas) was reflective of student perceptions of relevance of the nominated curriculum areas as noted across the previous three surveys; that is, students generally felt that their education in the areas of anatomy, physiology and IC had prepared them well for practice. They felt less well prepared (or not prepared), however, in the areas of microbiology and sociology. It could be suggested that nursing students may feel less well prepared in areas that they perceive to be less relevant (or not relevant) to nursing practice.
The survey instrument did not ask students to provide a reason for their responses to this question; however, it could be speculated that students engage less well with content or subjects they perceive to be less relevant and therefore feel less well prepared at the end of their pre-registration training when they need to apply that knowledge. Conversely, previous research indicates that final-year nursing students can lack confidence in their ability to apply pharmacology knowledge, not because of perceived irrelevance of the content but due to a perceived limited amount of pharmacology content in the curriculum (Honey & Lim, 2008). These sentiments were also reflected in Survey S4, with students expressing a desire for the amount of pharmacology in the curriculum to be increased; however, students can feel overwhelmed by a high volume of pharmacology content (Manias & Bullock, 2002). Pharmacology knowledge is an integral component of medication competence and thus provides important foundational knowledge for clinical practice. Rather than simply increasing the volume of pharmacology content, Honey and Lim (2008) recommended that student learning may benefit more from emphasising rationale and a thorough understanding of fundamental pharmacological principles. It could be argued that, as a fundamental component of IC competence, a similar principle should be applied to microbiology content in the nursing curriculum. That is, the curriculum should emphasise not only a comprehensive understanding of the fundamental microbiological principles but also an understanding of the rationale for IC practices provided by microbiology knowledge.

6.4 Summary of findings (S1–S4)

The aim of the longitudinal survey was to explore nursing students’ understanding and perceptions of microbiological concepts over the duration of a pre-registration nursing course. Although the focus of the project was students in the BN (OC) program, the inclusion of the paramedicine, nurse-paramedic (double-degree) and oral health student groups provided valuable comparative data. In the baseline Survey S1 the perceived relevance of the nominated subject areas to a career in nursing was high across all student groups. After the baseline survey, however, sociology consistently received more rankings of ‘not relevant’ than any other subject. As students move through their science subjects and see the application of science in clinical practice, it was anticipated that this would lead to a gain in student confidence about learning science and potentially a decrease in the perceived difficulty of science components. This, however, was not the case. A higher proportion of both nursing and paramedic students ranked
microbiology as ‘not relevant’ in Survey S2 than in Survey S1 and across all surveys (S1–S4) there was a clear and persistent distinction between the perceived difficulty of the science components (microbiology, anatomy and physiology) compared with sociology and IC.

The findings indicated that clinical placements undertaken in the first year of the pre-registration nursing program do not necessarily enhance students’ knowledge and understanding of microbiology, suggesting a need for more explicit linking of microbiology theory to clinical practice. Moreover, the responses to the knowledge questions across the four surveys identified misperceptions about the nature and transmission of microorganisms such as MRSA and knowledge regarding application of transmission-based precautions was limited. At the end of their pre-registration program students felt less well prepared (for practice) in the areas of microbiology and sociology than anatomy and IC and expressed a desire for more time to be devoted to the bioscience content and pharmacology in particular. The reason for this response is unknown.
Chapter 7: Student focus group

7.1 Introduction

By the 3rd year of the BN (OC) program, students will have undertaken a total of 12 weeks (480 hours) of clinical placement. These placements are undertaken in a variety of clinical settings ranging from small hospitals (basic patient care) in year 1 to acute care facilities in year 2 and chronic and complex chronic care and mental health facilities in third year.

In the final-year student Survey S4, described above, respondents indicated that while they felt that their pre-registration training had prepared them well for IC they felt underprepared in the area of microbiology knowledge. Interestingly, they also indicated that more time should be devoted to bioscience and pharmacology but not to IC. In the surveys, no explanation of these responses was sought; however, the clear disparity between the responses required investigation. Clarification of the responses was therefore elicited via a focus group to facilitate a deeper interrogation of the students’ sense of preparedness for the transition to IC practice after graduation.

7.2 Methodology

Full details of methods are detailed in Chapter 3 (page 50). A convenience sample of Uni 1 BN (OC) students (n=9) was recruited. All participants were female and in the final year of their pre-registration nursing program. Participants ranged in age from 20 to 29 years and three of the nine participants had previously gained qualifications as an Assistant in Nursing (AIN). The central question for the focus group was:

Based on your clinical experience to date, how well prepared do you feel for your transition to professional practice in regards to infection control?

7.3 Results

The dominant themes emerging from the data analysis were ‘practice readiness’, ‘deviations in compliance with best practice’, ‘personal vulnerability’, ‘power relationships’ and ‘application of theory’.
Chapter 7: Student focus group

7.3.1 Practice readiness

Based on their clinical placement experiences during the undergraduate program, the participants felt quite confident about hand washing, but less confident in their knowledge of other protocols such as contact precautions. Participants expressed a desire for inclusion of more education about specific microorganisms, particularly MRSA, in the curriculum:

... like we’re pretty good with hand washing like at the university and then in the hospital and it’s all fine ... we did sort of do that for gloving and gowing and things but going into the hospital I sort of really felt we were complacent with it ... and then we have sort of information on like, say MRSA say like, so how much contact do you have to have to get it and all that sort of stuff, I think it’s important to get that and we don’t really go into it. (P3)

Yeah, so we’re going to visit this patient on [contact] precautions and I’m thinking ‘What are precautions?’ I had no idea what that was. They [clinical staff] said, ‘ok so you’ve got to gown up and glove up’ and that was all I got ... and you had to go in and gown and glove. (P6)

In relation to MRSA, participant P3 reveals that what students had been taught in the classroom did not necessarily translate when she was in the clinical setting. As P6 illustrates above, despite learning IC practices such as contact precautions at university, when it came to clinical practice she had no memory of what it meant she was supposed to do nor why she was supposed to do it.

7.3.2 Deviations in compliance with best practice

Many examples were given of inconsistency in IC prioritisation and compliance both between and within hospitals:

I feel like I haven’t really seen other people do it the right way enough for myself to know how to do it the right way. There’s no consistency. Within different hospitals, but even within different staff of the same hospital, everyone’s different, so you’re like ‘Well, what’s the right way and what’s the wrong way?’ (P3)

Yeah even within hospitals, like what ward you go to, like in the orthopaedic ward they were really strict with hand hygiene. Yeah, they were crazy about it but then other wards they didn’t as much. (P1)
These deviations in HCWs’ IC practice ranged from complete non-adherence to unnecessary overuse of personal protective equipment (PPE) and were reported by the students to be relatively widespread:

... it’s a big, big thing, you know, how you’re supposed to wear sterile gloves. And she [the clinical supervisor] said to me, ‘You stand outside and I’ll do this quickly’ and did it [the procedure] without gloves. (P7)

Yeah like, [I was told] ‘I’ve been here for 40 years so I don’t need gloves.’ (P6)

And like the doctors when they do their rounds ... they just will walk in and then they go see the next person and then the next person and the next person, and they don’t worry about it ... even if they’re like picking at the wound and stuff. (P9)

One of the participants empathised with HCWs’ reticence to wash their hands as frequently as IC guidelines require and admitted that she herself had started to act selectively in relation to her own hand hygiene practices:

I think what shocked me on my first hospital placement was that I didn’t realise how much I was going to have to do it. Like I didn’t realise how much touching or how many times you were like ‘Oh my gosh, I have to wash my hands’ and then you’re using the sanitiser stuff all the time and then you get that film so then you go wash them and five minutes later you’ve got the stuff, and yeah your hands just get destroyed. So that makes you not want to do it because your hands are like burning … So that’s what got me and that sort of was like, maybe I just won’t do it here or like for little things. (P8)

7.3.3 Personal vulnerability

Students were quick to condemn the deviant IC practices conflicting with what they believed to be ‘good practice’ based on their university training. The seemingly commonplace nature of this deviance and justification of inappropriate behaviours had not only created cognitive dissonance for the students but also caused them to feel anxious about the risk to their own health:

I thought I knew enough, but then it was just sort of hard thinking ‘I know this, but they’re [nurses] not doing it’. (P6)

It’s like when they go and eat in the staff room when you’re sitting there eating as well and you think about stuff like that. It’s like ‘Look what you’ve done all morning [i.e. poor hygiene] and now you’re going to go and eat and use all of the common things’. (P3)
I just want to protect myself; I want to wash my hands, I want to glove up, I want to gown up. They might say, ‘I’ve been here 40 years, I don’t need gloves’ but I’m going to put everything on so that I don’t take it home with me or take it to the next patient, I don’t want that. (P1)

7.3.4 Power relationships

Participants were acutely aware of, and at times, challenged by, the power relationship with their clinical supervisors. For some students, comments from clinical supervisors such as ‘You’re just the student here’ or ‘You’re here so I better do this’ had made them feel like their presence was considered a burden by some of the clinical staff. Despite feeling vulnerable to health risk exposure, some students felt compelled to conform to the social expectations and mores of the workplace (‘ward culture’) even if that meant staying silent when observing IC practices that they recognised as being ‘poor’.

… when we’re out on clinical placement you kind of feel obliged to follow your supervisor and things like that so you do, you tend to fall into whatever they’re doing and you’re too scared to say something because they are your supervisor or they are in charge and they are the ones signing you off on everything, so you don’t want to say something about what they’re doing wrong. (P8)

It’s hard. You don’t want to fall into their culture. You have this idea that I’m not going to, but I guess you have to work it out for yourself. (P3)

In contradiction to the voiced ideologies and disdain expressed for the poor IC practices they had witnessed, it was evident that some of the students abrogated their ethical responsibility for hand hygiene, shifting it instead to the workplace supervisor (or nursing educator) to set the standard.

And it’s their [nursing staff] example as well. Like if I see other people hand rubbing then I’ll go and do it too. Like it tends to be if my supervisor walks out of the room and does that then I do it as well. Like straight away, like I might not have if they hadn’t done it. (P6)

… when we go into our prac rooms [at university] now, we’re supposed to go and wash our hands and most of us forget, but if our lecturers walked up and did that [hand washing], we’d probably do the same. (P1)
For some students, they had reconciled their actions by citing a (perhaps misguided) assumption that knowing ‘more’ and being an RN (rather than student) would help them feel confident about ‘standing up’ against (or being ‘forced’ into) bad practice when they did transition into the workplace.

I think I’ll be more confident in following it [IC policy] now that, like, when they don’t look at you like you’re a student, whereas you’re actually a registered nurse and you’re able to do things for yourself. (P8)

Yeah, if we got more information and understood best practice so that we can go out on clinical placement and say, ‘Well best practice says that’s wrong, so this is how we do it’. So we can, as student nurses, actually educate nurses that are also out in the field. And then us being educated like that, we’re more confident to stand up and say ‘oh no, I’d rather do it this way than do it your way.’ (P7)

7.3.5 Application of theory

When asked about their microbiology training, students spoke of the difficulty of seeing the relevance and clinical applicability of the microbiology content, particularly in the first year of their undergraduate program. This was predominantly attributed to the placement of the microbiology content within the broader bioscience subjects:

I think because we learn the microbiology in anatomy and physiology, which isn’t a nursing subject, it’s a science subject and they don’t relate it to the clinical setting. (P2)

… when you are in first year, a lot of it [microbiology content] is learning the names [of microbes], learning what they are and it’s really hard to then connect it to clinical. (P6)

There was general consensus among the group that it would be beneficial to have the microbiology content, particularly regarding clinically significant microorganisms such as MRSA, reinforced in the second year of the program. Other suggestions for improving the relevance and understanding of the microbiology content centred on enhanced integration of microbiology into the nursing practice subjects in the form of IC clinical scenarios:

… where it comes from and what it does … not just ‘MRSA is this’. They should incorporate the [IC] precautions and the hand hygiene and everything in there. (P1)
Chapter 7: Student focus group

That’s the thing, you did it first year and you try and think back and it’s like ‘Oh yeah, I remember a bit of it’. It’s good if you can link it to the gram negative and the gram positive and all that sort of stuff. But then it would be good to have it linked to the clinical situations … because I remember going out on placement and hearing about MRSA and having never heard of it. (P6)

These clinical scenarios were also seen as important to provide the students with an enhanced understanding of the rationale for the application of particular IC precautions to specific microorganisms or particular patients:

Like they tend to say ‘Just do it’ but it helps me to remember it if I know why I’m doing it, like what will happen if I don’t, you know, that sort of thing. (P7)

That’s why we need the education. It’s to know why we are doing it. Why are we wearing a gown? It’s because it’s a contact precaution so you can get it [infection] from doing that and pass it on or from having it on your clothes and that’s why you do it. (P9)

And now you’ve walked into their room, don’t walk back out with your gown on. Little things like that … teaching us, because you can’t rely on the nursing staff in the hospitals to teach us because they’re not doing the right practice. (P3)

There was unanimous sentiment that there should be inclusion of these clinical scenarios across all years of the pre-registration program.

7.4 Discussion

The participants in this study, as a group, expressed some confidence about their preparedness for the transition to IC practice. For some students, uncertainty about the rationale for particular IC practices and lack of knowledge regarding MRSA had been a source of frustration and anxiety. This concurs with the findings of Jennings-Sanders and Jury (2010) who surveyed a cohort of sophomore, junior and senior nursing students (n=119) regarding their knowledge of MRSA. Despite 96% of participants in that study claiming to be currently working or doing clinical placement in a hospital, over half (54%) responded ‘no’ when asked whether they felt they had enough understanding of MRSA. Moreover, the level of MRSA knowledge (% correct answers) of the senior nursing students was not significantly different to that of the sophomore
students. This suggests that knowledge of MRSA is not being enhanced by increased exposure to clinical experience. Given that IC practices are grounded in microbiological principles, it could be argued that inclusion of more targeted conceptual microbiology content in the curriculum is warranted in an effort to enhance students’ knowledge of clinically important microorganisms such as MRSA and understanding of the rationale behind the IC practices.

There was, however, a perceived disconnect between microbiology content and its application to practice reported by the students in this study; a disjuncture seemingly potentiated by incorporation of the microbiology into the ‘science subjects’ which were perceived by the students to be distinct from and not clinically related to nursing.

Student concerns about developing the interconnections between scientific principles and clinical practice have also been reported in other areas of the nursing curriculum such as pharmacology (Manias & Bullock, 2002). Benner, Sutphen, Leonard, and Day (2010) advocated the importance of incorporating contextualised examples such as open-ended case studies throughout the curriculum so that students “not only know the ‘what’ and ‘how’ of scientific knowledge, but ‘when’ to use it appropriately” (Handwerker, 2012, p. 6). The implementation of narratives and visual aids, based on common practice stories collected from nurse educators, has been reported as one strategy for enhancing the relevance of science in the clinical practice context (Dannenfeldt et al., 2009). Such contextualised learning can improve students’ self-efficacy related to applying appropriate IC in individual situations.

Previous research has identified the hand hygiene practices of clinical mentors to be the strongest predictor of nursing student hand hygiene compliance. A study by Snow, White Jr, Alder, and Stanford (2006) found that if a mentor attempted hand hygiene, the student would also attempt hand hygiene 71% of the time. The findings of the present study, however, support previous research which found that poor role modelling of IC practice by clinical supervisors is not uncommon (Gould & Drey, 2013; Ward, 2010). The students in this study were acutely aware of the dominant hegemony within the clinical environment and, similar to the findings of other international studies (Gould & Drey, 2013; Ward, 2010), had been loath to challenge poor IC practice despite the potential safety risks to both themselves and their patients. Driven by a pervasive need to “fit in with the culture of the clinical site” (Knowles, 2014, p. 14), nursing students generally choose not to report non-compliant or improper behaviour, despite being
faced with ethically challenging situations for fear of repercussions (such as receiving a negative report from their clinical supervisor) and/or a perceived potential negative impact on their future employment prospects (Knowles, 2014). Further, there is evidence to suggest that students who witness unethical behaviour are more vulnerable to the notion of acting improperly themselves to ensure a positive evaluation is obtained (Feudtner, Christakis, & Christakis, 1994).

Previous research indicates that it is not uncommon for nursing students to encounter clinical experiences where they feel a sense of powerlessness or they may even experience vertical violence in which students become the target of ‘abusive registered nurse behaviour’ (Thomas & Burk, 2009, p. 226), although there was no direct suggestion of vertical violence made by the participants in this study. These negative experiences can impact on students’ career intentions (J. Curtis, Bowen, & Reid, 2007), their self-confidence and, importantly, their sense of belonging. Levett-Jones & Lathlean (2009) identified belongingness as a key factor in nursing students’ clinical learning experience and espoused the influential relationship between students’ sense of belonging and their willingness to acquiesce to and/or question poor clinical practices encountered during clinical placements. Students who feel alienated or ostracised in the workplace are far more reticent to ask questions and are more likely to conform to poor practice than students who feel comfortable and secure in the workplace. The rapport between a student and their clinical supervisor plays an important role in determining a student’s sense of support during their clinical placement experience (Levett-Jones & Lathlean, 2009).

Quality clinical supervision is undoubtedly a key component of clinical learning. The complexity of providing quality supervision however, should not be underestimated. According to Gillieatt, Martin, Marchant, Fielding, and Duncanson (2014), supervisors not only require “access to a depth of knowledge, skills and values. Supervisors require knowledge of supervisory models, standards and policies, supervisee developmental levels, adult learning principles, self-care frameworks, and the influence of diversity” (p. 3). Factors such as lack of time, poor contact from the university and lack of training can, however, negatively impact on registered nurses’ clinical supervision roles (Broadbent, Moxham, Sander, Walker, & Dwyer, 2014). This is an important consideration: if preceptors feel ill-equipped or unsupported in that role, they may harbour negative feelings towards students on clinical placement thereby exacerbating
students’ sense of ‘being a burden’ and potentially compromising the learning outcomes. To address these concerns, inter-professional supervisor training workshops which expressly incorporate skill development in power relations and working with cultural diversity have recently been successfully trialled in Australia (Gillieatt et al., 2014). The development of an online pre-clinical placement learning plan developed collaboratively between students and their clinical supervisor has also been reported as helpful for establishing early communication and clarifying expectations of the clinical experience (Grace & O’Neil, 2014).

As future health care professionals, it is anticipated that students, particularly those in the final year of their pre-registration program, would role model the behaviours required of them as a registered nurse and assume an appropriate level of responsibility for their own learning. Participants in this study, however, demonstrated a concerning abrogation of responsibility and learned helplessness, such as “admit[ing] his or her failure helplessly and do[ing] nothing to alter this situation” (Odabasi, 2013, p. 125) in regards to their own IC practices. These behaviours are notably inconsistent with the National Competency Standards for Accreditation as a Registered Nurse (Nursing and Midwifery Board of Australia, 2013), specifically that:

The registered nurse:

Demonstrates accountability and responsibility for [their] own actions within nursing practice;

Questions and/or clarifies interventions which appear inappropriate with relevant members of the health team; and

Reflects on their own practice to identify professional development needs.

Although the students in this study assumed that they would be able to ‘stand up’ against poor practice once they graduated, evidence suggests that this would be difficult if, as noted by previous research, graduates are moving into a culture where ‘nurses rationalise their own behaviour even if they recognise that it does not fit with recommended practice’ (Jackson, Lowton, & Griffiths, 2014, p. 403). New graduates often report being overwhelmed by the workload required of them, feeling “constantly challenged by their wavering confidence” (Duchscher, 2008, p. 444) and, more importantly, find themselves “seeking acceptance into a tradition-bound and hierarchical nursing culture” (Duchscher, 2008, p. 445). It is therefore unlikely that new
graduates would be prepared to challenge senior colleagues who were undertaking and/or expecting the graduates to undertake poor IC practice. Nevertheless, the national competency standards (Nursing and Midwifery Board of Australia, 2013) state the expectations of graduates to possess and demonstrate leadership skills: “The registered nurse takes a leadership role in the coordination of nursing and health care within and across different care contexts to facilitate optimal health outcomes” (p. 2). In this context, it is important for nursing students to develop their leadership and advocacy skills as much as possible during their pre-registration training. To achieve this, Jones and Sackett (2009) posit that leadership and management courses should be integrated right across the pre-registration curriculum, rather than “being relegated to the last semester of study” (p. 204) as has traditionally been the case.

7.5 Conclusion

Integration of microbiology content within the science subjects is potentially problematic. There is a pressing need to revisit the placement and timing of microbiology content in the pre-registration curriculum and the pedagogies used to engage with that content.

Simply making changes within the curriculum alone, however, is not enough. Feelings of powerlessness and exposure to poor IC practice during clinical placement experiences predispose students to acquiescence and subsequent sub-optimal practice after graduation. New graduates require the skills (and must be prepared) to communicate concern and advocate for compliance with best practice from an evidence-based standpoint. Enhancing the nexus between universities, clinical placement supervisors and healthcare leaders must therefore become a strategic focus of nursing education.
Chapter 8: General discussion

This chapter provides a general discussion to integrate the findings of the qualitative and quantitative phases presented in chapters 4–7 and explores literature relevant to the findings of this study.

8.1 Introduction

In the 2005 Lowbury lecture, Hambraeus (2006) proclaimed that “[t]he four cornerstones for efficient infection control in healthcare settings are resources, knowledge, education and compliance” (p. 217). This study has explored the influence of perceptions of science, applied microbiology knowledge and clinical placement experiences on students’ IC knowledge, intentions and practice. Considered individually, none of the aforementioned factors are sufficient to explain the ongoing sub-optimal IC practices of HCWs; there is little doubt that this is a multi-factorial problem.

8.2 Foundation knowledge: relevance and application

It has been stated that an understanding of microbiology is fundamental knowledge for IC practice (Roark, 2005). Students in this study perceived microbiology to be more difficult to learn than other scientific disciplines. The longitudinal survey data indicated that although nursing students became more familiar with IC procedures, particularly hand hygiene, as they progressed through their pre-registration program, this did not necessarily enhance their knowledge and understanding of underlying microbiological concepts. The interview data from the qualitative phase of the study further highlighted that students’ ability to transfer microbiology knowledge to practice was limited; suggesting the presence of a ‘theory-practice’ gap in relation to microbiology. Further, the findings from the focus groups indicated that the placement of theoretical microbiology content within the first-year bioscience subject potentiated the perceived irrelevance of that microbiology content to practice.

8.3 Clinical placement

Being a nurse requires the constant exchange of cognitive knowledge, perception, judgment and skilled ethical action. To teach this fluidity and expertise in practice educators must guide students to integrate these apprenticeships during each class and clinical experience (Handwerker, 2012, p. 1).
As highlighted in chapter 2, clinical placement plays an integral role in nursing students’ preparation for the transition to practice and underpins the formation of a professional nursing identity. Moreover, an important aim of clinical placement experiences is to provide students with an opportunity to enact theory in practice. For many students, however, there is disjuncture between their expectations and the reality of the clinical learning environment (Papathanasiou, Tsaras, & Sarafis, 2014). Positive role models, confidence and a sense of belonging were identified by Walker et al. (2014) as key elements for the construction of positive nurse identity whilst on clinical placement. As students spend time in the clinical environment, they begin to “construct their own schemata of admirable qualities that the RN displays which they perceive facilitates and, in some cases, hinders learning” (Stockhausen, 2005, p. 11). The strong influence of ward culture, including role models, on student learning in the workplace during clinical placements was a consistent theme in the qualitative phases of this study. It is well recognised that nursing students model the behaviour of practising nurses (Cameron, Schaffer, & Park, 2001; Snow et al., 2006; Stockhausen, 2005). Despite the prominence of HAIs and importance of all HCWs learning and applying appropriate IC practices, poor role modeling of IC practice by clinical supervisors is not uncommon and can have a significant impact on students’ IC intentions and practice (Ward, 2010), creating cognitive dissonance and feelings of personal vulnerability. Such situations can present students with an unexpected, and somewhat confronting, ethical dilemma and has the potential to “erode [their] ethical principles” (Feudtner et al., 1994, p. 670).

Participants in the student focus group were quick to recognise and express disdain for poor IC practices modeled by other HCWs but portrayed learned helplessness regarding their own IC practices. Previous research indicates that, for some students, the pervasive need to ‘fit in’ and feel a sense of belonging is so strong that knowingly complying with poor practice can seem “the lesser of two evils; from the students’ perspective it [is] often better to comply than to be rejected or risk ostracism” (Levett-Jones & Lathlean, 2009, p. 348). This finding highlights the importance (and application) of ethics training in the pre-registration nursing curriculum.

8.4 Ethical decision making

Alongside clinical competency, moral competency forms an essential element of nursing practice (Baker, 1987). In fact, some authors have argued that the two are inseparable (Gallagher, 2006). Ethics training in the pre-registration nursing curriculum
needs to prepare students to “confidently analyse and successfully resolve ethical dilemmas” (Garity, 2009, p. 114) that, in all likelihood, they will encounter during clinical placements or once they enter professional practice. One such teaching strategy is the use of debates on ethical issues to allow students to explore both sides of the issue (Garity, 2008). In the case of IC, a relevant debate topic could be:

‘Two nurses are working in one bay of a medical ward. They are each responsible for six patient beds. Both nurses are wearing gloves. One wears the same gloves for the whole six beds. The other is wearing double-gloves but removes the outer pair after the first 3 beds and continues onto the next 3 beds with the remaining pair of gloves on. Does the gloving practice of either of these nurses cause any concern? Does the gloving practice of either of these nurses raise any ethical issues?’

In light of the poor practices commonly witnessed by nursing students, such as those reported by students in the present study and others, Knowles (2014) posited that nursing students should be made aware, before going on clinical placements, that they may witness behaviour in the clinical environment that contradicts what they have been taught in the classroom to be best clinical practice that, when not followed, creates ethical dilemmas. Moreover, it is important for students to be reminded that “the line between short cuts and unethical practice is subtle and easy to cross” (Cameron et al., 2001, p. 441) and the consequences of acquiescence, for both themselves and their patients, could be life threatening. It has been suggested that the failure of graduates to practice ethically, despite their pre-registration training, may be the result of ‘moral blindness’: the denial of an ethical problem or failure to view a practice situation from an ethical perspective (Gallagher, 2006). Gallagher asserted the importance of moral perception in ethical competence and the need to develop nursing students’ perceptual abilities through the enhanced incorporation of medical literature and patient narratives into the ethics curriculum. Further, she warned that “[p]rofessional actions do not necessarily improve with ethics education. Yet, without an aspiration to ethical action, ethics education is futile.” (p. 234). Ultimately, nursing curricula must not only promote ethical ‘knowing’ but ethical ‘doing’.

8.5 Behavioural motivations

Despite the inclusion of microbiology education and IC skill development in the early stages of undergraduate training, simply having an awareness of the need for compliance with IC best practice is not enough to ensure translation into practice. Nor is IC practice necessarily related simply to increased levels of microbiology and/or IC
knowledge (Pittet, 2004). Pittet (2004) claimed that behavioural motivations are an important cornerstone and key determinant of IC alongside knowledge of microbiology and epidemiology. Therefore, IC training must also be underpinned by these elements if changes in IC performance are to be achieved. A recent study by Ward (2013) demonstrated the application of the Theory of Planned Behaviour (TPB) to nursing students’ IC intentions and behaviour (Figure 8.1).

![Figure 8.1. Application of the Theory of Planned Behaviour to IC practice](source)

Source: Adapted from Ward (2013, p. 297)

According to this social theory, IC behaviour is directly linked to the intention to perform appropriate IC practice, which in turn, is influenced by attitudes about IC, subjective norms (perceived pressure to perform IC – strength of others’ opinions) and perceived level of control. Ward’s (2013) study demonstrated that students’ attitudes towards IC prior to undertaking clinical placement can be positively influenced by microbiology/IC education, particularly when that education is structured in such a way as to highlight the risks and consequences of poor IC practice. These positive intentions can, however, be negatively impacted by encountering a poor safety culture and/or role modelling of poor IC practices by mentors, supervisors and colleagues in the workplace. The findings of the focus group in the present study also indicated that students felt they
had little control over their own IC practices as a result of their student status and the need to obtain a ‘good report’ from their supervisor:

You kind of feel obliged to follow your supervisor and things like that so you do, you tend to fall into whatever they’re doing and you’re too scared to say something because they are your supervisor or they are in charge and they are the ones signing you off on everything, so you don’t want to say something about what they’re doing wrong (P8).

Ultimately, the perceived importance of IC can be lessened and the necessity of such practices portrayed as “an additional extra rather than integral to care” (Ward, 2013, p. 304), or worse, poor and/or risky IC practices can quickly become adopted as the norm.

Another behavioural science theory, the Health Belief Model (HBM), has also been used as an explanatory framework to understand the infection prevention and control practices of health professionals (Brinsley, Sinkowitz-Cochran, Cardo, & The CDC Campaign to Prevent Antimicrobial Resistance Team, 2005). According to the HBM, behavioural change is influenced by a person’s background (including socio-demographic factors), personal perceptions and cues to action (Table 8.1).

<table>
<thead>
<tr>
<th>Table 8.1 The Health Belief Model</th>
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</thead>
<tbody>
<tr>
<td><strong>Socio-demographic Factors</strong></td>
</tr>
<tr>
<td><strong>Age, Sex, Ethnicity</strong></td>
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<tr>
<td><strong>Knowledge</strong></td>
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<tr>
<td><strong>Perceived benefits</strong></td>
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<tr>
<td><strong>Perceived barriers</strong></td>
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<tr>
<td><strong>Perceived self-efficacy</strong></td>
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<tr>
<td><strong>Behaviour change</strong></td>
</tr>
</tbody>
</table>

One of the factors predicting IC practices, as identified by the HBM, is perceived threat. In this context, perceptions of threat have two dimensions: perceived susceptibility to infection; and perceived severity (‘infectiousness’ and consequences) of the microorganism and/or disease in question. These perceptions are recognised as a
fundamental element of behavioural change theories/determinant of positive
behavioural change (El-Toukhy, 2015). That is, “[p]erceived susceptibility to a severe
risk motivates people to adopt positive behaviours to reduce or eliminate the risk” (El-
Toukhy, 2015, p. 1). It could therefore be argued that if nurses don’t perceive
themselves to be at risk or perceive the microorganism to be of little threat to their own
safety, they are less likely to adopt IC precautions in that instance.

The nexus between these factors is critical: misperceptions of microbiological principles
compounded by inaccurate risk/threat perception and perceived lack of susceptibility
can easily impact patient safety. For example, if a patient tests positive for a
microorganism that is transmitted via droplets (airborne) but the HCW incorrectly
believes the microorganism to be transmitted by direct (body fluid) contact, the HCW is
likely to choose inappropriate PPE to wear. Alternatively, if the HCW makes
assumptions that a microorganism is ‘not infectious’ and/or the patient doesn’t ‘look
infected’ then they may be lax in their application of IC measures. It has been suggested
that repeated exposure to and non-compliance with IC precautions in such situations
can, over time, further reduce HCWs’ perceptions of the potential risk (Kouabenan,
Dubois, De Gaudemaris, Scarnato, & Mallaret, 2007). This ‘familiarity phenomenon’
was demonstrated by Kouabenan et al. (2007) who found that HCWs with the most
patient contact were likely to underestimate the perceived risk of MRSA infection.
Length of service also influenced perceived risk of MRSA contamination: the more
years of service, the lower the perceived risk.

8.6 Self-efficacy

Upon closer inspection there is one common but perhaps overlooked explanatory
construct, that of self-efficacy, that underpins and/or influences each of the
aforementioned factors.

Self-efficacy is defined as “people’s judgment of their capabilities to organize and
execute courses of action required to attain designated types of performances” (Bandura,
1986, p. 391). It is neither a static nor global trait but “a differentiated set of self-beliefs
linked to distinct realms of functioning” (Bandura, 2006, p. 307). Thus, a person may
feel highly efficacious in relation to one domain (e.g. parenting) but have low self-
efficacy in relation to another domain (e.g. career progression).
Efficacy beliefs and expectations can be developed from four principal sources:

1. performance accomplishment of similar tasks (mastery experiences)
2. vicarious experience (observation of the success or failure experiences of other people/role models)
3. verbal persuasion (positive feedback/suggestions from mentors and/or peers)
4. self-evaluation of physiological state.

Nursing self-efficacy has been described as the “expectations of learning the knowledge base and performing the various skills necessary to become a registered nurse” (Harvey & McMurray, 1994, p. 472). Students who have a strong nursing self-efficacy will perform academic tasks with a greater degree of confidence, undertake challenging tasks more readily and persist longer in the face of obstacles or difficulties (Zimmerman, 2000). More importantly, increased self-efficacy has been linked to improved professional practice behaviors (Manojlovich, 2005). Bandura (1982, p. 122) described the important influence of self-efficacy in the following way:

Knowledge, transformational operations, and component skills are necessary but insufficient for accomplished performances. Indeed, people often do not behave optimally, even though they know full well what to do. This is because self-referent thought also mediates the relationship between knowledge and action.

Thus, this construct has potentially significant implications for both nursing education and clinical practice. Consistent with the general education literature, self-efficacy has been shown to predict the success of nursing students in bioscience subjects. Using the self-efficacy for science (SEFS) scale, Andrew (1998) found self-efficacy could predict up to 24% of students’ academic performance in a first-year nursing bioscience subject. Although nursing students’ science self-efficacy has been shown to increase gradually over years 2 and 3 of the pre-registration program (Friedel & Treagust, 2005), McVicar et al. (2015, p. 508) warned that “the common practice of curriculum ‘cramming’ in Year 1… with an expectation that students will be able to embrace detailed applied bioscience, is not conducive to raising efficacy.” These authors suggest that a focus on raising science self-efficacy in Year 1 is key to addressing the ‘bioscience problem’. They go on to recommend that this could be achieved via adjunct workshops to support and develop students’ study skills and reinforcement of the application of biosciences in subsequent years of the program. They also recommended that admissions criteria for pre-registration
nursing programs should include pre-entry qualifications in science. Face-to-face science preparation workshops run by bioscience academics prior to students commencing their first science subject have been shown to be beneficial for reducing nursing students’ science anxiety, increasing their confidence about studying science and improving their academic performance in the first bioscience subject (Cox & Crane, 2014).

In Australian HE institutions, bioscience subjects are often taught by academics with non-clinical backgrounds (Birks et al., 2015; Logan, 2008). Nursing students’ difficulty with understanding the relevance bioscience to a career in nursing could potentially be alleviated, to some extent, by writing clinical scenarios in partnership with nursing staff.

At some Australian higher education institutions these bioscience subjects are common to a number of health programs and may therefore be undertaken by a diverse cohort of students. It may, therefore, not always be appropriate for academic staff to use nursing-specific scenarios in those subjects. Nursing academics could, perhaps, assist students by reinforcing the theoretical microbiology during students’ preclinical training prior to clinical placements.

Clinical placement experiences play an important role in development of nursing students’ clinical competence, professional identity, and their self-concept (Goldenberg, Iwasiw, & MacMaster, 1997). By providing students with opportunities to perform nursing skills in an authentic clinical environment, these clinical learning experiences help “increase [students’] self-efficacy in activities they will perform as practicing nurses” (Goldenberg et al., 1997, p. 303). Self-efficacy, however, is recognised as an attribute that is not static (Fencl & Scheel, 2005) and can, therefore, be negatively affected by challenging clinical placements and experiences of failure, particularly if those negative experiences occur early in the learning process (van der Bilj & Shortbridge-Baggett, 2002). Anxiety about the clinical environment can also reduce students’ proficiency for performing newly acquired skills, tasks or procedures (Cheung & Au, 2011).

There is little doubt that role modeling, both within the classroom and the clinical environment, plays an important role in the development of nursing students’ ethical competence and, more importantly, in promoting ethical action (Pang & Wong, 1998). As noted previously, nursing self-efficacy is underpinned by vicarious experience and verbal persuasion. Thus, observation of role models emulating moral behaviour during clinical placements, developing students’ capacities to act on their values (Lynch, Hart,
Chapter 8: General discussion

& Costa, 2014) and providing opportunities in the classroom to self-reflect and deliberate upon both positive and negative role models (Pang & Wong, 1998) are likely to positively influence self-efficacy for ethical decision making.

Middleton (2013) claimed that “[n]ursing care … must be delivered by professionals with both clinical skills and personal leadership qualities to ensure care is person-centred and facilitates the optimum patient experience” (p. 84). Leadership skill development is an integral component of pre-registration training. It is important for students to acquire and demonstrate professional leadership skills as part of their pre-registration training. However, as highlighted by the student focus group in the present study, nursing students often feel immense pressure to conform to the mores of the workplace and, in the case of IC, this commonly manifests as failure to contest poor clinical practice, despite recognising it as poor practice (Ward, 2010).

Positive deviance, that is ‘intentional and honorable behavior that departs or differs from an established norm’ (Gary, 2013, p. 28) may be one process for creating change in a clinical environment where poor practice is commonplace. Positive deviance, however, involves risk for the person deviating (Gary, 2013) and is therefore likely to only be displayed by those students and graduates who feel empowered and possess strong self-leadership skills. Manz (1992) defined self-leadership as “the influence people exert over themselves to achieve the self-motivation and self-direction needed to behave in desirable ways” (p. 80) and he argued that self-leadership lies at the heart of empowerment. Spreitzer, De Janasz, and Quinn (1999, p. 513) noted that “[e]mpowered individuals do not wait passively for the work environment to provide direction; instead, they take a proactive approach toward shaping and influencing their work environment.” Self-leadership is an important attribute in multi-disciplinary teams where distributed leadership is an expectation, enabling each member of the team to contribute their knowledge and skills to the patient care. Statistical modelling undertaken by Prussia, Anderson, and Manz (1998) found that the utilisation of self-leadership strategies positively influences perceived self-efficacy, which subsequently has a positive effect on performance. Although the participants in that particular study were junior management students, it is feasible that similar trends would be present in nursing student cohorts given the underlying centrality of self-efficacy to both situations.
The construct of self-efficacy is integral to a number of different behavioural models, including the Health Beliefs Model, as outlined in the previous section. Higher levels of self-efficacy facilitate increased effort and persistence towards particular behaviours, including hand hygiene, in the face of challenges or barriers (Kretzer & Larson, 1998; Sax et al., 2005). Role modelling of IC best practices from clinical preceptors is also likely to enhance students’ IC self-efficacy and facilitate increased effort and persistence toward IC best practice. Major improvements in IC practice may, however, be difficult to achieve whilst nursing students continue to see sub-optimal practice when on clinical placement and new graduates find themselves in workplaces with unexpectedly high workloads. A busy workplace can make it difficult for students to develop the skills learnt as part of their pre-registration training and new graduates often report that there is an expectation, from the start, for them to perform like more experienced nurses (Clark & Holmes, 2007). Workload demands and time constraints in the workplace can reduce students’ sense of self-efficacy and perceived level of control which, according to Ward’s Theory of Planned Behaviour model will in turn negatively impact on their IC intentions.

Given the centrality of self-efficacy to the aforementioned areas of influence on students’ and graduates’ nursing practice, there is a need to recognise the importance of both self-efficacy and foundational knowledge; that is, knowledge of theoretical microbiology concepts to IC practice. It could be argued that clinical practice, in fact, lies at the intersection of self-efficacy and knowledge of core concepts (Figure 8.2).

Figure 8.2. Intersection of self-efficacy and core concept knowledge
Bandura (1977) proposed that poor performance in a given area may not be due to a lack of skills and/or knowledge but due to a lack of self-efficacy to use the knowledge and skills effectively. In this context, there is a need for greater consideration of the pervasive influence of students’ self-efficacy in future curriculum development. Identification of areas where students’ self-efficacy levels are low could be used as the basis of interventions and development of tools and pedagogies to enhance the strength of self-efficacy.

It is clearly evident, however, that a substantial body of work remains to ensure that all commencing nurse graduates are confident and skilled in their ability to correctly and consistently apply IC procedures.
Chapter 9: Conclusion

9.1 Introduction

Alongside attributes such as compassion and empathy, infection prevention and control is a mainstay of daily nursing practice. Poor IC knowledge and practice poses a risk to patient (and health practitioner) safety; thus, it is essential that new graduates are competent in IC practice. As discussed in the previous chapter, self-efficacy is a central construct which could arguably influence all aspects of IC education and practice. Enhancing nursing students’ IC self-efficacy may be pivotal in improving IC behaviours and intentions. Lauder et al. (2008), however, noted the potential implications of unrealistic perceptions of self-efficacy on competency:

What about those students who already have unrealistically high self-efficacy, those students who think they are competent but are not actually as competent as they think they are? Self-efficacy and, for that matter, self-reports of competency, must be rooted in a realistic interpretation by the student (p. 1860).

The Australian competency standards for registered nurses (Nursing and Midwifery Board of Australia, 2013) contain only one competency statement specifically related to IC which states that a RN ‘maintains standards for IC’ (p. 8) which is listed under the ‘Collaborative and therapeutic practice’ domain. The following, more generic, competency statements are listed under the ‘Professional practice’ domain:

a. performs nursing interventions in accordance with recognized standards of practice
b. recognises the responsibility to prevent harm.

Based on the plethora of evidence in the literature and the results of this study, one could argue that failure to adhere to IC precautions such as hand hygiene not only compromises patient safety but that such actions could be considered as practising below the required standard of competency. That is not to say that failure of a HCW to comply with IC policies automatically implies incompetence; rather, it may simply be reflective of adherence to the peer group practices and does reflect the need for reassessment of the competency statements regarding IC.
9.2 Competency and capability

The skills performed by nurses, according to Evans and Donnelly (2006, p. 152) “are not professionally meaningful as isolated acts and should not be viewed as separate from knowledge and judgement.” As novices, new graduates “are taught context-free rules to guide action in respect to different attributes.” (Benner, 2001, p. 21). There is little doubt that, without the relevant experience, new graduates do benefit from rules, guidelines and protocols to guide their clinical practice, however, Benner (2001, p. 21) argued that “following rules legislates against successful performance because the rules cannot tell them the most relevant tasks to perform in an actual situation”.

Does this then create a thought-free reliance on protocols? Gustavsson (2004) noted the importance of decision making for ethical practice:

> Ethical education, therefore, becomes something other than letting yourself be useful, or following a set of rules … To make a wise assessment, a process of decision-making is required in order to achieve a resolution of the best actions to take in relation to the concrete situation at hand (p. 48).

Evidence in nursing practice literature, however, indicates that new graduates have difficulty providing their rationale for nursing actions (Burns & Poster, 2008) and will make decisions about whether to adhere to IC precautions according to decisions based on (often partial or incorrect) assessment of risk (Cutter & Jordan, 2012; Kouabenan et al., 2007) rather than decisions based on a thorough understanding of microbiology principles. Without an ability to apply microbiology knowledge to IC decision making (i.e. apply the knowledge in context) there is an inherent risk of incorrect application of IC practices and thus a risk to patient (and nurse) safety. Transmission-based precautions, for example, are cited as “the foundation of IC for serious organisms and infections” (Mitchell et al, 2014, p. 6). Appropriate application of these precautions requires an understanding of the mode of transmission of different microorganisms. Inadequate knowledge of particular microorganisms has been shown to manifest in incorrect application of transmission-based procedure. Slyne, Phillips, and Parkes (2012), for example, compared the knowledge and application of IC precautions and practices of RNs and pre-registration students with varying years of clinical experience. The findings indicated that although both the most experienced RNs and the least experienced student nurses reported being confident in their knowledge of the microorganisms MRSA and C. difficile, only 56% and 68% of the RNs and students, respectively, demonstrated accurate knowledge of the microorganisms. Moreover, the
proportion of participants in either group who correctly answered questions regarding appropriate use of PPE and hand hygiene for patients with MRSA or *C. difficile* infections was less than 35%.

### 9.3 Re-thinking IC competence

Two previous studies have attempted to identify essential IC competencies for new graduate nurses (Liu et al., 2014) and hospital-based HCWs (Carrico, Rebmann, English, Mackey, & Cronin, 2008) using a Delphi process. Both studies listed ‘basic microbiology’ knowledge as a component of these core competencies. Liu et al. (2014) identified a total of 81 competency items. Seven of these competency statements were listed under the ‘Basic microbiology’ domain (Table 9.1).

<table>
<thead>
<tr>
<th>Competence statement</th>
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<tbody>
<tr>
<td>Identify the components required for infection transmission</td>
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<tr>
<td>Identify different routes of transmission of infectious organisms</td>
</tr>
<tr>
<td>Recognise a person who is suspected to be infected with pathogens</td>
</tr>
<tr>
<td>Recognise the concept of multi-resistant organisms</td>
</tr>
<tr>
<td>Realise that there are different types of microorganisms and that they infect in different ways</td>
</tr>
<tr>
<td>Read and interpret microbiology results/reports from the laboratory at the basic level</td>
</tr>
<tr>
<td>Describe the normal microbial flora of the body</td>
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</tbody>
</table>

Source: Liu et al. (2014)

Panellists in this Delphi survey were also asked to rate the importance of the broad areas of competency identified (‘very important’, ‘somewhat important’, ‘not very important’ or ‘irrelevant’). While hand hygiene and PPE competency were rated ‘very important’ by over 97% of the panellists, only 58% of the panellists rated basic microbiology as ‘very important’. The remainder of panellists rated it ‘somewhat important’.

Carrico et al. (2008) identified two broad microbiology competency statements with nine associated terminal objectives (measurable activities) (Table 9.2).
Table 9.2 Basic microbiology competency statements identified by Carrico et al. (2008)

<table>
<thead>
<tr>
<th>Competency statement</th>
<th>Terminal objective</th>
</tr>
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<tbody>
<tr>
<td>Describe the role of microorganisms in disease</td>
<td>a. Describe the different types of microorganisms and their role in HAIs.</td>
</tr>
<tr>
<td></td>
<td>b. Describe antimicrobial resistance and its importance in HAIs.</td>
</tr>
<tr>
<td>Describe how microorganisms are transmitted in health care settings</td>
<td>c. Identify the links in the chain of infection.</td>
</tr>
<tr>
<td></td>
<td>d. Differentiate between transmission routes of microorganisms in the health care setting.</td>
</tr>
<tr>
<td></td>
<td>e. Apply principles of asepsis</td>
</tr>
<tr>
<td></td>
<td>f. Distinguish between clean, disinfected, and sterile patient care items</td>
</tr>
</tbody>
</table>

Source: Carrico et al. (2008)

Both studies (Carrico et al., 2008; Liu et al., 2014) also identified ‘Critical thinking’/‘Critical assessment’ as a competency domain. Carrico et al. (2008) listed only one competency statement in this domain: “Demonstrate ability to problem-solve and apply knowledge to recognise, contain, and prevent infection transmission”. The terminal objectives associated with that competency statement, however, are arguably insufficient to achieve that competency:

a. Explain how to access IC resources including policies and procedures.

b. Discuss own role in infection prevention and control (e.g., recognising unsafe activities)

c. Describe practice changes (e.g., altered standard of care) in the event of limited resources.

Almost all of the competency statements listed above fall under the ‘Understand’ domain of the modified version of Bloom’s taxonomy of learning devised by Krathwohl (2002) (Table 9.3).
Healthcare professionals must have sufficient foundational knowledge to enable them to marshal and appropriately apply IC knowledge in different clinical scenarios. Gustavsson (2004, p. 44) espoused that ‘knowing how’ means “both being able to do certain operations, a skill, and being able to present a reasoned argument about what has been done.” Thus, whilst the IC competencies identified by Liu et al. (2014) and Carrico (2008) form a good foundation, it could be argued that given the well-documented sub-optimal IC knowledge and practices of HCWs, re-conceptualisation of IC competency objectives and assessment is warranted.

The ANMAC competency standards state that the standards ‘remain broad and principle-based so that they are sufficiently dynamic for practising nurses and the nurse regulators to use as a benchmark to assess competence in practise’. It could be argued, however, that the current IC competency statement (‘maintains standards for IC’) is too broad as it does not make any reference to understanding the underpinning scientific knowledge. By contrast, Australian Dental Council competency standards for newly qualified dentists (Australian Dental Council, 2015) require graduates to “understand the scientific principles and application of IC” (p. 10).

The following definition for medication competence in pharmacology was proposed by Sulosaari et al. (2012) “Registered nurses’ medication competence consists of theoretical, practical and decision-making competence.” p. 399) Given the parallels between medication competence and IC practice described in Chapter 2, it is feasible then to propose that IC competence could be conceptualised in the same way: infection prevention and control competence consists of theoretical, practical and decision-making competence. According to this proposed definition, students’ would need to understand, analyse, synthesise and apply their microbiology knowledge. Eraut (1994, 142

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**Table 9.3 Krathwohl’s adapted version of Blooms taxonomy**

<table>
<thead>
<tr>
<th>Category</th>
<th>Activity</th>
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<tbody>
<tr>
<td>Increasing</td>
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</tr>
<tr>
<td>complexity</td>
<td></td>
</tr>
<tr>
<td>Remember</td>
<td>Recognise, recall</td>
</tr>
<tr>
<td>Understand</td>
<td>Interpret, classify, compare, describe, explain</td>
</tr>
<tr>
<td>Apply</td>
<td>Execute, implement</td>
</tr>
<tr>
<td>Analyse</td>
<td>Differentiate, organise, attribute</td>
</tr>
<tr>
<td>Evaluate</td>
<td>Check, critique</td>
</tr>
<tr>
<td>Create</td>
<td>Generate, plan, produce</td>
</tr>
</tbody>
</table>

Source: Adapted from Krathwohl (2002)
p. 48) differentiated between replication and application of professional knowledge in the following way:

To use knowledge applicatively is to do more than just use it in an applied setting. If a particular ‘application’ has been coached and rehearsed then further repetition of it is purely replicative. But when such knowledge is used in circumstances at all different from those previously encountered, more than replication is involved.

Since the proposed definition of IC competence incorporates ‘practical and decision-making competence’ it could be argued that in order to assess competence one would require more than simply observing IC practice (e.g. hand hygiene audits). IC practice based on reflexive use of protocols can masquerade as informed clinical decision making. While a new graduate may demonstrate adherence by applying the correct protocol or PPE to a particular case scenario or patient, this does not demonstrate their decision-making competence, their ability to synthesise and apply knowledge. In short, correct practice alone does not equate to competence. In a profession that requires nurses to be autonomous and accountable for their actions, it is imperative that new graduates have the ability to “make decisions based on appropriate scientific evidence rather than ‘ritualised associations’, some of which [may be] erroneous” (Wilkes & Batts, 1996, p. 338). Students would need to demonstrate an understanding of the rationale behind the ‘5 Moments of Hand Hygiene’ (rather than simply knowing what the ‘5 Moments’ are) and be able to bring this knowledge to bear in a variety of contexts.

The ultimate goal of defining competency in this way would be to teach IC practice that is not based on simple memorisation of protocols but is based on informed decision-making. An understanding of microbiology would be central to this process. This would also build IC self-efficacy ensuring that students have the self-efficacy to apply that knowledge to practice. Given the multitude of factors which can impact on IC behaviour, it would be unrealistic to assume that changing the competency standards, alone, will guarantee better IC practice. The revised competency standards could, however, drive curriculum development and improved IC practice.

**9.4 Recommendations arising from the data**

The recommendations for curriculum development and for nurse educators that have evolved from the data are summarised in Table 9.4 and discussed in the following sections.
Table 9.4 Table of recommendations arising from the data

<table>
<thead>
<tr>
<th>Recommendations for curriculum</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A review of the placement, nature and timing of microbiology teaching in Australian pre-registration nursing curricula</td>
</tr>
<tr>
<td>2</td>
<td>Identification of threshold concepts for microbiology</td>
</tr>
<tr>
<td>3</td>
<td>Development of a diagnostic tool to explicitly identify student misconceptions of microbiological principles at the commencement of the final year of the pre-registration program</td>
</tr>
<tr>
<td>4</td>
<td>Enhance students’ understanding of their own health beliefs (as per the Health Belief Model) and the concept of positive deviance</td>
</tr>
<tr>
<td>5</td>
<td>Integration of leadership training right across the pre-registration curriculum</td>
</tr>
<tr>
<td>6</td>
<td>Inclusion of ‘negotiated voice’ training modules both within the nursing curriculum and clinical supervisor training</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommendations for educators</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Professional development activities for bioscience teachers that focus on microbiological concepts considered ‘important’ by IC professionals</td>
</tr>
<tr>
<td>2</td>
<td>The use of active learning models for teaching of microbiology and IC</td>
</tr>
<tr>
<td>3</td>
<td>Modelling of IC best practice by clinical supervisors and nurse mentors in the clinical environment</td>
</tr>
<tr>
<td>4</td>
<td>Familiarisation of clinical supervisors and mentors with the microbiology component of the pre-registration curriculum</td>
</tr>
<tr>
<td>5</td>
<td>Post–clinical-placement debriefing sessions to provide students with an opportunity to process any ethical dilemmas experienced in the clinical setting.</td>
</tr>
</tbody>
</table>

9.4.1 Recommendations for curriculum

An important step in re-defining IC competency would be determination of curriculum content that currently allows students to develop the necessary skills and knowledge to demonstrate competency and which parts of the curriculum would need to be reconceptualised. A review of the placement, nature and timing of microbiology teaching in Australian pre-registration nursing curricula is urgently needed to identify the pedagogies being used and ensure that the “time-gap between the introduction of the theoretical knowledge and its first use in professional practice is not too large” (Eraut, 1994, p. 120). Identification of threshold concepts (Meyer & Land, 2005) for microbiology could form the basis of a revision of the conceptual framework being used to teach microbiology concepts. Development of a diagnostic tool to explicitly identify student misconceptions of microbiological principles at the commencement of the final
year of the pre-registration program would also provide educators with an opportunity to address these misconceptions prior to graduation.

In a crowded curriculum, it is easy for health professional educators to focus on transmission of theoretical and professional craft knowledge (Barradell & Kennedy-Jones, 2013); however, Higgs et al. (2004, p. 31) claimed that health professional practice is also informed by “knowledge of one’s self, values and beliefs.” This notion was supported by Sulosaari et al. (2012, p. 399) who noted that “medication competence is always interrelated and linked to nurse’s values and attitudes.” The findings of this study, and associated previous research, suggest the same is true of IC competence. Thus, there is a need to enhance students’ understanding of their own health beliefs (as per the Health Belief Model) and the concept of positive deviance. New graduates require the skills (and must be prepared) to communicate concern and advocate for good practice from an evidence-based standpoint. Leadership training traditionally occurs in the final year of study. To strengthen these leadership skills, it has been suggested that leadership and management courses should be integrated right across the pre-registration curriculum (Jones & Sackett, 2009). Inclusion of ‘negotiated voice’ training modules both within the nursing curriculum and clinical supervisor training may also be of benefit (Bradbury-Jones, Sambrook, & Irvine, 2011).

### 9.4.2 Recommendations for educators

Given that a reasonable proportion of academics teaching the science/microbiology content in Australian pre-registration nursing programs are scientists do not have a clinical nursing background (Birks et al., 2015), some professional development activities designed collaboratively with ICPs may be beneficial. These professional development activities could focus on microbiological concepts considered ‘important’ by the IC professionals, an understanding of how those concepts are applied in daily clinical practice, and highlighting of the challenges that students and new graduates may face when trying to apply that microbiology knowledge to practice. The use of active learning models for teaching of microbiology and IC may also be beneficial for enhancing application of that knowledge to practice (Middleton, 2013).

In the clinical environment, clinical supervisors and nurse mentors need to not only model IC best practice but also support students in the application of their microbiology knowledge to decision making about IC practices. Clinical supervisors and mentors...
becoming more familiar with the microbiology component of the pre-registration curriculum may help this process. Post–clinical-placement debriefing sessions with a particular emphasis on providing students an opportunity to process any ethical dilemmas they experienced in the clinical setting may also be of benefit.
Chapter 10: Limitations and future work

10.1 Limitations

As with all research, there were a number of limitations associated with the current study.

Student surveys

Since the majority of the surveys were carried out in a single institution, the findings may not be generalizable to other institutions with different curricula. However, the similarity of responses, in Survey S2, of students from a second institution (Uni 2) enhances the validity of the data. Self-selection bias cannot be discounted since participation in the survey was voluntary. Provision of a SID by some students did enable cross-matching of survey data longitudinally although the majority of these students only participated in two surveys (S1 and S2). The sample size was considered too low to draw any statistically meaningful conclusions therefore analysis was not provided. The low participant numbers in survey S4, whilst reflective of attrition rates from the BN program at that time, reduced the generalisability of the data from that survey. Similarly, the low proportion of 2012 commencing students participating in S1(a) poses a limitation, however, given the demographic similarity of the S1(a) participants with S1 participants suggests it is unlikely that sampling bias was an issue.

ICP interviews

The semi-structured interviews focused on IC behaviour. As IC professionals who have primary responsibility for IC leadership within their healthcare institution, it is possible that participants may have not answered questions regarding non-compliance of HCWs with IC policies completely honestly. Therefore, the possibility of social desirability bias cannot be discounted, however, there was no evidence of this in participant responses. Although ICP participants in this study came from a diverse range of hospitals, it may be useful in future studies to conduct additional interviews based on specific variables such as age or hospital healthcare-associated infection rates.

Focus group

For some participants, the group dynamic of a focus group may influence the nature of participant responses (Morgan, 1997). It is possible that being interviewed by a
university academic rather than a non-academic (e.g. a research assistant) may have encouraged participants to give what they thought were socially or academically desirable answers that they believe would represent themselves and/or their IC activities in a ‘favourable light’. There was, however, no direct power relationship as the researcher was not involved in the teaching or assessment of any subjects undertaken by these students. The researcher did not know participants’ academic grades so it is not possible to rule out self-selection bias; however, the primary focus of the study was the impact of clinical placements on students’ self-reported preparedness for IC practice, which was unlikely to have been affected by students’ academic achievements. It was confirmed by the BN course administrator that individual students in the broader cohort had undertaken their clinical placements in a variety of clinical settings.

Although conducting two or more focus groups may have ensured that the findings/themes arising were not unique to a one-off group, the timeframe of the study and schedule of student clinical placements precluded this from occurring. The responses given by students in this study were consistent with findings of similar international studies (Ward, 2010; Gould, 2013), thus reducing potential bias of the interview data.

10.2 Future work

There can be no doubt that much work remains to be done to achieve a significant and consistent impact on new graduate nurses’, and indeed all HCWs’, IC practices. The current study, for example, did not investigate the microbiology curriculum. Due to the volume, range and variability of pre-registration nursing curricula across the world, this was not considered a viable analysis within the scope of this thesis. This thesis, however, forms the basis for future work “should explore the ideal curriculum” and how this compares to current practice. Given the variation in bioscience content across HE institutions identified by Logan and Angel (2014), a similar audit of the microbiology-specific content of BN programs across Australian universities would provide an insight into variations of the range and depth of the microbiology component of the curriculum. It would also be useful to interview bioscience educators to identify ‘troublesome knowledge’ (Meyer & Land, 2005) and to identify the different teaching approaches used by science educators for teaching microbiology and the resultant effect on IC practice (if any). Although distance education students were included in this study, they were not the focus of the research. The unique features of delivering theoretical content
to DE students, however, warrant deeper exploration of the affordances and challenges of different study modes, not just in relation to content but also synchronous and asynchronous pedagogies.

The focus of this study was pre-registration nursing students. Further studies would also benefit from exploring recent nursing graduates’ perceptions of risk and conceptions of microbiological principles to allow misconceptions to be addressed as part of ongoing IC training. Future work could also explore the role of ICPs in shaping nursing students’ perceptions and expectations of IC during clinical placements.

10.3 Final comments

Given the ongoing prevalence and impact of HAIs and continuing emergence of new pathogens, the role of microbiology education and training as an integral component of IC competence must not be overlooked or undervalued. Any improvements in IC practices that may be achieved through re-defining IC competence and enhancing nursing students IC self-efficacy skills is a valuable goal, not only to ensure patient safety but potentially save hundreds, perhaps thousands, of lives.
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References


# Appendices

<table>
<thead>
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<th>Appendix number</th>
<th>Appendix title</th>
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<tbody>
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<td>Information sheet for participants</td>
</tr>
<tr>
<td>A2</td>
<td>Interview guide – ICP interviews</td>
</tr>
<tr>
<td>A3</td>
<td>Table of themes and exemplars</td>
</tr>
<tr>
<td><strong>Student surveys</strong></td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>Information sheet – student surveys</td>
</tr>
<tr>
<td>B2</td>
<td>Survey S1</td>
</tr>
<tr>
<td>B3</td>
<td>Survey S2</td>
</tr>
<tr>
<td>B4</td>
<td>Survey S3</td>
</tr>
<tr>
<td>B5</td>
<td>Survey S4</td>
</tr>
<tr>
<td>B6</td>
<td>Student survey raw data (on disc)</td>
</tr>
<tr>
<td><strong>Student focus group</strong></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>Information sheet – student focus group</td>
</tr>
<tr>
<td>C2</td>
<td>Table of themes and exemplars</td>
</tr>
<tr>
<td><strong>ICP Interviews</strong></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Interview transcripts</td>
</tr>
</tbody>
</table>
Appendices

Appendix A1: Information sheet for ICP interviews
INFORMATION STATEMENT FOR RESEARCH PARTICIPANTS

Project Title: How much microbiology do nursing students need? Exploring the issue from the perspective of infection control professionals

Researcher: Jennifer Cox

This project forms part of a PhD project being undertaken by the interviewer. If you have any queries about or issues with this research project, you should contact the supervisor in the first instance. Contact details are provided below:

Dr Heather Cavanagh, School of Biomedical Science, Charles Sturt University, Wagga Ph: 02 69332501

This project aims to explore infection control practitioners’ views on the importance of microbiology knowledge in compliance with infection control practice, the perceived adequacy of new graduates’ microbiology and infection control knowledge and the microbiology knowledge/understanding of the infection control professionals.

You are invited to participate in the project by taking part in a face-to-face interview with the researcher. Each interview is expected to last for approximately 1 hour and will be conducted at the participants’ workplace at a suitable date and time. Each interview will be audio-taped.

De-identified data collected during this project will be published within a PhD thesis, may also be used in preparation of peer reviewed publications and may be used to inform future developments in relation to undergraduate nursing curriculum. All original data will only be accessible only to the research team and will remain confidential at all times. All of the information collected will be stored and reported in a de-identified manner.

Your participation in this project is voluntary and you can withdraw from the project at any time with no penalty or discriminatory treatment. If you withdraw after participating in the interview, every effort will be made to delete any information and/or comments given.

NOTE: The School of Biomedical Science’s Ethics Committee has approved this project. If you have any complaints or reservations about this project, you may contact the Committee through the Executive Officer:

The Executive Officer
Ethics Committee
School of Biomedical Science
Charles Sturt University
Orange NSW 2800
Tel: (02) 63657818
Fax: (02) 63657563

Any issues you raise will be treated in confidence and investigated fully and you will be informed of the outcome.

If you are willing to participate please sign the attached consent form and return it in the reply-paid envelope supplied. Volunteers will be contacted to arrange a convenient time for the interview. Thank you for taking the time to read this form and for your willing assistance in this study.

Yours Sincerely,

Jenny Cox
Appendices

Appendix A2: Interview guide for ICP interviews

Interview Guide

1. Tell me how you got into infection control
   a. What is your role?
   b. What qualifications do you have (e.g. BN)?
   c. How long have you been in the job?
   d. What (if any) specific training were you provided with?

2. What do you understand infection control to be about/entail?

3. Do you think knowledge and understanding of microbiology makes a difference in understanding and application of infection control policies?

4. Do you feel infection control knowledge is consistent across all groups of healthcare workers? If not, how would you characterize it?
   a. How would you characterize the IC knowledge of new graduates entering the healthcare profession?
   b. Do you see any trends with regards to where the graduate has undertaken their pre-registration training (e.g. TAFE vs. uni)?
   c. Is it reasonable to expect that a new graduates’ knowledge will change as they become more experienced? What sorts of changes to you see and how long does it normally take for those changes to occur?

5. How do you feel about compliance rates (with infection control policies) at your hospital (good, poor, inadequate etc)?
   a. Do you see any challenges or barriers to compliance?
   b. Is there a problem with compliance? Why do you think this is so/not so?
   c. How do you as the IC person address those challenges/barriers?
   d. In a perfect world with unlimited money and resources, what sorts of things would you do to address the issue of poor compliance?
   e. Do you see any other barriers to achieving this goal?
### Appendix A3: Table of themes and exemplars – ICP interviews

<table>
<thead>
<tr>
<th>Theme</th>
<th>Exemplar statements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theory versus practice</strong></td>
<td></td>
</tr>
<tr>
<td>Theory-practice gap</td>
<td><em>It’s the basis of what they learn but it’s translating what they [undergraduates] learn into good clinical practice. That’s where I find there is a huge gap. They go and learn the rules but actually don’t know how to apply them with the various scenarios that would be faced with.</em> [P2]</td>
</tr>
<tr>
<td>Putting theory into practice</td>
<td><em>I often ask what they are taught at uni because you can talk about hand hygiene and when to do it and they are sort of a bit ‘miffed’... The amount of people that don’t know standard precautions is alarming.</em> [P1]</td>
</tr>
<tr>
<td></td>
<td><em>I don’t believe people’s intention is to not be safe and not look after people properly with infection control. I just think there is a huge gap - that the light has not gone on yet as to translating the knowledge into good practice.</em> [P2]</td>
</tr>
<tr>
<td></td>
<td><em>We did a hand hygiene audit the other week and there was new graduate on the ward. She walked from room to room with the same pair of gloves on, doing the same sorts of things, for FIFTY minutes ... oh no, actually she took her gloves off to answer the telephone – she took off one – then she put the same glove back on to keep going.</em> [P7]</td>
</tr>
<tr>
<td></td>
<td><em>What it is important to the nurses at bedside is to have basic understanding of microbiology but to be able to understand that it means ‘cleaning my hands’, it means wearing a mask, it means ‘this is why it is important to clean the environment around the patients’, because what they lose is where they think ‘that is not my job to clean’ or ‘why do I have to wear a mask’ because they haven’t actually translated the information across</em> [P2]</td>
</tr>
<tr>
<td></td>
<td><em>The basics of infection control about personal protective equipment [PPE] are not getting through to people.</em></td>
</tr>
<tr>
<td>IC not seen as important</td>
<td>We are certainly having issues with aseptic technique. We are having things happening like new grads disconnecting a drip and then putting the drip on the bed and then going to put it back up again, now that is very basic, it should have been rubbed in. [P3]</td>
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<td>---</td>
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<tr>
<td></td>
<td>But they don’t appreciate that they can’t walk out of the room and touch things out there because of the spread - that [knowledge] still lacks.</td>
</tr>
<tr>
<td></td>
<td>I think it’s just because it’s not seen as a priority in their training. It’s seen as part of it, but there a lot more important things you need to know</td>
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<tr>
<td></td>
<td>The importance of it [infection control] doesn’t seem to gel. There seems to be more of a focus on the diagnoses or getting into that exciting part of what is happening [P1]</td>
</tr>
<tr>
<td></td>
<td>Maybe they don’t understand why that is so important? Maybe they haven’t remembered from their studies why, if have you hooked that drip back up [after placing it on the bed] that you have increased your infection risk and why that is so drastic for your patient. [P3]</td>
</tr>
<tr>
<td>Disjunction between university curriculum and the ‘real world’</td>
<td>It’s like it’s a real shame that the universities and TAFE’s don’t work more closely with not just the facilities but the professional associations. Say like with infection control...[P2]</td>
</tr>
<tr>
<td>Separation of what universities teach &amp; what IC educators feel is needed</td>
<td>Both the universities and the TAFE’s... they seem to go and teach something different to what’s actually happening on the ground. So it’s a huge transition, a huge transition for some of these people to come across into [the healthcare system] [P2]</td>
</tr>
<tr>
<td></td>
<td>I think its education and when you get out there it’s all too late. It comes back to the undergraduate initial training rather than getting it from on the job [P8]</td>
</tr>
<tr>
<td>Peer Attitudes and actions</td>
<td>“...application of infection control practice relates to clinical leadership. If you have a ward with good clinical leadership then you will have good general infection control practice. If you have a ward where the clinical leadership is lacking then infection control practice, hand hygiene in particular, you will see its poor...” [P5]</td>
</tr>
</tbody>
</table>
### Ward culture

<table>
<thead>
<tr>
<th>Ward culture</th>
<th>It’s a ‘see one, do one, teach one’ type of mentality. They see it being done the wrong way, you know, specimen taking or something being done the wrong way and they think that is normal and then they teach it to somebody else. [P4]</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>They start to see other people cut corners and they see that obviously infection control isn’t as important so they can cut corners too.</td>
</tr>
<tr>
<td></td>
<td>So the grads can come out with all the knowledge in the world but if the senior nurse is not interested, unfortunately thegrads are going to sit back and do what the ward does. [P1]</td>
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<tr>
<td></td>
<td>They are more concerned about protecting themselves instead of the patient and that is a big thing we need to change, that culture of protecting us and not our patients [P1]</td>
</tr>
<tr>
<td></td>
<td>It’s really hard to educate adults. It’s exceptionally hard, especially in the workforce because it’s hard to change opinion and [the attitude] “I have done it that way for a 100 years”</td>
</tr>
<tr>
<td></td>
<td>So if you [the ICP] are trying to say “this is the way you should do it”, yet everyone else on the ward isn’t doing it right, you have got then a cultural barrier to break through as well because they’re wanting to do things how others are showing them or how they’re seeing it done. [P3]</td>
</tr>
<tr>
<td></td>
<td>Because when they [new graduates] come into the hospital they also get very swayed and jaded by the people that have perhaps been around a bit too long, “oh don’t worry about doing it that way”. Because they want to fit in they will do it that way. [P2]</td>
</tr>
</tbody>
</table>

### Learning in context

<table>
<thead>
<tr>
<th>Learning in context</th>
<th>They do need it, but they need it in the context and given context, “What does this actually mean in the work place?”, “What does it actually mean in the clinical environment?” So see how it actually applies. [P8]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I find that once you explain or go back to a bit of micro basics for them but when you bring it out to the forefront and attach it to the clinical application, they go “oh, get you now” and they’ll go with it. [P2]</td>
</tr>
</tbody>
</table>
Of course they are not going to know all the little side microorganisms, you know they don’t have to have an in-depth knowledge of those, but the ones that are more commonly found within a hospital situation. [P4]

I didn’t understand how important my microbiology was when I was doing my training or even in my intensive care [experience], but the importance grew as I grew and developed [P3]

You need to understand the principals and you need to have a really solid idea as to why you are going to do that [P3]

...If they could understand how a bug is transmitted and grows, it’s going to help them put in precautions rather than me telling them [which precautions are needed]. [P1]

We teach hand-washing but the fall-out from bad infection control isn’t realised and I think that needs to be demonstrated and illustrated. An eye opener for what happens if you don’t do it. [P8]
Appendices

Appendix B1: Information sheet for student surveys

Project Title: Investigating Undergraduate Nurses Comprehension and Retention of Microbiology and Infection Control Knowledge

Researcher: Jenny Cox, PhD candidate, School of Biomedical Science, Charles Sturt University.

Supervisor: Dr Heather Cavanagh, School of Biomedical Science, Charles Sturt University, Wagga. Ph: 02 69332500

This project forms the basis of a PhD project. The purpose of this longitudinal study is to examine comprehension and retention of microbiology and infection control knowledge of undergraduate nursing students over the duration of a nursing degree. You are invited to participate in the project by completing 4 separate questionnaires, which will be administered at various stages over the duration of your candidature as prior to commencement of first-year, and again at the end of first, second and third year. Each questionnaire will usually take about 8-10 minutes to complete.

Participants are also asked to provide their Student ID number on the last page of the questionnaire so that the questionnaires can be linked together and then linked to academic outcomes after final grades are awarded. Please note that provision of your Student ID is completely voluntary. In order to maintain confidentiality of participants, this page will be removed by the School Admin Assistant and replaced with a generic number prior to any data being analysed. In this way, participants can be assured that any information/reponses given will in no way influence their final grades.

It is envisaged that the results will be used to assess current health science curricula and inform the design of new teaching strategies.

You are invited to participate in the project by completing the attached questionnaire. Your consent to participate will be assumed from your completion and return of the questionnaire. Please note that you are under no obligation to participate in the project or can withdraw from the project at any time. Non-participation or withdrawal will not result in any penalty or discriminatory treatment.

NOTE: Charles Sturt University’s Ethics in Human Research Committee has approved this project. If you have any complaints or reservations about the ethical conduct of this project, you may contact the Committee through the Executive Officer:

The Executive Officer
Ethics in Human Research Committee
The Grange
Charles Sturt University
Bathurst NSW 2795

Tel: (02) 6338 4628
Fax: (02) 6338 4194

Any issues you raise will be treated in confidence and investigated fully and you will be informed of the outcome.

Data collected during this project may be presented at conferences and published in journals without any identifying information being used. All data collected will be accessible only to the research team and will be confidential. All of the information collected will be stored in a de-identified manner and only aggregate data will be published.

If you have any queries about or issues with this research project, you should contact the Supervisor (Dr H. Cavanagh) in the first instance. Thank you for taking the time to read this form and for your assistance with this project.

Yours Sincerely,
Jenny Cox
Appendix B2: Survey S1

Please tick one box only

1. My gender is:
   □ Male  □ Female

2. My age is (please circle):
   18-24  25-31  32-38  39-45  46-51  over 51

3. I am enrolled in:
   □ Bachelor of Nursing (On-Campus)
   □ Bachelor of Nursing (Distance Education)
   □ Bachelor of Nursing/Early Childhood
   □ Other (Please specify)_____________________

4. Pre-entry qualifications (status at time of enrolment):
   □ Enrolled nurse – acute care facility
   □ Enrolled nurse – long-term care facility
   □ Other (please specify)_____________________

5. In which year did you commence your degree? _____________

6. How much time have you spent working in a hospital?
   □ None at all
   □ Only when on clinical placement
   □ Up to 5 yrs
   □ More than 5 yrs
Appendices

7. Have you previously undertaken any tertiary study?
   □ Yes – TAFE (go to Q8)  □ Yes – University (go to Q8)
   □ Yes – Other (go to Q8)  □ No (go to Q9)

8. If you answered ‘yes’ to the above question (Q7) please indicate whether your previous study included any microbiology
   □ Yes, a lot (more than 1 whole semester)
   □ Yes, a little (less than 1 whole semester)
   □ No, none at all

9. Please indicate how relevant you think each of the following subjects are to a career in nursing:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Very relevant</th>
<th>Relevant</th>
<th>Not relevant</th>
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<tr>
<td>Anatomy</td>
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<tr>
<td>Infection prevention &amp; control</td>
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</table>

10. Please indicate how difficult you think each of the following subjects is to learn:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Very easy to learn</th>
<th>Easy to learn</th>
<th>Difficult to learn</th>
<th>Very difficult to learn</th>
<th>Unsure</th>
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<td>Anatomy</td>
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<tr>
<td>Infection control</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Appendices

11. Which body location would NOT normally have microbes present?
   - Skin
   - Large intestine
   - **Blood**
   - Not sure

12. The body’s first line of defense against infection is:
   - Antibodies
   - White blood cells
   - **Unbroken skin**
   - Not sure

13. A person can only get Hepatitis C if they are an intravenous drug user:
   - True
   - **False**
   - Not sure

14. Select the correct statement:
   - Patients rarely contract an infection while in hospital
   - Approximately 10% of patients will contract an infection while in hospital
   - Approximately 50% of patients will contract an infection while in hospital
   - Approximately 90% of patients will contract an infection while in hospital
   - I am unsure how commonly patients contract an infection while in hospital

15. Do you know the concept of universal or standard precautions?
   - No, it means nothing to me
   - I have heard about it but don’t know the details
   - I have a general understanding of universal/standard precautions
   - I know it well

16. What is the most common source of infections in the clinical setting?
   - Medical instruments
   - Air
   - **Hands**
   - Food
   - Not sure
17. The most effective way to prevent transmission of infections in the clinical setting is:
   - [ ] Masks
   - [ ] Gloves
   - [ ] **Hand hygiene**
   - [ ] Gowns/aprons
   - [ ] Not sure

18. MRSA (Methicillin-resistant *Staphylococcus aureus*) is a common cause of hospital-acquired infections. The MRSA organism is:
   - [ ] A bacteria
   - [ ] A fungus
   - [ ] A virus
   - [ ] Not sure

19. A patient can only get an MRSA infection from a hospital (or healthcare facility):
   - [ ] True
   - [ ] False
   - [ ] Not sure

20. A nurse only needs to wash his/her hands before and/or after caring for a patient if the patient is known to have an infection:
   - [ ] True
   - [ ] False
   - [ ] Not sure

If you would be willing to provide your student number please enter it in the box below.

Thank you for taking the time to complete this survey.
Appendices

Appendix B3: Survey S2

Please tick one box only

1. My gender is:
   □ Male    □ Female

2. My age is (please circle):
   18-24  25-31  32-38  39-45  46-51  over 51

3. I am enrolled in:
   □ Bachelor of Nursing (On-Campus)
   □ Bachelor of Nursing (Distance Education)
   □ Bachelor of Nursing/Early Childhood
   □ Other (Please specify)____________________

4. Pre-entry qualifications (status at time of enrolment):
   □ Enrolled nurse
   □ Other (please specify)____________________

5. In which year did you commence your degree? _____________

6. How much time have you spent working in a hospital?
   □ None at all
   □ Only when on clinical placement
   □ Up to 5 yrs
   □ More than 5 yrs
7. Have you previously undertaken any tertiary study?
□ Yes – TAFE (go to Q8) □ Yes – University (go to Q8)
□ Yes – Other (go to Q8) □ No (go to Q9)

8. If you answered ‘yes’ to the above question (Q7) please indicate whether your previous study included any microbiology
□ Yes, a lot (more than 1 whole semester)
□ Yes, a little (less than 1 whole semester)
□ No, none at all

9. Please indicate how relevant you think each of the following subjects are to a career in nursing:

<table>
<thead>
<tr>
<th></th>
<th>Very relevant</th>
<th>Relevant</th>
<th>Not relevant</th>
<th>Unsure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy</td>
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<td>Physiology</td>
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<td>Microbiology</td>
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<td>Sociology</td>
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<tr>
<td>Infection control</td>
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</tr>
</tbody>
</table>

10. Please indicate how difficult you think each of the following subjects is to learn:

<table>
<thead>
<tr>
<th></th>
<th>Very easy to learn</th>
<th>Easy to learn</th>
<th>Difficult to learn</th>
<th>Very difficult to learn</th>
<th>Unsure</th>
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</tbody>
</table>
Appendices

11. Which body location would NOT normally have microbes present?
   - Skin
   - **Blood**
   - Large intestine
   - Not sure

12. The body’s **first** line of defense against infection is:
   - Antibodies
   - White blood cells
   - **Unbroken skin**
   - Not sure

13. Hepatitis C can only be transmitted between intravenous drug users who share needles:
   - True
   - False
   - Not sure

14. Select the correct statement:
   - Patients rarely contract an infection while in hospital
   - **Approximately 10% of patients will contract an infection while in hospital**
   - Approximately 50% of patients will contract an infection while in hospital
   - Approximately 90% of patients will contract an infection while in hospital
   - I am unsure how commonly patients contract an infection while in hospital

15. Do you know the concept of universal or standard precautions?
   - No, it means nothing to me
   - I have heard about it but don’t know the details
   - I have a general understanding of universal/standard precautions
   - I know it well

16. What is the most common mode of transmission of infections in the clinical setting?
   - Through the air (droplets)
   - **Hands (direct contact)**
   - Contaminated food
   - Not sure

17. Hand hygiene should be performed in the following situations:
   - As you enter and leave a patient’s room
   - Before and after touching a patient
   - After removing your gloves
   - **All of the above**
   - Not sure
18. MRSA (Methicillin-resistant *Staphylococcus aureus*) is a common cause of hospital-acquired infections. The MRSA organism is:
- □ A bacteria
- □ A fungus
- □ A virus
- □ Not sure

19. MRSA is transmitted via:
- □ Droplets
- □ Direct contact
- □ Insects
- □ Contaminated food
- □ Not sure

20. A patient can only get an MRSA infection from hospitals or other healthcare facilities:
- □ True
- □ False
- □ Not sure

21. Performing hand hygiene immediately before caring for a patient:
- □ Helps to protect the healthcare worker
- □ *Is useful to protect the patient*
- □ Helps to protect the environment
- □ Is only necessary for patients know to have an infection
- □ Not sure

If you would be willing to provide your student number to assist this study please enter it in the box below.

Thank you for taking the time complete this survey.
Appendix B4: Survey S3

Please tick one box only

1. My gender is:
   - □ Male
   - □ Female

2. My age is (please circle):
   - 18-24
   - 25-31
   - 32-38
   - 39-45
   - 46-51
   - over 51

3. I am enrolled in:
   - □ Bachelor of Nursing (On-Campus)
   - □ Bachelor of Nursing (Distance Education)
   - □ Bachelor of Nursing/Early Childhood
   - □ Other (please specify)___________________

4. Pre-entry qualifications (status at time of enrolment):
   - □ Enrolled nurse
   - □ Other (please specify)___________________

5. In which year did you commence your degree? _______________

6. How much time have you spent working in a hospital?
   - □ None at all
   - □ Only when on clinical placement
   - □ Up to 5 yrs
   - □ More than 5 yrs

7. Have you previously undertaken any tertiary study?
   - □ Yes – TAFE (go to Q8)
   - □ Yes – University (go to Q8)
   - □ Yes – Other (go to Q8)
   - □ No (go to Q9)
8. If you answered ‘yes’ to the above question (Q7) please indicate whether your previous study included any microbiology

- Yes, a lot (more than 1 whole semester)
- Yes, a little (less than 1 whole semester)
- No, none at all

9. Please indicate how relevant you think each of the following subjects are to a career in nursing:

<table>
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<tr>
<th>Subject</th>
<th>Very relevant</th>
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<td>Physiology</td>
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</table>

10. Please indicate how difficult you think each of the following subjects is to learn:

<table>
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<tr>
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<td>Infection control</td>
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</tr>
</tbody>
</table>

11. The body’s first line of defence against infection is:

- Antibodies
- Unbroken skin
- White blood cells
- Not sure

12. *Staphylococcus aureus* is an example of normal microflora?

- True
- False
- Not sure
13. The most effective way to prevent transmission of infectious agents in the clinical setting is:

- Wearing masks
- Wearing gloves
- **Proper hand hygiene**
- Wearing gowns/aprons
- I am unsure

14. When nursing a patient who has MRSA, which of the following PPE (personal protective equipment) is necessary for general patient care? *(you may tick more than 1 box)*:

- Gloves
- Goggles
- Apron/gown
- Mask
- Unsure

15. What is the most common mode of transmission of infections in the clinical setting?

- Through the air (droplets)
- **Hands (direct contact)**
- Contaminated food
- Not sure

16. Hand hygiene should be performed in the following situations:

- As you enter and leave a patient’s room
- Before and after touching a patient
- After removing your gloves
- **All of the above**
- Not sure

17. Wearing gloves when caring for patients makes hand-washing unnecessary:

- True
- False
- Not sure

Clinical Scenario:

Cynthia, a 35-year-old woman with no significant previous medical history, has presented at the emergency department where you are working. She is complaining of a mild sore throat and low-grade fever that has persisted for three days. She also states
that she had a severe headache with neck stiffness, nausea and vomiting the day before. There is a possibility that this patient has a case of meningitis. Blood samples have been taken and sent to pathology.

18. What PPE (personal protective equipment) should you wear when dealing with Cynthia (you may tick more than 1 box):

- Gloves
- Goggles
- Apron/gown
- Mask
- Unsure

19. How is bacterial meningitis transmitted?

- Bacteria travel through the air
- Bacteria are passed from person to person via kissing or sneezing
- Bacteria are exchanged via all body fluids
- Not sure

20. What should you assume is the most likely cause of Cynthia’s illness?

- Brain tumour
- Fungal meningitis
- Bacterial meningitis
- Until the lab results come back, I am unsure

If you would be willing to provide your student number to assist this study please enter it in the box below.

Student Number ……………………………………

Thank you for taking the time complete this survey.
Appendix B5: Survey S4

*Please tick one box only*

1. **My gender is:**
   - □ Male
   - □ Female

2. **My age is (please circle):**
   - 18-24
   - 25-31
   - 32-38
   - 39-45
   - 46-51
   - over 51

3. **I am enrolled in:**
   - □ Bachelor of Nursing (On-Campus)
   - □ Bachelor of Nursing (Distance Education)
   - □ Bachelor of Nursing/Early Childhood
   - □ Other *(Please specify)*_________________________

4. **Pre-entry qualifications (status at time of enrolment):**
   - □ Enrolled nurse
   - □ Other *(please specify)*_________________________

5. **In which year did you commence your degree? _____________**

6. **How much time have you spent working in a hospital?**
   - □ None at all
   - □ Only when on clinical placement
   - □ Up to 5 yrs
   - □ More than 5 yrs

7. **Have you previously undertaken any tertiary study?**
   - □ Yes – TAFE *(go to Q8)*
   - □ Yes – University *(go to Q8)*
   - □ Yes – Other *(go to Q8)*
   - □ No *(go to Q9)*
Appendices

8. If you answered ‘yes’ to the above question (Q7) please indicate whether your previous study included any microbiology
   - □ Yes, a lot (more than 1 whole semester)
   - □ Yes, a little (less than 1 whole semester)
   - □ No, none at all

9. Please indicate how relevant you think each of the following subjects are to a career in nursing:

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<tr>
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<tr>
<td>Infection prevention &amp; control</td>
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</tbody>
</table>

10. Please indicate how difficult you think each of the following subjects is to learn:

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<tr>
<th>Subject</th>
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<th>Difficult to learn</th>
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<td>Infection control</td>
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</table>
11. To what extent do you think your undergraduate studies have prepared you for practice in the following areas?

<table>
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<tr>
<th>Subject</th>
<th>Prepared me well</th>
<th>Prepared me very well</th>
<th>Did not prepare me very well</th>
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</tr>
</tbody>
</table>

12. Which subject areas (if any) in the undergraduate nursing curriculum do you think should be increased?

______________________________________________________________________________

Please give a reason for your answer
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

13. Which subject areas (if any) in the undergraduate nursing curriculum do you think should be decreased?

______________________________________________________________________________

Please give a reason for your answer
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
Appendices

14. Please rank, (by circling a number between 1 and 5), how essential the following areas of knowledge are to clinical practice:

<table>
<thead>
<tr>
<th></th>
<th>Very important</th>
<th>Not important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Names of microorganisms</td>
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<td></td>
</tr>
<tr>
<td>Normal habitats of bacteria</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Transmission of microbes</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Gram stains</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Sterilisation &amp; disinfection</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

15. What is the most common mode of transmission of infections in the clinical setting?
   - ○ Through the air (droplets)
   - ○ Contaminated food
   - ○ Hands (direct contact)
   - ○ Not sure

16. Have you heard of the 5 Moments of Hand Hygiene?
   - ○ No, it means nothing to me
   - ○ I have heard about it but don’t know the details
   - ○ I have a general understanding of the 5 Moments
   - ○ I know it well

17. Hand hygiene should be performed in the following situations:
   - ○ As you enter and leave a patient’s room
   - ○ Before and after touching a patient
   - ○ After removing your gloves
   - ○ All of the above
   - ○ Not sure

18. In which of the following situations should Alcohol Hand Rub not be used:
   - ○ Before putting on gloves
   - ○ If you have forgotten to wash your hands
   - ○ When hands are visibly soiled
   - ○ Not sure
Appendices

19. Thorough cleaning of a hospital room with disinfectant and/or bleach will ensure that any bacteria left by the previous occupants is removed:

☐ True ☐ False ☐ Not sure

20. Patients who are colonized with MRSA always display clinical symptoms of infection:

☐ True ☐ False ☐ Not sure

21. Mr Jones is a patient with an MRSA wound infection. You have been asked to help him into his ward bed. What infection control precautions should you use when dealing with Mr Jones:

☐ Hand hygiene before and after contact
☐ Gown and gloves plus hand hygiene before and after contact
☐ Mask, gown and gloves, plus hand hygiene before and after contact
☐ Unsure

22. You have to draw blood from patient A, who has no sign of infection, then from patient B, who has Hepatitis C. What infection control measures do you take?

☐ You employ gloves, mask, and hand hygiene for patient B, but only hand hygiene for patient A.
☐ You perform hand hygiene for both patients, and additionally use gloves for patient B
☐ Use hand hygiene and gloves for both patients
☐ Unsure

23. Skin conditions such as psoriasis can make a patient more susceptible to infection:

☐ True ☐ False ☐ Not sure

If you would be willing to provide your student number to assist this study please enter it in the box below.

Student Number ……………………………………
Appendices

Appendix B6: Raw data (quantitative)

The raw data from the student surveys has been tabulated and presented on a CD attached to the inside cover of this thesis.
Appendices

Appendix C1: Focus group information sheet

INFORMATION SHEET

Exploring final year nursing students feelings of preparedness for transition to IC practice

Researcher: Ms Jenny Cox,

Supervisor: A/Prof Heather Cavanagh, Faculty of Science, Charles Sturt University, Wagga Campus.
Ph: 02 69332726 Email: hcavanagh@csu.edu.au

This project forms part of a PhD project. Participants will be asked to volunteer their time to take part in a focus group regarding infection control and professional practice. The guiding question for the focus group will be:

Based on your clinical experience to date, how well prepared do you feel for your transition to professional practice in regards to infection control?

Each focus group is expected to run for 45-60 mins. These focus groups will be recorded and then transcribed for later analysis. To ensure confidentiality, student names will not be included on the transcript so no single student will be identified. A participant can chose to withdraw their interview from the data set at any time. Participants’ details will be kept separate from the data in locked storage in a locked office at Orange Campus. Should a participant become distressed during or after the interview, they should contact J. Cox to be put in touch with an appropriate councillor.

De-identified data collected during this project will be published within a PhD thesis, may also be used in preparation of peer reviewed publications and may be used to inform future developments in relation to undergraduate nursing curriculum. All original data will only be accessible only to the researcher and her supervisors and will remain confidential at all times. All of the information collected will be stored and reported in a de-identified manner.

If you agree to participate please complete and sign the consent form.

With thanks,

NOTE: The School of Biomedical Sciences Ethics Committee has approved this project. If you have any complaints or reservations about the ethical conduct of this project, you may contact the Committee through the Executive Officer:

Ingrid Stuik
School of Biomedical Sciences,
Charles Sturt University,
Locked Bag 49
Dubbo, NSW 2830,
Australia
Tel: (61 2) 6885 7327
Email: bmsethics@csu.edu.au

Any issues you raise will be treated in confidence and investigated fully and you will be informed of the outcome.
Appendix C2: Focus group - Table of initial themes and sub-themes

<table>
<thead>
<tr>
<th>Key Theme 1: Deviations in good practice</th>
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<tbody>
<tr>
<td>One student (P6) was told [by clinical supervisor]: “I’ve been here for forty years so I don’t need gloves” while another student (P7) recalled being told “This is what you’re supposed to do but we’ll just go and do something else”</td>
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<td>I feel like I haven’t really seen other people do it the right way enough for myself to know how to do it the right way. There’s no consistency. Within different hospitals, but even within different staff of the same hospital, everyone’s different, so you’re like ‘well, what’s the right way and what’s the wrong way?’ (P3)</td>
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<td>“...you can’t rely on the nursing staff in the hospitals to teach us because they’re not doing the right practice.”</td>
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<td>“They [medical staff] just will walk in and then they go see the next person and then the next person and the next person, and they don’t worry about it [hand hygiene].” (P9)</td>
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<td>“…and even if they [doctors] are in an MRSA room they just walk in there, they don’t gown up.” (P3)</td>
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Exposure to poor/sub-optimal practices whilst on clinical placement

Dr. - Perceived lack of susceptibility - relates to Health Beliefs model
## Appendices

### Key theme 2: Vulnerability

<table>
<thead>
<tr>
<th>Sub-theme</th>
<th>Exemplar</th>
<th>Explanation</th>
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<tr>
<td>Cognitive dissonance</td>
<td><em>I thought I knew enough, but then it was just sort of hard thinking “I know this, but they’re [nurses] not doing it”</em> (P6)</td>
<td>Seeing IC practices that are inconsistent with the theory learnt at university.</td>
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<td></td>
<td><em>And so going into next year you’re thinking ‘well I just hope somebody, wherever you end up, teaches you properly right at the start so that you are doing it’.</em> (P3)</td>
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<tr>
<td>Exposure to health risks</td>
<td>“…well I don’t feel like I really had much information on that, like, we did sort of do that for gloving and gowning and things but going into the hospital I sort of really felt we were complacent with it. Like people going into the room and not wearing them and things like that, it’s like, well what is the actual, you know, protocol? We didn’t really have much information on it. And then we have sort of information on like, say MRSA say like, so how much contact do you have to have to get it and all that sort of stuff, I think it’s important to get that and we don’t really go into it.” [S3]</td>
<td>For some students, their perceived lack of knowledge in regards to pathogens eg transmission and relevant IC precautions.</td>
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<td></td>
<td><em>I just want to protect myself; I want to wash my hands, I want to glove up, I want to gown up. They might say ‘I’ve been here forty years, I don’t need gloves’ but I’m going to put everything on so that I don’t take it home with me or take it to the next patient, I don’t want that.</em>” (P1)</td>
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<td></td>
<td>“It’s like when they go and eat in the staff room when you’re sitting there eating as well and you think about stuff like that. It’s like ‘look what you’ve done all morning [ie poor hygiene]”</td>
<td>Poor practices of the nursing staff caused them to feel anxious about the about the risk to their own health from exposure to organisms such as MRSA.</td>
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**Appendices**

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<thead>
<tr>
<th>Microbiology education</th>
<th>I think because we learn the microbiology in anatomy and physiology which isn’t a nursing subject, it’s a science subject and they don’t relate it to the clinical setting (P2)</th>
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<tr>
<td></td>
<td>“I think by doing microbiology in first year you’re just kind of ‘oh yeah, this is like school and whatever’ but not having that clinical practice and then going to see like hospitals and that when you are in surgical wards...there’s no sort of exposure to that in first year so you’re kind of like ‘oh yeah, interesting? No, not really’ and you don’t apply it” (P3)</td>
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<td></td>
<td>“…when you are in first year, a lot of it [micro content] is learning the names [of microbes], learning what they are and it’s really hard to then connect it to clinical.” (P6)</td>
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<tr>
<td>Key theme 3: Relevance</td>
<td>A &amp; P perceived as a science subject, distinct from and not clinically related to nursing. May also speak to findings of Student surveys - microbiology seen as hard to learn whereas IC seen as easy and very relevant.</td>
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<td></td>
<td>Timing of microbiology content/education seems disconnected from clinical context and/or perceived lack of relevance – maybe comes down to the teachers but difficult to relate specifically to nursing in mixed course cohorts</td>
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Appendices

“...it would be good to have it linked to the clinical situations because I remember going out on placement and hearing about MRSA and never having heard of it” (P6)

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<th>Key theme 4: Power relationships</th>
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<td>Relational violence</td>
<td>I think I’ll be more confident in following it now that, like when they don’t look at you like you’re a student. Whereas you’re actually a registered nurse and you’re able to do things for yourself. Whereas when we’re out on clinical placement you kind of feel obliged to follow your supervisor and things like that so you do, you tend to fall into whatever they’re doing and you’re too scared to say something because they are your supervisor or they are in charge and they are the ones signing you off on everything, so you don’t want to say something about what they’re doing wrong.” (P8)</td>
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<td>“Yeah, if we got more information and understood best practice so that we can go out on clinical placement and say ‘well best practice says that’s wrong so this is how we do it’. And then us being educated like that, we’re more confident to stand up and say ’oh no, I’d rather do it this way than your way’. ” (P7)</td>
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<td></td>
<td>Staying silent when confronted with ethical concerns/issues during clinical placement. Power relationship with clinical supervisors</td>
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<td></td>
<td>A feeling that knowing ‘more’ would help them feel confident about being ‘forced’ into bad practice</td>
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<td>Social acquiescence</td>
<td>“It makes you feel like you’re in the way a bit...Should I be doing what you’re doing? You know you’ve just got to work out whether you’re right or they are.” (P6)</td>
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<td></td>
<td>“It’s hard. You don’t want to fall into their culture. You have this idea that I’m not going to, but I guess you have to work it out for yourself.” (P3)</td>
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<td></td>
<td>Feeling the need to conform with social expectations of the workplace and dictate their own IC practices, despite the feeling of vulnerability from exposure to health risks. Sense of fatalism about their ability to change the culture.</td>
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"And it’s their [nursing staff] example as well. Like if I see people hand rubbing then I’ll go and do it too...I might not have if they hadn’t done it.” (P6)

<table>
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<tr>
<th>Deferring responsibility</th>
<th>“And it’s their [nursing staff] example as well. Like if I see people hand rubbing then I’ll go and do it too...I might not have if they hadn’t done it.” (P6)</th>
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<tbody>
<tr>
<td></td>
<td>“...when we go into our prac rooms [at university] now, we’re supposed to go and wash our hands and most of us forget, but if our lecturers walked up and did that [hand washing], we’d probably do the same.” (P1)</td>
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Deferring responsibility for their own actions....if they do it then I’ll do I too, but it’s up to them to set the example.....perhaps culminating in ‘learned helplessness’
Appendices

Appendix D: ICP Interview Transcripts

Interview Transcript ICP #1

What are your qualifications?
I have completed Bachelor of Nursing and graduated from CSU in 1998. I general nursed for 4 years then completed midwifery and also have qualifications in child health degree immunisation, TB and infection control.

So how many years have you been nursing since you moved into infection control side of it?
I have been doing infection control for a bit over 2 years. I did four years general nursing before that and was in midwifery for 3 years. During that time I completed my child and family health and infection control. I also have done a grad cert through the colleague of nursing in infection control.

How long did the infection control graduate certificate take to complete? 12 months

Was that voluntary or a requirement? I was acting in this role and I was doing it at the same time

Did you get any extra training from the area health service? No – I think with most things in nursing if you have a passion for it or you like it. Then I think when I look at my history of what I have studied – midwifery/children - its all about those measles, mumps, rubella, all those types of childhood things link in really closely.

You were just able to volunteer to move into infection control?
It was just through expression of interest.

What is infection control about in your mind and what would you tell someone your role is?
The role of infection control is to implement the infection control policy and make sure we are doing it. NSW Health has these minimal standards that we must meet and I suppose you grab things out of that, that you can expand on. You have to follow the whole policy but for instance I do a lot of MRO’s* and isolating patients with query infectious disease or not. We have done a lot of work in enforcing that work and hand hygiene is the guts of infection control. For instance, with the swine flu there is a hell of a lot work that is not in your job description that you have just got to get done clinic set up, all that mundane running stuff, lots of education in hand hygiene, mandatory training, standard precautions. Standard precautions and additional precautions and infection control are so we protect ourselves and our patients.

The training that you say you are giving, how often is the mandatory training held? Every 12 months – That is all staff, not just nursing.

Does that include your cleaners, everyone in hospital?
Yes – Once every 12 months. We have a mandatory training day and every staff member needs to attend. We don’t get the medical officers obviously and we don’t get the compliance to mandatory training. It’s one of those things that we try. I do hand hygiene education around the place that is required. You just sort of pick topics and you might go educate the cleaners on something because there has been an issue. It’s really hard to educate adults. It’s exceptionally hard, especially in the workforce because it’s hard to change opinion and “I have done it that way for a 100 years”, so it’s really hard to break that model. I believe if we can get it right at the beginning there is no issue later on.

So when they first graduate or when they first start in the workforce?
Anywhere. I don’t know where I am going to find it, but to me, and I actually had a few of the consultants agreeing with me about this, that if you look at our hierarchy triangle, infection control is the bottom. Now if we do that right, the rest will fall into place. There won’t be an infection problem in theatre, we should decrease joint infection, we should be able to stop the infection MRO’S if we are using antibiotics appropriately. There are so many components of our job that we could eradicate if we could just get it right down here.
The undergraduates do a variety of topics in their nursing degree, so if I give you a couple of topic areas, from your perspective and your career in nursing, what is going to be the most relevant (from most important to least important)? Anatomy, physiology, Microbiology pharmacology and sociology

Leave it in that order. We have got to know the body, know what they do and it’s good to know about the microbes, and then the microbes and pharmacy - they work together. If we don’t know the basics you are not able to do the sociology.

Do you think the knowledge and understanding of micro makes a difference to people’s ability to undertake infection control practices.

Yes- that is something I want to do even though I have been in the job for over 2 years now and I am learning heaps about micro as I go, that is an area you can just go so much further in. I had no knowledge of it really until I was thrown in the job. So when you are trying to explain to people about MRSA and community-acquired MRSA [the differences], it comes down to micro and pharmacology - it’s their sensitivities and resistances, those types of things.

Have you found that as your knowledge of micro has improved your understanding of infection control rationale also improves? Yes

Do you think that would apply also to the nursing staff?

Yes if they could understand how a bug is transmitted and grows, it’s going to help them put in precautions rather than me telling them “they have TB, you need airborne precautions”. They need to understand how the TB virus works. And you don’t need to know everything nitty gritty. It’s more the MRO’s - if they understand the difference between droplet, airborne and contact, which is how bugs are transmitted. I went to ED one day to a patient with MRSA and they (the nurses) had a duckbill mask on his face. I said “why have we got these precautions on, when it’s in his sputum. It is through contact this is transmitted, so if he spits in your face that is a fair call, but the duckbill mask is for filtering”. We’ve got all of these lovely precautions, PPE, so that comes back to standard precautions - the basics of infection control about personal protective equipment are not getting through to people.

In your mind would the nursing staff be able to implement or know what PPE to implement better, more likely to get it right more of the time, if they understood the microbes better?

Yes, the transmitting of them.

Is infection control knowledge consistent across all the different types of healthcare workers in the system, say doctors compared to nurses compared to others? Do you think it’s fairly constant of their amount of knowledge?

Different groups and even in different areas of nursing. As I said, I come from midwifery and I hate bugs. We are scared of bugs, we do everything to prevent our babies getting anything. But you can go to rehab, the other end of the spectrum, who has vulnerable patients again, or ICU they are more concerned about protecting themselves instead of the patient and that is a big thing we need to change, that culture of protecting us and not our patients. And that’s what our new hand hygiene campaign does which is good. But I think it depends. For instance, wards 2 and 3 here are very good with infection control because that’s where they go and I have focused a lot of education on those areas. They get a lot of MRO’s. ICU department is getting a lot better, but then our HDU department has a high turnover of staff so it really struggles to maintain that level. It’s got to be led from the top. You have to have a boss who is going to enforce it and understand it’s important. So the grads can come out with all the knowledge in the world but if the senior nurse is not interested, unfortunately the grads are going to sit back and do what the ward does.

So you think that that also comes as a cultural issue within the work place? How big a role do you think that plays - the culture play in a workplace?

Huge, it’s huge. We didn’t do much with infection control in the past. You talk to the older nurses that they talk about (and this is nothing against university training because I’m a university trained nurse) but this is just an observation. 30 years ago we had matrons going around bouncing coins off beds, everything was starched, patients were sitting up. The only place infections really came from was dirty surgery –
because you know, they were still learning. MRSA was there but quite low. Then we went through this emergence of antibiotic over-utilisation, we started training in universities and we (nurses) got a bit of an attitude. Don’t get me wrong, I think a lot of really big positives have come out of this because I don’t believe we should stand back and go “yes sir, 3 (bags full) sir”. I believe in being the patient advocate, but we’ve dropped off a lot of the sternness and strictness. We mixed everyone together and said “that’s all right” and didn’t worry about infection control. And now we have come out the other end going “oh my god” we’ve got a serious problem. But I have got those nurses that have been nursing for 30 years going “we use to do that” and la, la, la. So it’s really hard to change it back. And I was nurse in the middle of all that going “oh we didn’t isolate. Nothing really happened” But we didn’t know the patient, we just amputated someone’s leg and didn’t give it too much more thought. So it’s sort of this circle we’ve done.

So as far as your doctors and your interns go, compared to your nurses, do you feel they have less infection control knowledge?

Yes, less knowledge. It doesn’t seem to rank on their radar and that’s why I am saying it needs to be a basis, needs to be for everybody.

As far as new people entering the workforce (graduates and the like), how do you think their infection control knowledge is? Do you think it is adequate or you could add training on?

I often ask what they are taught at uni because you can talk about hand hygiene and when to do it and they are sort of a bit ‘miffed’ and that’s right across nursing, not just focusing on the undergraduates. I find that they will follow their peers and I don’t know how we break that. The importance of it doesn’t seem to gel. There seems to be more of a focused on the diagnoses or getting into that exciting part of what is happening.

So they have some knowledge but probably not in context?

Yeah, and they don’t understand. The amount of people that don’t know standard precautions is alarming.

Do they know universal precautions?

Yes, but that went out in the 80’s apparently. When I was at uni we talked about universal precautions but the standard procedures haven’t come through [with the new grads] so whether universities are still teaching universal precautions I don’t know.

Do you see any trends when people come into the workforce, in regards to where people have done their pre-registration training?

No – No difference. Don’t take any notice, sorry.

How long does it take new people, graduates for example, once they start working, before they become familiar with infection control and procedures? You would see a change over a period of time I would imagine. What sort of a time frame?

I probably couldn’t say I’ve seen many graduate nurses that I have noticed a big change in. I am noticing a lot of change in the older nurses. There is a graduate that has been working here for 4 years and she understands it and she is really enforcing things on the ward. Probably 18 months/ 2 years [to see a change]. And that’s only because we are doing more and more educating and bringing it to the forefront.

The sorts of actual changes that you see - is that related to them (the nurses) understanding it better, or just more of a willingness to take it on?

Probably a bit of both. They are getting better compliance and they still don’t quite understand why they are doing it, but then some people were just grasping it and running with it.

It’s well recognised that there is a problem with hand hygiene compliance world-wide. The compliance level at this hospital, would you say it is poor, medium, or better?

It is getting better, we would have had a 10-fold increase with compliance, and our ICU is brilliant now. There are some sections that let themselves down. As I said, the wards (2 and 3) are brilliant. It seems to be not the thought process of why I’ve got - it comes back to that standard precaution – I’ve got to put on
a gown and gloves because someone has an MRO - but they don’t appreciate that they can’t walk out of the room and touch things out there because of the spread - that (knowledge) still lacks.

So you’d say it’s pretty good now?

It’s getting a lot better. You could actually teach the infection control policy at uni. It is that basic. It’s so basic the IC policy. It is scary how basic it is. You could teach them in university and have them coming out doing the right thing.

Do you think it goes back to the undergraduate training? Is that the place to get it right?

I do think it is a place to get it right. It’s like, two nurses must check IV medications. If we drill it in there, we get a new wave of nurses coming out and we eventually break the bad habits. Its all about we’ve got to change, and if we get the new people coming out the way the NSW Health needs to go (or Australia) it makes things different.

So if it’s all centred on undergraduate training, is it as simple as teaching students the policies or do you think there might be a reason to step up a bit of micro in there as well so they not only understand the policies but they also understand a bit about the microbes? Or are they better off doing that sort of thing when they get out in a hospital?

You could step up the micro a bit. You don’t have to get right in, just a good overview of the basics is really good. Just looking at the infection control policy, you’ve got: standard precautions, hand hygiene, PPE, work safety, safe work practices, linen, waste. Very basic, but undergraduates don’t understand the difference between clinical and normal waste. So many people think that if we use it in the hospital then its clinical waste. Those small little things, to me they’re just so basic.

As far as compliance goes then, what would you say the major barriers are? Is it just a lack of understanding of the policy? Yes

How big a role does lack of willingness to be bothered (attitude) play, compared to not understanding the policy? Is not understanding the policy your biggest issue?

I think there are so many policies they find it so hard to find what is relevant to their practice. If you are working in ED, your relevancy is “what do I give a heart attack victim”. That is why I am saying it needs to be embedded somewhere else so we don’t need to think about it, its second nature. That’s how I think we should be with it, not that whole “oh I have got to think about that and do that and that”. It should just be embedded that I just wash my hands before and after touching a patient.

You would think it should be fairly easy. There is obviously a reason why hand hygiene is not happening? It’s seems to be the case everywhere, that it’s just “not happening”

It’s because we are not taught the importance of it. The swine flu is a classic example. The population, the community and the media [all say] “It’s only flu. People die of the flu every year” But what would happen if everyone died of the measles that we immunise against there will be an uproar. Pertussis - Look at the uproar from the pertussis [whooping cough] in the community. So with the flu, people don’t want to understand that we don’t have immunity to this H1N1 - that is the problem. It will affect so many our community and of the 10% of the community affected with a normal influenza, 0.2% die. With this one, 40% is affected and we will lose 5 – 6% of people. So the low hundreds to 4-, 5- or 6000 people dying from it is a hell of a difference. Flu’s are preventable. If they could just understand. It’s really hard to get people to understand the mechanisms isn’t it. This is preventable. We wash our hands, cover our mouths - simple hygiene - we will prevent the spread.
So you talk about a lot of education you do that affect compliance here (at this hospital). Are you finding that in your role it’s just about educating people more, or is there anything else you do to try and ramp up the compliance rates?

I set up systems. For instance, for people (patients) with multi-resistant organisms, their medical records are flagged. The computer system is flagged so there are hints for them (nurses) along the way. I check that every day and put an email out to the NUMs every day to say who has got MROs in our facility and we get them to use precautions. So I do a lot of work trying to make the compliance better. It’s getting better but there seems to be no ownership from the medical staff or nursing staff that if they see a medical record flagged, they don’t do anything about it. I found one this morning and I said “look this one needs to be addressed. We have gone to all this work to flag these patients and no-one’s taken any notice”. So they don’t notice that, they don’t notice the allergy sticker. I think it all compounds in. It just shows how complacent people are getting. It’s always someone else’s job.

If you had a perfect world - unlimited resources, unlimited money - what would you do in your role to fix the compliance problem in infection control?

I’d actually like to start at kindergarten, into school – we get hand hygiene happening there and getting it through. I think bugs have a very important part in our life. I think that children should be allowed to play and get dirty. They need an immune system. It is about the balance of having a good immune system but just helping to prevent things being spread. So if we can get them young enough it’s going to be second nature as they get older. That would be the ideal. Otherwise, in this setting, we need to get our new practitioners. We need to start with the new practitioners. It is going to be very hard to change the consultant at the other end, but we need to empower the consultants, help at that end too so they lead by example for their junior staff. So the NUM needs to wash her hands and be pro-active in that for her nurses to do it. We need to empower people to be comfortable in doing it I suppose, but I don’t know how we do that.

So it just becomes second nature rather than something that has to be pushed on them all the time?

Yeah and with unlimited resources the computer system should print something out. We print a patients’ details out. It needs to print on there that they have an MRO. It needs to be highlighted in red; things that stand out for staff because we are busy. So if things can pop up and they stand out to people. Also you need about 20 (IC) people in this size hospital. Here [at this hospital] you could have an infection control person on every ward and they could be working every day, just reinforcing, helping with hand hygiene. You know, fluffing of the sheets - that still happens, even though we’re taught not to do it, it still happens; linen on the floor, because there’s not enough resources, there’s not enough staff. There are so many compounding things.

* MROs = multi-resistant organisms
  
  NUMS = nursing unit managers
Interview Transcript ICP #2

What’s your role, title and qualifications?

ICU Course in 1989 from there I continued to work in ICU. Then in about 1998 I was approached to do some infection control back-filling for the ICP at the Hornsby hospital and I did the colleague of nursing of infection control course. I did that for about 4 months. I also worked as a research nurse for ICU around this time as well and then I applied for a job here at Nepean in 1999 and got the position here as a registered nurse. There was an expectation of having had a lot of experience or background but obviously my time from doing relieving and from me doing the course in infection control this helped to secure my position here. I then also went on to do my degree - Bachelor of health science (conversion)- and I have worked here for about 3 years as the RN or acting CNC before I was appointed the CNC for infection control. Can’t think of what courses I’ve done off the top of my head - Along the way I have done a lot of workshops and activities and I am currently working towards my Master of Infection Control [degree] with the University of Adelaide. With different things, with health or externally with the College of Nursing or the Royal College of Nursing, I have done different courses for [CPD] points. I have done ‘Publishing for Writing’ and I did a statistics course that we had here in- house - that went for a year. I have been working here for 10 years.

Is the training up to you to undertake on your own or is provided as part of your employment?

As part of my professional development and as part of my appraisal. We used to have a work performance thing; I would sit down with my Director of Clinical Operations and we would sit down and put a plan in place as to what I would achieve for the year – performance agreement type of thing. And part of that was not just in the organisation, we would also look at professional development. I did start my honours paper, but we had a bit of catastrophe with that, and that was on a nursing action research which I found really difficult to try and apply in a clinical workplace when you are working full time and you haven’t actually got everyone on board.

When you are talking about your role in infection control, what would you describe your role as being? What does your role encompass?

A bit of everything really. As the CNC, my role is the co-ordination and implementation of an infection control program for what we call “the western cluster” which covers Lithgow to Nepean but is focused here at Nepean being the largest. We have two CNS’s that work in the department with me and a part time admin[istrative assistant]. We have developed a strategic plan for the area health service and that was signed off by the Chief Executive and it focuses on things like monitoring or surveillance, education, culture change, finances and governance. So in all of those domains I have to function as a CNC, according to my domain as well, which looks at clinical leadership, peer support, education and management. In a nut shell, I oversee the day-to-day IC activities but that is largely done CNS’s here, but that doesn’t mean at any one time I’m not out and about, walking around doing rounds, doing audits talking to patients, showering patients and getting in and still doing my clinical nursing activities. I also provide support and advice for staff either at the cold-face or broadly for the organisation. So what the components of the infection control program education are, we determine, and we usually base that on the policy requirements and the equipment requirements. We also coordinate or put together the monitoring data, the mandatory stuff that is submitted to the Department of Health and also the local stuff that we feed back to the wards. We also look at what changes we can make, measurable things, so basically the wards can look at their own information and make their own changes and see their own effects but that sort of comes from our advice. We have a principal that “infection control is everybody’s business” so infection control just isn’t me or the staff here it’s everybody, so we push the ownership but it’s very much patient and staff focused with the perspective of the responsibility that my position has to the organisation in regards to ensuring that we are doing things safely in the right way. Policy development and things like that. I am also heavily involved with the NSW Infection Control Association. I am on their executive as an education officer. So I am convening the state conferences, looking at themes and interesting information that helps that may help professionally the ICP’s across the state. I also help run rural education days and help take the information out the small sectors or remote areas that don’t often get the opportunity to access information knowing that a lot of the ICP’s out there wear dual hats making it difficult for them to get targeted and interesting education that is helpful for them on a day-to-day basis.
I also sit on the NSW HAI (Health-associated infection) expert advisory group with the quality and safety branch. There I get the opportunity to look at things from an ICP perspective not just microbiology or beaurocrat position so we are often ask to comment on the policy’s and the documents and things that help keep the hospital going and keep the patients safe, what’s realistic and what’s not, because what bureaucracy want not may be what can actually happen, being that it’s really important that the end result is and that the patient gets better and goes home. Its’ sort of all those roles we are bringing in to my work role as well. We have a Link Nurse program here that my CNS has been running because it’s important, I believe, to have a succession plan so that’s why we make sure all the different staff members here are doing different roles and helping them develop. I have a CNS who does a lot of the monitoring and analysis, learning their understanding, what it means to have an infection and try to get that information back to the wards, Interpreting laboratory results. Our offices are adjacent to the microbiology lab so we are really lucky. We get a lot of feedback and input and we work very closely with them which is really important. I report to the head microbiologist here and to the executive or clinical operations here but I also have professional link to the director of nursing. So I sort of have 3 bosses and they all actually work really well together. For the clinical staff I work with the microbiologist, for the organisational staff I work with the director of clinical operations, and always my professional reporting to the director of nursing insures I am practicing with in my scope.

You mentioned that you are located close to the microbiology laboratory. Do you think that the knowledge and understanding of microbiology makes a difference in terms of understanding and applying infection control practices? I guess not only for yourself but for nurses or other staff, are they better able to practice infection control if they have a higher level of microbiology knowledge or doesn’t it make much difference?

It’s difficult to say… yes and no. Yes, in that its’ really important and I didn’t understand how important my microbiology was when I was doing my training or even in my intensive care [experience], but the importance grew as I grew and developed. I think what you learn, the basics, it always comes back to me and I look at it and go ‘yes, I do remember this, I do remember learning this’, but I was not sure what it all meant. The difficulty is not just in getting a basic knowledge, it’s the application of it in clinical practice that switches lights on in people, they go “Oh I remember learning about it, but I didn’t know it meant this.” People, with infection control want to know all about microbiology, yep, yep, yep, it’s important to have a good understanding of basic microbiology because as you are in it you actually learn more but I have a microbiologist here so I don’t feel that my role is to be the chief microbiologist. I believe my role is to be able to understand and translate microbiology applications into clinical applications. It’s good to understand gram-negatives and gram -positives and it’s good to understand differences between what type of testing we do or what we don’t but its not overall significant to the bedside. What it is important to the nurses at bedside is to have basic understanding of microbiology but to be able to understand that it means cleaning my hands, it means wearing a mask, it means this is why it is important to clean the environment around the patients. Because what they lose is where they think ‘that is not my job to clean’ or ‘why do I have to wear a mask’ because they haven’t actually translated the information across. I find that once you explain or go back to a bit of micro basics for them but when you bring it out to the forefront and attach it to the clinical application, they go “oh, get you know” and they’ll go with it.

So it’s not so much about having more of the theoretical microbiology knowledge but maybe having it in a clinical context that matters?

Yes really, really, really, important because if they don’t understand why they are required to do certain things – even cleaning – “it’s not my job to clean, I didn’t go to uni to get a degree to clean” – One of the fundamental most important things is if you understand. They say they know all about microbiology, but then you explain to them “well what do you think is all around the room, why do you think the patient would be shedding, why do you think it would be important to clean how long do you think organisms live” and then they go “oh okay”. That’s when it becomes important. It’s the basis of what they learnt but it’s translating what they learn into good clinical practice. That’s where I find there is a huge gap. They go and learn the rules but actually don’t know how to apply them with the various scenarios that they would be faced with. Whether you are working in ICU or mental health or working in a medical ward or nursing home… “Oh that doesn’t apply to me because I can’t do this here.” No, no, no, you need to understand, you have got the basic knowledge, how are you applying that in your particular situation and they don’t get it unless you talk it through and then they start to take ownership. I don’t believe people’s intention is to not be safe and not look after people properly with infection control. I just think there is a huge gap, that the light has not gone on yet as to translating the knowledge into good practice. Once they
get it they go “Oh that’s easy, I get that. That makes sense, yes of course I will put a gown on, of course I will put gloves on” but before it was “Oh it takes too long, it affects my patient’s care”.

Do you feel that comes down to the undergraduate training, the fact that there is a gap there? Do you think that’s to what they are learning in their undergraduate training, could there be improvements made there? Do you see any trends like people that come through TAFE verses the university, do you see any differences there? Or do you think it’s something that’s just hard for people to perceive until they are actually out there on the ward?

There is across the board. The TAFE and the university don’t teach the same type of thing. I know they teach differently cause I’ve got their different applications. But when I speak to say some of the ENs or even AINs they are taught differently in different ways. Even like the wound management stuff – they’re not taught asepsis, they are taught this other thing. There doesn’t seem to be….both the universities and the TAFE’s…and sorry you may not want to hear this, but they seem to go and teach something different to what’s actually happening on the ground. So it’s a huge transition, a huge transition for some of these people to come across into… look, I am not saying the health system is great, it’s still a bit of an antiquated system of hierarchy and things like that, but they come across with all these ideas of “this is the way it will happen” and “this is what we are taught”. It’s a real shame that the universities and TAFE’s don’t work more closely with not just the facilities but the professional associations. Say like with infection control. I have been trying to work with the state group and with the national group to try and work with the faculties or different universities to see if some of our experience within the association wouldn’t be well served in trying to work with the universities to try and give some better scope as to what it’s all about. But when we have approached them before we have sort of been told “thank you but no thank you, we have our own people in the faculty who can do that quite adequately” and I am like “well I don’t even know who there are, they are not even infection control professionals, what are they teaching?” I’m not questioning that you can’t teach these things, I am not that saying that, but the problem is that when they [the students] come across here sometimes they get very upset or very angry with us because “that’s now what they taught us and they’d be right”, and you don’t want to say anything but there is sort of this gap that is missing. Although we bring the students to the facility and things like that… I occasionally get involved in education and stuff like that but not always. If I see them [the students] up in the wards with the various tutors and things like that, we have a chat or I give them a run through on how things work and they are just amazed and they didn’t realise you did things like that. Even stuff like cannula care and insertion, there’s some microbiology but the information about how that goes across isn’t really… the consequences of an infection you know, people die. This is why it’s really important you do it this way. It’s not just because somebody told you to do it this way. Because when they come into the hospital they also get very swayed and jaded by the people that have perhaps been around a bit too long, “oh don’t worry about doing it that way”. Because they want to fit in they will do it that way. Because they don’t have that grounded theory of understanding of “no, an infection from a cannula is important and people die. It’s not OK just to leave it alone”

So you are saying the culture in the work place obviously plays a big role?

Huge, it’s huge.

I terms of the undergraduate nursing course structure, they do a number of different topics as you know. In terms of the science side of things they do anatomy, physiology, micro, pharmacology and sociology and sometimes the students don’t see the relevance on some of those topics. From your perspective as a professional in the industry, which of those topics would you consider to be most relevant to a career in nursing?

Hm…you start with anatomy as a young nurse I suppose, but then what I learnt in physiology during my intensive care course was invaluable because it helped me develop an understanding and appreciation of microbiology - understanding how the whole thing works. Sociology… well… if you can’t express it and put it out there and adapt it to the environment that you are placed in at the time, it doesn’t matter how much you know. As to which one is most important, hmmm…they are all equally important. I could be the smartest person in the world but if I can’t help my patient or get my information across or communicate there is an issue or a problem, well that is a waste of time. But I could be the best talker in the world but have no idea what I’m on about then that is too.

So would you say from the things you have seen in your role, would you say the confection control knowledge is fairly constant from the different types of health care workers you know, in terms of doctors versus nurses versus allied health?
A gap (laughs). I would say a serious gap. Actually something we are looking at with the health department is our medical staff education and training. [I’m] terribly, terribly worried about that because they all get sent off to university to become doctors but they actually don’t really know anything about infection control even though they know a high level of science.

So their infection control knowledge is fairly poor. Do you think there is a reason for that?

Um I think it’s just because it’s not seen as a priority in their training. It’s seen as part of it, but there are a lot more important things you need to know. For example, I was approached recently regarding some clinician exams because it was flu season they were concerned that they didn’t want to become liable if sick students who were being examined passed the flu on to the patients so they asked me to set something up or do something. And I said “but if your staff member was unwell or they detected the patient was unwell, isn’t infection control, you know the fact that they put a mask on and clean their hands, isn’t that part of the assessment?” And he goes “no” because it was targeted at a specific specialty. But I would have thought It doesn’t matter how specialised it is, infection control is same across the board. But “no they actually don’t get marked on that”. So this is where the universities, they don’t take that as an important thing. Even when I looked at, for the medical staff, I went back to the medical schools and asked them “how do you assess they have done hand washing, how do you assess that they have been taught how to do venipuncture” and things like that. They actually didn’t have any assessments or competencies required. It was just one of the outcomes they had to achieve but they didn’t measure that. I asked “but how do you know they have done it?” and it was “oh well they just say they have” and that was through three medical schools, not just one. So I was a little bit disappointed because I thought I would see you know like with nursing, you have to check that you have done certain things or everyone has to check that you have your immunisation up to date, there was no real onus that that was important that that was done because there’s far more important things that our doctors have to do…so very disappointed there.

 Allied health, I find, have a pretty good grounding in infection control. Usually when we talk to them they are good and ask pretty sensible questions and very realistic types of scenarios so they seem to have a good understanding of science and interpretation. I don’t know why that is in allied health. Whether it’s the nature of the people that do allied health, when I talk about allied health I usually mean physio[therapy] and OT (occupational therapy).

 With nursing it varies, just varies. I would like to say they all had a good level of knowledge but I can tell you they don’t. Sometimes I walk in and think “you’ve been here 10 years, what are you doing?” (laughs).

 So do you find when the new graduates come in for example, I imagine their knowledge changes as they have been on the job for a while. What sort of changes do you see and what sort of time frame do you see that occur over?

 I know when they come in they have a fairly good basic understanding generally in infection control. I can give them a questionnaire with 5 questions that will ask them about standard and additional precautions and hand washing and they will get all those right, so I always go “well that’s good, they know that”, but when you actually seen them in practice. Again when I talk about cannulas or even emptying urine bags, they haven’t got their PPE gear on or anything like that, they’re not protecting themselves. Or they’re letting a patient walk along with their drain dragging on the ground or something, I have to say “hey, what’s this about”. Even though they sort of have this good skeleton stuff they don’t sort of see that. They really, really want to do well when they start but I think the demand of having to know everything and do everything…and they set themselves up. I have had a talk to a few of the grads and the they set themselves up. They think that they have to do everything and a lot of them don’t what to ask because they don’t want to be seen as not knowing, so they get themselves into a ‘tizz quite a few of them, in the first few months - to the point of tears - because they can’t do it all and they don’t know how to do it all. Things like paging doctors, they start to put them as priorities in front of infection control. They start to see other people cut corners and they see that obviously infection control isn’t as important so they can cut corners too. Although when we walk into the ward and they see you they look a bit coy. You say “C’mon, I know you know better than that” and they go “yeah, yeah, yeah, but I’m just so busy” or “I see other people not doing it”. They’ll use some excuse and then you have got to set them back. They really are looking for mentorship and peer support and peer appreciation, the new ones.

 It takes them about 2 years I reckon before they come back onto the right path. Because after their first year, they’re just thinking they’ve got the hang of it and got the confidence but they’ve learnt some bad habits. By the second year they are starting to get a little bit more seniority and they are actually
mentoring people or sometimes they are in charge of things and they have to deal with a wider situation, so it’s not just their patients that they have to focus on now. We come up [to the ward] and say “there is an outbreak happening here, we need to move this patient, clean this, do that..”. And they say “well why is this happening”, [well it’s] “because of poor infection control practices, or this and that”, so they start to come around and start to mature and see that “oh so it is important that we’re doing that and we should have been doing that in the first place shouldn’t we” and I’m like “yep”. So it isn’t until they start to come around, until sort of after 2 years that they start to grow up because they now see past their patients they are now starting to see the ward and hopefully in the future they will see the facility. Because you know you only focus on your own things. You actually can’t see that another ward is actually doing it tougher or harder or another nurse in your ward might be busier ‘cause you have sort of been taught to focus on your patients, not so much the bigger perspective and it isn’t until you get a bit more experience and responsibility that you start to say “hey that’s not right their not checking those cannula’s.” So initially they start off good, than they pick up bad habits so the priority of importance of infection control (because you can’t see it) drops off. See, they are more likely to get in trouble for not filling out the forms or doing something, than a visual aid of washing your hands or checking the cannula sites or good hygiene or things like that. Because you can’t see the bugs they think “it doesn’t matter if I don’t clean around the area here, it doesn’t matter that I don’t clean my pump after the patient not using it any more, I’ll just chuck it back in” cause there’s no understanding of that.

We know that compliance rates globally are sub-standard for the most part. How do you feel about compliance rates in terms of hand hygiene and standard precautions in your hospital? Would you say good, poor in inadequate?

I think we have a fairly good system – I’m not saying we are perfect. We have good and bad days. Recently we have been seeing a reduction in our hospital-acquired mandatory indicators. Since we have brought in our implementation plan or our strategic plan for the area and we have used the national slogan of ‘Infection Control is Everyone’s Business’, we have endeavoured to bring back infection control to what I call ‘point of care infection control’, so it’s not about me, it’s not about how I run the program, it’s about how the program is run at the ward level and trying to empower staff there to take charge. And that has been well received here in most of our wards. I get very good support from our executive and also from our managers - they are just brilliant - and they try when they can to really support what we do. We have standardised use of signs, we have every ward doing their hand hygiene auditing so I can see compliance. I was speaking at the nurse leaders meeting this week showing them where their wards were going well and where they weren’t. They often ask me for figures on their infection rates. We try to get the staff involved when we find our there is an infection and work with them. So look, things are not perfect and our perfect is zero infection, we know that but I don’t know how possible that all is. I think we have still got a long way to go but I think getting investment from our executive, support from our local management and maintaining interest by the end-users i.e. the nurse’s, all benefits the patients’ and that is why we are working really well with our link nurse program to get that end of buy-in. We have been working on that the last couple of years to get the executive on board, so we have used our medical staff. So we have used our medical staff and our microbiologists have been letting the executive managers know and giving us a lot of support. Then the middle management ranges are the clinical nurses consultants also work really well. And we are now drilling down to the nurses and we are targeting link nurses at the moment we sort of improving their portfolio giving them more recognition and responsibility but not more work. Trying to get them to grow professionally and to look at why things are happening. I have lots of people here that are interested in infection control but how do I keep that going?

If it was the perfect world and you had unlimited money and resources, what would you as the infection control person do to address the issue of poor compliance?

Get rid of the bureaucracy. We have too many teeth, just trying to get programs up and running is too difficult. I would like to invest in the nurses at the bedside and get the opportunity to do more education. I know they want to do the right thing, it’s just more on how to get away from the bedside and do other duties because that is extremely difficult. Because they want to know about the microbiology they want to know about the antibiotics. They don’t want to study themselves they want someone to just tell them. I would like to get them in a better learning environment, in a small group session or on-line stuff. It doesn’t matter how many accessories we have unless you can get the nurse motivated on site. Because I am a nurse and I am looking I want to nursing education. That is what I want to do invest more time and money in providing more information and experiences like we just talked about and visual stuff. We have medical stimulation centres but we don’t have nursing stimulation centres. So those types of things I would like to invest in.
What's your role, title and qualifications?

My title is the Nurse Manager of education here at XXXX base. It’s a reasonably diverse role but from the practicality of where you are coming at with this interview, I certainly have a role in managing the clinical nurse educators within the facility - about 10 of those that answer through to this position. Some of the management is joint with the NUMs in some areas. I oversee the new grad or transitional registered nurse (as we have to call them now) program with in the facility, so I organise the intake of those and orientation of those and the rotations where they are going. I do their appraisals and any issues will come back to me. I also oversee the trainee enrolled nurse program which has not finished up yet, this will finish in April of next year. I also oversee nursing students within the facility, there are two clinical facilitators that work with the undergrads on a day to day basis and those positions both answer through to this position. I organise the clinical capacity system and do the data base and accept the students and help deal with any issues that may arise but I don’t manage the day to day clinical placement for those students. I also have a lot of other roles which I suppose any of these positions pull off in to product committee, forms committee, various other committees that I represent nursing for. I do go back to Dubbo and Bathurst representing the hospital with this position. From this prospective I have a role with assisting any of the new starters including mandatory training. Mandatory training for the hospital staff and clinical, non-clinical are organised through this position. I run infection control in-service now, I source the infection control staff to run those sessions. I run the sessions then I get the feedback, and I do the evaluations on those sessions. I also oversee the in-service [training] calendar within the facility so when the infection control girls are looking at running in-service training they come to see me and we work out when they are going to run them and where and then we plug that into the calendar and promote those sorts of things. I am also probably called on to problem solve if we have any clinical issues or any sorts of issues with staff. So from the perspective of infection, if staff member who there were issues with and that was reported back to me by other staff. Then I would be involved with maybe developing the learning contract or bring them on some sort of education package or plan to try rectifying any problems they may have. That’s something that happens more holistically you might have a particular person who has come into the facility and is not quite coping in an area and just needs some up skilling and we would put some plans in place. That talks about my role.

My background - I went through Charles Sturt from 1990 -1992 in Bathurst. I came out at that time then worked at Riverside at Bloomfield and in local nursing home. Then I came here, I went through probably most areas of the hospital, it wasn’t a new grad program then but I spent a little time in most areas. I ended up in the surgical ward here (the male surgical ward) and I worked for about 10 years on that ward. I did a post grad certificate in orthopaedics that was an area of interest then I got CNS [Clinical Nurse Specialist] in that area. I developed an interest in education, which sort of flows on from CNS, and trialled the clinical educator position when we were first kicking along with the educators in the facility. I then obtained a position as a clinical nurse educator general, medical and surgical type educating and I did that for a few years. I also did a bit of CSU facilitation the actual floor stuff. I did a Certificate Four in Educational Training then I moved into this role. I had an opportunity in this role I had a 12 month secondment from the nurse manager position. I did a graduate certificate in nursing education and completed that a couple of years ago and then last year I did a Grad Cert in Health Service Management. Last year I started my first year for my Masters and this year I have only got the unit I am doing this semester and my research for me to finish after my Masters. I also do little courses etc on the way. I have been probably two and half years in this job, which is very much a manager’s role and doesn’t have the clinical contact. In clinical education you don’t have your own patient contact. It’s been probably five years since I have had a patient load so I’m thinking maybe I need to go back and do a bit! (laughs)

From your perspective, which of the following subjects is the most important in relation to a career in nursing: anatomy, physiology, microbiology, pharmacology and sociology. What order would you place them in?

I think that is a very difficult question. I think nursing is very much a holistic process and you really need all of it. I would add on their psychology. I suppose it’s a sideline of the sociology but it’s incredibly difficult to say which one of those is more important than the other and if you pulled one of those out and didn’t do it you wouldn’t round off your nurse. When I did my undergraduate degree I did sociology and I thought this is a waste of time. “Why am I doing this, I want to be a real nurse”. I frequently get those comments coming from students that are on prac. “Oh we have had a wonderful prac experience” and
“why can’t we do all of our training in the hospital, and “I learnt so much more here and uni is such a waste of time”. I frequently get those types of comments and I always talk to the students because I discovered a lot of the study I did at uni myself did make a lot of difference and did round off my education and was useful. It just may have not been useful the minute I got out. Sociology is very important and I have applied a lot of what I have learned in my undergraduate studies over the course of my time, a lot more than I thought I would. So I have changed my own opinion over the duration of my career as to how important those things where. Nursing is such a diverse career, you really don’t know what you are going to need where. Even when you are working on an acute ward where you think all I need is anat[omy] & phys[iology] and a little bit of science, you do actually need all those other things too because you are interacting with people and people are so complex.

And I suppose a couple of years down the track you could change the type of ward you work in?
That’s right. You are dealing with all different people doing all different things. You work in acute care, you work in mental health. You are doing everything wherever you are to a certain extent. Students don’t realise how much what they have learnt at uni they're actually applying when they come out on pract. They think they are learning it all [on prac] but they are actually pulling what they’ve learnt together and practising it. I am certainly not someone who would be pushing back for hospital training. We really do need to have the level of professionalism we get from university level training.

I am very much aware of how important clinical placements are and it is extremely important that they get good lengths of time on clinical placements, get high quality clinical placements and they are able put together what they have learnt and apply it. It’s extremely important and it’s not just a matter of tallying up the hours (it shouldn’t be). They really need to get high quality clinical placements when they are coming out because I do often feel they are not getting enough of that clinical placement. It does depend. There is a different variety curriculum’s with different unis have different times. I have some concern with the changes of the curriculum at the moment where primary health care is becoming the focus in the first year and they’re not getting the acute placements early on. I do understand that primary health care is certainly a focus but I am not entirely sure how that’s going to go but I guess time will tell.

Do you think that a higher level of knowledge microbiology helps with their [students] understanding in infection control practice, or their understanding of when you are explaining this to them. Do you think this helps them understand and apply that?
I think any understanding of why you are doing something helps you do that particular thing. Whether you are talking about microbiology or whether you are talking about anat[omy] & phys[iology] for why you are not putting the oxygen on too high for a CAL retainer. They do need to understand why they do something. We had a clinical educators meeting yesterday and one of the topics came up for discussion was aseptic technique, and a lot of concerns from the educators regarding aseptic technique in general within the facility – particularly with undergrads but also with other staff. I think there is a lot of confusion with aseptic technique out there at the moment. We have moved away from a very strict ‘clean and dirty’ to a ‘clean wound field’ concept. Different people have been taught different things and I think being very hard line as to what was aseptic technique once, the edges have blurred and people have gone… we are having difficulty with students even being able to put on sterile gloves in an acceptable manner when they come out at a postgraduate level. That’s just no something that is just good enough with them coming out into practice. Aseptic technique just with things such as putting in catheters, all of those things, we really have to go back and reinforce why they are doing things. So whether they are getting enough or not reattaining it I can’t tell at this end. But it is difficult as they do get a lot of information when they go through the course and you do only need to retain it until you pass your exam. Because you are not retested on it once you have passed. Whether its not being refreshed once they’ve learnt it, or maybe they are not applying it at the right times I don’t know whether linking into the curriculum better, you know, doing the microbiology and then having some of that coming out in the prac as learning objectives in the prac. I don’t tend to see the learning objectives that I see people focus on when they are out there – understanding why that’s important. Certainly feedback from places like theatre - new grads going into theatre - they certainly have to go back to square one with their technique, with such things as how they are gowning and how they are gloving. And just to get students to think about the order they are doing things and why they are doing it.

We are certainly having issues with aseptic technique. We are having things happening like new grads disconnecting a drip and then putting the drip on the bed and then going to put it back up again, now that is very basic, it should have been rubbed in. The practicalities of nursing come into it to. Your work load is heavy and you’re very busy and when you first start you don’t do things so quickly and you try to cut some corners to keep up like disconnecting a drip to take someone to a shower - our infection control says we shouldn’t disconnect any more than we have to with a drip. Maybe they don’t understand why that is
so important? Maybe they haven’t remembered from their studies why have you hooked that drip back up and you have increased your infection risk and why that is so drastic for your patient. Are they really working out if they have given there patient a peripheral cannula infection and then they go on and become septic can they follow it through? I don’t know if they are following it through and they are thinking look it doesn’t matter? It doesn’t look dirty.

In terms of the people you have in the hospital, who are they employees do you feel the infection control knowledge is consistent across groups of workers, eg RNs versus ENs versus doctors?
I am talking overall about our new grads when I am talking about this at the moment. We have probably a very large intake of grads this year we had staffing shortage earlier in the year and we have taken half our intake this year overseas. Historically our large intake are CSU students and it would be half and half this year, ACU and Sydney uni’s [students] that have come through this year.

You didn’t see any differences?
I suppose we have had increased difficulties with our overseas graduates that are probably language and cultural issues that have impacted on their transition to practice. The harder it is for them to keep up with their work load the more likely they will take short cuts. That probably comes from that angle whether it’s a knowledge thing or not I am not sure. From the perspective of other staff, look…um…our more senior staff and staff that have been here for a while, there is a mix. There are some that have a good knowledge base and have good understanding of what they are doing and are very careful with what they do. There are others that have perhaps got lazy with practice and now cut corners and don’t care, so it’s probably a bit of both that way. You have a percentage of the nursing population who are very keen to do everything right and do their courses and when shown something they actually then apply it. Medical staff - we certainly have an on-going battle with hand-washing. If you look at any statistics… we have done audits on hand washing. Despite… I mean you’d know… despite the evidence that are out there, despite the studies that have been done, despite people understanding how important hand washing as a basic principal is, when we do our audits we still look at a very abysmal percentage of people actually washing their hands between patient contact. Medical staff are terrible and allied health aren’t much better. You look at those audits - allied health don’t wash their hands between. Nurses again, don’t do it as well as they should either, and we all should know. We are still having a battle with it, just such a basic thing as hand washing. I think we have improved things a little bit with the chlorhex handwash being more available, and certainly with big pushes on things such as the swine flu at the moment. We have not had big pushes on getting people through competencies on hand washing but again, nursing staff are probably not doing so bad, but it even comes back to cleaners not understanding.

So every staff member in the hospital has to have mandatory IC training? And how often?
It should be every 12 months, but they don’t all get it every 12 months. There’s always an issue with staff and getting people to training and they don’t get a very long session, it’s about an hour. In that session, they go through hand washing and they do look at why it’s important to do things. It’s very basic though, but that is probably what you need, is that basic reinforcement level. They also do a little bit on staff health in that hour so it’s not a very long period of time.

In terms of when the new graduates come out how would you say their level of knowledge of infection control is? Would you say it is pretty poor?
Yes it is pretty poor.

Do you see the knowledge that there is a change in the knowledge over a period of time? Does it get better and how long does it take before you start to see them picking it up?
It depends on which category that grad falls into. Are they someone who wants to learn and are they a keen learner? Or are they just a person who had just finished uni and that is it, I never want to go back to the books again. I just want to get a job and go out and party. That ‘go out and party person’, you work on them as hard as you can but they don’t really care. The person who wants to learn, we work with these people and we’ve got competencies to get through with them. We want them actually to be passing and meeting a standard. As an education department we try to set a standard that is here (signals a horizontal level at head-height with hand) and we want everyone to get to that standard. So it depends I think which category they fall into. For those who are actually trying, within 12 months they have gotten to a good level. We certainly have difficulties though if you staff have an area - existing staff - that aren’t practicing
in an appropriate way there. So if you have got someone coming out and you are trying to say “this is the way you should do it”, yet everyone else on the ward isn’t doing it right, you have got then a cultural barrier to break through as well because they’re wanting to do things how others are showing them or how they’re seeing it done.

So you feel this plays an important role - what they are seeing on the ward?
Yes. Absolutely

The culture within the ward plays a really important part in terms of their transition?
Yes, their transition to practice and how they end up practicing themselves. Even though we teach critical thinking and reflective practice in undergraduate degrees - and I think that it is essential for a well-rounded nurse - they are not always mature enough perhaps to be able to apply that. Some are, some are great. Some come out, they’ve got that skill and then they are able to go to a ward and ask “why are you doing it that way?” That’s what we want. We want people thinking “why, why are you practising that way”?. This is where the underlying knowledge is really important because if they know the microbiology or they know the anatomy & physiology, well then they can say “this is what I know to be right – so that doesn’t fit”. I think the other problem we’ve got is that there isn’t always only one way to do something that could be correct. Even with aseptic technique, you need to understand the principals and you need to have a really solid idea as to why you are going to do that, because you could have three or four or ten different ways that could be correct. However there are a hundred ways they could be incorrect and students will see people doing things different ways. They have to be able to work out that not everyone is doing it right, unfortunately. They really have to have that grounding to apply and problem solve and get the answer right.

You’ve mentioned that from the audits you’ve done, the hand hygiene is fairly poor?
It is, but you look at any of the stats – we’re no better, probably no worse than anyone else.

From the things you’ve said, I’m wondering if you think there would be an avenue for a closer nexus between the university and hospital. Do you think there would be any value of a program when a new graduate comes out something like an in-service but it would be more than about just the aseptic technique say, it would be more about ‘why’ and ‘this is what you can’t see’?
It probably would. You can’t target people when they come out, they may be a bit overwhelmed. I think part of the problem with your new grads/transitional RN’s out there for that first three months is they’re just overwhelmed. They have this responsibility, they haven’t had it before, and they’ve got everything coming at them from every angle. I mean we do orientation with them when they start. We do skill stations and re-practice some things but a lot of it just goes over their head because it’s just so much all at once. I think it is probably something you could target but it wouldn’t want to be immediately on coming out into the workforce.

So perhaps after five to six months?
Yes, it would need to be once they have actually worked out what they are doing and then I think it would sink in better. Really difficult with the current climate, any education, we are struggling. There are so many things we want to be able to teach people. We are very much fiscally strapped – there isn’t the staff to release people. Getting people time out of their shift and off the wards is a real struggle. So how you structure something like that, you would need to be very clever about it for it to work. You could do little things with the in-service slot. The problem with that sometimes is getting them to retain what you are teaching. Maybe on-line stuff could be possible; you can do these things very informal, which is great. From the perspective of encouraging people to get there they have professional development points that will be continued as we go to national registration, if you can tie it in to get credits for it or tie it in to some sort of attainment those sorts of things you will get people keener. I think those are the types of things you would need to structure it in for a program like that.
You said there doesn’t seem to be any competencies when they come out on clinical placements.

The learning objectives - it doesn’t seem to me that it doesn’t really link in to what they are learning in microbiology they really link into the nursing subject a lot. I have not seen anyone thinking an objective to “develop an objective and understanding as to why a patient has sepsis?!” or even just looking at why are you taking a MSU? Where is it going? I have never had a student write down a learning objective that says “I have a understanding of why I am taking a MSU”. Those sorts of things are not linking through. Which they could. I guess what I am thinking is they are being taught the body of knowledge in microbiology. They are getting through it and passing exams. I guess my understanding and how most people learn is if you can link those things into actual practice of what someone is practically doing, it will consolidate the learning and I am guessing that’s where I am coming from. They are not really working out why it is valuable. You need to have that linked a little bit more as to when they come out on prac somehow.

So you feel that the education plays a fundamental role?

I’m biased (laughs). I think education, people think you tell someone something and therefore they should know it. Education isn’t only about telling someone something, it’s about telling them or explaining a particular thing but then it’s that whole cycle of ‘explain the thing, do the thing, then check they actually know the thing’ and then get them to teach someone else. Then they may actually retain it. You have got to have the whole circle going. It’s not just give them the information and get them to re-iterate it back. It needs to be more integrated.

So from your perspective, you are seeing that there is not quite as big a link between the theory and practice (especially in the undergrads) with the science side of things as there is with the nursing side of things?

Yes. The nursing side of things is very much there. They get that coming through. It does depend. In some instances the science links in. If you place a student in dialysis and you are actually looking at the science of kidney function then they will apply it. The dialysis staff will actually go through how it all works and why the tubes do this etc. If you place a student in ICU and are looking at ventilation, then yes that will be applied - the anatomy & physiology will be applied whilst they are there. They start looking at ECG’s when they are in emergency then some of the anatomy & physiology from the cardiac stuff will be applied. I am not really seeing though the microbiology applied in the same way. Students really like to be able to achieve wonderful tasks whilst they are on prac. They love to have been in on a cardiac arrest and they love to have done a ventilator and they want to be able to put in the nasogastric (tube) and do the catheter change - you know - “I have done a catheter change and I’ve done this and I’ve done all these wonderful tasks” and they want to achieve all these technical things. Maybe microbiology and hand washing doesn’t have such glamour attached to it (laughs). But it could be – it depends on how you present it. You have to present it to the student. I have never had a student come out and say they were passionate about microbiology (laughs) or aseptic technique but for the ones that want to go into theatre for example, they should be, they should be… you know. The feedback I am getting back from the theatre educators is such that we really have to go back to basics. Part of it may be that unfamiliar environment and you know, they forget half the stuff they learnt because they are so nervous to start with. But then I think they haven’t really integrated it well enough in their thought processes and taken it on board enough.

In terms of your compliance rates, which you said are reasonably low, from what I gather you feel one of the barriers to getting that compliance is there are some people who certainly don’t think it’s important…

Uh huh, yep (nods)

…and things like work loads..

Well workloads are always an issue

Is there anything else you are seeing as a real barrier?

One of barriers at the moment within this facility is certainly just physical layout and design in the buildings, those type of things. Hopefully once we move in to our new hospital we will overcome those
things. Just the sheer fact that there isn’t a handwashing sink close to where you are. There isn’t enough of them located in the buildings. The rooms are not set up in an appropriate way to encourage things. Physical layout and how things are organised is very important - where the pan room is in relation to the treatment room- are you likely to go in the pan room first then take your dirty thing into the treatment room. All those kind of things have not been well designed in our current building. Hopefully that will improve but it would have an impact. Um…what else…I guess skill mix really impacts on everything. I suppose this really just comes into work load but because we have a shortage of senior clinicians within health in general, and just because there aren’t always people to ask, that is certainly a barrier.

If money was not an issue, in an ideal perfect world what would you change or do to get the compliance up and to get your infection rates down?

Well your physical layout would be the first thing. You would fix your buildings, you would have your single rooms, you would have those sorts of things available. Certainly you would educate. I would have the education programs available for staff. Particularly for our new starters and those staff, I would have supernumerary time that we were actually able to pull them and go through things, get them to understand the ‘why’ s’ and the ‘wherefore’s’. I would have educators available in all areas. I guess from the perspective of education we don’t want to be police, but if staff know there is someone around that knows how to do it the right way and is promoting that culture of doing it the right way, everyone’s more likely to do it the right way. So more of those people about – I’d have educators everywhere (laughs).
Interview Transcript ICP #4

How did you get into infection control? What qualifications did you have, what were you doing before moving into infection control and how long have you been in this role?

My background is in um basically trauma and theatre work, a lot of big stuff, in Melbourne. I came up here and managed the day surgery, endoscopy and oncology units, um... then was asked to be the resource manager buying in everything for the hospital from a swab to an operating machine. I always had an interest in infection control and when there was a problem within the infection control department nearly four years ago, they asked me to come down and clean it up for accreditation. So basically I had no training before I started, I have since done a graduate diploma in nursing sciences in infection control and so have been working in infection control for four years.

So that extra training you did (the graduate diploma) where was that through?

Adelaide University.

Did you have to do that of your own volition?

Yes I did. Well... the hospital actually said to me I knew enough and didn’t actually need the certificate. But I don’t think it’s fair on people to have positions where they don’t have the qualifications for it, when they [hospital management] expect it for everyone else. So I went and did if off my own bat.

Your role specifically now, what does it actually entail?

It is the clinical manager of infection prevention and control and staff health. So it’s the day to day running of the infection control department. You know looking at the wards, um being involved with the facilities in cleaning, kitchen, new development or redevelopment of existing areas, um... site surveillance following up positive blood cultures and all that sort of thing and educating the staff.

I am interested in what sort of transition of undergraduate education into practice. Within most the undergraduate nursing degrees students study topics such as anatomy, microbiology, sociology, psychology and pharmacology. In terms of relevance to a career in nursing, would you say any one of those particular topic is more relevant?

I think all of them have a relevance, but I am biased, I would suggest that micro has a slightly higher relevance. Understanding where the infection is coming from, what’s caused it looking at practices and things like that that may be contributing factors... But I think they all have a place.

So would any of them be the least relevant?

No, I think they all have a place. Emphasis, you know... maybe the sociology a little bit less emphasis but I don’t know how you structure that particular unit though. In my point of view, all Charles Sturt Graduates come out a slightly higher lever. I think I have said it to you before. They are very well trained and they are slightly more aware of what they are doing and why.

Do you think knowledge and understanding of microbiology makes a difference in graduate’s ability to understand and apply infection control practices?

Yes I think it does, and particularly, we’re reviewing our bacteremias and things like that at the moment and a lot of our blood cultures come through as contaminates. We have a higher level of contaminates than we do of true bacteremias in this facility. And it’s because they [the nurses] don’t understand what they are doing when they take a blood culture. Even though they say they understand aseptic technique, it’s not coming through in their practices.

So do you think the situation would be improved if there was an increased level of microbiology training, whether it be undergraduate or not?
Yes I do think it would be and I am targeted your more prevalent organisms. Of course they are not going to know all the little side microorganisms, you know they don’t have to have an in-depth knowledge of those, but the ones that are more commonly found within a hospital situation like your *e.coli*’s and your *strep*s and things like that, and multi-resistance in organisms and why, what is actually happening within the organism.

*Would it be better for that extra education to occur in the undergraduate before they came out, or would it be more perhaps applicable if it was some sort of refresher course once they have been out on the job six to twelve months after that?*

I think both. I think it’s very important in their undergraduate training to look at practices they see around them and be able to say “well that’s going to be a contaminated specimen”, you know, to be able to review what they see and what they are being taught and to question why they are being taught in such a way. So from an undergraduate perspective, to give them the armour to have the ability to question people, I think it’s really important. But I do think a refresher six months afterward would be an ideal thing, because we can’t expect them to remember everything. It’s a bit of a situation where they get into the hospital and it’s a ‘see one, do one, teach one’ type of mentality. They see it being done the wrong way, you know, specimen taking or something being done the wrong way and they think that is normal and then they teach it to somebody else. But if they had that background knowledge to be able to question then maybe we would be able to cut it short a bit.

*So the culture on the ward places a really big role?*

It does. It does and I feel sorry for the undergraduates because they don’t have the presence or the ‘armour’ to say “well we were taught this way because of….”. Saying we were taught to do it this way goes nowhere, but to say “because of” it gives it the little bit of clarity and background so they can feel they can say it.

*Do you at present have any sorts of additional training, or what occurs in terms of your staff training - do they get any microbiology training, and what form of infection control updating is what I want to know and how often.*

We don’t have any strict microbiology training, but we do target particular areas and particular units when we see something happening that shouldn’t be happening. I will use the bacteremias again with that, you know our emergency department, we are very much in to targeting them at the moment. We are giving lectures and an analysis of the pathology that comes through. That is also given to our infection control champions to take back to their wards and we have a meeting with them every month (if they decided to turn up). And we expect them to take it back to their ward and talk about it from a ward level and we are always available if they want to talk on a specific subject. We go up there on a drop of a hat. I have got a lot of lectures on a USB port so that I can go up there any time.

*Would that be something that you would find useful, for example to work in collaboration with the university to do perhaps something along those lines with a half a day in- service learning more about the actual microbes and their transition to make them appear more real?*

And I think that’s what you’ve got to do, is to make them appear more real and to the get the undergraduates to think “if it’s yours, would you be doing it the same way?”. That’s the basis of their practice, or it should be.

*So the infection control champions that you mentioned, how do they become one of those?*

They actually are appointed. It’s always a level two (RN) on the wards and they’re appointed and then we give them extra training, extra resources when we meet once a month. We ask them to do go round and do IV site audits, different general audits, checking how many of their staff have done the 5 Moments of Hand Hygiene e-learning packages. It’s basically that we are trying to get our level two’s motivated, not to just sit on their laurels, but to actually become a champion for a particular area. And there is a champion for each of those 5 areas of preventable harm and they all have a badge that says they are a champion of that preventable harm, which we encourage other staff to go and ask them for advice or information,
So like a ‘ready-resource’?
Yes, and then they can come back to us, or the staff can come direct to us if they want to. I’m not backward in coming forward and saying “Look, I’m not sure about your question, give me 10 minutes and I’ll get back to you”.

Do you feel infection control knowledge is consistent across all the workers in the hospital in terms of different groups? For example, allied health workers, doctors, would you say the infection control is fairly consistent.

No.

In what way is it not?
Well take the hand hygiene auditing we have just done. The best people for hand hygiene were medical students to start with then the allied health area. Nurses and doctors didn’t fare so well. Doctors actually came last because, of course, because they don’t think they have micro-organisms. Another example of it is throughout this swine flu outbreak, people don’t understand, they say yes it’s aerolising precautions when you are doing something, or droplet precautions when you are just going into the room, but they forget they need to have the gowns and the gloves on as well. They will argue with you black and blue “but it says droplet precautions, that means I just need a mask” No! The knowledge is not there. And I think we, as infection control professionals, have not helped that. I still hear people refer to barrier nursing and I pick them up every time because there is no such thing as barrier nursing or reverse barrier nursing. It’s the nitty gritty we have to get into our undergraduates and new graduates.

In a word or a sentence, how would you characterise the infection control knowledge of people (new graduates) coming into any area of the hospital?
I think it’s not too bad but I think its watered down as soon as they hit the wards - by what they see that is going on about it.

Would you say you see a change in new graduate’s knowledge over the time they are here? You said that you feel it gets watered down as soon as they get on the ward. What sort of time frame does that normally occur over and does that knowledge then after the period of time pick up again or is it a downhill run?
It’s a downhill run and it depends on what university they come from how quick it is. As I have said before, Charles Sturt University has a really good reputation within the hospitals but it also depends on the stresses they are placed under a ward situation but it is fairly rapid. I can give an instance of someone who has been out for 12 months from a university training putting blood culture bottles on the floor. [They said] “Oh sorry I thought it was better than putting it on the bed”. Well get the right equipment, get a trolley, get your sterile field.

You have mentioned the hand hygiene audits you have been doing; in terms of the compliance rates with in the hospital would you say they are good, poor or inadequate?
I can give you the official compliance rate was 51%. But I would suggest in reality it’s probably 35 – 40% because they knew they were being watched. And I think that has a big play in it.

What sort of challenges or barriers you find to compliance. You have mentioned culture on the ward so I imagine that is a big one. Are there any other challenges you find to get people to comply with hand hygiene and other infection control policies?
As you said, the challenge of the wards is one of them. The challenge of peers is another. If they [the nurses] are doing a round with a doctor and the doctor doesn’t wash his hands then they don’t either because they feel like they’re sort of standing out like a sore thumb. I also think the availability, and they have to be taught to check that it’s on the end of every bed when they do their initial rounding with the patient when they come on to a shift. There are lots of things, “that’s not my job”. I am sorry, I know I am old fashioned but I believe in anything in the patient surrounding is your job. If you don’t do it yourself then you make sure someone else gets it done. So availability, um... I have to say I feel really sorry for these staff in any hospital at the moment because we are so short of beds it’s horrific. And the nursing
numbers in comparison to the acuity of patients is very slim and that always makes a difference in those sorts of things.

**Is there anything particular that you have done in your role to try and address those challenges and what have you done?**

Well we do have an e-learning package on hand hygiene and we also have an e-learning package on just basic infection control. We go up and talk to them on the wards, just nicely remind them that they have a responsibility to make sure that there is Avergard [hand sanitiser] on the beds, or we’ll go and put it on the beds and basically just talking to them. I get involved with new graduate study days and push push push it all and I actually take hand rub with me and they use it before every lecture I give and they get hand moisturiser after. Just to really pound it into their heads, all those sorts of things.

**If this was a perfect world, and you had unlimited money and unlimited resources what would you do in your role to try to improve the hand compliance rate and general compliance rates?**

There is actually a new device out that will alarm if you go into a patients room without having done hand hygiene. There are a couple of them over in Denmark and Sweden where you can’t get into the ward without washing hands – that’s the activator to open the door to the ward. So I would have that on every patient’s room.

**Tell me how you got into infection control. How long have you been nursing for? Whether you undertook any specific training when you went into that role? Or any other training you have undertaken since then?**

Well I started my nursing career in 1977 so about 15 years later I was working in the operating suite and I am also a midwife, while I was in the operating suite I had an occupational exposure and that stimulated my interest because I had a contact with the infection control coordinator who had the results from the patient and I couldn’t understand why he wouldn’t give me the patient’s results. I was then in a very patronising way told that I didn’t have anything to worry about. I guess what stimulated my interest was I thought I didn’t understand infection control. Why did they have these funny sort of rules? So I thought I needed to know so I applied to do the course so that I would have an understanding of infection control because it seemed a bit mystical at times, why different precautions were applied and I suppose as a person at the cold face you only get part of the information. So I have been nursing for 15 years and when I applied to do the course I did it under my own steam I paid for it myself. Then I looked for a position in infection control which I was successful in the private sector, so I worked in the private sector in that role for about six years. And then a position came up in the public sector and of course in a public hospital its a completely different environment but I knew I would get a lot of experience so I went into the public sector and I have been there for about 12 years.

**So did you get any further training once you took the course you paid for yourself? Do you get any additional training in terms of on-going professional development within the health care system or is that just up to you to undertake?**

I undertook that myself. I later did a Masters of Public Health because I was interested in epidemiology so I paid for that myself and did it in my own time for the first two years. It was 4 years part-time and then the health facility that I was with allocated time to attend lectures. The other thing that I was funded for by my current employer was project management diploma and that was funded and it was recognised that a lot of what we do in infection control are different projects so to understand how to manage projects so it would
be beneficial to formally manage projects using professional management techniques and styles. So I did that last year.

**How would you see your role as an infection control practitioner and in your role how would you describe your role in infection control to someone who doesn’t know, an outsider?**

The aim of my role is to reduce the risk of infection transmission in the health service and how I do that role is through a lot of activities which is probably described best as quality activities. So…collecting data, analysing it, feeding back and providing advice and recommendations to change practice based on the results of the auditing that’s been undertaken and so a lot of my role is around auditing and surveillance so its around providing advice and recommendations around reviewing practices in clinical areas.

**And the scope of your role - having worked in both private and public I imagine that there is a difference? What difference would you perceive between someone undertaking the infection control role in a small hospital compared to one of the large metropolitan hospitals.**

The role in the large metropolitan hospital are undoubtedly much more challenging from a infection control perspective and much more complicated and the patients are much more compromised and sicker.

**The undergraduate nursing students do a variety of topics within their degree. For example, the microbiology generally is taught within the suite of science subjects in many cases along with other topics. In terms of anatomy, physiology, microbiology, sociology and pharmacology what would be the most important of those topics in order of relevance to a career in nursing, in your experience?**

I think it depends on what stage you are at in your career but starting at the beginning anatomy and physiology and then microbiology. You need to have that basis and then you build on that and sociology once you get out there and when you are caring for people you need to have an understanding of sociology. I guess for a junior nurse they are not going to give out any medication to understand anatomy, physiology and microbiology because that is there immediate things and as they progress through their course, sociology and pharmacology - as they start handling medications - would come next.

**So do you think that a knowledge and understanding of microbiology makes a difference in graduates or undergraduates in their understanding or ability to apply to infection control policies and practices?**

I think it’s a basis of infection control microbiology that’s what we base our principals of infection control on - microbiology

**Would you say an increased knowledge of microbiology would lead to an increased ability to apply infection control policies?**

It’s hard to generalise but yes, I think it’s good to start off with the basis. You need to start off with a good understanding of microbiology and then of course it depends on the person and application but it would be a very good starting point and it’s the basis of infection control. And this is what we base all our principals on is Microbiology.
Do you think infection control knowledge is consistent across all healthcare workers or groups (doctors, nurses of allied health)?

Definitely not. It depends on each discipline. For example, medical staff (older ones) have not had any training in infection control. The graduates coming through now have an hour in their undergraduate program so that’s an improvement from nothing. They do some occupational health and safety training but generally medical staff are the poorest of allied health and nursing and medical staff. Their compliance to hand hygiene is the worst and I think it’s related to their lack of infection control training. I know from my practical experience if you work with medical staff that have worked at the old Fairfield hospital their compliance with hand hygiene is quite different to someone who has not had that experience because if they have not had that experience then they really have not had that infection control training.

How would you characterise the infection control knowledge of new graduates coming in (like brand new graduates particularly in the nursing field). How you would say their infection control knowledge is?

It’s ok, very basic we have a liaison program at our health facility and that is to give people a better understanding of infection control which we have Link Nurses in each ward and they have a portfolio in infection control and they get three full days of additional training and its very specific to infection control so obviously there’s a lack of understanding from their undergraduate course that requires them to need a liaison in infection control.

So you would say there is a gap in current training in terms of what you require once they graduate in terms of what you feel they are graduating with.

Yes there is.

Do you see any trends in terms of where people have trained in regards to TAFE versus University? Do you see any differences in graduates from University versus TAFE?

We have a home TAFE that’s not very far from the Monash medical centre so they come and have a two day infection control program. That has been initiated by that TAFE, whereas the university in their undergraduate training there is so much else going on we are not involved in any specific infection control training and I know they do get some infection control training in their course but its not run by people that are practising in that area, its run by educators or academics except for the TAFE that we have a relationship with.

What sort of changes you see in new graduates when they come in and how long it takes before you see significant changes?

It depends on the individual but what we notice is they start challenging some of the practices that are occurring and might feedback to the team (the infection control team) some concerns they have and that has developed directly from them taking the infection control liaison course. So it stimulated their interest and they started thinking about things around them and they start challenging current practice and investigating if it should be changed or reviewed.

So does culture on the wards play a role in the practices that are undertaken? In other words, is there a culture whereby infection control practices are not necessarily followed? Does that play a role in new graduates in their application of policies and practices?

Wherever we are, application of infection control practice relates to clinical leadership. If you have a ward with good clinical leadership then you will have good general infection control practice. If you have a ward where the clinical leadership is lacking then infection control practice, hand hygiene in particular, you will see its poor and it’s the same with take up of influenza vaccination and other prevention of
preventable diseases are not followed up. Once a new graduate gets into that environment then they quickly adopt the ward culture as a norm.

You mentioned the gap between the university training and the practical training when the students graduate. Would you feel that it would be better or benefited by a close liaison between some hospitals and infection control professionals and Universities to better address that or is it already occurring?

Well its only occurring with this TAFE and the undergraduate nurses come to us and spend a couple of days and we run an infection control mini-program for them. But I think it must be at great benefit and their feedback is that it is of benefit. Whether it makes a difference down the track, I don’t think there has been any evaluation, but I think that’s lacking in the university undergraduate nursing training. And I think that’s because it’s so much they have to pack in that there is no work experience in infection control like the TAFE program where people at the cold face deliver a short program over a couple of days. We don’t have any involvement with the university that does the same as us, but it would be a great benefit.

Do you think if infection control people going to the university such as yourself going to the TAFE course or would it be adequate if the infection control practitioners have a closer liaison with the University academics so they can still teach it? Would it be better if the infection control people go to the university to teach it?

I think it would be better if the students came out to the facility, because I have done some training of radiographers where you go to the university and you give the lecture it’s difficult to know how much they comprehend in the two hours. I think they would get a lot more value if they were in the work place and there was that practical application of the theory. And I think that sometimes some students have a gap between the theory and the practice. And if you are only providing the theory some people don’t adapt the practice or understand how to adapt the practice.

Would there be any benefit in perhaps once they [graduate nurses] get six months into their employment they have a refresher in microbiology training about the microorganisms?

I think it’s much better if you are in the work place and you can apply that information practically, once it has a practical relevance it means a lot more.

So you also mentioned that part of your role is doing hand hygiene audits. How do you feel about your compliance rates at your hospital – are they good, poor inadequate?

We audit every clinical area at least once a year but we report to the Department of Human Services 3 times a year on the 7 highest risk areas. What we do, for instance the newborn service, their compliance was up to 81% so we thought there is no point in reviewing them. We don’t regard them as high risk any more from a hand hygiene perspective, so we went to another area and that’s what we do constantly; we move around so we say we are not focusing on 7 areas only we are focusing on high risk areas and they alternate depending on where we perceive a risk to be, based on the previous audit results. There is no point in auditing a place that is really good. We go to a place that is poor and we work on them until they improve. We think it’s a very successful program and Hand Hygiene Australia agree with us. They are promoting that other facilities that only do the same old high risk areas all the time include an ICU and include emergency departments because its very difficult to change the culture in these areas, it’s a very complex environment and the staff in that area say they are very busy and don’t have time to wash their hands.

That is certainly one challenge to obtaining compliance. Do you think there are any other barriers to get people to comply with hand hygiene [policies]?

It’s an awareness I guess. The other thing that we ran last year was a Hand Profiling project. We had an intensive care director that was not convinced that when he examined the patient we observed and he asked us to watch him. And we observed that there were 13 opportunities for hand hygiene and he applied the hand hygiene only three times. And he said it wasn’t practical for him if he had a 14 bed ICU to apply the hand hygiene per patient 13 times in a 14 bed ward round. What we did is plated his hands [on agar plates]. We replicated that examination of the patient and plated his hands 13 times. We demonstrated that when he used the alcoholic hand rub the number oforganisms significantly decreased and when he didn’t do that, the number of organisms where high. What we noted was the thumb of his right hand-
even when he used the product—was still contaminated because he was very excited and he became a believer of that hand hygiene after that. If you use the hand hygiene you reduce the number of organisms and there is a potential risk there. He was consistently missing him thumb when he was applying it so he corrected his technique and then we plated his right hand and there were no organisms after he used the hand hygiene product. And then what he did with his team in ICU was change the way they undertake their ward round, so they changed their practice based on their infection control need instead of having 13 opportunities per patient they reduced it down to 2 or 3 just by changing the way they undertook the ward round and examination and that made it more realistic that they could comply with the hand hygiene opportunities required as they did a ward round through their ICU.

So I guess it’s about seeing the bugs that make it real?

We have run that same project on our three emergency departments as well just so people are aware of what can grow on their fingertips if they don’t apply the hand hygiene product.

If it was a perfect world and you had unlimited money and resources, what sorts of things would you like to do to address poor compliance or improve compliance?

I would institute some mandatory training. Before people came into the clinical area they would have to pass a certain level of practical. It would be mandatory; they would need to show that they knew what the 5 Moments of Hand Hygiene were and in their clinical practice their compliance would have to be 80% and above so they would be safe to work in the clinical area. I would also make it mandatory that if they were working in the clinical area they would be up to date with their vaccinations for the vaccination preventable diseases so they couldn’t transmit a preventable disease to their patients or their patients to them. And I would also make sure that it was mandatory to have antibiotic management systems in place so that we reduce the evolution of multi-resistant organisms through the overuse of antibiotic and that staff are compliant with antibiotic guidelines.

Interview Transcript ICP #6

How did you get into infection control? From nursing and then how you moved into your current role?

I studied nursing when I finished school—which was mmm…about 20 years ago (laughs) and then I did my new grad year and part of that was in theatres and I became quite obsessed with theatres. I travelled overseas before I went to Saint Vincent’s and did my post graduate certificate in theatres. From there I became an educator in theatres at Saint Vincent’s Public and I just loved that sterile environment—you know, no bugs. I then met my husband and he lived in the country so I needed to move out to a rural area. We decided to move to [regional town] and believe it or not, there weren’t many job opportunities for people with my experience in theatres open at that time. So I came to [healthcare facility] and they were very willing to accept me. I worked in theatres—it was only 0.5 [FTE] - then they had an internal advertisement for infection control coordinator. I thought I would give it a go. I didn’t have a great deal of knowledge in it but I thought surely my theatre background will assist. I have never looked back. So I decided with the very generous support of the hospital they put me through another post graduate certificate with infection control which I did by correspondence with Griffith University which was great. It was a great assistance to me because it really did make me understand the origins of infection control within the hospital and the different facets I needed to focus on.

The Grad Certificate you did with Griffith were you required to do that or the hospital offered to put you through that?

It was my own interest that I wanted to do it, because obviously it was expensive and at that time I couldn’t afford to do it so I asked [healthcare facility] if they would be willing to help and they paid for it all.

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How long have you been in the infection control role?

Minus the 2 years of maternity leave I’ve had 8 years. So I have been working here since Dec 1999 and then I stated this job in May 2000.

What would you say your role entails?

There are so many facets to cover. It’s definitely multi-faceted in the sense that I think my primary focus obviously is with the patients and making sure that people, the nursing staff, understand standard precautions and transmission-based precautions, so that we don’t have any cross-transmission of potential infections. Keeping the hospital bug free! (laughs). I have also been involved in staff health and we have now developed that role into someone taking over that role into someone taking over staff health and they do that one day a week. The education for the patients and the visitor’s as well. Obviously hand hygiene is a main focus throughout the hospital. Also understanding antibiotics and pathology. There is myriad of things I do.

So you obviously have the surgical wards here. So how many wards do you have in total?

We are 99 beds. We have XXXX [ward] west and east. The west [section] is an orthopaedic ward where a lot of joints go to, and then the east is the medical. Then we have down stairs on the first level is St Elizabeth’s [ward] which is divided up into coronary care, high dependency unit and then we also have ICU of which we have 4 beds. Then we have XXXX [ward] which is divided up into [beds] #1 to 15 are the maternity beds and we extend out it if we are busy. Then the other beds up to #26 I think it is, can be med surg which and for day cases. We have a separate day surgery unit, just down on Edward Street which is four theatres and is forever busy. And we have a theatre unit here as well.

How much education do you have to undertake for your staff is that more the role of your nurse educator?

I defiantly get involved there. I am big one for getting out there and being seen to make sure things are enforced. I’m thinking what my last 6-month clinical indicator for in-services would be. I think on average 25/30 for the six months so I probably do at least one a week in-service wise. And then when I get a role about something - we have a new pathway for multi-resistant organisms at the moment that we have developed, and we have been the pilot program for this system for the rest of the Calvary’s nationally. So that has been quite intensive and it has absorbed a lot of my time. I am at the stage now, probably because of swine flu, that my yearly plan is running a little bit behind (laughs). But I really would like to get infection control associates on board. We have got a committee that meets bi-monthly and the members on that committee I have specifically chosen from wards and I have also chosen people that I know (because I’ve been here for 10 years) and I know the little personalities that are ‘doers’ and they’ll report back to me and that sort of thing.

I also have- talking about the scope of infection control- obviously I have set up my own program with a business plan, but it also encompasses making sure I do a ward round once if not twice a week, to touch base to make sure that I know what the profile is of the hospital infection-wise. And we have also, part of going back to that national program that we want to put out there, we have an IPM [Inpatient Management] system which is an in-patient system and we have developed the infection control side of that. So I can come in the mornings now (and it’s only been this year) and click my computer and I can see who is flagged [as being positive for infection] around the whole hospital. So then if there’s anything that I am really concerned about – like if I have a flag for TB- I would drop everything and I will go see that person to make sure they are carrying out the correct transmission- based precautions, that that patient is in a negative pressure room for example.
Appendices

I am very interested in the Multi-resistant Management Pathway that you have talked about. It doesn’t seem like it has been done in public hospitals. It seems, like something you guys have come up with?

We have a multi organism committee now which is fantastic, and one of our cardiologists Dr Carol chairs it. We have met twice now. On the second meeting I gave a little in-service about standard and transmission-based precautions and just the similarities that the hospitals [public and private] have. So within that it has been great to have that connection with the public system. We run off the same policies. For example, getting back to the multi-resistant organisms, that policy came out at the end of 2007 and when I came back from maternity leave in 2008 I was like “Hallelujah, I don’t have to fight this fight anymore because it’s in black and white” about screening because we have always been very proactive about screening patients who might be high risk for MRO’s and patients who had a prolonged period in another hospital. And from that, touch wood, we have little or no out breaks of MRSA in the last 10 years which has been great.

And you feel that’s definitely been a result of the screening?
Yes I do. I really do. Because as soon as we pick them up [MROs], or we think they’re high risk [the patients], we have them on contact precautions so it’s just that extra step. But the thing is with the public system (and getting back to your question), I just find the finances are not there for them. We can charge a lot of this pathology to private funds and we can afford to run these systems and the thing is I sort of feel too, is that we need to have that good community relation; we need the community to know we are safe and that we are bug-free and that sort of thing so we get the business. So I think I also look at it from the perspective that “Okay, we are running a business. What steps do we need in place to secure that we keep on accruing that business – the patients?” I am not sure if that’s a bit ‘out there’.

Obviously I am looking at the undergraduates and I am involved in the undergraduate training. The nursing program varies between universities but they all contain various elements of science, being physiology, micro and then also sociology and physiology. The students, to vary the degrees, can or can’t understand why they have to do a particular topic/s. From your perspective would any of those topics be more relevant to a career in nursing? Are there any more relevant or least relevant?

I think that there are two that stand out for me within my role and that is: microbiology - there defiantly needs to be more focus on what *staphylococcus* is and the varying degrees of *Staph*. Like what is the multi-resistance? How do you read a pathology form? My patient’s on antibiotics, are they the right antibiotics? And I think knowledge (as you would well know) is confidence and I love seeing now like all my managers when I ask them “Okay is that the right antibiotic for that patient?” they say “Yep, we’ve checked it, its good”. So that just cuts that workload out for me as well, but in saying that, that patient has been so well looked after. Because I know that there is that forty-eight hour wait to get the pathology back and they might be prescribed the antibiotics and they are not getting any better. With some patients I do find myself intervening because if they are not getting any better, [I ask] “can we try another antibiotic”. That’s another confidence issue as well - who is going to ring the doctor? Who is going to ring the VMO?

The other um study that you spoke about was psychology - I think it’s so important - to understand how the patient feels. Let’s tell the patient what they need to know - they have a multi-resistant organism. OK, so you’ve done the micro [testing in the lab], you know what it is, let’s make sure the patient is aware, make them part of this chain, so they understand how important is that we have to do the contact precautions, that we don’t want to treat them as a leper and [let them] understand we have got a duty of care to the other patients. Because that’s something that I find a challenge continually; I’ve had to go and see someone today who was VRE-positive in the past. They’ve been to Sydney, had VRE-negative swabs and so now they don’t understand why they come back here and they’ve still got to have contact precautions because there is nothing that tells us in any directive, that we can clear VRE at this stage. So, after a 45 min conversation with the patient, calming them down, showing them their original positive result (and it was all reasonable requests) that patient is now content and they’re working with us within the realms of infection control.
Do you think an increased level of microbiology correlates to an increase ability to apply infection control procedures?

Yes definitely if they understand the virulence of a pathogen. It sounds awful but I sometimes use semi-scare tactics, “Okay guys if we get an outbreak with this we are in trouble. If someone gets VRE septicaemia then we are looking at mortality rates”. It’s sort of sometimes like you have to show people the obtuse things when they don’t understand or just want to come to work do the 9 – 5 and leave, and that’s what I find with the majority of people. So if they understand why we are doing this and if they have missed the link I need to really hone in on [the concept] “you can’t let people go in there without a glove and gown if that person has an MRO infection because it’s going to spread throughout our hospital”. And the most interesting thing that has come out of that MRO directive [management pathway] in particular is what we have been telling people for ten years - it’s not just the patient focus, it’s the environment. The fomites will hold bacteria and viruses as well and that has been so evident with swine flu. So I feel, as much as we hate these outbreaks and swine flu and everything happening, it increases the awareness so that we are prepared and we are not scared because as soon as people don’t understand they panic and they do ridiculous things that could potentially psychologically effect people and physically affect them perhaps.

Do you feel that infection control knowledge is consistent across all health care workers or groups in terms of doctors, nurses of allied health?

Gosh, you know the people in this hospital that get it the most are Hospitality - the cleaners. They are phenomenal, they tick the box, they do everything. In our last HICMA (they’re hospital infection control management resource people we use and they survey all the Cavalries), hospitality got 97% for their area overall. As a hospital we got 92%, which is great but it’s just yet again when I give in-services to them they are interested, they are focused and they follow through. My nursing colleagues are good and understand but I see them nodding and I think only 50% goes in. I start at the basics and what I hope is they understand the basics and then you are building on that. But I don’t think too often – like today – I had to start again at the basics with a manager that I know I’ve spoken to before. So you sort of think “where am I missing it?” I just think - and that’s why I am so happy about talking with you about all this Jenny and I know there will be progress with what you are doing - because it’s those fundamental basics that you’re learning at university or through other tuition, like myself doing a post-grad certificate you sort of think “Oh, I didn’t know about this” or “with this particular pathogen this would happen and this is the course that it takes and this is what I have to do to interrupt its transmission”.

Do you think that it all comes back to education in terms of the undergraduates? Do they need more micro and/or do they need it done differently in a more clinical context or might it be that because they don’t have the experience on the wards it just fresh from uni is it that we step up the micro leave it the same but do a refresher course? What do you think is the way?

I would just like to see infection control as a little topic by itself and standard and transmission based precautions as a topic at uni would be great. The thing is that I find is say, getting back to that TB case, everyone panics “what do we do, what do we do” and there’s policy’s and everything else but its having that rationale isn’t it? - so I need to look for the policy, I need to ring the infection control person, blah blah blah.

Getting back to your question what we need to do infection control to improve it for undergrads, I think they are always so eager and the undergrads here are fantastic and they absorb everything and I also talk to them when they come through – we’ve got a group here at the moment - and I just try to keep it pretty simple. I think to make perhaps micro more interesting, like doing um maybe seeing the end results. How could we have stopped this happening? Giving them scenarios?

What I can gather from yourself and other people is that there is a basic knowledge about ‘washing your hands’ but it’s the connecting the dots is what I am hearing from people is what the students can’t do. So do you think they have a lack of understanding other than the traditional normal situation as soon as it requires a student to ‘connect the dots’ and how these things are transmitted then that is not quite connecting is that what you are finding? Is it that doesn’t really understand ok this means that this will be transmitted in such a way?
I always think that their intelligent and that they understand about asepsis, but in saying that, I got a phone call last week about someone attending a wound dressing and they didn’t understand. But maybe if they understood to be able to connect the dots. If they are able to …we have this saying in nursing – “See one, do one, teach one” and what I am trying to promote at the moment with this MRO thing is that the nurses talk to the patients about the MROS because you know, I have a new patient up stairs who’s come and been screened and they have VRE. I ask the manager “Has anyone spoken to the patient about the VRE?” We have to have the responsibility to educate. So getting back to that, I think it will be more ingrained within them if they were practising what they are learning. And that for me, having gone through the uni system and coming out and working in a hospital, it was great to study all those things but a lot just goes by the wayside because you are not continually practicing it.

So it’s a theory-practice gap then? You’re finding that when the undergraduates come out on clinical placement there’s a theory practice gap, particularly in the relation to the infection control?

Yep. Even with some of the nurses that have come back and are doing refresher courses. Even how to glove and gown properly. You know those basic aseptic approaches are just missing and there is good support here I have clinical nurses educators and we try to support people through. But it just becomes sometimes a concern…and I’m only talking about the minority…but the thing is that relieves me when I have situations and I hear there has been a break in aseptic technique and there’s fundamentals just missed, is that I would see more infections than I do. Because we just have no evidence of cross-transmission on wards and I think too, the culture of our hospital. We have a lot of older nurses that have been here for a long time and have the correct techniques and they sort of overlook what is happening with the new grads and the program so things that are carefully monitored.

So you’re saying culture, in your case culture on the ward, plays a really big role? And in your case it seems to be a positive role. Would you agree it could play a negative role if there where people on the ward not participating.

Yes, and we had that for a very long time with contact precautions. People were just “hoo ha”. Until you can give them examples of what happened and how you follow up on things. And also getting back to the scare tactics, you know “it’s your registration. These infection control practices is outlined in your registration so it’s your responsibility as a registered nurse to act these out”. There is that sort of aspect as well, people need to take responsibility for their actions.

So I guess sounds like one of the ways you have been able to address this is through education which then changes the culture on the ward? And that has really helped play a positive role.

We have been quite fortunate and the other thing is that, getting back to the whole psychology and confidence and understanding how people are, people always want to do the right thing and look after other people. But people are all too quick when someone does something wrong not to address them and to address the hierarchy and the hierarchy is not always here or they forget to do it and then its those people who escape the loop don’t get picked up on. ie some of our doctors. The other week I called one of the doctors and I said “I appreciate that you belong to our system and you set a good example and you understand your patient is under contact precautions” and he knew what I was getting at. So in doing that, in setting that standard now in that I will phone the doctors because I want this system to work across all disciplines, the nurses will look up and think Emma is going to phone if I don’t do it right (laughs). But yet again, I have taken that role…not putting feathers in my own cap….. so they can hopefully see that this is how we can address things, because we are always the patients advocate and we don’t need to prolong patient stays through cross-transmission of bugs.

Obviously you’ve done a lot of work to create an environment where compliance is now ‘the culture’ which is a credit to you. So how is that reflecting on your compliance rates in regards to hand hygiene?

We have not started that study because I need to train to become an auditor to do the checklist and that sort of thing. But we are going through oodles of alcohol rub and I am more than happy that people are using it. Yet again, the evidence is we have no cross transmitting of any infection on the wards.
So you’ve got very low infection rates as a result?

Mmm (nods). We had two nosocomial MRSA’s out of 16539 bed days and one of them I think just hadn’t been screened properly and the other was a day patient and that is in six months. But then on the flip side we have had some problems with VRE [Vancomycin-resistant enterococci]. We didn’t know if it was an outbreak – there were no septicaemias- or if we had 5 people who were just colonised with it. So there are things like that, but we always just go to worst case scenario. We cleaned out the whole environment, we screened intensively for 6 weeks to make sure that we didn’t have it [VRE] in our environment so there would be no further cases. So getting back to your question, I just feel we have that continual compliance here, and I suppose it’s the thing that…(jokingly) and I’m depressed because my director of nursing is leaving… but I have been able to do so much since she’s been here because she understands microbiology. She is a midwife; she’s proactive and is a great leader, has all those ticks. It’s a great hospital to work within because there is that sort of reward culture you know, which is great. Like our Director of Missions will drive around with (we call it) the ‘dolly trolley’ with treats for us to say thanks so much for being so good at your job you know, a bit of a ‘pat on the back’. So people want to [do the right thing]. Sometimes I sort of think ‘is it too condescending some of the things I do?’ Like I go around with my lollypop basket when I want to talk about something new, but you are getting peoples attention, it’s all positive. And with our hand hygiene education that we’ve done, we have done we ‘train the trainers’, so going back out there ‘see one, do one, teach one’. We teach people how to teach others and watch others and commend others when they wash the hands or use the gel. If I see someone using the gel I say “great job” and you know that’s given them a titbit; you know that’s bacteriostatic for an hour. Even if one person out of six takes away something, you are going to be winning. And the other thing too is I always love incorporating with education people’s families – [I say to them] “You know this now so tell your family and friends too as well as your colleagues. [They say] “You know, this is really helpful. This is something I’m taking away from work too”

So microbiology can be fascinating if you do it right?

Yeah, yeah, yeah.

Do you think you have any major barriers to getting that compliance to stay at the good levels that it is?

Probably the doctors. I want them to be better role models definitely, because the nurses always come back with “Dr so and so didn’t do it” and it’s like “Well why didn’t you tell them. Have I got to be the guard?” That is my major barrier. I am not the policeman. I am a coordinator. I can only set the program, teach people and try and get them to do it. But I am just so lucky that I work in an environment that is so nurturing and forward thinking.

If you had a perfect world, unlimited money and unlimited resources. What would you do in your role to improve infection control?

First I would patent and invent a litmus test paper that would just screen people for VRE and MRSA coming in (laughs) so then I could be ‘bug free’ all the time. I would love to do more screening, but it creates bed blocks and creates extra labour. Then I would love to come up with a quick and easy treatment so people wouldn’t have to wear ‘labels’ because yet again, part of that psychology and caring for the patient. No one likes to have a ‘label’ over them.

So you would like to do mandatory screening all the time if it were possible.

I really want NSW Health to develop further guidelines for VRE to help us with that. I went to an infection control conference and they say two to three percent of the population have VRE. But a lot of my colleagues in the public health system sort of frowned upon what I’m -the screening - it’s sort of like [their attitude] “well it’s everywhere, you can’t stop it. Just standard precautions will stop the transmission of it”. Whereas [for me] it’s sort of like “I really want to believe you but ethically I can’t”. I still need to do some sort of screening for VRE because it has become a problem, everywhere.

There are definitely ‘heads in the sand’ with infection control. What I would love, if I had all that money, I would dedicate at least an hour a day to each ward for someone on the ward to be on top of infection control, to do the checks and rounds to make sure everything is clean. I know that it is because the cleaners are great and they have their own specific checklist now, [although] I’m wondering if we’ve actually reached saturation point with checklists now.
I saw some great new machines the other day at the conference the other day. They cost $4500 each. They’ve got hydrogen peroxide in them and they decontaminate a room, so that would save on labour and OH & S injuries potentially so that’s the next thing I’m going to ask for from Calvary (laughs).

**Interview Transcript ICP #7**

I’m interested in how you got into Infection control. You were nursing on the wards and then it was just a voluntary move into the role?

P1 – No there is actually a position here, for a full time position for an infection control nurse and I had a child and needed regular hours…

P2 – I didn’t really have an interest in this particular job.

P1 - and I got seconded to staff health and if no one else left and they said by the way while you’re here you’re going to stay longer and you’re going to do infection control, with I might add no training what so ever.

**So you didn’t get any formal training?**

P2 – Sandra probably educated both of us, probably me more than Sue because Sandra has been here for 10 years or so, for a long time. But Sue wouldn’t have got that training, because when Sue came on board there was supposed to be another person working that had already been trained up, and then that person done. So Sue pretty much got dumped in it, but mostly you do get that bit of orientation and then you went off and did a two day course didn’t you?

P1 – Yeah I went off and did a two day course, but then I had a background in public health, TB and plaque. Same principles in contact bracing…

P2 – Like getting a super bug in a hospital as public health you take people down in the community so it was pretty frightening like to start with.

P1 – And I think that people that do stay in infection control then go off and do their certificate and whatever so or do at least a five day course. So I know from myself I did the five day course and then went and did the certificate and the girl in Bathurst has done the same thing so if you’re going to stay in it you tend to then get the paperwork.

**What would you say that your role specifically is here within, so what exactly does it entail, you know obviously you do some of the training of the other staff members, like the regular mandatory training…**

P2 – Yep we do that once a week, but also it’s such a complex job because one day you might be... like today we’ve just done meetings and you know and really haven’t really achieved a lot but then other days you might be out educating all the Wards or you might be doing a lot of audits, hand hygiene audits, cannula audits, we look up infections you know, we get phoned up by pathology. So there isn’t, you don’t have a day where you go ‘I think I might do this today, cause it doesn’t work. You come on and you read your emails, and you look at IPM to see how many MRO patients we’ve got in the hospital, that’s probably the first thing we both do and then we often do a ward round where you go around seeing what kind of patients are on the wards and talk to the staff, see what’s happening.

P1 –and see what’s happening, and see basically the general state of the hospital not just with the patients but also the cleanliness. You know whether there is rubbish everywhere, things are not clean whatever so you can get onto it, ‘cause that’s probably one of the biggest issues is environmental cleanliness.

P2 – Environmental cleaning, hand hygiene, our core business really is hand hygiene, environmental cleaning and MRO’s.
So if you see something, so in a Ward that is particularly dirty, there’s rubbish whatever, do you just go to the NUM and say look this needs dealing with or is it up to you to organize the cleaners or whoever to come in?

P1 – We usually go through the NUMs to do it, we’ll speak directly with the cleaners, but you always let the NUM know what you’re going to do.

P2 – Spotless Cleaning now have taken over which is the private partnership. So what I tend to do is just go to the ward clerk and say “look can you get someone to clean the back stairs”, so they’ll log a call and someone comes and cleans the back stairs. So if you have issues like that it’s probably better in that way ‘cause you can get something done probably a lot quicker. So you just log the call and they have to action the call in a certain time frame and it’s all about money. So it is a bit different whereas before we probably were able to approach the cleaners a lot easier because they weren’t under this privatization thing.

Do you think that a knowledge and understanding of microbiology helps? You know, if you’ve got more knowledge it helps and in terms of the staff as well on the wards does it help them know about infection control better to be able to implement it more are there more likely to implement it if they have more of an understanding of microbiology or is it some other factor?

P1 – I think the thing for me as far as microbes and all that it’s really interesting to know which microbes you would expect where. So you know E.coli, yeah you know you tend to get those in your urine; you get them in the bowel, but if you find them in blood not so good. You know that kind of thing, knowing exactly where you know ok a lot of people probably have E.coli in their urine and not necessarily have an infection, you know like the little old ladies and stuff. So knowing where the bug’s from and where you would normally maybe find it, it would be really helpful and knowing the difference about resistance and which antibiotics are appropriate and I suppose with microbes you need to know antibiotic, like the marrying of which antibiotic to which microbe and all that kind of stuff.

P2 – And also how its transmitted too pretty much, you know, is it transmitted through air or straight contact so you’re not going to see E.coli flying so therefore you won’t put in those particular precautions, so you’ve just got to be really careful of contact and cleanliness whereas if it is say TB or something like that which can go through aerolisation process, totally different ideas.

Do you find that hand hygiene is improved if you give staff some microbiology training or do you think it would be, if they got a bit more training about the actual bugs and things like that?

P2 – I think if they understood the prevalence of it, they think that it’s only those people with MRSA, whereas we know that probably 50% of the community has got community MRSA. They think oh you know if I know that… then I’ll just do it. If they thought that everybody maybe had potential to have infection and how common it is then maybe they would be better at washing their hands for every patient and we wouldn’t need to have special precautions for patients because we would do the same thing for every patient. That’s the issue they think MRSA, oh I’ve got to wash my hands, I’ve got to do this, I’ve got to get a gown, but for the general person that we haven’t screened and haven’t looked at, the classic example is that a man came in with bursitis, he’s got a bursitis which you don’t normally find community MRSA but it was a bit open so they did the swab and it’s got community MRSA but he’s sitting up next to a man with a total knee replacement.

P1 – Where is his bursitis?

P2 – In his knee, knee I’m pretty sure, but if they we’re doing proper precautions for the man with the knee and the man with the bursitis, there shouldn’t be an issue, there shouldn’t be a transmission. Because there shouldn’t be cause they’re doing the same precautions, washing their hands, doing that and then they go to the next patient. So if we all did that for every patient then we wouldn’t have the resistance and the problems that we do have.

Thinking about the undergraduate nurses, when they come out on their clinical placement, do they have enough knowledge, in terms of microbiology or general infection control? Would you like to see more knowledge or are they just not able to apply it, how do you perceive their knowledge to be?

P1 – I don’t think they know how to apply it, really as it’s a fairly daunting, you know first time out in the wards but I really don’t think they’ve got the concept between that particular bug and the transmission
firmly in their head as in ok, *E.coli* how it moves around where we look for it and, as you said, the rationale behind it. So they are just busy, still very job orientated.

P2 – And they really, really believe that the gloves are great, the gloves have been probably the worst thing that they ever implemented in public hospitals because people back when Sue and I trained, when Adam was a boy.

P1 - you washed your hands.

P2 – You washed your hands and you cleaned someone’s bum with your hands and so you washed them really, really well, but now they put the gloves on and the wardsmen and the doctors... I’ve seen doctors do it all the time, put the gloves on, don’t wash their hands at all, touch the patient, take the gloves off, and walk off the Ward. So the gloves have been a really, and I think if they didn’t encourage them to wear gloves and only to wear gloves when they are touching body parts or substances, that would be huge, because we did a hand hygiene audit the other week and there was a new graduate on the ward, she walked from room to room with the same pair of gloves doing the same thing.

P1 - For 50 minutes. Oh no I don’t think so; she took her gloves off to answer the telephone

P2 – She took off one.

P1 – then put on the same glove back on to keep going.

P2 - So gloves have been to the detriment. So as far as microbes and all that and their understanding of prevention they think gloves actually helps prevent it.

P1 – Well no I think they’re probably looking at it, it protects them and they’re not looking at the patient care and what is the outcome of the patient.

So they’re not basically applying the concepts, like the theory they’re not really applying that when it comes to practice.

P1 – But even like the aseptic technique, doing a dressing and all that and the non-touch technique. If you do the non-touch technique and you do it properly you don’t need gloves because you’re doing it in a non-touch technique.

There are a number of subjects taught in the undergraduate nursing curriculum including anatomy, physiology, micro, pharmacology and sociology. Which of those subjects, do you think which are the most important to the least important in terms of relevance to a career as a nurse?

P2 – I think they need them all I think we just really need to go back to the basics, I think from an infection control perspective we’re missing the basic stuff which is why we are actually here. Which is really for the patient, the patients’ safety. I mean why have we got a patient safety committee, why is there a CDC commission, why do we have to have hand hygiene in Australia, because people aren’t doing the basic stuff and if we were doing them all those people wouldn’t have a job. They wouldn’t have all those complaints.

P1- Before then we used to just bury them.

P2 - So maybe I don’t think IMS is a bad thing, but certainly from IMS a lot of stuff...

P1 – there’s more accountability basically for your actions.

P2 – You know it’s phenomenal the amount of people that have the most weirdest things and you think how could that have happened, its such basic stuff. People that have a central line in go to the Ward with a central line and the person goes home still with central line still in place because nobody documented it. Documentation is huge, the way people don’t document is atrocious, like if we actually litigated every patient chart you would find that people aren’t documenting anywhere near enough. We can’t find even people having surgeon cannulas, they’ve got a cannula in but nobody’s written it anywhere.

P1 – Or you’ll go around to the Ward and go ‘got any cannulas in’ ‘no’, ‘well what’s the bandage on your leg?’, and you take it down and here is a cannula sitting there and there is no record of the cannula anywhere and we are getting more and more bacteremias.
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P2 – I think it’s, the nurses are so busy now because it’s become more a business. You know health care is a business now, whereas before it was more about caring for the patient. How many days are they, let’s do their estimated date of discharge because that’s more important than actually looking after the patient for the time they’re here. We are already discharging them and if you don’t give them discharge and they don’t want it why did they go home that day. Whereas looking at well did you look after that patient properly while they were actually here.

P1 – And also the skill mix too plays a huge role, because they’re taking out more of the RN’s and putting more AIN’s in and now the AIN’s have what 6 months in TAFE and you might have an RN with two AIN’s on a post-op night, which is a huge amount of pressure and corners are being cut because they just cannot.

P2 – I think if you did a survey of nurse’s of our vintage that would be the reason for most of them leaving nursing because of that kind of thing, that pressure on you to.

P1 - And accountability because your accountable for all those patients and all those staff that’s working under you, their actions. Whereas before you used to have sort of a team leader and have a good mix.

P2 – And you had more of an idea of your patients, like you know what, you know whether they’ve open their bowels, whether they had a urinary tract infection, you know you’re talking about microbes. Well a lot of patients’ have catheters in and they don’t get a daily UA, so how do you know they’ve got a UTI, they get the catheter taken out and then their incontinent or whatever and then ‘oh I think I’ll do a MSU and they’ve had a catheter in. So they’ve obviously got a UTI while the catheter’s been in but nobody has checked it daily to see when the infection occurred and unless they spike a temperature. You know you have patients that are completely off their head, you do a UA and they’ve got a UTI. Basic, basic stuff and the AIN is not going to know that so when you’re talking about education, that basic stuff well what happens with a UTI when you’ve got a UTI what happens to them physically. If you could teach that, yes they can go completely off they’re nut and they do particularly the elderly as you know. You know that kind of thing, how does it affect them physically that you might pick up on before you actually get an MSU result back.

**Do you feel that infection control knowledge and application is consistent in all the areas across the hospital as in between the different types of health care workers, Nurses, Doctors, Allied health?**

Both – No.

P1 - Nurses work under five moments of hand hygiene, Doctors have one, ‘I wash them as I leave the hospital.’

P2 – Nurses are inundated with information about infection control and they are taught it fairly well, like when they’re in the hospital setting. Doctors aren’t, allied health - a little bit, Wards men, cleaners are probably not as well as they should be, here.

P1 – Wards men, no definitely not.

P2 – But the doctors all think that it’s not their business and they don’t see it as their business and they’ve always been like that. That’s the nurses’ job.

**So do you see any trends in terms of when new graduates come out? Obviously you get some from the various universities’ and some from TAFE. Do you see any trends in terms of the knowledge or their infection control knowledge?**

P1 – The Sydney Hospital ones that have come are probably, after being done their post-grad, 12 months in Sydney, they are on the ball with hand hygiene. The ones that are coming out of, dare I say Bathurst and Orange Uni they’re not.

P2 – I find to with the medical personnel like the interns that we get and we might orientate them, like they start at the beginning of the year, you tell them “do this, do this”. We get them to do an origin label of cannulas and they start out really well. But then I look around and they go “Oh the registrar’s aren’t doing it, why should I?” So they learn behaviour, bad behaviour, from people that are already here.

**So the culture on the ward plays a really big part?**

Both – Oh yeah.
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P2 – Of course it does because why are you going to bust your guard when nobody else is. When you looking at the thing and nobody else is going to put cannulas in or dating cannulas or doing UA’s on everybody that has got a catheter well why would you do it.

P1 – I also do think it’s a time issue because when mistakes are made with those you know they’ve been doing 18 hour shifts.

P2 – Yeah but I mean we’ve got 10 hour nights, they’ve got 2 hours for change over, you cannot tell me it takes you 2 hours to hand over and what do they do for that 2 hours, can I just ask? Why can’t they take the time?

P1 – Where’s this for Nursing?

P2 – Yeah for nursing.

P1 – Well they’ve only got 10 hours on ICU though.

P2 – No everywhere, every ward’s got 10 hour shifts now.

P1 – Oh well that’s how long since I’ve done night shift.

P2 – But everywhere you know that’s the thing, I know in ICU for the Doctors they have a standard because [name] who is the intensive care director, expects this standard. So they have to meet that standard; if they don’t he just rips shreds off them.

P1 – They’re gone.

P2 – And they’re scared and I don’t practically think we should go back to that scare policy, you know Sister so and so, cause I trained with the NUMs’ that’s how long ago it was and you were you were scared of them.

P1 – But I really do think that at the end of shifts and whatever I think a lot of the NUMs need to come out of their little cubby hole because they really don’t know what’s going on in the Ward and someone needs to actually do a walk around the Wards, you know like we can walk around the wards, we send emails and they all get scared of them.

P2 – We want to introduce this form now to make the Registrar, the Residents and Interns responsible and it’s not going to go to the Residents and Interns it’s going to go to the BMO. So the BMO can go, well I’ve got thirty of these can you start dating the cannulas because you’ve got to start from the top.

P1 – Because I’m getting sick of getting these letters in the mail.

P2 – Thirty a week, I’m going to do those weekly when it comes in.

So you say when the new graduates come out they might be good to start with and then over a period of time they sort of get complacent? So their knowledge when they first start is good regardless of how they start they tend to drop off?

Both – Yeah

P2 – Because that’s why we have mandatory training, that’s why we do yearly stuff because you tend to drop off. I mean as far as putting PPE; personal protective equipment. You know I have had Doctors say to me ‘I’ve never been shown this ever’, they’ve never been shown how to put on a gown and gloves and that’s not so important, but how to take it off without cross contaminating themselves. Yeah you know they’ve never been shown that, so you know when we had the pandemic, oh well not the pandemic but recently the swine flu. Doctors didn’t have a clue did they? Absolutely no idea how to put a mask on, a really basic thing.

P1 – And they put the mask on and leave the mask on for the whole day and then just pull it down and when they think they need it, pull it up.

P2 – And that happened a lot so your medical people are really poorly, poorly. I mean I know they’re educated in anatomy and physiology but as far as that kind of really basic stuff at the cold face, no education whatsoever, they have no idea, and these are Doctors that have been here, you know one of the
Doctors has worked you know comes from Melbourne and he’s worked in quite a few places and he’s said ‘I’ve never ever been shown that.’

**So you’re doing your hand hygiene audits, how do you rate your compliance, good, poor, brilliant otherwise…**

P1 – A work in process.

P2 – Because of the new Five Moments initiative, it’s probably poor at the moment, but I think once we and I think the Five Moments are fabulous, I think they’ll be really, really make lots of sense to lots of people because now when people see us they just start washing their hands.

P1 – Yeah.

P2 – When we walk into the ward… (Sound like rubbing hands together)

P1 – and in inappropriate times, whereas they need to be thinking about what they’re doing, to protect themselves and protect the patients. Yeah I do think it’s a two way street.

P2 – It can only go up and I think it will get better.

**What do you think is the biggest challenge to compliance, is it like you say they’re not really considering, they’re just considering they don’t want to contaminate themselves rather than contaminating the patient or what would be this barrier?**

P1 – I don’t think they think.

P2 – I think its knowledge, I don’t think they, that’s what the good five moments is basic, it’s got before you touch the patient, after you touch the patient, oh that’s pretty easy and if it’s in that patient zone than its even easier. You know if they’re over in the office then they don’t need have to keep washing their hands ‘cause they’re in the office.

P1 – Yeah especially because we’re walking past they all wash they’re hands.

P2 – And for Doctors or Allied Health if they go to the patient bed and if they just talk to the patient they don’t need to wash their hands, they’re just talking to the patient. But if they’re going to do an assessment or something then sure then wash their hands. It’s got to be really back to the basics and I think that will be good and having the hand rubs has made a huge, huge difference because everyone always had to find a sink.

P1 - and it was an old place and there was just no sinks.

**And so do you think there is a role in there to change the undergraduate education in anyway? And what suggestions would you make?**

Both – Yes.

P2 – Well certainly the Five Moments have to be implemented.

P1 – I think they need to know about the bugs in relation to their work, not just saying ok *E.coli* does this da da daa, but put it into their work environment.

**So an ability to be able to apply that knowledge you know in practice?**

P1 – Yes.

P2 – So a patient you with gastro you have to treat differently from a patient with just a wound infection, so a patient with gastro has to have different cleaning, you know you need to wash with a different you know, they need to know that.

**And you’re not seeing that come through?**

P1 – No.
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P2 – Oh god no. they don’t have a clue, I don’t even know if they know what’s, how its supposed to be cleaned or you know the cleaning codes. They all have different coloured cloths and all that for all different areas. They wouldn’t know that, they wouldn’t have a clue.

P1 – But they’re not cleaning so…

P2 – I know but it’s still important.

So the final question then. In a perfect word if you had unlimited money, unlimited resources what would you do in your role to address the problem with infection control?

P1 – I think if you actually had time on the Wards to do education in units and then do, put case presentations up, go along the Wards and go ‘right ok.’

P2 – Well I think actually go around with them and do a dressing and say ‘well what do you think is the best thing’. You know say you’re doing ongoing education, cause it’s easy to say well you’ve got to wash your hands unless you’re actually there at the time while they’re doing it. They might just tell the nurses but I think they need to focus on a lot more on medical and allied health as well. Because I mean it cannot possibly just be the nurses because the nurses have been flogged to death with the education and they’re a bit over us always going to them and they’re the ones that 80 or 90% have hand hygiene, the Doctors are all 10 or 20.

P1 – Oh that’s generous.

P2 – I just thought I’d be nice.

Interview Transcript ICP #8

What qualifications do you hold?

Bachelor of Nursing and Masters degree in Critical Care Nursing.

How long have you been in the job?

12 years off and on.

How would you describe role is as an infection control educator?

Identifying areas where you can improve, looking at what current practice is and how you identify these areas to improve it.

Students cover scientific discipline areas in their degree, in terms of relevance to a career in nursing, how would you rank the following subjects (in order of importance)- “Anatomy, Physiology, microbiology, pharmacology and sociology”?

Physiology, anatomy, pharmacology, microbiology and sociology

From your perspective, do you think that having a knowledge and understanding of microbiology makes a difference in people with their infection control practices? Or they don’t really need it that much?

They do need it, but they need it in the context and given context, “What does this actually mean in the work place?”, “What does it actually mean in the clinical environment?” So see how it actually applies.

From your experience in the hospital do you think infection control knowledge across different groups of health care workers eg Nurses, doctors etc differs or is fairly similar?

I think there is a huge difference in the knowledge base. Nurses are more aware of the IC practices. They may not be better but I think there is a high awareness in nurses as well as physio and dieticians are also
more aware. Surgeons are the worst, with not washing their hands. The medico’s really underestimate the fallout of bad infection control practices.

**How would you characterise level of knowledge of new graduates as far as infection control goes?**

Nursing new grads. If directed to think about it, they have quite a good understanding and knowledge of it however they are so “deer-in-the-head lights” when they first get out that it does not become a priority for them. I think that this should be addressed and become a priority for them - the first thing they think about. This should go for medical interns as well. They don’t see it as a priority, they are caught up with all the other bits and pieces they have to do that is more important and those infection control principals get caught up. The prioritising should be reshuffled.

**Do you think or have seen any trends from pre-registration training from TAFE or university grads’. Do you think there is a big difference are there no trends?**

The assistants-in-nursing are the worst at it because they come from the aged-care facilities where they are not promoting infection control principals. Their infection confection control guidelines are not adhered to and a lot of private facilities as well so therefore they have to have initiative of their own. I think it’s a big difference with the registered nurses and the enrolled nurses who have been primarily in public hospital systems they understand it a bit more, then people who have worked in aged care.

**Do you think it’s reasonable when the new graduates come in, do you expect their knowledge to change when they have been in the job for 12 months. What sort of changes do you see in regards to infection control do you see occurring since they have been there?**

I think the awareness in hand hygiene is the primary one. They get the culture practice like washing their hands before touching a patient. Washing their hands after touching a patient and after removing gloves. They develop hand washing techniques but not the awareness of gowns on a patient; they think that if they have a gown on the patient then they are not spreading germs around. But in fact if you put it on another patient this will happen. Stepping it up from hand hygiene they forget about other important things.

**What sort of time frame do you see that change occur?**

12 – 18 months. The awareness is getting better. It takes a good 12–18 months until they are actually proactive with the infection control. The have to incorporate it to time management as well.

**How would you characterise the compliance rates in terms of where you have worked, with things like hand hygiene would you say they are good or poor?**

My background I think primarily has been metropolitan tertiary facilities so infection control principals are fairly hard core where I was. There were always appropriate goggles around gloves etc always signs in your face. When coming to a rural facility there is not so much around or easily assessable. Maybe this has got to do with the culture or change and the infrastructure, with basins not been built. It may also be time-poor staff, there may be one infection control Clinical Nurse Consultant (CNC) that has not a lot of other support, or professional support. The larger facilities have a larger support from the hierarchy.

**So would you agree that in some hospitals, an infection control person can have a large role, compared to someone who is specialised in the metropolitan area? Do you feel this may be an underlying factor for variance in compliance rates?**

Absolutely, an infection control CNC will look after 3 regional centres whereas in the metropolitan area you have one sitting in a 12 floor building, it is a lot more easily accessible and manageable than something that is geographically spaced out.

**Do you think there is a problem with compliance across the health care sector and what sort of reasons?**

I think excuses for not applying with the principals are “I’m too busy” or “I’m too overworked.” I don’t agree with that. I think it’s a ridiculous excuse. I think it is used a lot in the workplace. I think it’s a bit of ignorance hand washing. I like to talk about that and that is your first point of infection control is hand washing and throwing statistics at people. That’s how you can transfer the biggest bugs and that’s how we
touch patients, which is our role that is our job! I don’t think that it is being really illustrated, this is why we get placements that get busy and easily forget.

So do you think that it might come back to education or is it just awareness in the hospital?

I think its education and when you get out there it’s all too late. It comes back to the undergraduate initial training rather than getting it from on the job. If we hear about it like microbiology, we teach hand-washing but the fallout from bad infection control isn’t realised and I think that needs to be demonstrated and illustrated. An eye opener for what happens if you don’t do it.

In a perfect world if an infection control person had unlimited money and unlimited resources, what do you think would be the way to fix the compliance issues? Is there something the infection control person does in a hospital that might be unlimited resources?

State initiative - I don’t know if that is the case at the moment - but there needs to be one policy that covers metropolitan facilities and covers rural facilities. It has to be across the board. There has to be spot checks because I think people are prone to responding to peer pressure very well, especially nurses. If you point a finger they don’t want to be seen as the weakest link and if you do point your finger at people and say ‘that is just wrong’ then there is nowhere for them to turn except improve their practices. I like the hard-core sort of approach as it does save lives and that is the end result and fairness of the important of it and the fallout from not doing it would promote better infection control. Limited recourses are how do you change culture? I believe culture plays a really big part of it.

So do you think for undergraduate students, what they have seen when they go out on clinical placements has a really major impact?

It is a massive influence, the influence the clinical placements have on undergraduate students is enormous. I think they shouldn’t be having more prac. We should be demonstrating best practice in the labs and get them completely fluent without even thinking it is best practice. Then they can take best practice into the workplace instead of going out to the workplace and then being told this is what we do here.

I had a student that had just been on prac and they told me that nursing staff where wiping people’s bottoms without using gloves and throwing dirty washers on the carpet floors. And this was a standard practice with a registered nurse doing it in front of a student and the student new it was wrong. If the student was there 5 days a week watching this practice, what do you think they are inclined to do? They are going to do what the nurses do because it’s culturally accepted in that environment. I want to stop that. I want to prevent them from being exposed to that sort of practice and try to get them consolidating what best practice is, so students can go out feeling very confident with best practice.

So do you think that some of the poor compliance rates could be related to if they (the students) go out to the work place they are told its really important and they don’t see that, therefore perception of nursing is more what they see then what they hear.

Definitely this is a huge issue, and the university is not going with the students so we do not seem to be defending what we are teaching them. They go out and see things that are not best practice and because we are not there saying “that’s not right”, the student does not have enough confidence to pull up a senior staff member and say, “we have been taught that is wrong”. That is where the university needs to be able to support them.