Infection control in the Australian health care setting

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INFECTION CONTROL IN THE AUSTRALIAN HEALTH CARE SETTING

SUBMITTED BY

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ABSTRACT

1,708 members of the Australian Infection Control Association were surveyed to describe the practices of Australian infection control practitioners. The study details the methods infection control practitioners use to co-ordinate and measure nosocomial infections as clinical outcomes of Australian infection surveillance and control programs. Administrators' and clinicians' perceptions of the elements and infrastructure of infection surveillance and control programs and the role of the infection control were measured in 316 hospitals in New South Wales, Australia.

A literature review found that the development of Australian infection surveillance and control programs is behind that of U.S.A and the United Kingdom.

The survey of the infection control practitioners identified that their role and duties varied between facilities as did the time allocated to infection control tasks.

The survey of infection control practitioners demonstrated variation in their levels of skill, education and experience.

Infection control practitioners' use and application of evidence and associated skills was examined and found to be limited in relation to clinical decision making and policy development.

The survey also examined the methods infection control practitioners use to undertake surveillance of nosocomial infections. The methods reported indicated non-standard approaches to surveillance activity.

A survey of administrators and clinicians in NSW hospitals was undertaken to identify variation in administrator and clinician perceptions and to describe their level of support for recommended essential infrastructure and criteria for infection surveillance and control programs and the role of the infection control practitioner in accordance with Scheckler's model. The survey indicated divergent views regarding the role of the infection control practitioner and the essential elements of infection surveillance and control programs.

The study identified that education of infection control practitioners is necessary to facilitate standard approaches to co-ordinating infection surveillance and control activity. The development of Australian infection surveillance and control programs require a strategic alliance between stakeholders. to define essential elements of infection surveillance and control programs. In addition, the role of the infection control practitioner must be defined before key stakeholders can agree on the minimum skills, qualifications and experience required by an infection control practitioner.

DECLARATION

I hereby declare that this submission is my own work and to the best of my knowledge 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 UNSW or any other educational institution, except where due acknowledgement is made in the thesis. Any contribution made to the research by others, with whom I have worked at UNSW or elsewhere, is explicitly acknowledged in the thesis.

I also declare that the intellectual content of this thesis is the product of my own work, except to the extent that assistance from others in the project's design and conception or in style, presentation and linguistic expression is acknowledged.

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Support in the form of a research scholarship for the survey of Australian Infection Control Association membership was received from the Australian Infection Control Association.

Infection control practitioners attending a New South Wales Department of Health sponsored infection control workshop assisted by pilot testing the survey sent to Australian Infection Control Association members.

Whiteley Industries Pty Ltd sponsored the purchase of the textbook that was used as an incentive for Australian Infection Control Association members to participate in the survey.

The staff of the AIDS/Infectious Diseases Unit, New South Wales Department of Health provided clerical assistance with the distribution of the survey to administrators and clinicians in New South Wales hospitals.

Members of the New South Wales Department of Health Infection Control Practice Group assisted by pilot testing the survey tool used in New South Wales.

I am grateful to the entire membership of the Australian Infection Control Association and the Chief Executive Officers, Directors of Nursing, infection control practitioners and microbiologists/ infectious disease physicians in NSW hospitals, for participating in this study.

DEDICATION

I am indebted to my supervisor, Dr Mary-Louise McLaws for the encouragement and intellectual challenge she offered during this process.

The support of my peers Gina Pugliese and Dr Marguerite Jackson and my colleagues at the AIDS and Infectious Diseases Branch, New South Wales Health Department was invaluable and I value their friendships.

I am grateful to my dear friend Jane Faulkner for sharing the dream and to my parents, Marie and Tom for their life-long commitment to my pursuits.

Sue Resnik was the first expert infection control practitioner to inspire me. As my partner, her love and support during this process was unrelenting and this work is dedicated to her.

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GLOSSARY

Acute hospitals:

Public, Department of Veterans' Affairs (repatriation) and private hospitals which provide services predominantly to admitted patients with acute or temporary ailments; the average length of stay is relatively short.

Australian Council on Healthcare Standards:

An organisation established in 1974 in order to conduct the process of accrediting health care facilities in Australia.

Clinical Indicators:

A measurable element in the process or outcome of care whose value suggest one or more dimensions of quality of care and is theoretically amenable to change by the provider.

Credentialling:

The process by which an individual nurse is designated as having met established professional practice standards, at a specified time, by an agent or body generally recognised as qualified to do so.

Free-standing day hospital facility:

A private hospital where only minor operations and other procedures not requiring overnight stay are performed, not forming part of any private hospital providing overnight care.

Hospital accreditation:

The formal process of surveying a hospital against a pre-determined criteria and standards to determine whether or not it complies with applicable standards; such standards are believed to be related to the hospital's ability to provide services of acceptable quality.

Infection Control Nurse

Used since 1960 in the U.K. and since 1962 in Australia to describe the nurse whose primary role was to oversee control of infections in hospitals. First used in the U.S.A. in 1963 and further used during the Study on the Efficacy of Nosocomial Infection Project to describe the person other than the hospital epidemiologist who was primarily involved in the day-to-day infection control activities. Replaced, in the U.S.A. and in Australia, more recently, by term infection control practitioner. In Australia and the U.K. often used interchangeably with infection control sister.

Infection Control Officer

Title used in the U.K. to denote senior member of hospital staff who performed specific functions related to infection control. Replaced in 1960 by the position of infection control nurse or infection control sister.

Infection Control Practitioner

Term adopted initially in the U.S.A. in 1972 during the formation of The Association for Practitioners in Infection Control. In Australia, often used interchangeably with the term infection control nurse.

Infection Control Sister

Title used in Australia and the U.K. to describe the member of nursing staff with primary responsibility for co-ordination of infection control activities. Used interchangeably in U.K. and Australia with infection control nurse.

Infection Control and Surveillance Program

An organised program that includes surveillance, control measures and formal infection control policy. Typical staffing and accountability varies between countries. Often accountable to an infection control committee and includes staff such as an infection control practitioner or nurse, hospital epidemiologist or microbiologist. Essential components defined during the Study on the Efficacy of Nosocomial Infection include organised surveillance and control activities, a trained, effectual infection control physician, and at least one full-time infection control nurse for each 250 beds and a system for reporting surgeon specific infection rates.

Nursing homes:

Establishments which provide long-term care involving regular basic nursing care to chronically ill, frail, disabled or convalescent people or senile inpatients.

Private hospitals:

Privately owned and operated institutions, catering for patients who are treated by a doctor of their own choice. Patients are charged fees for accommodation and other services provided by the hospital and relevant medical and paramedical practitioners. Includes private free-standing day hospital facilities.

Public hospitals:

Establishments controlled by State and Territory health authorities, which provide acute care. They provide free shared-ward accommodation and treatment by a hospital-appointed doctor. In addition, they provide, to those who choose to be private patients, private ward accommodation and/or doctor of choice.

Registered nurse:

A person who has attained the legal right to practice and to use the exclusive title Registered Nurse in accordance with state legislation.

ABBREVIATIONS

ACHS	Australian Council on Healthcare Standards
AICA	Australian Infection Control Association Inc
CDC	Centers for Disease Control and Prevention
IC	Infection control
ICC	Infection control committee
ICN	Infection control nurse
ICP	Infection control practitioner
ICS	Infection control sister
ISCP	Infection Surveillance and Control Program
IVDRB	Intravascular-device related bacteraemia
NHMRC	National Health and Medical Research Council
NSW	New South Wales
U.K.	United Kingdom
U.S.A	United States of America

CHAPTER 1

INTRODUCTION AND REVIEW OF RELATED RESEARCH

1.1 History of infection control in Australia

Australia's first infection control (IC) programs developed in the early 1960s in response to a pandemic of staphylococcal infections in hospitals (Nahmias and Eickhoff 1961). In 1959 a Joint Hospitals Infection Committee was formed in Brisbane, Queensland and consisted of medical representatives from the Princess Alexandra and Brisbane General Hospitals. This Committee was unable to cope with the day-to-day IC issues in individual hospitals. Subsequently, in 1960 Princess Alexandra Hospital, Brisbane established an IC Subcommittee and in 1962 appointed Australia's first infection control sister (ICS) (Graham 1992).

Prince of Wales Hospital appointed New South Wales's (NSW) first ICS in 1965. In 1967, Canberra Hospital appointed the Australian Capital Territory's first full-time IC practitioner (ICP). South Australia's first IC appointment was at the Adelaide Children's Hospital in the late 1960's. Royal Hobart Hospital, Tasmania appointed the first Tasmanian ICS in 1977. The locations and dates of the first ICS appointments in Victoria and Northern Territory are unrecorded (Graham 1992).

Administrators in NSW hospitals initiated local appointments of either full-time or part-time registered nurses to the position of ICS and by 1975 seven metropolitan hospitals in Sydney had full-time ICSs (Wright, Albera, and

McAllister 1989). However, the role and function of the ICS and objectives for Infection Surveillance and Control Programs (ISCPs) in Australia were first described in 1977 (Albera 1977). Formal ISCPs were first defined by the Australian Council on Healthcare Standards (ACHS) who in 1974 stipulated those facilities undergoing voluntary accreditation include:

1. a multidisciplinary committee to establish, institute, direct, review and modify effective measures for controlling infection;

2. a specifically appointed part-time or full-time IC nurse (ICN) to carry out day-to-day activities;

3. committee review of reports of hospital-associated infections, identification of patients requiring isolation, review of reports on disinfection, sterilisation and environment monitoring (The Australian Council on Healthcare Standards 1974).

In 1989, Australia's only reported case of patient-to-patient transmissions of human immunodeficiency virus (HIV) occurred. The transmissions were not identified until 1992. (Chant et al. 1993; Berry and Fung 1994; Collignon 1994; Mortimer and Heptonstall 1994). Two years later, in 1993, NSW reported the first patient-to-patient transmission of hepatitis C virus (HCV) during minor surgical procedures (Chant et al. 1994). These IC events, more than any previously, threatened consumer confidence in the levels of IC in Australian hospitals. This was compounded by subsequent investigation of 149 patients potentially exposed to an HIV-infected health care worker during exposure-prone procedures performed in Sydney from 1992 to 1994 (Bek et al. 1994).

As a result of these incidents, NSW, in 1995 became the first Australian state to adopt a government policy position that compelled public and private hospitals to employ an ICP to co-ordinate a facility-wide ISCP (New South Wales Health Department 1995). One year later, in 1996, the Federal Government recommended that one ICN be appointed for every 200-250 beds within an establishment. The ICN's role was to implement local policies developed and endorsed by the facility's IC Committee (ICC) (National Health and Medical Research Council 1996).

Three separate but similar incidents were reported which involved breaches in disinfection and sterilisation procedures in NSW in 1997 (Walton 1998) and again in 1998. There was also a public report of a surgeon who was positive for HIV and hepatitis B virus (HBV) while performing exposure-prone procedures in NSW and Canberra in 1997 (Green 1998). The extent to which these events raised the profile of IC in Australia is untested although the clinical (Robotham and Doherty 1998), legal (Walton 1998), political (Milohanic 1998), professional and public reactions (Choluv 1998; Milohanic 1998) to these events were serious and expensive, both financially and in human costs.

1.2 Rationale for the study

In 1985 Haley and colleagues published a landmark study on the efficacy of infection surveillance and control programs in preventing nosocomial infection in US hospitals (SENIC) (Haley 1985). SENIC demonstrated for the first time that there were four key elements to an effective ISCP. These four elements were:

1. organised surveillance and control activities;

2. a trained, physician with an interest in IC;

3. a full-time ICN for each 250 beds; and

4. a system for providing feedback of surgical infection rates to surgeons.

Each element was necessary and collectively they enabled ISCPS to prevent infections, improve patient outcome and minimise cost.

Australia has never and most likely will never experience a SENIC or similar study. IN addition, no previously published detailed profile of Australian IC exists. Like SENIC, this study aimed in the long-term to assist Australian ICPs to define and co-ordinate quality ISCPs that prevented nosocomial infection and subsequently improved patient outcome and reduced cost.

The underlying concept and framework of the PhD was that infection control in Australia is flawed. The results of the study were used to dispute commonly held perceptions regarding infection control in Australia. These perception included that:

- ICPs co-ordinated ISCPs in a standardized manner;

- ICPs subscribed to a minimum level of education and or preparation for the role;

- The methodology used in the surveillance of nosocomical infection produced useful and meaningful results;

- Australian infection control practice and recommendations were generally based on the best available evidence; and

- clinicians and non-clinicians held common viewpoints regarding the goals and priorities of ISCPs.

The purpose of this study was to describe the IC practices of Australian ICPs, in particular their surveillance activities. The study details the methods ICPs use to co-ordinate and measure nosocomial infections as clinical outcomes of Australian ISCPs. This study also describes ICP use of evidence and evidence-based skills including accessing and reviewing literature, research, publication and routine use of personal computers. In addition, by comparing the perceptions of administrators and clinicians regarding elements and infrastructure of ISCPs, this study has been able to demonstrate areas where consensus must be reached. The thesis concludes by proposing an approach to infection control that will facilitate collegiality between IC stakeholders. The approach includes strategies that ICPs should employ to improve the quality of ISCPs and their professional standing.

1.3 Study objectives

This study included six specific objectives. The first objective was to describe the development of Australian ISCPs. The next objective was to profile the practitioners responsible for co-ordinating these programs in health care facilities. The third objective was to describe ICPs' skills, education and experience. The fourth objective was to describe the extent to which Australian ICPs use scientific approaches and evidence for ISCPs. The next objective was to report on the methods that Australian ICPs use to survey nosocomial infections. The final objective was to measure the degree of consensus between clinicians and administrators with regard to the most effective infrastructure and key components of an ISCP. The study has concentrated on the United States of America (U.S.A) and the United Kingdom (U.K.) for comparison as these countries have established government-funded ISCPs (Garner 1993; Glynn et al. 1997), ICP training programs (Russell 1995; Emmerson et al. 1997), active professional associations (Russell 1995; Barrett 1999) and peer-reviewed publications for reporting IC activity (White 1992; Barrett 1999). In the main, comparisons between Australia and Europe or Asia have been avoided as countries within these continents are generally still developing standardised approaches to IC and are greatly influenced by U.S.A and U.K. directives and models for IC services.

1.4 Thesis outline

The format of this thesis includes the reporting of a separate methods section in each chapter. This format provides a manageable framework for reporting and discussing the various analysis, findings and discussion of each discrete component of the survey to build upon the aims and outcomes of the study. Data relating to the survey of AICA members is reported in Chapters 2, 3, 4, and 5. Chapter 6 reports data collected from a survey of key IC stakeholders in NSW.

1.4.1 CHAPTER 1

Chapter 1 presents a purpose and rationale for the study. It briefly identifies the milestones in the development and maturation of ISCPs in the U.S.A and U.K. and within Australia. A comprehensive review of the literature indicated five primary areas that should be considered in any overview of IC. The five primary areas provided a comprehensive framework for the study chapters and assisted in the identification of previously unanswered questions regarding Australian IC. The primary areas are in order:

1. the role and function of the ICP;

2. cost and efficiency of ISCPs;

3. surveillance of nosocomial infections;

4. evidence-based IC; and

5. advocacy for IC and the role of professional associations.

1.4.2 CHAPTER 2

The purpose of Chapter 2 is to profile Australian ICPs by providing a demographic overview and detailed report of their work practices and responsibilities identified from a survey of ICPs. The findings of Chapter 2 are compared to similar information reported on peers in the U.S.A and Canada. Chapter 2 identifies the likelihood of Australian health decision-makers adopting the international trend of reviewing the allocation of resources and cost-benefit of ISCPs. It provides possible strategies with which Australian ICPs and their relevant professional body, the Australian Infection Control Association (AICA), can adopt to assist their professional development. The extent to which Australian ICPs are already applying these strategies is explored in Chapters 3, 4 and 6.

1.4.3 CHAPTER 3

The purpose of Chapter 3 is to provide a foundation for the IC career pathway in Australia. ICPs were surveyed to describe existing skills, qualifications and experiences. Chapter 3 recommends the development of a system of credentialling, recognition of expertise, adoption of divergent roles and improved networking for ICPs. Chapter 3 also identifies the trend within the profession towards qualifications that are more focussed on epidemiology rather than clinical models. It compels AICA to assist ICPs in the development of a credentialling model. The move towards evidence-based IC is further explored in Chapter 4.

1.4.4 CHAPTER 4

Chapter 4 provides detail on the quantitative, self-reported data provided by ICPs on their use and application of literature, research and information technology. Chapter 4 identified necessary adjustments that the Australian IC community must make if ISCPs are to develop despite the predicted cost and clinical-effectiveness reviews that international colleagues have already addressed (Jackson 1997; Larson 1997).

1.4.5 CHAPTER 5

The purpose of Chapter 5 is to use data obtained from surveying Australian ICPs' current surveillance practices and methodologies. Chapter 1 demonstrates the critical contribution that standardised surveillance has made to the development of ISCPs internationally while Chapter 2 illustrates that irrespective of methodology, surveillance activity consumes the greatest proportion of an Australian ICP's total IC time. Chapter 4 discusses the extent to which ICPs use software and computer technology for surveillance activities. Chapter 5 details international developments and achievements in nosocomial surveillance. Argument is made for the adoption of a national, standardised system of surveillance by demonstrating the ways in which such a system could potentially contribute to the effectiveness of Australian ISCPs. The role of external stakeholders such as AICA, ACHS, medical industry and the state and federal governments is explored. In addition, Chapter 5 demonstrates that if an ISCP is to be effective, administrators and clinicians must hold a consensus opinion on the respective role of surveillance and other essential elements of an ISCP. Chapter 6 further explores the importance of consensus in IC decision-making.

1.4.6 CHAPTER 6

The purpose of Chapter 6 is to use quantitative data collected from administrators and clinicians in NSW hospitals to demonstrate their relative support for essential elements of ISCPs as defined by a U.S.A consensus panel. A model of IC service delivery developed by a consensus panel of experts in the U.S.A is used to compare the responses of NSW clinicians and non-clinicians to issues that Scheckler and colleagues considered pertinent to ISCPs (Scheckler et al. 1998). NSW administrators and clinicians have provided responses to affirmative statements regarding the requirements for ISCPs in hospitals and the role of the ICP as defined by the panel.

1.4.7 CHAPTER 7

Chapter 7 summarises the major findings of the previous chapters and draws upon the conclusions of each chapter to make recommendations on areas in Australian IC that require direction, change and development. Chapter 7 includes an approach that incorporates the most important recommendations of the study.

The background, methods, results, discussion and recommendations of both surveys are discussed within each relevant chapter.

1.5 Constraints & study design

1.5.1 The Role of Student in the Australian Infection Control Community

Prior to the study, I co-ordinated the ISCP in a 365-bed teaching hospital in metropolitan Sydney, NSW for seven years. During the years of the study, 1994-1999, I held leading professional and occupational positions in IC. These positions enabled me to gain substantial credibility in the IC community through advancing and supporting IC initiatives in NSW and at national and international levels. These positions also provided me with unique opportunities to access and contribute to relevant clinical, professional and bureaucratic IC issues and materials. These positions included:

1. Research Assistant and Co-ordinator of the NSW DoH Nosocomial Infection Outcome Indicator Project funded by the NSW DoH;

2. Project Officer - NSW DoH Nosocomial Infection Taskforce;

3. Senior Policy Analyst - Infection Control, - NSW DoH;

4. President - Infection Control Association NSW Inc;

5. President - Australian Infection Control Association;

6. Member of the Communicable Diseases Australia and New Zealand - Commonwealth Nosocomial Infection Sub-Committee;

7. Member of the Communicable Diseases Australia and New Zealand - Commonwealth Nosocomial Infection Surveillance Sub-Committee;

8. Member Editorial Board - American Journal of Infection Control;

9. Member of the Founding Board of the Asia-Pacific Society for Infection Control; and

10. Member Editorial Board - Asia-Pacific Infection Control Journal.

1.5.2 ETHICAL CONSIDERATIONS

In 1994, the AICA Executive Committee considered the project proposal in the form of an AICA scholarship application. The proposal included detail on the survey methodology including the use and publication of survey data. A copy of the survey tool was attached. A covering letter was signed by the then President of AICA. The survey included an optional separate "tear-off" slip for respondents wishing to enter a draw for the opportunity to win an IC textbook to the value of $250 (AUS). Medical industry fully supported the purchase of the textbook prize. Researchers reassured respondents that their participation in both the survey and the draw was voluntary and that any submitted data would remain confidential and would be reported only in the aggregate.

As Senior Policy Analyst - Infection Control, NSW Department of Health (DoH) in 1998, I initiated a survey targeting directors of nursing (DON), chief executive officers (CEO), ICPs and infectious disease physicians/medical microbiologists in NSW hospitals. Prior to distribution, the survey and attached letter of explanation were subjected to the normal, Departmental approval process for correspondence prepared under the signature of the Chief Health Officer. A covering letter informed potential respondents that completion of the survey was voluntary and that unique coding numbers on the survey would only be used for the purposes of improving response. Anonymity, de-linking of data and use of the data for publication and development of NSW DoH IC Guidelines were addressed in the letter.

1.5.3 THEORETICAL CONSIDERATIONS

Nosocomial infections are a recognised cause of increased morbidity and mortality amongst health consumers (Haley et al. 1981; Haley et al. 1985). The additional costs incurred by health providers because of nosocomial infections are of concern to health management (Jarvis 1996). Health providers are at risk of occupational transmission of disease. Management of nosocomial infection requires an organised ISCP with measurable outcomes (Scheckler et al. 1998). Management is possible only if each clinician adopts safe minimum standards of care as defined by the ISCP (Haley et al. 1985). The ICP is responsible for developing and implementing these standards and co-ordinating the ISCP (McGuire N 1984; Pugliese et al. 1984; McGowan 1990; Scheckler et al. 1998). ISCP development must include reviewing relevant international best practice, (Larson 1998) regulation and policy, whereas implementation requires education of staff and dissemination of information (Scheckler et al. 1998). Ongoing review of ISCPs and their associated recommendations is both necessary and complex. A multidisciplinary team that represents all stakeholders will potentially provide the most comprehensive review of an ISCP and its outcomes. Stakeholders include ICPs, clinicians and management. It is important that monitoring of infection outcomes is rigorous and epidemiologically sound.

1.5.4 ASSUMPTIONS OF THE STUDY

The study assumed that AICA members worked in separate hospitals and that in each case the addressee would receive and complete the relevant survey. Return of completed surveys was considered as participation. The NSW DoH survey assumed that the DoH database was correct. It also assumed that in those hospitals where a position existed for an ICP, DON, CEO and/or Infectious Disease Physician/Microbiologist that the position would be filled.

1.5.5 SELECTION OF STUDY METHOD

During the period 1993 to 1995, the increasing reports of critical IC incidents in Australia and subsequent civil litigation and government and professional responses highlighted the need for a comprehensive description of the state of IC in Australia. Subsequent IC developments, such as the adoption of a regulatory approach in NSW and the move towards standardised surveillance in NSW, Queensland and Victoria need to be considered in the light of the existing ISCPs.

In the U.K. and U.S.A, researchers have provided comprehensive descriptions and profiles of IC activity and IC professionals by using a descriptive, retrospective, self-reported approach (McArthur et al. 1984; Pugliese et al. 1984; Shannon et al. 1984; Delaney, Pearce, and Smith 1997; Glynn et al. 1997; Jackson, Soule, and Tweeten 1998; Turner, Kolenc, and Docken 1999). Accordingly, this study adopted a similar method. As there was no publicly available database of Australian health care facilities, AICA members were used to describe the demographics and IC practices of facility-based ICPs in Australia. It is unlikely that an ICP would hold a position in IC without concurrent membership in AICA as AICA is Australia's only professional IC body and provides members with unique networking opportunities. AICA also disseminates relevant IC information regarding IC issues to members. Administrators and clinicians employed in acute hospitals in NSW were identified as a suitable study population to comment on the essential elements and infrastructure of ISCPs. The granting of permission by the Chief Health Officer enabled the use of the NSW DoH database that contained the addresses of all acute hospitals in NSW. At the time of the survey, NSW remained the only state in Australia with legislative requirements for minimum standards of IC. In NSW a consultative development process was undertaken prior to promulgation of IC standards, establishment of an IC Resource Centre, a 24-Hour Needlestick Injury Hotline and a Hospital Infections Surveillance System. This consultation demonstrated that the NSW government valued stakeholder consultation. These initiatives also indicated the government's commitment to achieving best practice IC in NSW. It was also assumed that the researcher's employment, as Senior Policy Analyst-IC, with the NSW Health Department would assist the response rate.

There were no databases held by either AICA or the NSW Health Department that contained information identical to that sought by the surveys. Validation of responses and estimation of generalisation to non-responders was therefore impossible.

VARIATION IN RESPONSE RATES

The variation in response rates between Chapters 2 to 5 relates to downward adjustment of the denominator to accommodate to non-response to some discrete sections of the questionnaire(Chapter 4) and sub-selection of the sample according to either length of time practising infection control (Chapter 3) or the nature of their facility (Chapter 4).

1.6 Benefits of the study

The absence of reported detail on the activities of Australian ICPs and ISCPs provided sufficient motivation for this study. AICA members were selected as the study population as they represented the only accessible pool of ICPs. AICA members represent each Australian state and territory. This study aimed to contribute to a more definite global understanding of the core business of the Australian IC community and the qualifications, experience and skills required to co-ordinate an ISCP in Australia. By raising stakeholder awareness of the current limitations of Australian IC and comparing them with international models, this work will facilitate greater use of valid outcome measures and evidence-based approaches to IC in Australia.

Since the establishment of formal ISCPs in the mid 1960s, measurement of ICP competence, surveillance activity, assessment of IC program infrastructure and use of evidence in ISCPs recur throughout the IC literature.

1.7 Review of related literature

Literature review focussed initially on general reports of the history of IC and the characteristics of ICPs and ISCPs are reported. Specific areas such as evaluation of ISCPs, economic rationalism, ICP education, nosocomial surveillance, scientific methods and use of information technology emerged from the preliminary literature review. These areas were examined in depth. Sentinel papers were identified by the following methods:

1. electronic search of on-line MEDLINE and PubMed databases in English for the years 1970 onwards;

2. in addition to MEDLINE, review of the peer-reviewed IC journals considered leaders in the field, the American Journal of Infection Control (AJIC), Infection Control and Hospital Epidemiology (ICHE) and Journal of Hospital Infection for the years 1970 onwards;

3. examination of current state, national and international IC policy, guidelines, legislation and standards;

4. Internet review of the World Wide Web pages of the major IC and professional organisations and agencies; and

5. personal communication with peers in the field including Dr Brian Collopy, Ms Grace Emori, Ms Elaine Graham-Robertson, Ms Teresa Horan, Associate Professor Marguerite Jackson, Ms Madeleine McPherson, Ms Dolly Olesen and Ms Gina Pugliese.

The literature review provides an overview of the development of the IC profession and ISCPs. The U.S.A and in particular, the Centers for Disease Control and Prevention (CDC), incorporating the Hospital Infections Program (HIP) and National Nosocomial Infection Surveillance (NNIS) System continue to lead the world in the development of ISCPs. Accordingly, the majority of published literature is from the U.S.A (Nettleman 1993).

1.7.1 GLOBAL DEVELOPMENT AND MATURATION OF ISCPS

In the mid-1950s the world experienced a pandemic of Staphylococcal infections amongst hospitalised patients (Nahmias and Eickhoff 1961). The development of formal approaches to IC has been attributed to the world-wide spread of this agent (Nahmias and Eickhoff 1961; Haley 1985; Haley et al. 1985; Hambraeus, Paardekooper, and White 1997; Haley 1998; Scheckler et al. 1998). In 1958, the American Hospital Association (AHA) published recommendations that called for hospitals to establish committees that would review and consider hospital-acquired infections (American Hospital Association 1958). These committees constituted the first Infection Control Committees (ICC) and one of their early tasks was to develop hospital-based surveillance systems to determine the nature, extent and risk factors for a hospital-acquired or nosocomial infection.

Table 1.1 details the clinical, political and professional events in the development ISCPs and expansion of the ICN role in the U.K. from 1950's to the present.

Table 0-1.1 Significant events in the development of ISCPs and the evolution of the ICP role in the uk

YEAR	UNITED KINGDOM
1950's	Pandemic - Staphylococcal infections
1958	First IOs appointed
1959	Report on Staphylococcal infections recommends appointment of IOs
1962	IC Sister position replaces IOs
1975	Appointment of ICNs increases significantly
1978	PHLS sets up Study Group on Hospital Infection
1979	HIS formed
1980	First National Prevalence Survey of Infection in Hospitals
1986	HIS sets up Working Party to identify ICNs in current practice.
1993	Most Health Authorities have appointed ICNs
	Infection Control Standards Working Party publishes *Standards in Infection Control*
1997	PHLS reports on Hospital-acquired Infection: Surveillance Polices and Practice
1998	Nosocomial Infection National Surveillance Scheme (NINSS) established by PHLS

Key:
HIS Hospital Infection Society
IO Infection Officer
ICN Infection control nurse
NINSS Nosocomial Infection Surveillance Scheme
PHLS Public Health Laboratory Service

The U.K. appointed its first infection officers in 1958. The primary role of the infection officer was to review the prevalence of sepsis in hospitals (Gardner 1962). The ICS replaced the infection officer role in 1962. The ICSs were responsible for overall co-ordination of a hospital's ISCP and were directed in their work by the hospital's ICC. These original ISCPs in the U.S.A and the U.K. included elements of surveillance and control. Control included reviewing staff practices and making recommendations on the delivery of clinical care so as to minimise the risk of patients acquiring nosocomial infection.

In the U.S.A during 1958 there were two national conferences that addressed management and control of staphylococcal infection (Dixon 1991; Eickhoff 1991). The proceedings included recommendations relating to asepsis, reprocessing of equipment, monitoring colonisation rates amongst staff and reporting of cases to the ICC. A subsequent conference in 1963 focussed on the risks of hospitalised patients acquiring infection associated with new invasive therapies and equipment. This conference recommended the application of epidemiologic methods for organised surveillance of hospital infections and the provision of education to health care workers (Haley 1998).

Table 1.2 provides detail on the significant clinical, political and professional events that lead to the development of ISCPs, the ICP role and the role of the hospital epidemiologist in the U.S.A.

Table 1.0-2 significant events in the development of ISCPs and the evolution of the ICP role in the U.S.A

YEAR	UNITED STATES
1950's	Pandemic - Staphylococcal infections
1958	AHA recommends hospitals establish ICCs
1959	AHA convenes Expert Advisory Committee
1968	CDC convenes training course
1969	JCAHO requires hospitals to have formal ICCs
1970	CDC develops NNIS and encourages hospitals to establish surveillance systems
	Stanford University reports favourably on ICN
1972	CDC recommends 1 FTE ICN for every 250 beds
1972	Association for Practitioners in Infection Control
1974	CDC begins Study on Efficacy of Nosocomial Infection Control
1977	APIC Journal established
1980	Society of Hospital Epidemiologists of America formed
	Infection Control and Healthcare Epidemiology first published
1982	CBIC undertakes first in-depth task analysis of ICPs
1983	APIC publishes first curriculum for ICPs
	CBIC develops system of certification
1985	NNIS adopts more rigorous approach
	NNIS hospitals able to use IDEAS software
1986	NNIS promotes targeted surveillance
1992	CBIC repeats Task Analysis
1994	APIC name change - Association of Professional in Infection Control & Epidemiology
1996	APIC launches web-site
1998	Consensus panel publishes recommendations on ISCP infrastructure and ICP role
	CDC/APIC announce Infection Control Staffing Research
1999	APIC/CHICA publish Professional and Practice Standards

KEY

AHA	American Hospital Association
APIC	Association for Professionals in Infection Control and Epidemiology
CBIC	Certification Board of Infection Control and Epidemiology
CDC	Centers for Disease Control and Prevention
CHICA	Canadian Hospital Infection Control Association
FTE	Full-time equivalent
ICC	Infection control committee
ICN	Infection control nurse
JCAHO	Joint Commission for the Accreditation of Healthcare Organisations
NNIS	National Nosocomial Infections Surveillance system

Regulatory, accrediting and professional organisations were early advocates for formal ISCPs in the U.S.A (Friedman 1996; Larson 1997).

These advocates included the then Communicable Disease Center that supported ISCPs with the establishment of an investigations unit that could assist in hospital outbreak investigations. The Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) was responsible for accrediting hospitals that participated in a voluntary accreditation process. From 1969, the JCAHO required accredited hospitals to have formal ICCs. The JCAHO's requirement is considered to be a key foundation stone for IC (Eickhoff 1991; Larson 1997). The American Hospital Association (AHA) influenced the development of the early ISCPs, especially with the publication of key IC documents such as the 1968 manual Infection Control in the Hospital (American Hospital Association 1968). The AHA manual provided standards and guidelines for ISCPs. In addition, the AHA convened an expert advisory committee to consider issues relating to nosocomial infection during the period 1959 to 1995.

From 1963, Stanford University Hospital in California had considered the British ICS model and in 1970 they reported favourably on the use of an ICN as the central co-ordinator of the facility's ISCP (Wenzel 1970). CDC convened the first formal IC training course in 1968. ICPs undertaking this course were trained in surveillance techniques that enabled them to undertake surveillance with an epidemiologically sound approach (Haley 1998).

The CDC had been involved in early tests on the critical number of IC nursing staff required to co-ordinate ISCPs in various sized facilities. In 1972, the CDC recommended that to effectively undertake surveillance of nosocomial infections one full-time ICN was required for every 250 beds (Centers for Disease Control and Prevention 1972).

1.7.2 1970-1977

There were two key events in the 1970s which acted as catalysts for the ongoing development of ISCPs initially in the U.S.A and to a major extent in other developed countries. These were the development of the NNIS System in 1970 (Sartor et al. 1995), and the ten-year Study of the Efficacy of Nosocomial Infection Control (the SENIC Project) which began in 1974 (Haley et al. 1980; Haley and Shachtman 1980; Haley et al. 1985). The NNIS and SENIC continue to exert extensive influence on the structure and purpose of modern ISCPs.

1.7.3 THE NATIONAL NOSOCOMIAL INFECTIONS SURVEILLANCE SYSTEM

The NNIS system first began collecting voluntary data from participating hospitals in the U.S.A in 1970 (Haley et al. 1985). The original aims of the NNIS were to establish a national database of nosocomial infection and to enable participating hospitals to improve their methods of surveillance. The program required contributing hospitals to perform hospital-wide nosocomial infection surveillance amongst acute care patients. Hospitals used standard definitions and codes to collect and report data to the CDC each month. Reports comprised a line-listing of minimal data relating to the patient, the infection, associated risk factors and outcome. CDC's primary role was to act as both custodian and repository for the data. CDC analysed the data and provided regular local and periodic national reports of aggregate data. NNIS still maintains this role although it is somewhat extended from that of the early to mid-1970s as it now monitors antibiotic resistance and supports research relating to IC.

The NNIS methods were relatively constant until 1985 when the system adopted a more rigorous methodological approach to surveillance aimed at providing valid results for infection rates and associated risk factors. From 1985, participating hospitals were able to use dedicated software to facilitate participation in the NNIS system. The software is known as IDEAS (Interactive Data Entry and Analysis System). Initially only about half of all participating hospitals were equipped to use the software, although by 1992 all participating hospitals were compelled to use the program (Sartor et al. 1995).

The second major advancement in the NNIS methodology occurred in 1986 when the CDC endorsed a more targeted outcome-focussed approach to surveillance. From this time, hospitals were no longer required to carry out hospital-wide surveillance. Instead, they could select target approaches that focussed on intensive care unit, high-risk nursery or surgical patient infections. The attraction of these surveillance options was significant. The NNIS now represented a flexible, comprehensive surveillance system that enabled surveillance to be a structured and planned component of an ISCP. The new methods incorporated collection of additional data on infected and uninfected inpatients. This data enables hospitals to evaluate their ISCPs and specific clinical practices which may be associated with increased risk of acquiring nosocomial infection. In 1995 Sartor reported on the development of the NNIS system since 1986 and concluded that during that period, participating hospitals have found collection of risk adjustment data and inter-hospital comparison of data to be both feasible and useful (Sartor et al. 1995).

However, critics of NNIS suggest that alternate methods of case finding such as surveillance by antibiotic exposure are more sensitive than NNIS methods (Yokoe et al. 1998). Critics also recommend that clarification of NNIS definitions for nosocomial pneumonia and primary bloodstream infection will enable NNIS to improve (Gastmeier et al. 1998) the cost-effectiveness of its surveillance recommendations (Yokoe and Platt 1994). The intense resource requirements (Yokoe et al. 1998) and accuracy (Emori et al. 1998) of NNIS are also contentious.

Most recently IC professionals have been challenged by claims that despite its essential nature, surveillance alone is insufficient to cause change in practice and subsequent reduction in infection risk. Additional factors such as a supportive work culture and expert advice are postulated as being equally effective change agents. (Lovett and Massanari 1999)

Since NNIS's inception, publication by the CDC of annual and semi-annual reports and public domain placement of NNIS methodology has enabled both contributing and non-contributing hospitals to compare their local infection rates with a threshold (Emori et al. 1991; NNIS Report 1991; Horan et al. 1993; Banerjee SN and et al. 1995; Horan and Emori 1997). Accordingly, global IC communities consider NNIS to constitute "international best practice" infection surveillance methodology.
Countries

developing standardised approaches to the surveillance component of their ISCPs frequently adopt and adapt the NNIS methods (Larson 1997). Since 1978, NNIS methods have been used by countries other than the U.S.A for determining the prevalence of nosocomial infection. Countries which have used or which are currently using NNIS or NNIS-like definitions include Australia (McLaws et al. 1988; New South Wales Hospital Infection and Epidemiology Surveillance Unit 1998.), Belgium (Mertens et al. 1987), Denmark (Jepsen and Mortensen 1980), France (Quenon et al. October 1992), Germany (Gastmeier et al. 1998), Italy (Moro et al. 1986), Mauritius (Jepsen et al. 1993), New Zealand (Nicholls and Morris 1997), Norway (Hovig, Lystad, and Opsjon 1981; Stormark, Aavitsland, and Lystad 1993), Spain (Vaque et al. 1996), Sweden (Bernander et al. 1978) and the U.K. (Meers et al. 1981).

1.7.4 STUDY OF THE EFFICACY OF NOSOCOMIAL INFECTION CONTROL (SENIC)

Although the NNIS provided a framework and methods for the surveillance component of IC surveillance and prevention activities, the efficiency and necessary elements for an effective ISCP were untested. The extent to which U.S.A hospitals had incorporated ISCPs into their facilities was also unknown. In 1974, the CDC initiated the SENIC project in order to address these outstanding questions.

The SENIC study had three specific objectives (Haley et al. 1985). These objectives were to:

1. determine the extent of nosocomial infections in U.S.A hospitals;

2. report on the implementation of the new ISCPs in U.S.A hospitals; and

3. establish whether the above programs were effective in reducing the risks of hospitalised patients acquiring nosocomial infections.

The SENIC study hypothesised that nosocomial infection rates could only be reduced if a program had four components (Haley et al. 1985) which were:

1. surveillance;

2. control including policy development, education and review of clinical practice;

3. an ICN to collect and analyse surveillance data in addition to having overall responsibility for co-ordinating the control program; and

4. active involvement of a physician or microbiologist in the program (Haley 1995).

The SENIC definition of surveillance activity included measurement of the infection rate, consideration of risk factors and provision of feedback to clinical staff. In contrast, control activities were those functions that were known to reduce the risk of infection including aseptic technique, appropriate cleaning, sterilisation and disinfection of used equipment and instruments.

The SENIC study was conducted in three stages. Phase 1, the Preliminary Screening Questionnaire, involved mailing a survey to 6586 U.S.A hospitals to establish to what extent they had adopted the above four components of an ISCP (Haley and Shachtman 1980). The response rate to Phase 1 was 86%. Results from this phase indicated that most (87%) of respondents had a systematic approach to collecting and analysing surveillance data. Most hospitals reported surveillance findings and 62% used their results to provide feedback and education to nursing staff. Results relating to control suggested that most hospitals had written policies for implementing specific patient-care practices although the proportion of hospitals monitoring compliance with recommended practices ranged from 56% to 80%. Less than half (42%) of the responding hospitals had an ICN that spent more than 20 hours per week exclusively on infection surveillance or control activities. Most (64%) responding hospitals had a physician or microbiologist who had an interest in IC and served as head of the ISCP. Few (16%) heads of ISCPs were trained in either infectious diseases or microbiology. The time they allocated to IC was minimal.

From the study population of 6586 hospitals, the samples for Phase 2, the Hospital Interview Survey, and Phase 3, the Medical Records Survey, were selected. These hospitals were stratified according to number of beds and medical school affiliation, as investigators believed these two variables were the best predictors of nosocomial infection rates. Separate groups of CDC data collectors participated in Phases 2 and 3 so that both groups would be unaware of the other's data (Haley et al. 1980).

Phase 2 of the SENIC study was known as the Hospital Interview Survey. Phase 2 involved dispatching a group of 58 trained interviewers to a sample

of 433 hospitals. The interviewers, who were also CDC staff members, undertook standardised interviews, usually in pairs, during October 1976 and July 1977 to obtain specific information about the hospital's ISCP. Data were obtained by interviewing twelve of the staff members in each hospital who were considered to have duties that would impact upon infection surveillance (Emori, Haley, and Stanley 1980; Haley et al. 1985). Areas examined during interview included:

1. the characteristics and activity of the ICN, hospital epidemiologist and ICC;

2. the methods of surveillance and outbreak investigations;

3. monitoring of the environment;

4. isolation practices;

5. IC's relationship with administration and other hospital departments;

6. nurses' reports of patient care;

7. staff training in IC;

8. methods employed to change staff IC behaviour;

9. housekeeping and disinfection activities; and

10. the role of the microbiology laboratory (Haley et al. 1980).

Phase 3, the Medical Records Survey, involved 338 sample hospitals. In each hospital, a randomly selected sample of medical records of approximately 500 patients admitted as adult general medical and surgical patients during 1970 and 500 of the same type of patients admitted during the period April 1975 to March 1976 was reviewed. The 1970 period was chosen as it reflected a time when hospitals most likely did not have an ISCP in place. Phase 3 involved 169,518 patients in 1970 and 169,526 patients in 1975-1976. The CDC employed and managed medical record analysts who reviewed each record for specific demographic and clinical data relating to nosocomial urinary tract, surgical wounds, pneumonia or bacteraemia infections. Investigators calculated the frequency of nosocomial infections and specific measures of the nosocomial infection rate using total admissions and the days of hospitalisation as denominators.

Phase 3 determined that the overall U.S.A nosocomial infection rate was 5.7 infections per 100 admissions to acute care facilities. The number of nosocomial infections in the U.S.A was calculated to be 2.1 million annually (Haley et al. 1985). In addition, Phase 3 estimated the actual number of infections that were being prevented in each hospital by the ISCP and theorised the number that could be prevented if all hospitals had implemented those activities which had previously been demonstrated to be effective.

The results of the third phase of the SENIC study confirmed the original hypothesis that ISCPs could reduce infection rates. Investigators reported that an effective ISCP could reduce infections by 32%, however, to be this effective, the ISCP required four specific components. Each component was necessary and these were (Haley et al. 1985):

5. organised surveillance and control activities;

6. a trained, physician with an interest in IC;

7. a full-time ICN for each 250 beds; and

8. a system for providing feedback of surgical infection rates to surgeons.

In addition to the above findings, SENIC investigators found that most hospitals lacked an effective ISCP and therefore in 1975 only 6% of U.S.A nosocomial infections were actually being prevented (Haley et al. 1985).

Retrospectively, SENIC is considered to have directly impacted on five key areas of ISCPs (Haley 1998). The five areas were:

1. preservation of the role of IC in hospitals;

2. rekindling of interest in surveillance;

3. change to outcome orientation;

4. increases in physician training; and

5. use of multivariate analysis in clinical decision-making.

The SENIC study is widely acknowledged as the scientific basis upon which modern ISCPs are based (Scheckler et al. 1998). SENIC confirmed the value of organised programs and in conjunction with the NNIS, highlighted the contributions that epidemiologically sound surveillance makes to an ISCP program. U.S.A ICPs view surveillance as a core element of an effective ISCP, while other countries such as the U.K. and parts of Europe have been slower to adopt a similar position (Glynn et al. 1997; Widmer, Sax, and Pittet 1999).

1.7.5 1980'S ONWARDS: THE ROLE OF STAFF

Credit for establishing the hospital epidemiologist role as part of the ISCP was apportioned to the CDC during proceedings of a 1970 conference that encouraged hospitals to employ physicians and nurses to establish the first hospital surveillance systems (Eickhoff 1991). Support from non-government agencies and increasing litigation relating to infection compounded the need for this specialist role (Wenzel 1993). The SENIC investigators described the characteristics of those persons heading the ISCP and referred to this group as hospital epidemiologists. There was significant difference in the qualifications and affiliations of this group and in addition, the time and approaches they applied to their ISCP work also varied (Haley 1980).

In the late 1980s and early 1990s, although a valued member of the ISCP the hospital epidemiologist, like the ICP, faced role erosion. Advocates for the position encouraged their peers to adopt a less infection-focussed approach to outcome monitoring in order to survive the move towards total quality improvement (Wenzel 1993). Inconsistency between the value of the hospital epidemiologist's input to an ISCP and the amount of financial compensation made to the epidemiologist for this input was identified in 1997 and remains unresolved (Deery 1997).

The recommendations from SENIC influenced regulatory, accrediting and policy making organisations in determining their ISCP criteria (Haley 1998). Many countries have adopted SENIC recommendations with each facility having an ICN or ICP to provide overall co-ordination of the facility's ISCP (Soule and Huskins 1997).

The U.K. however, subscribes to the concept of an IC team (ICT) (Mehtar 1993; Glynn et al. 1997). The U.K. ICT model is grounded in the early amalgamation of the roles of the ICO and the ICN (Gardner 1962). Other European countries including Sweden (Hambraeus 1995) also promote ICTs.

A 1997 U.K. report indicates that the typical ICT consists of one IC doctor, a consultant medical microbiologist and two ICNs. Although each hospital is compelled to have an ICT, some teams are responsible for providing services to more than one hospital. The median number of beds for each hospital was 790 (range 310-1600) (Glynn et al. 1997)

Australia (Birrell, Hutton, and Garsden 1997) and the U.K. (Teare and Peacock 1996) have each reported success in the establishment of IC outreach programs that involve using a "link", "satellite" or "ward-based liaison" nurse to assist the ICP with co-ordination of the ISCP and nosocomial infection data collection.

The SENIC recommendations have been virtually unchallenged until 1998 when an expert panel from the U.S.A published a recommendation on the essential elements, optimum infrastructure and core business of ISCPs (Scheckler et al. 1998). Recent trends in health care delivery and changes in hospital role, function and service delivery have necessitated a review of IC staffing levels. To this end, the CDC is currently working with the Association for Professionals in Infection Control and Epidemiology (APIC) to reassess the influence of IC staffing on infection rates (Association for Professional in Infection Control and Epidemiology Inc 1998).

1.7.6 THE HISTORY OF THE DEVELOPMENT AND MATURATION OF AUSTRALIAN IC AND SURVEILLANCE PROGRAMS

Table 1.3 details the clinical, political and professional events that shaped the development of Australian ISCPs and the ICP role.

Table 1-0-3 Significant events in the development of ISCPs and the evolution of the ICP role in Australia

YEAR	AUSTRALIA
1959	Joint Hospital Infection Committee convened, Brisbane
1960	Princess Alexandra Hospital (PAH), Brisbane convenes Hospital Infection Control Sub-Committee
1962	Australia's first ICN appointed at PAH.
1965-1967	NSW, Australian Capital Territory & South Australia appoint first ICSs
1974	ACHS accreditation defines formal IC programs
	ACHS require hospitals to appoint an ICN
	NSW forms IC Sister's Group
1977	MRSA emerges
	Role & function of IC sister described

YEAR	AUSTRALIA
1984	The First Australian Nosocomial Infection Prevalence Survey
1985	Australian Infection Control Association formed.
1986	AIDS Taskforce publishes first national IC guidelines
1987	First National AICA Conference
1991	ACHS introduces clinical indicators
1992	First NSW Health IC Policy
1993	NSW reports first patient-to-patient transmission of HIV
	Possible patient-to-patient transmission of HCV in NSW.
1994	NSW Health Department Nosocomial Infection Outcome Indicator Project begins.
	NSW Health Department investigates patients potentially exposed to an HIV-infected health care worker.
1995	NSW promulgates Australia's first IC Regulations
	NSW Health Department policy compels all hospitals to appoint an ICP
1996	NHMRC/ANCA releases Infection Control in The Health Care Setting Guidelines
	NSW Health Department convenes NSW Nosocomial Infection Taskforce
	AICA publishes Standards for Practice
1997	123 patients in NSW undergo elective operations possibly involving inadequately disinfected surgical equipment.
	ACHS convenes Nosocomial Infection Clinical Indicator Workshop
1998	NSW Health Department funds pilot Hospital Infection Surveillance System in ten NSW hospitals
	NSW Health investigates patients operated on by an HIV and HCV infected health care worker
	Ten NSW patients undergo colonoscopy with inadequately disinfected colonoscopes.
	AICA launches home page
	AICA proposes centralised model

KEY

AIDS	Acquired immune deficiency syndrome
ACHS	Australian Council on Healthcare Standards
AICA	Australian Infection Control Association
ICN	Infection control nurse
ICS	Infection control sister
NSW	New South Wales

1.7.6 a) 1950's-1960's

The published history of Australian ISCPs is limited. An unpublished draft history of AICA (Graham 1992) suggests that Queensland was the first Australian state to form an ICC in response to growing concerns relating to the pandemic of staphylococcal infections in hospitals (Nahmias and Eickhoff 1961). The Queensland Joint Hospitals Infection

Committee met first in 1959 and although initially a state-wide committee, this group was replaced in 1960 by local ICCs which dealt with the day-to-day infection problems of individual hospitals (Graham 1992).

The pioneering Australian ICPs were unable to refer to national or state standards, guidelines or policy documents relating to IC, ICP role or ISCP structure. Accordingly, the early Australian ISCPs relied heavily on reports of international experiences and developments (Albera, Murphy, and Gold 1996).

1.7.6.b) 1970's

In 1974, the NSW Infection Control Sisters adopted an infrastructure which was endorsed by the relevant NSW industrial nursing body and involved ICNs reporting to their respective DONs for nursing issues and the Director of Microbiology for the technical aspects of the ISCP (Albera 1977). This group subscribed to nine basic objectives which included:

1. provision of in-service training of hospital personnel;

2. to assist in developing or implementing improved IC measures;

3. to systematically record and report hospital-acquired infections;

4. to provide advice on isolation of patients;

5. to monitor the environment of high-risk medical areas;

6. to monitor housekeeping and disinfection procedures;

7. to monitor maintenance of hospital equipment;

8. to collaborate locally, nationally and internationally with similar organisations; and

9. to facilitate effective communication between local IC stakeholders.

Unpublished AICA documentation suggests that Australia's original ICNs readily adopted the U.K. program model (Graham 1992) rather than that of the U.S.A which involved close liaison with a hospital epidemiologist as Australian hospitals do not employ any hospital epidemiologists.

In 1974, ACHS introduced its accreditation program which required participating hospitals to appoint an ICN to co-ordinate an ISCP (Albera, Murphy, and Gold 1996). In the 25 years since its inception, ACHS has continued to publish requirements for IC staff and ISCPs. (The Australian Council on Healthcare Standards 1974; The Australian Council on Healthcare Standards 1976; The Australian Council on Healthcare Standards 1977; The Australian Council on Healthcare Standards 1978; The Australian Council on Healthcare Standards 1981; The Australian Council on Healthcare Standards 1986; The Australian Council on Healthcare Standards 1987; The Australian Council on Healthcare Standards 1988; The Australian Council on Healthcare Standards 1989; The Australian Council on Healthcare Standards 1990; The Australian Council on Healthcare Standards 1991; The Australian Council on Healthcare Standards 1992; The Australian Council on Healthcare Standards 1993). In 1976, the then NSW Health Commission published a job description for IC Sisters as a government directive. Irrespective of participation in the ACHS Accreditation system, from 1976, hospitals in NSW were expected to have a designated nursing staff member responsible for IC within the facility. This staff member was responsible for co-ordination of the ISCP.

The two Australian papers addressing the role of the IC Sister are not peer reviewed and only discuss the position in Victoria (Loxton 1976; Hawkins, Kohn, and Reichert 1982). The early IC Sister position is described as being challenging, exciting and privileged (Loxton 1976). Loxton described her role as ICP in one Victorian hospital as one that involved the following tasks:

1. organisation of a control of infection program;

2. instigation, planning and implementation of policies to be understood and used by all hospital staff;

3. maintaining an awareness of bacterial trends; and

4. tracing the possible spread of infection throughout the facility.

The emergence of methicillin resistant Staphylococcus aureus (MRSA) in Australia in 1977 (Gedney and Lacey 1982) and its subsequent presence as an endemic pathogen causing nosocomial infection in Australian hospitals led to heightened awareness amongst health administrators, providers and consumers regarding the need for IC (McDonald 1982). In particular, recommendations to contain MRSA included improved hygiene, adequate staffing and an appreciation of the complexities of increasing health care technology (Pavillard et al. 1982).

1.7.6.c) 1980's

In 1982, the IC Special Interest Group of the Victorian Branch of the Royal Australian Nursing Federation had twenty members. A survey of these members was undertaken in 1982 to describe the qualifications required by IC Sisters (Hawkins, Kohn, and Reichert 1982). The survey also collected limited data regarding demographics, classifications and typical functions. ICP qualifications were not reported. Response rates varied for each question ranging from 35% (7/20) to 100% (20/20). Respondents worked in hospitals that ranged from 60 to 600 beds. However, most respondents reported that their ISCP had only one IC Sister. The IC Sister frequently performed dual roles within a facility and the other role was often as a nursing administrator.

The typical IC activities reported by ICPs in this study included:

1. policy formulation;

2. preparation of statistics;

3. environmental monitoring;

4. participation in meetings;

5. acting as a resource person;

6. screening staff; and

7. teaching.

This early study is of interest, although interpretation of its reflection of the broader Australian IC community in the 1980s is limited by the fact that it was not subjected to peer review and only covered a small sample of ICSs working in one of Australia's six States and two Territories.

The critical elements of a facility-based ISCP in Australia were not defined until the present study, although ACHS stipulated general requirements in hospitals participating in its accreditation program. Similarly, job profiling and outcome measurement of Australian ISCPs has always been limited, although a national prevalence study undertaken in July 1984 highlighted for the first time the importance of nosocomial surveillance activity in Australia (McLaws et al. 1988).

The 1984 national prevalence study estimated that Australia's over-all adjusted prevalence of nosocomial infections was 6.3%. ICNs in rural and metropolitan, public and private acute care hospitals collected and contributed data for more than 28,000 patients involved in the study (McLaws et al. 1988). The study recommended that Australian state and national governments could measure and potentially reduce nosocomial infection rates in Australia by establishing a standardised method of collecting and analysing nosocomial surveillance data. Results could be used to identify at-risk procedures and patients and to guide clinical practice.

The focus of the early ISCP programs was on MRSA (Albera, Murphy and Gold 1996) whereas the emergence of HIV and acquired immunodeficiency syndrome (AIDS) lead to the formalisation of Australian ISCPs in the latter half of the 1980s. A 1986 AIDS Task Force guideline titled Infection Control Guidelines - Acquired Immune Deficiency Syndrome (AIDS) and Related Conditions constituted Australia's first national IC guidelines and focussed only on HIV and secondary pathogens that infected AIDS patients. The recommendations suggested in this publication were based on the use of protective apparel, yet the recommended approach to IC was to apply these precautions only to known HIV-infected patients. HIV/AIDS specific IC measures were used in Australia until 1988 when either Universal Precautions (Centers for Disease Control 1987) or Body Substance Isolation (Jackson et al. 1987) were adopted.

The next national IC publication was from the National Health and Medical Research Council (NHMRC) in 1988 (National Health and Medical Research Council 1988). This document encouraged hospitals to adopt strategies to reduce the transmission of infection. This guideline referred to HIV and MRSA as posing a significant threat to Australian health care establishments. Overall, the document recommended that individual facilities use the national guideline to develop specific local policies and procedures for minimising the risk of nosocomial infection. Surveillance of infections that had the potential to spread between patients and staff was considered a primary responsibility of the health care establishment.

1.7.6.d) 1990's

A subsequent national IC guideline (Australian National Council on AIDS and Health 1990), published in June 1990 endorsed universal IC precautions as the minimum standard and again recommended that health care facilities develop locally useful guidelines for communicable diseases.

The document emphasised the employer's responsibility to provide staff and patients with protection from infection hazards and recommended eight strategies for achieving this goal. Although the strategies are not specifically referred to as constituting an ISCP, they include many of the elements of modern ISCPs (Scheckler et al. 1998) and include:

1. providing safe facilities and equipment;

2. defining and endorsing safe work practices and use of protective apparel;

3. provision of education and information;

4. monitoring the health of employees;

5. establishing systems for reporting occupational exposure to infectious disease;

6. review and modification of work practices;

7. maintenance of adequate staffing levels; and

8. staff health vaccination programs.

In 1994 the national guidelines were updated (National Health and Medical Research Council and AIDS 1994) and a new system was adopted for classifying staff according to the type of contact with patients and the potential risks to which they might be exposed. In addition, this guideline was the first Australian guideline to adopt Universal Precautions (Centers for Disease Control 1987). Similar to the previous national documents, there was no specific preferred infrastructure for local ISCPs. The document focussed specifically on the prevention of hospital transmission of infectious diseases rather than strategies to reduce nosocomial infections such as surgical wound infections (SWI)s, bacteraemia or urinary tract infections. Compared with previous guidelines, this document included more comprehensive detail on the clinical, ethical, practical and legal responsibilities associated with testing, screening and managing exposures to blood borne viruses. There was no reference to surveillance of nosocomial infections.

In 1991, the ACHS introduced clinical indicators (CI)s for IC into the voluntary accreditation process (Collopy and Balding 1993). Data provided by participating hospitals on SWI and bacteraemia enabled ACHS to determine threshold rates and participating hospitals to modify practice in some instances (Portelli, Williams, and Collopy 1997).

In 1996, the NHMRC released Federal Government endorsed IC guidelines which recommended that the ICC be responsible for the surveillance of nosocomial infections (National Health and Medical Research Council 1996). This document also stipulated that one ICN was required for every 200-250 beds in Australian hospitals. The NHMRC considered the primary role of the ICN to be the implementation of IC policies developed by the local ICC. Other activities specified included:

1. monitoring clinical indicators;

2. collecting and analysing IC data;

3. preparing reports for consideration of the ICC; and

4. evaluating the ICC outcomes and policy statements.

NSW is the only Australian state to have IC regulations. The regulations are based on international IC best practice and were prepared by the DoH's expert IC advisory group in consultation with the IC community. They are subject to regular three-year review.

Since 1995, NSW hospitals have required comprehensive ISCPs to comply with the NSW IC regulations, although surveillance continues to be viewed as separate to the control aspects of the individual programs (New South Wales Health Department 1996). While the national guidelines continue to have no legislative base, they have had the effect of causing the remaining Australian states and territories to endorse their own ISCPs.

In addition to adopting a regulatory approach to IC in 1995, prompted in part by the report of patient-to-patient transmission of HIV (Chant et al. 1993), NSW was also the first Australian state to adopt a quality approach to IC with the piloting of nosocomial infection outcome indicators in 1994-1995 (McLaws, Murphy, and Keogh 1997; McLaws et al. 1997; McLaws et al. 1998). The NSW Outcome Indicator Project concluded that continuous standardised surveillance was a possible and necessary activity to reduce nosocomial infections (McLaws et al. 1997; McLaws et al. 1998).

Subsequently a NSW Health IC Taskforce was established in 1996 (New South Wales Health Department 1996).

Investigators involved in the NSW Outcome Indicator Project published three reports which respectively addressed the importance of epidemiologically sound surveillance of nosocomial surgical site infection, respiratory syncytial virus and intravenous device-related bacteraemia (IVDRB) in intensive care unit patients as part of Australian ISCPs (McLaws, Murphy, and Keogh 1997; McLaws et al. 1997; McLaws et al. 1998).

The sixty-one invited members of the NSW IC Taskforce included the NSW Outcome Indicator Project investigators, peer-regarded experts in the field including infectious diseases physicians, ICNs and microbiologists from metropolitan and rural hospitals in NSW. Medical industry, health service executives, ACHS, the Australian Society of Microbiology and the Royal Australasian College of Surgeons were also represented on the Taskforce. The Taskforce published its findings in 1996 (New South Wales Health Department 1996) and recommended the establishment of a state-wide system of standardised surveillance for nosocomial infections. The Taskforce Report also identified the need for a revision of the existing NSW directive regarding the role of the IC Sister and the publication of a revised generic job description with recommendations for core activities and staffing according to hospital size and service. The Taskforce reached consensus on definitions for nosocomial infections after brainstorming and distribution to all public hospitals in NSW of a survey regarding current IC practice.

In 1998, NSW Health initiated a twelve-month pilot of a standardised surveillance system, the Hospital Infection Surveillance System (HISS). HISS is co-ordinated through the Hospital Infection Surveillance and Epidemiology Unit at the University of NSW, Sydney. The HIES Unit convened an Expert Panel of IC professionals from NSW and interstate to come to a consensus on definitions and methodology for the pilot. Standardised data collection began in ten NSW public hospitals in November 1998 (New South Wales Hospital Infection and Epidemiology Surveillance Unit 1998.).

In 1998, the Communicable Disease Network - Australia and New Zealand (CDNANZ) convened an expert panel to review the national NHMRC 1996 guideline. The panel first met in September 1998 and expects to complete the revision and extensive stakeholder consultation by late 2000.

No Australian state or territory has addressed infrastructure and essential resources for ISCPs. NSW is expecting to publish Guidelines for IC infrastructure by late 1999. These Guidelines will include a modified version of the approach developed in Chapter 7 of this thesis. Victoria is the only other Australian state to have initiated a review of IC. In 1996 every public hospital in Victoria was subjected to a review which included clinical, practical and ISCP components (Victorian Government Department of Human Services 1998). The Victorian findings regarding ICP demographics and ISCP activities concur with the findings of this study and the Victorian recommendations regarding surveillance are similar to those of the NSW Nosocomial Infection Taskforce Report.

In December 1998, the Federal government convened a preliminary meeting of Australian IC experts to consider the feasibility of establishing a standardised system of national data collection for nosocomial infections. This initiative progresses the recommendations of the National Hospital Outcomes Programs, which included establishing a National Indicator Program (Boyce et al. 1997; Ibrahim et al. 1998). It will also complement the preliminary work undertaken by NSW to establish a state-based standardised system of surveillance of nosocomial infections.

The recent focus on surveillance at state and national government levels illustrates a shift in the focus in policy that shapes ISCPs, away from the pure control aspects and more towards an outcome measurement approach.

1.7.7 The impact of ACHS on Infection Surveillance and Control Programs in Australia

In the U.S.A, the JCAHO has influenced IC program structure and activities since 1969 (Larson 1997). It was not till five years later, in October 1974, that ACHS began asserting its influence on Australian ISCPs by publishing Provisional Standards for Australian Hospitals (The Australian Council on Healthcare Standards 1974). These standards stipulated that control of infection in hospitals and evaluation of the associated environment to transmit infection rested with a multidisciplinary committee of the medical staff. The recommended committee membership included representatives of administration, housekeeping, the laboratory, medicine and nursing. Chairmanship of the Committee was to be held by a person with knowledge of and interest in IC. ACHS recommended that in large hospitals either a part-time or a full-time ICN be appointed to complement the work of the ICC. The ICC Chair and the ICN were to be appointed and accountable to the hospital's CEO.

The ICC had four specific functions. These were to:

1. develop written standards for hospital sanitation and medical asepsis;

2. develop and periodically revise procedures and techniques for complying with the above standards;

3. periodically review antibiotic and anti-infective agent use within the hospital; and

4. assist in the development of the hospital employee health program.

Under the ACHS Standards, ISCP staff were for the first time expected to table standard reports at the regular ICC meetings. These included reports of:

1. hospital-associated infections;

2. patients requiring isolation;

3. tests on sterilization devices; and

4. bacteriological studies on personnel, patients or the environment.

The IC requirements included in the first (The Australian Council on Healthcare Standards 1976) and second (The Australian Council on Healthcare Standards 1977) editions of the ACHS Accreditation Guides for Australian Hospitals and Extended Care Facilities were unchanged. However, the third edition (The Australian Council on Healthcare Standards 1978) extended the membership of the ICC by recommending that a catering staff representative be included. The third edition published in 1978 also stipulated requirements of the ICN and included three additional recommendations for the work of the ICC. The additional work for the ICC included:

1. review of antibiotic usage and susceptibility and resistance trends;

2. review of all proposed hospital building plans; and

3. evaluation of all proposed new patient care equipment.

ACHS stipulated that the ICN should be a registered nurse with several years experience. The role of the ICN was to systematically detect, record and report all relevant nosocomial infections to the ICC. On receipt of these reports, the ICC would recommend appropriate action for supervision and implementation by the ICN.

Major prescriptive changes were introduced in the fourth edition of the Accreditation Guide (The Australian Council on Healthcare Standards 1981) including:

1. clinical control aspects of the ISCP such as handwashing, sterilization and disinfection, housekeeping, laundry, food handling, waste management, pharmacy, engineering, maintenance, and isolation of patients;

2. sanitation measures including linen handling and storage, installation of air-conditioning and heating, waste disposal and water treatment; and

3. additional representation on the ICC including Pharmacy, Supply, Engineering, Central Sterilising Services Department and Supply as well as representatives from each major clinical department such as Medicine, Surgery, Obstetrics/Gynaecology, Anaesthetics and Paediatrics.

In the fourth edition, ACHS (The Australian Council on Healthcare Standards 1981) made the first formal recommendation regarding ICP staffing. It was recommended that in large hospitals the ICN be employed full-time at supervisor level. For hospitals with fewer than 250 beds the recommendation allowed for employment of ICNs on a part-time basis, providing they were employed for a minimum of twenty hours each week. For the first time, ACHS endorsed that the ICN be administratively responsible to Nursing Division.

The fifth edition of the Accreditation Guide (The Australian Council on Healthcare Standards 1986) was unchanged. The sixth edition published in 1987 (The Australian Council on Healthcare Standards 1987) had the potential to erode the principal positions of ICNs in ISCPs in Australia. First, the ICN position was removed and the term "IC co-ordinator" was used to describe the person with overall institutional responsibility for co-ordinating the ISCP. This meant that the co-ordination of the ISCP was no longer the sole responsibility of a registered nurse, but rather that of "an appropriately qualified person." Secondly, the recommended IC staffing ratio of 1:250 beds was removed from this edition. There were no changes in the clinical IC recommendations (The Australian Council on Healthcare Standards 1987).

The ACHS IC program infrastructure requirements spanning the years 1988 to 1993 (The Australian Council on Healthcare Standards 1988; The Australian Council on Healthcare Standards 1989; The Australian Council on Healthcare Standards 1990; The Australian Council on Healthcare Standards 1991; The Australian Council on Healthcare Standards 1992; The Australian Council on Healthcare Standards 1993) remained unchanged from 1987. A major change to recommended IC surveillance activity occurred in 1991 with the development of CIs (Australian Council on Healthcare Standards Care Evaluation and The Royal Australian College of Medical 1991). The CIs addressed data-driven clinical decision-making. In 1994, ACHS stipulated that the IC co-ordinator must consult with either a microbiologist or pathologist. The microbiologist/pathologist became an integral IC team member with the recommendation that if a microbiologist/pathologist was not on staff within a facility, then one was to be appointed externally for consultation. This stipulation forced Australian ISCPs to move towards the overseas IC team style of managing hospital infections.

In June 1996, ACHS accreditation changed with the adoption of an "evaluation and quality improvement" (EQuIP) approach to monitoring the quality of care provided by a facility. The highly prescriptive requirements outlined in the previous ACHS Accreditation Guides were replaced by requirements that were more generic for IC such as:

1. the adoption of a systematic, organisation-wide approach to infection prevention;

2. ensuring all employees routinely take responsibility for infection prevention; and

3. providing appropriate vaccinations, protective apparel and equipment (The Australian Council on Healthcare Standards 1996).

ACHS at that time conceded that IC measures are complex, must be comprehensive and in Australia are dependent to a large degree, on the size and type of facility (McLaws et al. 1988). Accordingly, it encouraged facilities to consult relevant professional and industrial bodies to address legislative requirements and resources. Another important change occurred in 1997, ten years after the first Australian national prevalence survey and two years after the NSW Nosocomial Infection Outcome Indicator Project, when ACHS convened a Nosocomial Infection Clinical Indicator Workshop. Attendees were national experts invited to advise ACHS on future directions for nosocomial surveillance in hospitals participating in the ACHS accreditation program (Portelli 18 December 1998). The forum recognised the importance of relevant data collection and its ability to assist change in IC practices and procedures. However, the ACHS CIs remained unchanged in terms of validity from those originally published in 1991. In the second EQuIP Guide, (The Australian Council on Healthcare Standards 1998) published in 1998, generic IC requirements continued to mirror the requirements of the first edition (The Australian Council on Healthcare Standards 1996).

Although the ACHS ISCP requirements have been unchallenged for 25 years, there has been increasing agitation from members of the IC community for ACHS to improve the rigour (McLaws, Murphy, and Keogh 1997) and usefulness (McLaws et al. 1998) of its recommended IC CIs (McLaws, Murphy, and Gold 1995).

Now that the development of ISCPs has been examined, the different developmental styles of the ICP in U.K., Australia and U.S.A will be examined.

1.8 Infection control practitioners

1.8.1 UNITED KINGDOM

Although the U.S.A dominates the global IC community and spearheaded the development of formal ISCPs, the U.K. pioneered the development of the IC officer role (Central Health Services Council Standing Medical Advisory Committee 1959). A 1959 report on staphylococcal infections in U.K. hospitals recommended the appointment of an "infection officer". The infection officer was to be a senior member of a hospital's staff and was to have three specific functions. These functions were to:

1. inform hospital authorities of the incidence of sepsis;

2. to recommend appropriate measures to minimise sepsis; and

3. evaluate the efficacy of those measures.

The estimated amount of time required by an infection officer to co-ordinate and perform the above daily functions was approximately 15-30 minutes (May 1958). The role of the infection officer was revised in 1962 with a report on the "Infection Control Sister" (Gardner 1962). The ICS was reported as being a full-time position accountable for dealing with all health care workers involved in IC. The ICS role had additional responsibilities compared with those of the original infection officer. Specifically, the ICS had six core functions. These functions were:

1. to collect and prepare records of infection;

2. early identification and management of infected patients;

3. improving liaison between ward sisters and the matron regarding IC problems;

4. evaluating clinical practice;

5. maintain staff health records relating to infectious conditions; and

6. monitoring operating theatre staff staphylococcal colonisation, environmental auditing, evaluating the efficacy of IC recommendations and undertaking clinical research.

In the U.K., the number of ICNs appointed increased significantly from 1975 and their role differs slightly from that of their Australian counterparts. By 1993 most health authorities and administrative units had appointed an ICN who, unlike Australian ICPs, worked with an IC doctor in an IC team (ICT) (Law 1993). In Australia the ICP is most often responsible to the DON and confers with the Infectious Diseases Physician or Microbiologist. The ICN role in the U.K. has continued to evolve and has recently expanded to include risk assessment, risk management and a greater emphasis on quality aspects of health care.

However, until recently, the ICN was primarily considered an extension of the clinical ward team who was able to provide clinical advice and education to care givers. U.K. health providers now accept that the effectiveness of the ICN varies and that financial implications and constraints beyond those under the direct influence of the ICN also impacted on the overall effectiveness of the program.

The use of periodic prevalence studies, rather than routine prospective surveillance, to establish the magnitude of nosocomial infection is common practice and is in part due to financial constraints (Meers et al. 1981). Unlike the U.S.A ICPs, U.K. ICNs have had little understanding of epidemiologic principles and undertake surveillance of nosocomial infections that is not methodologically rigorous. Surveillance for IC focuses on responding to the identification of alert organisms.

As the U.K. ICNs have assumed new functions, including risk assessment, risk management and quality initiatives, their role has evolved. In a 1993 description of the role of the U.K. ICN (Law 1993) Law cites eight major categories of tasks that constitute the work undertaken by the ICN. These tasks are:

1 clinical;

2 teaching;

3 surveillance;

4 administration;

5 self-education;

6 ad hoc meetings; and

7 travelling to provide services across widely spread units.

The role of the U.K. ICN was clearly defined with the publication in 1993 of the U.K. Standards in Infection Control in Hospitals (Infection Control Standards Working Party 1993). The ICN must be a registered nurse who is undertaking or has completed post-registration education. Rather than simply conferring with the IC doctor, the ICN is responsible to the IC doctor and together they constitute the IC team.

The level of ICN staffing in the U.K. is dependent on the number of beds in each facility for which the ICN is responsible and the size and distance involved in servicing IC for each hospital within the ICN's area of responsibility. IC work is allocated to the ICT which includes an IC doctor, a Consultant Medical Microbiologist if the doctor is not specialised in Microbiology and the ICN. The ICN collaborates daily with the IC doctor and co-ordinates the functions of the ICT which are:

1. collaborating with the Communicable Disease Consultant in the event of outbreaks of food poisoning or other notifiable diseases;

2. liaising with other relevant Departments who have responsibility for environmental health, occupational health and safety and primary health care,

3. reviewing and monitoring policies and procedures,

4. co-ordinating surveillance activities, analysing results of same and where necessary, intervening based on the results;

5. co-ordinating and providing IC training and education to all relevant staff members;

6. ensuring suitable cover for 24 hours;

7. responding to critical IC incidents or outbreaks and undertake remedial action and reviewing of resources for investigation and control; and

8. in the event of a major incident, establishing an outbreak control group (Infection Control Standards Working Party 1993).

There is no literature either profiling the demographics of U.K. ICNs or detailing their allocation of IC hours and areas of IC priority. A major impediment to IC in the U.K. is the absence of a national standardised system of surveillance such as the NNIS. This limits the capacity of U.K. ICNs to assess the effectiveness of their roles locally and nationally.

1.8.2 UNITED STATES

Initially ICPs were only able to increase their IC skill and education by learning on-the-job (Larson, Butz, and Korniewicz 1988). This changed dramatically in 1968 when the CDC pioneered IC training through the "Surveillance, Prevention and Control of Nosocomial Infections" (1200-G) training course (Larson 1997). This course aimed to:

1. familiarise ICPs with the magnitude of nosocomial infections;

2. increase ICPs' understanding of the control, surveillance and prevention aspects of ISCP; and

3. to empower nurses through increasing their understanding of their ability to improve the quality of patient care by clinical intervention.

The impact of CDC on the ability and professionalism of ICPs reverberated around the globe and lead the professional development of ICNs in Australia and the U.K.. In 1976-1977, the U.S.A began to refer to their primary IC staff as ICNs. CDC undertook the first comprehensive report of U.S.A ICNs during Phase II of the SENIC project. It involved interviews with ICNs from 347 U.S.A hospitals that were considered representative of U.S.A acute care hospitals (Emori, Haley, and Stanley 1980). The authors noted that from 1970 to 1977 the proportion of U.S.A hospitals employing ICNs had increased dramatically from 6% to more than 80%. They also postulated that in the majority of hospitals it was likely that the ICN role would constitute the hospital's single greatest IC expenditure.

The ICNs, studied as part of SENIC, reported that formal responsibility for IC was for the most part (94%) that of a registered nurse. The majority (65%) of U.S.A ICNs in 1977 had a diploma as their highest qualification with a further 23% having a bachelor's degree. Less than one per cent had a master's degree. Nearly all (80%) ICNs reported having completed a course or seminar in IC. On average, the ICNs in this study reported spending 24 " 0.7 hours every week on control and surveillance activities with the actual time varying significantly depending on the size of the hospital. On average, one full-time equivalent was employed for every 250-300 beds although in hospitals larger than 300 the average number of ICNs was less than one full-time equivalent.

Unlike the U.K. ICNs, the U.S.A ICNs were most often accountable to the Nursing Service Department or to Hospital Administration rather than to the Medical or Laboratory Service.

Even though the U.K. ICN provided a useful model for the original U.S.A ICNs, Emori (Emori, Haley, and Stanley 1980) notes that in the 1970s, U.S.A ICNs' epidemiologic skills were maturing with the adoption of surveillance as a primary component of ISCPs. Another step in the evolution of ICNs was the term ICP, brought about by the formation of APIC where attendees chose the name Association for Practitioners in Infection Control rather than Association for Infection Control Nurses (Emori et al. 1998). In 1994 APIC changed its name to the Association for Professionals in Infection Control and Epidemiology, Inc (APIC). The name change was designed to reflect the expanded scope of practice of the ICP and the use of epidemiology in monitoring and preventing infections and other non-infectious outcomes (Russell 1995). Jackson recalls that the name change was strongly debated by APIC members and that overall they perceived the title "professional" to have more influence than that of “practitioner”. Interestingly, the term professional enabled APIC to retain its commonly used acronym. Another important change to the professionalism of ICPs in U.S.A has been the use of the term nurse epidemiologist. This title was adopted as it had more authority than the term ICN. The legitimate use of this title is questioned by pure epidemiologists who argue that only those with formal training in epidemiology should use the term nurse epidemiologist (Emori et al. 1998). Although the history of the title is somewhat chequered, by 1982 the literature began to refer to ICNs as ICPs. ICPs increased their professionalism with an in-depth analysis in 1982 of the tasks routinely performed and the skills and qualifications needed to undertake these tasks (McArthur et al. 1984; Pugliese et al. 1984; Shannon et al. 1984). The Certification Board of Infection Control, Inc commissioned this task analysis and the results were used to identify key IC practice areas and to design an examination that assessed ICP knowledge of each key area.

The findings of the 1982 task analysis profiled the typical ICP as a nurse who had worked in IC for between two and ten years, was an active member of the facility's ICC and had completed their most recent diploma or degree qualification 15 years prior to the survey. A small minority (54%) worked only as ICPs and most often consulted with the ICC chairperson for assistance with the ISCP.

ICPs indicated that they infrequently performed direct patient care activities. However, they considered microbiological knowledge and an understanding of infectious diseases to be integral to their role. ICPs also reported frequent use of epidemiologically sound methods for surveillance although statistical analysis of data was performed infrequently (Shannon et al. 1984). Irrespective of the hospital size, ICPs most often performed and considered important the following tasks (Pugliese et al. 1984):

1. development of IC policies and procedures;

2. surveillance of hospitalised patients;

3. preparation of oral and written reports of hospital-acquired infections;

4. education of personnel; and

5. consultation with hospital staff.

Regardless of the uniformity in the tasks performed by ICPs, in 1986, Weinstein suggested that the IC profession should clarify the minimum levels of education and skills that an ICP should possess. In addition to defining the minimum criteria, he also suggested that the APIC develop an internship or apprenticeship system that would enable up-skilling of ICPs. Weinstein challenged the IC community by suggesting that the absence of a standard knowledge and practice base limited the capacity of ICPs to be considered professional (Weinstein 1986).

In 1983 APIC published a core curriculum for ICPs (Soule 1983) and developed a system of certification (Pugliese et al. 1986; Pirwitz 1995) which aimed to protect and inform health consumers by providing a system that enabled ICPs to demonstrate competence through achievement of a minimum standard of practice and knowledge (Larson, Butz, and Korniewicz 1988).

Advocates for the ICN as the most appropriate health care worker to co-ordinate an ISCP included Larson who supported this claim by emphasising the managerial, clinical and patient care experiences and skills that nurses possessed. These skills were essential for monitoring and modifying clinical practice (Larson, Butz, and Korniewicz 1988). Larson also drew attention to the lack of research undertaken by nurses, citing the small proportion of nurses with formal education in research methodology or with doctoral level qualifications. To rectify this situation, the Johns Hopkins University School of Nursing began a Postdoctoral Nursing Fellowship in Infection Control in 1987. The principle goal of the Fellowship was to facilitate IC research by ICNs with advanced skills and knowledge of IC and research methods.

In 1987, Turner and colleagues surveyed all ICPs who worked in U.S.A acute care facilities with greater than 100 beds (Williamson-KM 1990). Turner's survey revealed that compared to the 1977 SENIC study findings, ICPs had increased the level of their education. Specifically, more ICPs in 1987 reported their minimum qualification as being an Associate Degree in Nursing rather than a Diploma as had been reported in 1977. Significant increases were also noted in the proportion of ICPs having completed bachelor and masters degrees by 1987. Of interest was the high proportion, 78.1%, of ICPs who reported APIC membership. The proportion who had completed the Certification Board certification process was not measured.

In view of Turner's 1987 findings and the changes to the ICP role, the 1982 ICP task analysis was repeated five years later in 1992 (Bjerke et al. 1993). Analysis of the second examination into IC tasks was again used to inform the Certification process. This feedback enabled the certification examination to continue to be an appropriate tool for evaluating ICP skill and knowledge (Bjerke et al. 1993). In 1992, less than half of the ICPs surveyed reported responsibility for positions other than IC. The majority of respondents were qualified at either bachelor (43.9%) or master (21.4%) level and on average had worked in IC for ten years prior to the survey. In the two years prior to the survey the mean number of hours ICPs worked in IC each week was 31.

In 1995, the Certification Board developed a revised measurement tool. This tool was administered to 4,967 IC professionals residing in Canada or the U.S.A (Turner, Kolenc, and Docken 1999).

Of interest is the definition of an IC professional used by investigators to determine the target population and sample. An ICP was by definition:

1. a person with at least two-years direct experience working in a health care setting; and

2. responsible for collection, analysis, and interpretation of epidemiologic data relating to infections; and

3. responsible for investigation and surveillance of suspected infection outbreaks; and

4. performing at least three of the following clinical activities:

   - planning, implementing and evaluating infection prevention and control measures;

   - providing education concerning infection risk, prevention and control;

   - developing and revising IC policies and procedures;

   - managing infection prevention and control activities; or

   - consulting on infection risk assessment, prevention, and control strategies.

The random sample included 4,467 APIC members and 500 members of the Canadian professional organisation, Community and Hospital

Infection Control Association in 1996. The survey collected demographic detail and data relating to 134 IC job activities.

A 30.8% response rate included useable responses from 1530 ICPs. Most respondents (34.8%) had ten or more years of experience working in IC although more than half (51.85) were not certified in IC. Less than half (44.4%) of respondents worked in facilities with more than 200 beds. The current Certification Board examination content has been modified based on the analysis of respondents' ratings for various tasks. Compared with the findings of the 1992 survey, the 1996 task analysis suggests that ICPs perform 29 additional individual tasks. The revised examination content has been designed on the premise that the 127 tasks ICPs perform can be categorised under five major headings which are:

1. identification of infectious disease processes;

2. surveillance and epidemiologic investigation;

3. preventing/controlling the transmission of infectious agents;

4. program management and communication; and

5. education.

In 1997, a year after the third survey, U.S.A ICPs were surveyed again (Jackson, Soule, and Tweeten 1998). This time, ICP's attitudes concerning changes to health care since 1994, including managed care and published IC guidelines and standards and the impact of these changes on their profession were targeted. Jackson's respondents conceded that managed care had irreversibly changed the way in which health care was delivered, yet were, however, unable to demonstrate the impact of this change on their own IC role and responsibility. Jackson found that 65% of respondents had either a bachelor degree or higher. ICPs reported working an average of 40 hours per week in IC. Irrespective of their setting, ICPs allocated the greatest proportion of their total IC time to surveillance activities. The average amount of IC time consumed by surveillance was 30%. Education was the next most time consuming aspect of their work and was followed by policy development and review.

The level of certified ICPs was low (38%) and Jackson promotes certification as an indicator of commitment to IC and as a guarantee of a practitioner having met a minimum level of competence in the discipline. Largely, ICPs agreed that epidemiologic principles must underpin their work, particularly if they venture into measurement of non-infectious outcomes.

In 1998 a Consensus Panel (Scheckler et al. 1998) was convened by the Society for Healthcare Epidemiology of America (SHEA). Its role was to make recommendations on the requirements for infrastructure and essential activities of IC and epidemiology in hospitals. The Panel suggested that the range of responsibilities of the IC professionals had increased and become more complex. This was due in part to more acutely ill patients constituting the inpatient population while less ill patients consume greater amounts of care in outpatient settings. The Panel rejected the earlier SENIC recommendation that an effective ISCP required one ICP for every 250 occupied beds. An alternate recommendation for staffing was not given although the Panel suggested a higher staffing level would be more appropriate. The CDC and APIC are currently undertaking a review of ICP staffing levels in the U.S.A with the intention of developing a predictive model for IC staffing (APIC Research Foundation 1998).

The report included two specific recommendations regarding ICPs. Firstly, that all hospitals should have the services of a trained epidemiologist and an ICP and secondly, that ICPs should undertake certification in IC (Scheckler et al. 1998).

Like the ACHS in Australia, the JCAHO has been largely responsible for shaping the role of U.S.A ICPs and ISCPs by publishing prescriptive Standards for Surveillance, Prevention and Control of Infection. The current JCAHO recommendations (Joint Commission on Accreditation of Healthcare Organizations 1996) (Appendix 1) are more extensive than those of the ACHS (The Australian Council on Healthcare Standards 1998) and differ in their emphasis on outbreak prevention and management and their insistence that management systems are supportive of IC.

Despite its relatively long history and demonstrated effectiveness in the U.S.A, the ICP role is under threat (American Health Consultants 1998). Jackson observed that in some facilities the ICP position has been made obsolete (Jackson 1997). Although obsolescence of the ICP role is primarily a cost-cutting measure, Jackson supports earlier recommendations (Counts 1989) advising ICPs to extend the areas in which they exercise epidemiologic skill to that of non-infectious disease and in particular the monitoring and investigation of the procedures where risk, cost and volume is significant (Jackson 1997).

1.8.3 AUSTRALIA

After a Queensland state ICC, developed to respond to the pandemic of staphylococcal infection, found it was unable to manage day-to-day IC work, Princess Alexandra Hospital, Brisbane formed Australia's first hospital-based ICC. Princess Alexandra Hospital appointed Australia's first ICS, Nancy Wernigk, in October 1962. The first NSW ICN was appointed at Prince of Wales Hospital in 1965.

Neither AICA nor the Australian IC community has ever formally endorsed a title for those members of staff involved in co-ordination of ISCPs. The limited Australian literature refers to this group as ICNs, IOs or ICSs, however, more recent literature and AICA documents refer to this position as ICP.

Clear definition of the role and function of Australian ICNs or ICPs is unavailable. However, in 1973 the NSW IC Sisters attempted to define the ICN role by referring to the job description of the then Sydney Hospital ICN (Albera 1977). In 1976 the NSW Health Commission published a job specification for the Hospital Based Infection Control Sister.

NSW was the first Australian state to convene a formal meeting of the then ICSs (Albera 1977). The meeting, held in 1973 at the Royal North Shore Hospital and attended by four Sisters, is considered to be the catalyst which eventuated in the establishment in 1974 of the NSW Infection Control Group (Albera, Murphy, and Gold 1996). The NSW Infection Control Group formulated a constitution in 1981 and at that time became the Infection Control Association NSW.

The Australian Capital Territory (ACT) appointed its first ICP in 1967. The years in which the remaining Australian states and territory made their initial ICP appointments are unrecorded although the first AICA conference is recorded as being held in Canberra in 1987.

1.9 Infection surveillance and control programs - cost & efficiency

Calculation of the cost of nosocomial infections is difficult and subsequent to SENIC, Canada (Losos and Trotman 1984), the U.K. (Chaudhuri 1993; Mehtar 1995), and West Germany (Daschner 1989) have determined their own nosocomial infection prevalence rate and extrapolated U.S.A costs to determine local cost estimates and to measure savings from ISCPs.

The cost effectiveness of ISCPs was first addressed by McGowan in 1982. He argued that there were two reasons why administration should support ISCPs. These reasons were firstly, the desire to avoid litigation from clients acquiring a nosocomial infection and secondly, to comply with the JCAHO requirement that hospitals seeking accreditation support and demonstrate a specified level of ISCP activity and standard of infrastructure (McGowan 1982). McGowan warned that unless ICPs could convince financial controllers that ISCPs saved hospital costs, ISCPs would not continue. His advice in 1982 is still current and included recommendations that ISCPs increase cost-effectiveness by:

1. establishing which infections are increasingly expensive and how potential for these infections can be minimised or prevented;

2. eliminating procedures and practices that have no demonstrated IC benefit;

3. improving levels of compliance with those procedures and practices which have been demonstrated to be beneficial;

4. consideration of the expected effectiveness and efficiency of new measures; and

5. evaluation of untested IC measures.

In the 1980s, when the U.S.A adopted prospective payment systems for health care, determining the cost and reducing the incidence of nosocomial infection became a priority area for ISCPs (Beyt, Troxler, and Cavaness 1985). Only half of the diagnosis-related groups (DRGs) used in the prospective payment system allowed for complications. Of those that did, only one complication - that is, one nosocomial infection - would attract additional payment. Hospitals were therefore in a position where the costs associated with up to at least 50% of all nosocomial infections would not be reimbursed (Farber 1984). Conversely, the financial incentive to prevent nosocomial infection was compelling (Wenzel 1985) and provided sufficient rationale for ISCPs to be adequately staffed, directed by specific prevention aims and supported by established, proven surveillance and control techniques (Haley et al. 1987).

The concept of ISCPs as direct-revenue producing units was first proposed in 1985 when Haley suggested that, in those hospitals where the SENIC recommendations (Haley et al. 1985) had been fully implemented, a typical 250-bed community hospital could expect to save up to $1200 per hospital bed or 600 extra days of stay annually (Haley et al. 1985).

In 1989, Daschner noted that while best practice IC was cost-effective, it was still an expensive commodity (Daschner 1989). Accordingly, he advocated surveillance by objective that Haley had championed subsequent to the SENIC study (Haley 1985). McGowan also recommended change to the traditional ISCP by promoting ongoing evaluation of the ISCP by the ICP, updated strategic plans and increased reporting of ISCP changes to management. Promotion of ISCP successes to management and a more strategic focus on areas where the ISCP could make most difference were considered critical approaches for sustaining the impact and effectiveness of local ISCPs and the ICP position (McGowan 1990).

In 1991, Haley detailed methods for demonstrating the proven value of ISCPs and reaffirmed the earlier concepts of cost-effectiveness. He recommended that ICPs calculate the costs of either days of illness or directly attributable costs of nosocomial infection and simultaneously demonstrate the proportion of actual infections that the ISCP prevented. Haley continues to endorse this strategy for ISCPs attempting to gain the same priority that management apportions to other activities which are capable of raising revenue (Haley 1991; Haley 1998).

In view of a recent publication that questions the impact of nosocomial infection patient outcome demonstrating the directly attributable cost savings of an effective ISCP may be problematic. (Rello J 1999) Rello's work challenges long held beliefs relating to the acquisition of nosocomial infection and asserts that severity of illness has a greater impact on evaluating the outcome of patients with hospital acquired infection.

Demonstrating the link between increased cost and nosocomial infection is complex

Although independent, comprehensive, costing of ISCPs and nosocomial infections has not been undertaken in either Australia, Europe or the U.K., key stakeholders in these countries have used local prevalence data and U.S.A costs to estimate the national cost of nosocomial infections and justify national expenditure on ISCPs (McLaws et al. 1988; Chaudhuri 1993; Jepsen 1995; Mehtar 1995). The success of ISCP models in less wealthy countries has however been demonstrated (Huskins et al. 1998).

The economic argument continues to underpin attempts to justify IC expenditure and the livelihood of ISCPs (Wenzel 1995; Jarvis 1996). However, experts recommend the adoption of new and creative IC measures and strategies. These measures include exercising more quality-driven approaches to ISCP and closer collegiate ties with peers that are skilled in health economics and health service delivery. To facilitate the adoption of these measures in Australia, the profession is dependent upon the development of more evidence-based approaches to IC and greater advocacy by associated stakeholders, such as ACHS, AICA, government and other regulatory bodies.

1.10 Evidence-based infection control

1.10.1 THE VALUE OF RESEARCH

Lacey argues that in the general nursing profession, research plays three critical roles (Lacey 1994). Firstly, it professionalises nursing by providing a unique body of knowledge, secondly, it assists the assertion of power and status by the nursing profession and thirdly, it directs the delivery of patient care. In Australia the majority of ICPs are nurses, (Murphy and McLaws 1999e) and it is reasonable to expect IC research in Australia to make a similar contribution to the IC profession as nursing research has to the general nursing profession.

1.10.2 IMPEDIMENTS TO IC RESEARCH IN AUSTRALIA

The lack of ICP-authored, published Australian IC literature is of concern as it seriously impedes the proclamation by the Australian IC community that they are professionals. More seriously, it also limits the extent to which Australian IC practice can be based on local evidence and experience. The literature cites several factors that impede widespread adoption of evidence-based nursing practice. These factors could equally limit the ability of Australian ICPs to define and adopt evidence in IC and include:

1. the inability of ICPs to locate research findings (Pearcey 1995);

2. limited training opportunities for ICPs in research methodology and writing for publication (Pearcey 1995);

3. the inability of Australian ICPs to design and undertake IC research (Hicks 1995);

4. limited opportunities and support for Australian ICPs to critically appraise research findings and apply recommendations to their programs (Pearcey 1995);

5. minimal support from management for IC research activities (Funk et al. 1995) ;

6. the absence of a local, peer-reviewed, scientific journal for wide circulation of findings (Murphy et al. 1997);

7. limited computer skills and access for purposes of data entry, analysis and storage; (Murphy and McLaws 1999d) and

8. existing limitations in the ICPs autonomy to apply research findings (Lacey 1994).

Regardless of the impediments to undertaking research and applying evidence-based approaches to IC, it is imperative that Australian ICPs increasingly base their practice on research. Limited health funding dictates that all health care, including IC, be delivered in the most cost effective manner possible (Hicks 1995; Jackson 1997).

1.10.3 THE IMPACT OF EDUCATION ON RESEARCH ACTIVITY

Traditionally, nursing was a non-academic career with a strong vocational base, however the recent transition in Australia to nursing education in the tertiary sector has resulted in the inclusion of basic research methods in the nursing curriculum. Without doubt, recent graduates who progress to the position of ICP will be more familiar with the processes of accessing, designing and appraising research. This familiarity may negate some of the previously described factors that have limited nurses undertaking appraisal of published works and initiating their own individual research studies (Hicks 1995). Hicks' 1995 study of 230 nurses found that reasons that nurses failed to publish research included uncertainty about research methodology, lack of confidence and lack of time. Of particular interest was the finding that although 45% of respondents cited time as a limiting factor to writing up, 71% of respondents had in fact undertaken research.

1.10.4 PUBLICATION OF RESEARCH

The publication of research methods and findings is critical to the ongoing development of the global IC profession and Larson eloquently reminds the profession of its obligation to review the scientific literature in order to maintain an up-to-date knowledge of IC practices (Larson and Satterthwaite 1989). Prior to 1998, AICA's official publication, the Australian Infection Control Journal, was not peer-reviewed. It is therefore probable that in order to gain critical review of their work, Australian IC professionals were compelled to seek publication in international IC journals or in a more generic, peer-reviewed publication, such as The Australian Medical Journal.

To maximise the impact of Australian IC research, it is imperative that these findings are easily available to and accessed by Australian IC professionals. The first stage of facilitating this process has included the development of a formal peer-review process for the AICA journal. The next logical step should be the development by AICA of formal training initiatives on reviewing the literature, research methods and writing for publication. The purpose and value of a peer-review process as a sensitive screening tool has been well described by Larson who is equally cautious in describing the weaknesses and vulnerability of such a system (Larson 1998).

In the U.S.A, both leading IC professional organisations, APIC and SHEA have established peer-reviewed scientific publications. APIC has published American Journal of Infection Control (AJIC) since 1977. AJIC currently has a circulation of approximately 14,000 (Larson 1998). AJIC is recognised internationally as the leading forum for describing advances in IC and reporting IC findings from IC professionals globally. AJIC's ranking by impact factor is in the top 4% of 4,730 scientific journals (Mosby 1998). Since 1980, SHEA has published Infection Control and Hospital Epidemiology (ICHE) which includes a mixture of articles relating to IC and hospital epidemiology (Scheckler 1998). Both journals are useful for world-wide dissemination of IC information and their ability to attract publications demonstrates the contribution that such publications make to the ongoing development of the IC profession and its body of knowledge. The establishment of a scientific publication of similar standard and quality in Australia will do much to encourage Australia IC professionals to undertake and publish research. In addition, it will provide an easily identifiable and accessible point for IC professionals to search the relevant literature.

1.10.5 APPLYING RESEARCH TO PRACTICE

Knowledge of research methods, the ability to write and publish findings and the capacity to apply findings and recommendations are valuable and necessary skills for the modern ICP and facilitate the development of rational policy and guideline statements for IC practice (Edmond 1995). The importance of using science to underpin practice and develop standards has recently been reaffirmed (Underwood and Pirwitz 1999). Underwood and Pirwitz demonstrate the important contribution evidence makes in the setting of standards. They also provide a useful model for the comprehensive development by professional organisations of state of the art documents.

Tornquist cautions that authors must be careful in ensuring that their work is useful to practitioners. She describes a propensity for authors to publish work in the format of theses and dissertations rather than in a form that is easily readable and clear (Tornquist, Funk, and Champagne 1995). The ability of nurses to locate and critically read research reports is also cited as an issue impeding wider application of research findings to clinical practice (Pearcey 1995). In addition, Tornquist describes scientific conferences as opportunities for confident researchers to espouse their work and their findings. She urges nursing researchers to bridge the gap between nursing research and the application of findings in the clinical setting (Tornquist, Funk, and Champagne 1995). In the absence of any formal record of current IC research or AICA sponsorship of IC research, it is difficult to establish whether Australian ICPs do tailor their IC practices and programs to accommodate local findings. Calls for Australian nurses and therefore most Australian ICPs, to base their practices on evidence have included legal, moral and ethical arguments that patients must be given the choice of undergoing procedures that are based on accurate, relevant and current findings (Shorten and Wallace 1996). As Shorten has suggested for the general Australian nursing profession, ICPs must also develop strategies to overcome any of the barriers to changing practice to an evidence-based platform. Strategies may include developing the skills of Australian ICPs in reading, writing, appraising and undertaking research, and increasing their ability to use computers and access electronic sources of IC information.

Australian ICPs will inevitably adopt more evidence-based approaches to their practices and programs. It is however interesting to note that, despite the existence of sophisticated systems, tools, products and training opportunities for ICPs in the U.S.A, the use of outdated IC practices there is still significant. In 1984, Jackson first questioned the use of obsolete practices and recommended that ICPs cease performing IC rituals and adopt more epidemiologically sound approaches to their IC practices and recommendations (Jackson 1984). However, a 1995 survey of APIC members found that the proportion of APIC members performing outdated practices which they did not want to change, ranged from 58% undertaking total surveillance to 1% performing disinfectant fogging of isolation rooms. Of interest was the significant finding that certified respondents were less likely to support outdated practices compared with non-certified respondents (Pirwitz and Manian 1997).

1.10.6 THE ROLE OF COMPUTERS AND COMPUTING SKILLS IN EVIDENCE-BASED IC

Difficulty performing statistical analysis is suggested by Tornquist as a powerful factor in nurses' reluctance and ability to undertake research (Tornquist, Funk, and Champagne 1995). The ability of computers and specialised software to minimise the historic task of "bean counting" and to facilitate and perform complex epidemiologic IC-related analysis is well described (LaHaise 1990). More recently, Reagan has described personal computers as being "ubiquitous" within the health care setting (Reagan 1997) although he also provides a series of reasons why IC staff have historically demonstrated a reluctance to adopt widespread computerised systems.

The literature includes several papers that support the use of computers in various aspects of IC. The most convincing argument for adopting computerised systems for IC and for surveillance in particular, is that IC staff must be able to maintain continuity of analytical thought (LaHaise 1990) and respond to IC events in a timely fashion (Burke et al. 1991). LaHaise also argues that management of different data systems by the IC staff requires functions best performed by a computer. In contrast, Reagan supports computer use by describing how manual systems can no longer adequately facilitate and support the collection, storage and analysis of the large amounts of data required by IC and hospital epidemiology staff. This argument is strengthened further by Reagan's suggestion that in circumstances where human resources for IC are scarce, staff have an obligation to make best use and allocation of their available time (Reagan 1997).

Application of computers and sophisticated information systems to IC are well described in the literature and include education (Wright, Turner, and Daffin 1997), surveillance (Gaynes et al. 1990; Burke et al. 1991; Classen et al. 1991; Mertens, Jans, and Kurz 1994; Smyth et al. 1997), information exchange (Friedman 1996; Sellick 1997), compliance with accreditation requirements (LaHaise 1990), identification of at-risk patients (Broderick et al. 1990), management of clinical problems (Carr et al. 1997) and dissemination of information (Harr 1996; Saba 1996; Sparks 1996).

1.10.6.a) Surveillance

In 1990, Gaynes and colleagues (Gaynes et al. 1990) provided the first useful model to assist IC staff in the evaluation and selection of a computerised system for surveillance. By describing the process in their own hospital, the authors were able to identify six critical areas for consideration in assessment of IC information systems. These areas were the:

1. presence of on-line help screens;

2. flexibility and systems for updating software;

3. inclusion of edit checks;

4. type and ease of data entry;

5. format of output data; and

6. methods and power of statistical analysis.

Researchers stressed the need for hospitals to seriously consider the advantages and associated costs inherent in a transfer to a computerised system. This early publication offered a cautious and conservative view of information technology that would have been appropriate for its time.

In contrast, Burke and colleagues described a state-of-the-art application, the Health Evaluation through Logical Processing (HELP) system, which had demonstrated significant improvement to the efficiency of the surveillance program and the ability of the ICT to apply and modify IC practice. (Burke et al. 1991). HELP involved a complex system of data capture and provided output in the form of warnings and reminders for practices such as antibiotic prescription and isolation of patients. HELP also generated a daily list of patients with nosocomial infection and used artificial intelligence to review comprehensive electronic patient records to identify those patients most at risk of acquiring a nosocomial infection (Classen et al. 1991). More recently, HELP has been described as an expensive expert system beyond the reach of most IC budgets but one which will most likely assist the development of more generic, less complex and less costly local IC information systems (Freeman 1998).

The literature also includes reports of specific software used for national surveillance in Belgium (Mertens, Jans, and Kurz 1994) and the U.S.A (Gaynes et al. 1990; Freeman 1998). In Belgium, 39% of target hospitals provided data during a national prevalence study. The authors cite lack of computer experience and skill as a possible factor for hospitals dropping out of the study (Mertens, Jans, and Kurz 1994). While the IDEAS software program is acknowledged as an integral component of the overall NNIS system, critics suggest that its inflexibility forces hospitals to amend their surveillance programs and specifically the definitions they use to define cases of nosocomial infection, so as to conform to the CDC requirements (Gaynes et al. 1990). It would, however, be impossible for the level of standardisation of the NNIS program to remain intact if greater flexibility were built into the IDEAS program. A comparison of two commercially-available software programs reports their respective ability to mirror the NNIS system definitions (LaHaise 1990).

Problems of data entry and validation in IC are reported (Broderick et al. 1990) and practitioners have suggested innovative methods to overcome this problem (Smyth et al. 1997). Smyth describes a system of automated entry using automatic database design and scanning of surveillance data, comparing this method to more traditional manual entry of data into a personal computer. Significant savings in time and similar levels of accuracy were noted (Smyth et al. 1997). In view of increasing calls for economic use of IC time, (Reagan 1997) further examination of such systems is required.

Australia has developed IC-specific software and information systems (McLaws and Whitby 1999). International experience suggests that computerised surveillance is and will continue to be an increasingly important component of modern ISCPs.

1.10.6.b) Information Exchange

Both Sellick (Sellick 1997) and Freidman (Friedman 1996) report the ability of electronic mail (e-mail) to expedite the rapid transfer of IC information across and between countries. From Freidman's perspective, information technologies have resulted in enhanced opportunities for and potentially better performance by ICPs. Sellick embraces the usefulness of e-mail and suggests that it will become imperative for epidemiologists, however he cautions against extinction of face-to-face interaction.

1.10.6.c) Requirements for Accreditation

One of the most practical uses of IC software and therefore one of the most marketable components of commercial software, is its ability to assist ICPs in fulfilling the requirements of their respective accrediting agency (LaHaise 1990; Freeman 1998). In Australia, the ACHS advocates surveillance and ongoing quality initiatives as part of its IC program requirements (The Australian Council on Healthcare Standards 1998). To date it has neither provided nor recommended software that will facilitate this process in

Australian hospitals and no such commercial software is available in Australia.

1.10.6.d) *Identifying At-Risk Patients*

An early report of a computer model details how microbiological, clinical and pharmaceutical data are collated and combined for predicting those patients at greatest risk of infection (Broderick et al. 1990). Such a system would facilitate prophylactic IC and enables ICPs additional time to maintain their ward-based activities.

1.10.6.e) *Clinical Problem Solving*

The capacity of information technology to influence clinical decision-making and problem-solving is explored further by Carr and colleagues (Carr et al. 1997) who reported information system-initiated clinical applications at the Millard Fillmore Health System including:

1. review of antibiotic use according to culture and sensitivity reports;

2. reducing prescription of antibiotics for colonisation;

3. improved, appropriate duration of antimicrobial use for organisms with the potential for increased or multiple resistance.

At Millard Fillmore, the information systems also provide appropriate models for costing nosocomial infection and for profiling the use of antibiotics in individual patient rooms and wards. Costing information is useful for demonstrating the cost-benefit of a facility's IC program. In contrast, information regarding antibiotic use in specific locations is extremely useful in reviewing and intervening in the development of multiple resistance within a facility (Carr et al. 1997). Australian ICPs have not reported similar systems of excellence and it is heartening to learn that paper-based systems, not electronic information systems, are most common in U.S.A hospitals (Freeman 1998).

1.10.6.f) Dissemination of Information

The capacity for information systems to facilitate information exchange and personal computers to assist ICPs to access and analyse such information is well described. Recent innovations include the establishment by APIC of a World Wide Web site and discussion forum (Harr 1996). This development enables IC to have a presence on the information super-highway and also facilitates global dissemination of critical IC information. Sparks predicts that ICPs will increasingly use the Internet in their practice and that it will become an essential tool for effective ISCPs and activity (Sparks 1996). The transition from accessing the Internet to developing an individual presence on the Internet is also likely, although the complex tasks involved in establishing a web presence may preclude many ICPs from taking this additional step (Saba 1996).

In 1997, AICA launched its World Wide Web site http://www.aica.org.au. This site provides global access for ICPs, health care professionals and members of the public to information regarding AICA activities and IC in Australia and neighbouring countries. The extent to which Australian ICPs are capable of accessing and do access the Internet is unreported, although international trends of increasing use of electronic resources by ICPs are likely to apply in Australia over time.

1.10.6.g) Impediments to Wider Use of Computers and Disadvantages

Generally, the literature agrees that computer use improves the efficiency of an IC program and expedites application of IC measures (Burke et al. 1991). Stronger supporters have suggested that hospital information systems are an essential component of any nosocomial surveillance system (LaHaise 1990; Mertens and Ceusters 1994). Freeman however, suggests caution and serious consideration of the cost-benefit of computerising an IC program. He also identifies that the decision must be an individual one for each facility and setting depending on the respective goals and objectives of the individual IC program (Freeman 1998).

The debate on computerisation also acknowledges the disadvantages of widespread computer use and the modifications that an ISCP requires before computerisation can be truly beneficial. These include:

1. the need for reliable support (Gaynes et al. 1990; Reagan 1997);

2. consideration of the time required to learn specific programs and hardware (LaHaise 1990; Mertens, Jans, and Kurz 1994; Reagan 1997; Freeman 1998);

3. involvement of IC end-users in design of the system (Burke et al. 1991);

4. awareness of the possibility that tasks now performed by humans will be performed by computers (Classen et al. 1991) and the reduction in face-to-face interaction (Sellick 1997); and

5. key-boarding errors and subsequent data inaccuracies (Freeman 1998).

Despite the obvious barriers to widespread adoption of computerised systems by ICPs, it is essential that ICPs improve their computing skills and periodically review the cost-benefit of adopting more computerised systems. If IC mirrors other professions, it is inevitable that growth of the IC profession and ICPs world-wide and in Australia will require increasing use of information technology. The speed with which changes occur in this area warrants careful consideration of each issue identified in the literature. As Australia develops additional IC-specific software, it is likely that ICPs in this country will become more competent which will hopefully facilitate ongoing research, analytical and publishing activity. The ultimate goal will be an increased body of Australian IC evidence and wider application of these findings to Australia IC practice.

1.11 Advocacy for infection control

Emori first identified the important role of advocates for IC in 1980 (Emori, Haley, and Stanley 1980). Other authors have since confirmed the contribution to IC professional growth made by professional associations, government and regulatory agencies.

1.11.1 THE ROLE OF PROFESSIONAL ASSOCIATIONS

There is one global IC organisation, the International Federation for Infection Control, (IFIC). IFIC was formed in 1987 with a goal to reduce nosocomial infections world-wide (Hambraeus, Paardekooper, and White 1997). IFIC works towards this goal through four strategies which are:

1. establishing a network for dissemination and sharing of information, achieving consensus and education;

2. negotiating and collaborating with related global agencies such as the World Health Organization (WHO);

3. developing and providing IC information and resources to resource-poor countries with limited IC expertise; and

4. where necessary, helping countries without local IC organisations to form networking mechanisms.

The tyranny of distance and the impact of local regulation and legislation does to some extent limit the development of a global approach and solution to IC although IFIC members subscribe to the common goal. To date IFIC's achievements include publication of a periodic newsletter, co-ordination and hosting of scientific meetings and development of an education booklet on IC basics. The governing body of IFIC is cognisant that IFIC's activities are designed to complement IC activities in countries where formal organisations exist and develop encourage activities in those countries less well-developed in terms of IC program and infrastructure (Hambraeus, Paardekooper, and White 1997).

AICA is a member of IFIC and has been represented at recent IFIC meetings. AICA's maturity as a professional has been more recent as evidenced through the publication of the AICA journal, the AICA web-page and the regular AICA-sponsored scientific conferences. Prior to developing a strong internal infrastructure and product portfolio AICA has been limited in the extent to which it could contribute to IFIC initiatives. This situation is perhaps also influenced by Australia's geographic isolation from Europe and the frequent consideration and often adoption, by Australian ICPs of U.S.A and U.K. IC practices and recommendations.

APIC is the largest single professional association for ICPs with 11,496 members at the end of 1996 (Jackson, Soule, and Tweeten 1998). Although based in the U.S.A, 10% of the readership of the APIC's journal reside outside of the U.S.A (Larson 1998) indicating APIC's world-wide influence.

In addition to AJIC, APIC provides the following services for members and ICPs (Russell 1995; The Association for Professionals in Infection Control and Epidemiology 1998):

1. sponsorship of training and educational workshops;

2. hosting of an annual scientific meeting;

3. publication of "position papers" which inform the IC community of APIC's preferred position on controversial, contentious or unresolved IC issues;

4. lobbying of government for health care reform; and

5. collaboration with other U.S.A and external IC stakeholders.

SHEA was formed in 1980 and its membership of physicians and PhD qualified professionals facilitates its position as an advocate of epidemiologic method in IC activities and in non-infectious aspects of health care. Like APIC, SHEA also convenes annual meetings, publishes position papers and provides advice to government and regulatory agencies. Collaboration between SHEA and APIC is evidenced by their joint participation in the development of position papers and guidelines and publication of these materials in their respective scientific journals (Scheckler 1998). SHEA oversees the publication of two scientific journals, one relating to quality issues in health and the other, ICHE, which provides a peer-reviewed forum for publication of scientific findings relating to IC.

The absence in Australia of an independent body with similar goals and membership functions to SHEA may be impeding the broader understanding and appreciation of epidemiologic methods by ICPs and medical staff involved in co-ordinating Australian ISCPs. In addition, the small proportion of non-nursing members of AICA (Murphy and McLaws 1999e) makes it difficult for AICA to represent professionals other than nurses who are involved in the delivery and co-ordination of IC services. These professionals include commercial members, dentists, non-medical microbiologists and physicians. Greater collaboration between all IC professionals in Australia, irrespective of their background, will strengthen the ability of the profession to influence government and other related agencies in their IC reforms and initiatives.

Like Australia, the U.K. has two separate professional associations for IC, the Infection Control Nurses Association (ICNA) and the Hospital Infection Society (HIS). Both groups were formed in the early 1970's, ICNA by nurses and HIS by medical microbiologists (Barrett 1999). HIS and ICNA both convene periodic scientific conferences for IC and publish IC material. The membership of ICNA is not recorded although HIS reports a membership of approximately 700, 500 being U.K.-based. Barrett describes a collaborative relationship between the two groups, which facilitates and is strengthened by, joint implementation of IC and development of guidelines. In 1993, a joint Working Party, representing ICNA, HIS and the Association of Medical Microbiologists and the U.K. Public Health Laboratory Service, published IC Standards (Infection Control Standards Working Party 1993) which represent consensus opinion on fundamental aspects of IC.

1.11.2 THE ROLE OF ACCREDITING BODIES

1.11.2.a) The Joint Commission for The Accreditation of Healthcare Organizations

Scheckler advocates that the JCAHO requirement for hospitals in the U.S.A to have a co-ordinated IC program was the greatest incentive for hospitals to adopt and apply CDC recommendations (Scheckler 1998). JCAHO played this pivotal role from the early days of the profession and recent recommendations which exclude this requirement are predicted to have interesting effects on the long-term viability of traditional U.S.A ISCPs (Scheckler 1998).

1.11.2.b) The Australian Council on Healthcare Standards

ACHS's contribution to Australian IC is well described in the previous sections of the literature review that detail the history and development of the profession in Australia. The report of literature relating to Australian IC surveillance details ACHS's influence in the development of clinical indicators for nosocomial surveillance and measurement of the quality of ISCPs (McLaws, Murphy, and Keogh 1997; Portelli, Williams, and Collopy 1997).

Although ACHS, like JCAHO, no longer specifies that Australian hospitals participating in its accreditation process require an ICC, the ongoing requirement for collection of indicator data implies that an ICC will oversee the process (The Australian Council on Healthcare Standards 1998).

1.11.3 THE ROLE OF CERTIFYING BODIES

The Certification Board of Infection Control (CBIC) maintains a unique and important role in advocating best practice IC (Pirwitz 1995; Docken 1998). Since its inception, certification has protected IC consumers by ensuring that certified ICPs practise to a level which is pre-defined and fitting for their profession (Pugliese et al. 1986). The periodic review of IC and ICP activity undertaken by CBIC ensures that the profile of ICPs is maintained and their programs evaluated from a task-analysis perspective (McArthur et al. 1984; Pugliese et al. 1984; Shannon et al. 1984). The certification process and the certified ICP, to some extent, legitimise IC and most recently an expert panel chaired by Scheckler recommended that ISCPs in hospitals be co-ordinated by certified ICPs (Scheckler et al. 1998).

Without a certification process or a body such as the CBIC, Australian ICPs struggle to demonstrate their competence and legitimacy (Murphy and McLaws 1999b). AICA is currently in the process of considering the feasibility of introducing a system of credentialling ICPs (AICA Credentialling and Certification Subcommittee 1997). It is likely that a comprehensive task analysis of Australian ICPs would further legitimise this professional group. In the absence of an advocate such as CBIC, the task of co-ordinating such a review should be undertaken by AICA.

1.11.4 GOVERNMENT AND REGULATORY AGENCIES

1.11.4.a) Hospital Infection Control Practices Advisory Committee (HICPAC)

In 1991, the U.S.A Department of Human Health and Services chartered the establishment of a twelve-member committee, the Hospital Infection Control Practices Advisory Committee (HICPAC), with specific terms of reference to advise and guide the CDC on matters relating to IC, surveillance and prevention of infection in U.S.A hospitals (Garner 1993). HICPAC membership includes representation from each discipline involved in IC decision-making including nursing, epidemiology, public health and medicine. The collegiate nature of HICPAC and the broad stakeholder consideration that it facilitates, as well as its tendency to reduce introspection on IC matters, are seen by experts as two of its major features (Garner 1993). The representation and consultation involved in HICPAC deliberations, as well as the acceptance of HICPAC guidelines as consensus documents, demonstrate its capacity as a key advocate for IC in the U.S.A (O'Rourke 1995). HICPAC supporters have, however, cautioned that HICPAC and its members must continue to publish clear guidelines and avoid the pitfalls of unnecessary sensitivity to political or commercial demands.

In Australia, there is no one body with terms of reference or powers equivalent to those of HICPAC. Australian state and territory governments adopt and advocate individual IC policy positions. The most highly controlled state for IC is NSW who in 1995 promulgated IC regulations for selected registered professionals. This action was taken subsequent to a report of patient-to-patient transmission of HIV (Chant et al. 1993) and strengthened NSW's IC policy position. No other Australian state has legislated for IC although the Queensland Government is currently considering this line of action (Olesen 1999). The Federal government's first detailed and specific IC policy position was published in 1996 jointly by the NHMRC and the Australian National Council on AIDS (National Health and Medical Research Council 1996).

1.11.4.b) National Health and Medical Research Council

The NHMRC was formed in 1936 with its current administration reporting to the Commonwealth Minister for Health and Aged Care. Like HICPAC, the NHMRC uses a collaborative multidisciplinary approach to meet its four statutory obligations which are:

1. to improve the standard of public and individual health in Australia;

2. to achieve consistency between the health standards advocated by individual States and Territories;

3. to encourage medical and public health research and training opportunities; and

4. to raise awareness of the ethical issues surrounding health (National Health and Medical Research Council 1999).

At the time of its release, the National policy was referred to as a sentinel report on IC providing a comprehensive guide to minimum standards for IC in various health care services.

1.11.4.c) National Centre for Disease Control (NCDC)

The NCDC is a Division of the Commonwealth Department of Health and Aged Care. NCDC undertakes activities aimed at reducing the incidence and associated social and economic burdens of infectious disease in Australia (National Centre for Disease Control 1999).

1.11.4.d) Communicable Diseases Network Australia New Zealand (CDNANZ)

In 1989, the NHMRC and the Australian Health Ministers Advisory Council (AHMAC) established the CDNANZ to provide a strong national capacity for control, surveillance and prevention of communicable disease. The CDNANZ collaborates with key stakeholders in various institutions in each state and territory to encourage development of national policy positions for communicable disease. The CDNANZ is supported and directed by the NCDC.

In 1998, CDNANZ established a steering committee to guide the revision of the previous NHMRC IC guidelines (National Health and Medical Research Council 1996). The NCDC is supporting the revision through scientific and administrative support (Zealand 1998).

The inconsistency with which National bodies have adopted and discarded portfolio responsibility for IC policy and definition of best practice Australian IC, has in some cases lead to confusion amongst ICPs regarding access to current IC information in Australia. The unresolved discrepancies between national guidelines and individual state policy positions, compounds this problem and limits cohesion between Australian ICPs. Although AICA provides limited national consensus, the voluntary nature of its membership and the honorary capacity in which AICA Executive members perform their respective roles are disincentives to the establishment of a strong, united and centralised body. Australian IC needs one central body that can be clearly and readily identified as the agency best reflecting consensus. Such an agency would enable the IC profession to progress and to adopt and affirm strong positions and comment on Australian IC. Until such a group champions advocacy for Australian IC and commands the support of IC professionals from all disciplines, Australian IC will continue to be fragmented and only partially effective.

This literature review has provided an overview of the development of ISCPs and the ICP in the U.K., U.S.A and Australia. Review of the published literature indicated few reports of Australian ISCP activity and ICP role and function. Chapter 2 provides a comprehensive description of Australian ICPs and the ways in which they co-ordinate ISCPs. Chapter 3 describes the skills, experiences and qualifications of ICPs co-ordinating ISCPs. Chapter 4 reports ICP use of evidence and evidence-based skills. The methods that ICPs use to undertake surveillance of nosocomial infection are detailed in Chapter 5 of this thesis. Chapter 6 describes variation in administrator and clinician levels of support for ISCPs. Chapter 7 summarises the major findings and makes recommendations including an approach for ISCP service delivery.

CHAPTER 2

A PROFILE OF AUSTRALIAN INFECTION CONTROL PROFESSIONALS

Chapter 2 profiles Australian ICPs by describing their demographics and detailing their work practices, existing roles and functions. This chapter also makes recommendations for ICPs and their professional body, AICA, to adopt more strategic directions for Australian ISCPs.

2.0 Overview

ACHS requires accredited facilities to have ISCPs (The Australian Council on Healthcare Standards 1998). Most often, nurses, referred to as ICSs or practitioners, are responsible for co-ordinating these programs. The NHMRC (National Health and Medical Research Council 1996) and the previous NSW Health Commission endorsed position statements (Health Commission of New South Wales 1980) on IC which identified the primary role of the ICN as the implementation of policies determined at local ICC level. Unlike the high profile role taken by ICPs during infrequent outbreak investigations, routine policy implementation neither allows ICPs high visibility nor increases management awareness of IC (Chant et al. 1993; Chant et al. 1994). International experience suggests that management and health funding bodies will soon question the cost-benefit of Australian IC programs and reduce resources allocated to IC (Jackson 1997). This study included a survey of the AICA membership for the attributes, activities and responsibilities of ICPs in Australia. Strategies that ICPs co-ordinating ISCPs can adopt to assist their development are suggested.

2.1 Methods

PILOT TEST

Subject critera

The criteria applied to select subjects to participate in the pilot test of the questionaire was that the subject was currently practicing as an ICP in an Australian health care facility.

Subject selection method

100 ICPs attending a NSW government workshop in 1995 were selcted for the pilot as they were identified as the most readily accessible single group with responsibility for coordination of ISCPs in Australia other than the AICA membership.

Research question or hypothesis

The pilot survey sought data which would provide a detailed description of NSW ICP's demogrphics, work practices, existing roles and functions.

Variables

The pilot survey was 43-item survey that included questions on the ICP's demographics, training and education in IC, staffing levels, IC activities, perceived deficits in their ISCPs, managerial support, perceived levels of competence, surveillance methods use of evidence, guideline and policy development, IC research activity and computer use. Data collection techniques.

Administration of the instrument

The survey and pens were distributed by hand to 100 NSW ICPs as they registered for the government sponsored IC workshop. ICPs were requested to complete the survey and place it in a specially marked return box as the exited the workshop venue at the end of the day.

Results

All ICPs returned the survey. Data were reviewed for completeness and responses entered into a database designed using EPI Info Version 6 software.

Data analysis

Frequencies were run each variable and questions with less than a 75% response rate were re-examined and where appropriate modified. Free text responses were reviewed and where these were deemed to be important in terms of the original purpose of the pilot, the range of possible responses were modified.

Modifications Based on the Pilot

Minor modifications were made to the questionnaire and included:

- reorganisation of the content to a more logical flow;
- replacement of some closed questions by the inclusion of Likert-scale type responses;
- deletion of a question that identified the respondent's postcode;
- re-wording of a question relating to the ICP's perception of management support for the ISCP;
- simplification of the required rankings of questions relating to the ISCP's practice in consulting with other staff members; and
- increased options and simplification of questions relating to education and training.

2.1.2 QUESTIONNAIRE.

The AICA National Executive Committee approved distribution of the questionnaire (Appendix 2) to its members. A self-administered, return-paid postal questionnaire was used to gather data on demographics, experience, training and education in IC, staffing levels, IC activities, perceived deficits in current ISCPs and managerial support.

2.1.3 SAMPLE.

The study population was AICA members responsible for the co-ordination of ISCPs. The questionnaire was mailed in 1996 to 1,078 non-medical and non-medical industry members of AICA. ICPs practising in healthcare for less than one year or indicating that they no longer co-ordinated ISCPs were excluded from the study. AICA members who pilot tested the questionnaire were also excluded. Questionnaires were coded to identify non-responders. Non-responders received second and third copies.

2.2 Analysis.

Each facility was classified as an acute or non-acute hospital or non-hospital according to its primary function. Acute settings included acute care, surgery or general practice settings. The remainder, outpatient services, mental health and nursing home or long-term care facilities were classified as non-acute. Facilities with primary functions of providing acute care, outpatient, mental health, early stage rehabilitation, surgery or general practice services were classified as hospitals. Facilities with primary functions of non-acute care including nursing homes, long-term care facilities and day-surgery clinics were classified as non-hospitals. Bed size, teaching affiliation and location indicated that non-hospitals were primarily small, non-teaching facilities providing long-term rehabilitation, short-stay or multi-purpose clinic type services in rural Australia. Hospitals and non-hospitals with a combination of public and private funding sources were classified as public facilities according to their function, type, bed size and location. Respondents working 38 hours or more per week were classified as full-time with the remainder as part-time. Bed size was used as a proxy for workload and staffing level.

Data were stratified by type of facility, hospital or non-hospital and analysed for distribution and central tendency. Data could not be stratified by state or territory due to the small respective sample sizes. Confidence intervals around proportions, upper and lower quartiles around means were presented and calculated using EPI Info version 6 software (Dean et al. 1995).

2.3 Results

2.3.1 THE CO-ORDINATOR.

The study group consisted of 65% (644/993) of AICA members who returned a completed questionnaire. The criteria for an eligible ICP were fulfilled by 57% (367/644) of respondents. ICPs were mainly (97%) female and most commonly (42%) aged between 41 to 50 years.

2.3.2 WORK ENVIRONMENT.

Most ICPs (38%) worked in publicly funded, acute care facilities with less than 251 beds. Over half (61%) of all respondents worked in public facilities. When examining hospitals by funding status and acuity, significantly ($p<.001$) more hospital ICPs worked in public, acute care facilities with less than 251 beds than those in similarly sized, private hospitals (79% and 95% respectively). Most (43%) non-hospital ICPs worked in private, non-acute facilities with 250 or fewer beds. Non-hospital ICPs worked almost exclusively (94%) in non-acute facilities. Table 2.1 details the type of facilities, funding arrangement, bed size and acuity where AICA members co-ordinate ISCPs.

2.3.3 STAFFING LEVELS.

Regardless of the type of facility, the majority of respondents worked part-time (85%; CI95% 81.4% - 88.7%), 83% in hospitals and 96% in non-hospitals (p=.14). One full-time ICP working alone was the most common staffing arrangement for facilities with greater than 250 beds (31% hospitals, 42% non-hospitals, p=.77) Table 2.2 compares the level of staffing by bed size and type of facility.

Table 2.0-1 Number of facilities by type, funding arrangement, bed size and acuity where AICA members co-ordinate ISCPS.

	Public				**Private**					
No. of beds (%) Function	1-250	251-500	> 500	Sub-Total	1-250	251-500	>500	Sub-Total	Total	(%)
Hospitals:										
Acute*	137	22	16	175	94	6	0	100	275	77.0
Non-Acute+	14	3	0	17	6	0	0	6	23	6.0
Other	11	0	1	12	15	0	0	15	27	7.0
Sub-Total	162*	25	17	204	115*	6	0	121	325	91.0
Non-hospitals:										
Non-Acute#	13	0	1	14	14	2	0	16	30	8.0
Other	0	0	0	0	2	0	0	2	2	0.5
Sub-Total	13	0	1	14	16	2	0	18	32	9.0
Total	175 (49.0)	25 (7.0)	18 (5.0)	218 (61.0)	131 (36.7)	8 (2.2)	0 (0.0)	139 (38.9)	357	100

*Acute (Acute Care, Surgical, General Practice)
+Non Acute (Outpatient, Mental Health, Nursing Home)
#Non Acute (Nursing Home, Long-term Care Facility)

**p = 0.000123*

2.3.4 INFECTION CONTROL EXPERIENCE.

The study group's IC experience ranged from one to 25 years with a mean of 6.0 (LQ3, UQ8). Full-time ICPs had significantly (p=.01) more mean years of experience with 7.5 years (range 1-23; LQ3, UQ 10) compared with part-time ICPs who had a mean of 5.8 years (range 1-25 years; LQ 2, UQ 8).

2.3.5 TRAINING AND EDUCATION.

The majority (89%) of ICPs had completed hospital-based nursing training. Almost half (48%) had completed an additional nursing certificate. Just under a quarter (23%) had completed continuing education studies relating to IC, hospital epidemiology or sterilisation and disinfection. Less than a quarter (19%) had completed undergraduate tertiary studies and only 4% had completed post-graduate studies.

Table 2.0-2 Comparison of IC staffing levels per bed size and facility type n=329.

	Hospital Size		Non-Hospital Size	
Total No. Of IC Staff	**< 250 beds**	**> 250 beds**	**< 250 beds**	**250 beds**
1- 4 FT*	13	25	34	6
1- 3 PT#	28	4	170	4
2-5 PT#			26	2
1 FT* plus 1-3 PT#	2	5	1	
2 FT* plus 1-3 PT#		4	4	
2 FT* plus 2-5 PT#			1	
TOTAL	43	38	236	12

* Full-time
# Part-time

2.3.6 ACTIVITIES.

In hospitals, surveillance was the most time-consuming activity with a mean of 9.0 hours per week (LQ 5.0, UQ 10.0) for a full-time ICP, 2.3 mean hours (LQ 0.5, UQ 3.0) for part-time ICPs (Table 3). After surveillance, full-time ICPs in hospitals spent 6.9 mean hours (LQ 4.0, UQ 10.0) on computer/clerical activities followed by 5.5 mean hours per week (LQ 4.0, UQ 6.2) on ward consultations. Part-time hospital ICPs spent 1.6 mean hours per week on ward consultations and 1.5 on computer/clerical activities. Part-time non-hospital ICP time allocations for surveillance (0.9 mean hours; LQ 0.0, UQ 1.0), policy development (1.1 mean hours; LQ 0.0, UQ 1.0), and ward consultation (0.9 mean hours; LQ 0.0, UQ 1.0) were similar. Full-time hospital ICPs spent a large number of mean hours (5.3; LQ 4.0, UQ 7.0) on committee meetings.

2.3.7 ADDITIONAL RESPONSIBILITIES.

Seventy-eight per cent (CI95% 73.9% - 82.4%) of the study group had additional responsibilities other than IC. Of the 101 ICPs who detailed their additional responsibilities, 61 worked in non-hospitals and 40 in hospitals. For hospital ICPs, common additional responsibilities included clinical care (60.0%, CI95% 44.8%-75.2%), occupational health and safety (47.5%, CI95% 32.0%-63.0%) and other responsibilities (45.0%, CI95% 37.1%-

52.9%) such as staff health. In non-hospitals, the most common additional responsibility was quality assurance (QA) (72.1%, CI95%62.9%-81.3%).

2.3.8 PERCEIVED REQUIREMENTS.

In hospitals, the rank order of areas for improvement was more clerical support (62%), more IC staff (42%), reorganisation of IC duties (31%) and more IC information (26%). Non-hospital respondents identified identical areas for improvement although the rank order and proportions differed. Non-hospital ICPs wanted more IC information (46%), clerical support (35%), re-organisation of IC duties (34%) and more IC staff (21%).

2.3.9 MANAGERIAL SUPPORT.

Management was perceived as very supportive of IC by 54% (173/323) hospital ICPs and 71% (22/31) of non-hospital ICPs (p=.07). It was uncommon for ICPs to report that management was non-supportive of IC (hospitals 0.9%, non-hospitals 0.0%).

2.4 Discussion

Hospital-based ICPs dominate the AICA membership and as such influence the direction and development of the profession in Australia. This study shows that while the majority of ISCPs are in acute care, public hospitals of less than 251 beds, 38% of the IC profession is employed in private hospitals and non-hospitals. Traditionally, professional and industry-sponsored educational forums, (Australian Infection Control Association 1997) government policy statements (National Health and Medical

Research Council 1996) and systems for accreditation and surveillance (The Australian Council on Healthcare Standards 1988; The Australian Council on Healthcare Standards 1989; The Australian Council on Healthcare Standards 1990; The Australian Council on Healthcare Standards 1991; The Australian Council on Healthcare Standards 1992; The Australian Council on Healthcare Standards 1993) have targeted ICPs as if they are all from large public teaching hospital-based facilities. Objectives of an ISCP should vary across settings (Friedman 1996; Lee 1997). Future IC policy, standards, products and service developments must be adaptable to smaller facilities.

Availability of IC products and services is problematic for countries with large rural areas. (Collignon 1994) Strategies to assist remote facilities include establishing a national resource centre, improving ICPs' computer access and publishing local IC information on the World Wide Web (Harr 1996; Saba 1996; Sparks 1996).

The minimum educational requirements for someone practising as an ICP in Australia remain undefined and unaccredited. Nevertheless, the majority of ICPs surveyed in this study had been trained in hospitals before tertiary nursing qualifications became mandatory. Only a small proportion of the profession was undertaking post-graduate tertiary qualifications or non-award continuing education. Certification of ICPs begins with endorsement of training programs by a national IC association (Pugliese et al. 1986). Accreditation would result in the development of a nationally recognised profession. The proportion of Australian ICPs studying tertiary and continuing education demonstrates the lack of suitable programs for ICPs and compels AICA to work collaboratively with academics to develop a standardised IC career pathway that offers staged IC qualifications.

This study found Australian healthcare facilities designate co-ordination of an ISCP to a sole individual working part-time in small public hospitals. Most facilities between 250 and 500 beds have only one full-time equivalent (FTE) ICP. The NHMRC IC policy supports the early U.S.A recommendation of one FTE ICP per 250 beds ratio (Haley et al. 1985) despite the efficacy of this staff level being unsubstantiated in Australia. The lack of evidence to substantiate the efficacy of Australian ISCPs and appropriate IC staffing levels requires testing.

Civil litigation relating to nosocomial infection acquisition has been infrequent in Australia, therefore managers have not been sufficiently motivated to require a measure of efficacy of their ISCPs. This study identified that, generally, health care managers consider co-ordination of ISCPs as requiring only part-time staff who have multiple responsibilities in addition to their IC duties. While the link between QA and IC is well described, (Wenzel and Pfaller 1991) future ICPs should ensure that they gain training for the additional QA role demanded of them.

Surveillance is the most resource-intensive component of Australian ISCPs, yet Australia lacks formal, standardised definitions and a system of surveillance for nosocomial infection (McLaws, Murphy, and Keogh 1997). The majority of hospital-based ICPs allocate at least a quarter of their time each week to surveillance. The return for such an investment is currently difficult to measure. Regardless of their full-time or part-time status, ICPs are spending too much of their time on clerical and computer activities and in preparing for and attending meetings. Hospital and non-hospital ICPs consistently indicated clerical assistance and computer hardware would improve their productivity. Employment of persons competent in information systems and office practice could assist ICPs to reduce clerical aspects of their programs. Despite the high levels of managerial support, ICPs perceive they must formalise their managerial relationship and increase their profile. Computerised surveillance of restricted populations would improve the quality of their surveillance outcomes, provide evidence-based practice and justify adjustments to IC staffing levels. In addition, ICPs should work with management to develop work plans with clearly identifiable outcomes that may define and prioritise their core business.

2.5 Conclusion

By detailing the ICPs responsible for co-ordinating ISCPs in rural and urban areas, this chapter has provided a profile that may assist planning of future strategies for the practice of IC in various health care settings. The challenge for ICPs now, is to use this information to develop problem-specific and, goal-directed ISCPs. To assist this cause suggested strategies and their associate priority are recommended in Table 2.3. Similar strategies may assist the evolution of IC in countries where the business of IC has not been formalised. Chapter 3 expands this argument by describing the experience, skills and qualifications of Australian ICPs.

Table 2.0-3 Recommended strategies for developing problem-specific & goal directed iscps in australia

PROBLEM	STRATEGY	PRIORITY	RESPONSIBILITY
Lack of evidence to substantiate efficacy of ISCP	**Seek national stakeholder support and consensus for government-funded SENIC-like survey of Australian hospitals.** **Support development of standardised system of national surveillance.**	**1**	**AICA, government**
ICPs with multiple responsibility	**ICPs negotiate annual IC business plans with established key performance measurements.**	**1**	**Local issue**
Unequal distribution of available IC time	**Undertake comprehensive review of local IC needs and resources.** **Develop priority-driven approaches to economically sound ISCPs**	**1**	**Local issue**
Variety in the needs of AICA members.	**Development of future policy, standards, products and service development should be based on broad generic principles of best practice IC.** **ICPs adapt broad principles locally.**	**2**	**AICA**

PROBLEM	STRATEGY	PRIORITY	RESPONSIBILITY
Undefined minimum educational requirements for ICPs	**Develop national system of ICP certification.** **Develop tertiary-based courses in infection control & epidemiology.** **Link ICPs wages to performance and education.**	**2**	**AICA, Tertiary sector, government**
Availability of IC products and services	**Develop national IC resource centre;** **Promote ICP use of world wide web**	**3**	**AICA, Tertiary sector, government**
Undefined appropriate staffing levels for ISCP		**3**	**AICA, government, industrial bodies**

CODE TO PRIORITY

1 Critical - Initiate immediately
1 Extremely important - Initiate within 1-3 years
2 Important - Initiate within 3-5 years
3 Long term - Initiate within 10 years
4 Optional - Complete if adequate funding, resources and stakeholder support available

CHAPTER 3

SKILLS, QUALIFICATIONS AND EXPERIENCE REQUIRED TO CO-ORDINATE AN INFECTION SURVEILLANCE AND CONTROL PROGRAM IN AUSTRALIA

Chapter 2 provided a profile of ICP demographics and a description of ICPs' experience and qualifications. It identified variation in the level of skills, experience and education that ICPs either possess or hope to achieve. This chapter provides further detail on the nature of ICP qualifications and the ICPs' perception of their IC competence according to a modified version of Benner's model from novice to expert and the reported timeframes associated with this model (Benner 1984). An argument is made for the urgent development of a system for credentialling and certifying ICP competence.

3.0 Overview

The membership of AICA includes a range of IC stakeholders including medical industry, medical microbiologists and infectious disease physicians. The majority of members are ICPs responsible for co-ordinating ISCPs in health care facilities with inpatient beds. ICPs voluntarily join their state-based association, becoming AICA members by default. Membership is independent of experience or education (Australian Infection Control Association 1989) The completion of basic or further education is not a criterion for an Australian health care professional to gain recognition as an ICP. No regulatory, legislative or professional criteria stipulate the minimum qualifications or experience that a health care worker must meet to be capable of co-ordinating an Australian ISCP. (AICA Credentialling and Certification Subcommittee 1997) Neither employers nor the profession itself measure ICP competence. ICPs, employers and administrative and accrediting agencies may view the job title ICP and accumulation of years of experience as a proxy for competence. (National Health and Medical Research Council 1996; The Australian Council on Healthcare Standards 1988; The Australian Council on Healthcare Standards 1989; The Australian Council on Healthcare Standards 1990; The Australian Council on Healthcare Standards 1991; The Australian Council on Healthcare Standards 1992; The Australian Council on Healthcare Standards 1993)

This chapter describes the perception of competence held by ICP members of AICA and the experience and qualifications they consider necessary for progression to the level of expert practitioner in Australia. Recommendations for an IC career pathway are discussed.

3.1 Method

3.1.1 THE BENNER (DREYFUSS) MODEL

The Benner model used in this study described skill development amongst 21 pairs of nurses after interviewing the subjects to establish differences between the clinical performance and appraisal of situations of beginning and expert nurses. Additional interviews were held with 51 experienced nurses. Three researchers conducted and consenually validated the interviews.

Benner asserts that as a nurse acquires and develops skill they progress through five discrete levels of proficiency. These levels are described in Appendix 3 are respectively, novice, advanced beginner, competent, proficient and expert. Progression through the levels requires variation in three elements of skill. Firstly, the student must replace the use of abstract principles with well-grounded paradigms. Secondly, the student's perception of situations change from a perspective where each element is seen as equal rather to a perception where only some aspects are seen as relevant. The third involves the student's ability to become engaged in a situation rather than a "detached observer" of a situation. (Benner 1984)

The use of Benner's model in this study was primarily in relation to the timeframes it recommended as being usual in a nurses at each level of expertise. The one-dimensional statements used in this survey did not enable respondents to reflect upon their IC practice experiences. For this reason the primary use of Benner's model was as guide to respective timeframes.

The attraction of using the timeframes from Benner's model related primarily to the fact that both the model and the timeframes have been validated in additional studies (Garland 1996). In addition, the model was well described, the population involved in the pilot did not appear to have difficulty with the use of Benner's terms, novice to expert, and there was no previous reports of tools used to measure ICPs self perception of the their expertise or proficiency. Similarly no professional or industrial guideline stipulated necessary levels of experience for Australian ICPs.

3.1.2 QUESTIONNAIRE.

In 1994, a comprehensive questionnaire was designed to gather data on Australian ICP demographics, experience, staffing levels and activity. The questionaire was pilot tested the questionnaire for face and content validity as detailed in Section 2.1.

The AICA National Executive endorsed return-paid post distribution of the questionnaire to its members in July 1996. The questionnaire was self-administered. Questionnaires were coded to identify non-responders. Non-responders received second and third copies.

Respondents reported their level of expertise according to a modified version of Benner’s five-level model of skill development and it's associated timeframes. (Appendix 3) (Benner 1984). Respondents indicated the qualification(s), from a list of all available appropriate qualifications in Australia, which they considered necessary for an ICP to progress through the five levels “novice” to “expert”. Time that each ICP had worked in health care and IC was measured.

3.1.3 SAMPLE.

All 1078 AICA members who were not employed by medical industry or medical practitioners were mailed a survey. AICA members who pilot tested the questionnaire were excluded from the sample. The denominator was adjusted downwards to reflect blank responses returned either by members who advised that they had retired from IC or marked "address unknown". The survey was completed and returned by 65% (644/993) of AICA members and almost all (85%) of these fulfilled the inclusion criteria of co-ordinating an ISCP for longer than one year.

3.2 Analysis

Data were stratified according to self-reported level of competence and measured for central tendency using SPSS Version 6.1 software (SPSS 1996). Competency levels consisted of novice, advanced beginner, competent, proficient and expert. Responses from ICPs in the first three competency levels, novice, advanced beginner and competent, were collapsed and redefined as the “inexperienced” group. Proficient and expert ICP responses were collapsed and redefined as “experienced”. Reported expected qualifications for ICPs in inexperienced and experienced levels were examined for agreement using Spearman’s correlation test (SPSS 1996). Years of experience in health and IC were categorised into two chronological groups according to the median.

Combinations of qualifications expected by each level for ICPs at that level of competence were ranked. The range and variety of expected qualifications were great, so the three most frequent combinations in each level were reported. These combinations included nursing, tertiary and post-basic qualifications. For each level, the top three reported combinations represented at least a quarter of all responses for that level.

The linear relationship between “inexperienced” and “experienced” practitioners’ perception of required qualifications for each level was calculated using Spearman’s correlation co-efficient (SPSS 1996). Small sample sizes precluded calculation of the correlation between each individual level’s perception on qualifications for its own and each other level. Correlation of >0.8 was considered strong, 0.5-0.8 as moderate, and 0.2-0.5 as weak (Abramson 1994). Missing data were excluded pairwise. A Chi test was used to measure correlation between the levels of competence and years of health care experience. Significance was set at $p < 0.05$. Denominator data differs for each question as not all respondents provided answers for each question.

3.3 Results

The study group consisted of 65% (644/993) of AICA members who returned a completed questionnaire. Of this group 83% (533/644) reported their perceived level of competence.

3.3.1 PERCEIVED LEVELS OF COMPETENCE

Most (90%) ICPs reported their IC level as being more than a novice and less than an expert; advanced beginner (21.2%; CI95% 17.8%–24.7%), competent (33.8%; CI95% 29.8%-37.8%) or proficient (34.7%; CI95% 30.7%-38.7%). Few, 3.6% (CI95% 2.0%-5.2%), members ranked themselves as novices or experts (6.8%; CI95% 4.4%-8.9%).

3.3.2 YEARS IN HEALTH CARE

Table 3.1 shows the level of competence by years in health care for respondents who provided all information on these variables.

Table 3.0-1 Level of competence by years of health care experience.

LEVEL	0-22 Years	%	95% CI	>22 – 28.5 Years	%	95% CI	Total	%
Novice	14	5.1	2.4-7.7	5	*2.0*	0.2-3.7	19	3.6
Advanced Beginner	72	26.5	21.2-31.7	38	*15.5*	11.0-20.0	110	21.2
Competent	96	35.3	29.6-41.0	80	*32.5*	26.6-38.4	176	33.9
Proficient	73	26.8	21.5-32.1	104	*42.3*	36.1-48.5	177	34.1
Expert	17	6.3	3.4-9.2	19	*7.7*	4.4-11.0	38	7.3
TOTAL	272	100		246	*100*		518	100

χ^2=20.51 *df=4 p<.001039*

Over three-quarters (78.7%) of all respondents had between ten and thirty years of experience in health care. The proportion of respondents in each level of the two health care year categories was similar. Almost half (42.3%) of the proficient respondents reported having had the maximum number of years of health care experience. Novice practitioners with maximum years of health care experience accounted for the smallest proportion (2.0%) of respondents.

3.3.3 Years in infection control

The largest category (57.7%) of respondents had less than four years IC experience (Table 3.2). Almost two-thirds (65%) of the most experienced group between 8 and twelve years IC experience while only a small proportion (10%) had over twenty years IC experience. Novice ICPs reported having four or less years of experience in IC. Over half (53.8%) of the ICPs with maximum years of IC experience identified themselves as being proficient. Almost three-quarters (69.9%) of the practitioners with less than 4 years experience reported being either advanced beginners or competents. Almost all (95.2%) of the practitioners with more than four years IC experience considered themselves to be at a level higher than advanced beginner.

Table 3.0-2 Level of competence by years of IC experience.

LEVEL	0-4 Years	%	95% CI	>4 Years	%	95% CI	Total	%
Novice	19	*6.6*	3.7-9.5	0	*0*	N/A	19	3.8
Advanced Beginner	101	*35.3*	29.8-40.8	10	*4.8*	1.9-7.7	111	22.4
Competent	99	*34.6*	29.1-40.1	78	*37.1*	30.6-43.6	177	35.7
Proficient	65	*22.7*	17.8-27.5	113	*53.8*	47.0-60.5	178	35.9
Expert	2	*0.7*	-0.3-1.7	9	*4.3*	1.5-7.0	11	2.2
TOTAL	286	*100*		210		100	496	100

χ^2=104.3 df=4 p<0.0001

3.3.4 QUALIFICATIONS

Table 3.3 details the rank order of the first three qualifications that each level considered essential to function at that level.

Table 3.0-3 Rank order of first three qualifications that each level thinks they should have.

Rank	Nov N=19	N	%	Adv N=106	n	%	Comp N=175	N	%	Prof N=165	N	%	Exp N=30	N
1	RN UG	4	21.1	RN BASIC	19	17.9	RN UG BASIC PBAS	21	12.0	RN UG BASIC PBAS EP	35	21.2	RN UG BASIC PBAS EP MAS	7
2	RN BASIC	3	15.8	RN UG BASIC	15	14.2	RN BASIC PBAS	16	9.1	RN BASIC PBAS EP	15	9.1	RN UG BASIC PBAS EP	5
3	RN UG BASIC	2	10.5	RN BAS PBAS	10	9.4	RN BASIC	13	7.4	RN UG BASIC PBAS	11	6.7	MAS	3
Total		9	47.4		44	41.5		50	28.5		61	37		15

Key:

RN - General registered nurse hospital trained

UG	- Undergraduate Degree in Nursing
BASIC	- Basic Infection Control Course
PBAS	- Post Basic Infection Control Certificate
EP	- Hospital Epidemiology Workshop
MAS	- Master in a health field eg. Public Health
Nov	- Novice
Adv Beg	- Advanced Beginner
Comp	- Competent
Prof	- Proficient
Exp	- Expert

Novice

The three most frequent combinations reported by 47% of novices identified that a general registered nursing (RN) qualification was critical. There was no consensus amongst the remaining 53% of novices other than a novice not requiring a masters degree.

Advanced Beginner

Almost half (41%) of the advanced beginners ranked two of the three basic qualifications, RN and basic IC course (BASIC). Almost a quarter considered an extra qualification, either undergraduate degree in nursing (UG) (14.2%; CI95% 7.5%-20.8%) or post basic IC certificate (PBAS) (9.4%; CI95%3.8%-14.9%), as essential.

Competent

The proportion of competent practitioners who agreed on the first three combinations of qualifications was smaller (28%) than the other four groups. There was consensus amongst the first three ranked combinations that RN and BASIC qualifications were necessary for competent ICPs. Irrespective of individual or ranked combinations of qualifications, over a quarter of all respondents (27%) agreed that competent ICPs should have UG and BASIC qualifications.

Proficient

The top three combinations of qualifications were common to over a third (37%) of all proficient ICPs. Among this group three quarters (75%) considered RN, UG, BASIC and PBAS essential for proficients. Over half (64%) of all proficient ICPs indicated that Hospital Epidemiology Workshop (EP) was an essential qualification irrespective of other qualifications. Almost all (88%) proficient ICPs reported that they did not require a masters qualification.

Expert

Half of all experts agreed on the first three combinations of qualifications. Of this group over three quarters (80%) considered experts should have completed each of the following; RN, UG, BASIC, PBAS and EP. Two thirds (66%) of experts expected ICPs at this level to have a masters degree. Almost three-quarters (70%) of all experts agreed that an EP was essential irrespective of other qualifications.

3.3.5 CORRELATION BETWEEN EACH LEVEL'S PERCEPTION QUALIFICATIONS.

Tables 3.4 and 3.5 detail the rank-ordered qualifications of each level perceived by “inexperienced” and “experienced” ICPs. The small sample size for each level and the variety of combinations made calculation of Spearman’s rho correlation between each level’s perception invalid.

Table 3-0-4 Rank order of first three qualifications that inexperienced (Levels 1-3) ICPs consider an ICP should have at each level of competence.

Rank	Nov			Adv			Comp			Prof			Exp		
	N=299	N	%	N=295	N	%	N=302	N	%	N=290	N	%	N=291	N	%
1	RN	64	21.4	RN, BAS	55	18.6	RN, UG, BAS, PBAS	31	10.3	RN, UG, BAS, PBAS, EP	48	16.6	RN, UG, BAS, PBAS, EP, MAS	56	19.2
2	RN, BAS	54	18.1	RN, UG, BAS	44	14.9	RN, BAS, PBAS,	28	9.3	RN, BAS, PBAS, EP	29	10.0	RN, UG, BAS, PBAS, EP	21	7.2
3	RN, UG, BAS	46	15.4	RN, BAS, PBAS	20	6.8	RN, BAS	26	8.6	RN, UG, BAS, PBAS	18	6.2	MAS	20	6.9
Total		164	54.9		119	40.3		85	28.2		95	32.8		97	33.3

Key:
RN = General registered nurse hospital trained
UG = Undergraduate Degree in Nursing
BAS = Basic Infection Control Course
PBAS = Post Basic Infection Control Certificate
EP = Hospital Epidemiology Workshop
MAS = Master in a health field eg.Public Health

Table 3.0-5 Rank order of first three qualifications that experienced (Levels 45) ICPs consider an ICP should have at each level of competence.

	Novice	n	%	Advanced Beginner	N	%	Competent	N	%	Proficient	N	%	Expert	N	%
	N=207			N=203			N=207			N=196			N=192		
1	RN, BAS	50	24.2	RN, UG, BAS	34	16.7	RN, UG, BAS, PBAS, EP	24	11.6	RN, UG, BAS, PBAS, EP	42	21.4	RN, UG, BAS, PBAS, EP, MAS	51	26.6
2	RN	44	21.3	RN, BAS	26	12.8	RN, BAS, PBAS	21	10.1	RN, BAS, PBAS, EP	16	8.2	RN, UG, BAS, PBAS, EP#	14	7.3
3	RN, UG, BAS	30	14.5	RN, BAS, PBAS	24	11.8	RN, UG, BAS, PBAS	20	9.7	RN, UG, BAS, PBAS	14	7.1	RN, BAS, PBAS, EP#	14	7.3
Total		124	60		84	41.3		65	31.4		72	36.7		79	41.2

identical rank

Key:

RN = General registered nurse hospital trained
UG = Undergraduate Degree in Nursing
BAS = Basic Infection Control Course
PBAS = Post Basic Infection Control Certificate
EP = Hospital Epidemiology Workshop
MAS = Master in a health field eg.Public Health

3.3.6 CORRELATION BETWEEN INEXPERIENCED (LEVELS 1-3) AND EXPERIENCED (LEVELS 4-5) PERCEPTION OF LEVELS.

Table 3.6 illustrates the correlation between inexperienced (Levels 1-3) and experienced (Levels 4-5) perception of levels. There was strong correlation between each group's perception of qualifications for advanced beginners and experts and weak correlation between novices and proficients. The Spearman's correlation coefficients for inexperienced and experienced ICPs' views of qualifications that a competent ICP should possess were unable to be calculated as only three respondents provided detail on both.

Table 3.0-6 Correlation between the qualificationS THAT experienced and inexperienced ICPs consider they should have.

Level	Correlation Coefficient	*P* value
Nov	-.1759	.168
Adv Beg	.8048	.000
Comp	.	.
Prof	.3504	.086
Exp	-.8874	.000

Key
Nov = Novice
Adv Beg = Advanced Beginner
Comp = Competent
Prof = Proficient
Exp = Expert

3.4 Discussion

Measurement of competence and reliable standards for practice are critical elements of a profession (Larson 1997). In 1996, AICA published formal professional standards for practice (Australian Infection Control

Association 1996). These standards included recommendations for surveillance practices, quality improvement, education and clinical issues and were based on the opinion of expert leaders. There was general agreement by the then AICA Executive that these standards reflected best practice IC in Australia. The standards did not address the measurement of ICP competence or identification of IC expertise. AICA markets these standards to both members and non-members. Potentially, they enable groups other than AICA members such as employers, public and peers to evaluate individual Australian ICP practice and more generally, the standard of the Australian IC profession.

Membership data routinely collected by AICA do not include details on member qualifications or experience. Results are unable to be compared with non-responder information. Accordingly, the ability to generalise these findings may be limited even though a 65% response rate is encouraging and consistent with results in similar international studies.

Respondents reported their individual levels of expertise according to a modified version of Benner’s model and it's associated timeframes and also indicated the appropriate qualifications for an ICP at each of the five levels. The one-dimensional statements used in this survey precluded ICPs from indepth consideration of the skills they had developed through reflecting on their practice situation encounters. However, Benners' model provided some guidance regarding the reported timeframes for each level of expertise. Similar comparison has been drawn between Benner's model and other specialty nursing groups. (Garland 1996)

The study methodology precluded the identification of criteria used by the respondents to determine their level of expertise. The respondent's prior knowledge and/or exposure to Benner's model was not established and may have impacted the respondent's ability to self report their perceived level of competence. However, the findings suggest that AICA members subscribe to an informal and poorly defined system of measuring competence. Specifically, the results indicated that most ICPs considered themselves to be at levels other than novice or expert. This result may reflect a general disinclination of self-reporting respondents to avoid extreme responses.

The Australian IC profession requires definition of a career pathway with specific levels of practice and validated criteria for progression between each level. The relationships between the study group's reported levels of competence, qualifications and experience provide the foundations for the pathway with a system of credentialling, formal recognition of qualifications and adoption of divergent roles comprising the essential building blocks. It is envisaged that this pathway will lead to ICP professional growth and development.

In the absence of any existing formal, staged-career path for ICPs, the identification by most ICPs that they were competent at levels other than novice or expert is curious but parallels previous work on self-reported competence amongst generalist medical-surgical nurses (Garland 1996).

Benner suggested that in addition to the development of specific skills through reflection on encounters with practice situations, an advanced beginner would have one year's experience, a competent between two to three years, a proficient three to five years and an expert greater than five years (Benner 1984). For all levels other than expert, Australian ICPs' length of health care experience concurred with Benner's suggested timeframes (McGregor 1990).Similar agreement is shown in the reported relationship between years of IC experience and level. The inability of almost all of the experienced ICPs to view themselves as experts may be associated with a general disinclination by these veterans to value their worth (Garland 1996).

In considering responses relating to experience, the results do not differentiate between the type of IC experience an ICP acquires or the setting(s) in which this experience is accrued. The continuity and full-time equivalence of service as well as the range and complexity of IC service delivery may impact upon an ICP's proficiency and self-perception of proficiency.

The finding of ICPs with between 22 and 28.5 years of health care experience in each level suggests that overall years of health care experience have little influence on the rate of ICPs' progression to the level of expert. An alternate view could be that health care workers are attracted to ICP positions irrespective of their health care experience. The proportion of novices (5.1%) advanced beginners, (26.5%) competent (35.3%) and proficient (26.8%) ICPs with less than 22 years of overall health care experiences reflects the relatively recent growth of the ICP position in Australia. The small proportion of novice (2.0%) and advanced beginner practitioners (15.5%) with maximum number of years of health care experience suggests IC is a position that health care workers close to retirement may not seek.

The high priority (28.5-47.4%) that all levels gave to a general nursing qualification is consistent with earlier British (Gardner 1962; Law 1993) and American recommendations (Larson, Butz, and Korniewicz 1988; Williamson 1990; Bjerke et al. 1993). The diversity in other highly-ranked qualifications may stem from the absence of a preferred set of qualifications stipulated by an authoritative body or reflect the world-wide lack of consensus on this issue (Emori, Haley, and Stanley 1980). The recent transition in Australia of nurse education from acute-care, hospital-based training to the tertiary sector may also have influenced this diversity (Sutton and Arbon 1994). The extent to which each of these factors impact upon an ICP's ranking of qualifications may vary in accordance with the wide range of individual experience in health and IC reported by respondents.

CREDENTIALLING

The U.S.A IC profession employs certification based on successful completion of an examination as one measure of competence. The examination is an assessment of knowledge that is based on the specific tasks performed by ICPs in the U.S.A. This system has played a critical role in the development of the U.S.A IC profession (Pugliese et al. 1986; Larson, Eisenberg, and Soule 1988; Larson 1997). However, current international nursing doctrine promotes competence based on mastery of practice domains rather than qualifications or experience (Garland 1996).

Tasks routinely undertaken by Australian ICPs have only recently been described (Murphy and McLaws 1999e) and provide valuable information for defining practice domains that could be used in the development of a competence-based system of certification for Australian ICPs.

FORMAL RECOGNITION OF QUALIFICATIONS

The absence of clearly defined minimum levels of education for ICPs limits the capacity of ICPs to gain professional credibility and public confidence (Weinstein 1986). By not defining the minimum levels of education or experience, in health care or IC that a practitioner must meet to practice as an ICP both the profession and its market are vulnerable and unable to truly determine the quality of the IC services they either provide or consume.

In Australia, professional development is largely a personal choice or responsibility and ICPs are actively seeking further education (Murphy and McLaws 1999b). As they gain experience, undertake further education and achieve qualifications they will eventually demand formal recognition of these achievements (AICA Credentialling and Certification Subcommittee 1997). They will also seek a system for measuring the impact of these additional achievements on their capacity to provide quality IC services. Industrial awards should permit increased remuneration for experienced ICPs with multiple qualifications. The absence of financial and professional incentives recognising excellence and expertise seriously limits the assurance of competence and protection of the public (Pugliese et al. 1986). AICA must progress its initial work to establish methods to promote the competent ICP (AICA Credentialling and Certification Subcommittee 1997). Without recognition, it is difficult for ICPs to assume appropriate clinical, academic and professional roles.

DIVERGENT ROLES

The emergence of epidemiologic skills as a high-ranking qualification is curious in the absence of a formal national system of nosocomial infection surveillance (McLaws, Murphy, and Keogh 1997). Perhaps forward-thinking Australian ICPs recognise the opportunities associated with increased understanding of epidemiologic principles (Shannon et al. 1984; Jackson, Soule, and Tweeten 1998). This is encouraging and provides the first indication of preparation by Australian ICPs for roles divergent from the traditional, clinically-focussed ICP role.

INCREASED NETWORKING

The value of networking in IC is well described (Weinstein-SA 1986) and for inexperienced practitioners to seek valid and reliable sources of information and advice, it is imperative that a formal system of identifying appropriately qualified and experienced ICPs be developed.

The lack of consensus between the qualifications each level considered appropriate for levels other than their own suggests an ill-defined pathway for ICPs. Individual ICPs at levels less than expert are unable to maximise their opportunities for progression. Of equal concern is the possibility of ill-prepared replacements occupying the positions that the present experts will ultimately vacate.

3.5 Conclusion

Credentialling of ICPs is important, primarily to protect the interests of the public and secondly, to ensure continued professionalism. The Australian IC profession is in an exciting period of development. The laying down of a clear-cut IC career pathway that includes a system of credentialling, recognition of expertise, adoption of divergent roles and improved networking will lead to a credible and viable IC profession in Australia. Developing IC communities globally can also benefit from the Australian experience.

Chapter 4 describes the extent to which ICPs use skills and tools to develop evidence-based IC policy and recommendations. Chapter 4's findings of limited use of and contribution to evidence by ICPs reaffirm the arguments raised in this chapter and illustrate the compelling need for defining minimum levels of education and a system of credentialling or certifying Australian ICPs.

CHAPTER 4

BASING INFECTION CONTROL ON EVIDENCE

Chapter 3 provided an insight on ICPs' skills, qualifications and experiences. This chapter expands the argument to improve the standard and availability of ICP education in Australia. It identifies deficiencies in ICPS' skills that limit their ability to apply evidence to Australian ISCPs.

4.0 Overview

Advocates of evidence-based health care are increasingly urging health care professionals to adopt a scientific approach to their work and their decision-making (Shorten and Wallace 1996; Rutala and Weber 1997). To adopt a scientific approach, professionals must be able to access, identify, interpret and critically appraise evidence (Sackett and Haynes 1996). Critical appraisal requires essential skills such as computer literacy and understanding of research principles. These skills are also required for professionals to contribute to evidence (Lacey 1994; Hicks 1995). Recently, North American professional associations for IC have developed standards that require ICPs to apply research findings when developing or revising practices and procedures (Horan-Murphy et al. 1999p.49).

In 1996, members of AICA were surveyed to describe the extent to which they were performing the tasks that facilitate an evidence-based approach to the IC practice. The relationship between demographics, computer use and research activity were examined.

4.1 Method

4.1.1 Setting

The AICA database was used to target ICPs co-ordinating IC programs in facilities with inpatient beds.

4.1.2 Subjects

The study population included all non-medical practitioner and non-commercial members of AICA who co-ordinated an IC program in Australia. From the 1,078 mailed surveys, 85 were returned advising that either an AICA member no longer practised in IC or was not known at the address held on the AICA database. Of the 993 eligible participants 63.4% (630/993) completed and returned the questionnaire. Return of the completed survey was interpreted as willingness to participate in the survey. Denominator data differs by question due to non-response by item.

4.1.3 Instrument

A 22-page written survey included questions on the AICA member's demographics, IC program staffing level, education, surveillance activity, use of evidence, guideline and policy development, IC research activity and computer use. Data relating to the use of evidence-based policy development, research activity and computer use are reported in this chapter.

4.1.4 Tools and Procedure

In May 1996, the AICA Executive Committee endorsed the survey content. The AICA President signed a covering letter that explained the purpose of the survey and invited recipients to complete and return the survey. As an incentive to complete and return the survey, participants were given the chance to win an IC textbook.

Each state and territory-based IC organisation provided AICA with an electronic copy of addresses of their member database. In June 1996, 1,078 copies of the survey were mailed to the study population. The covering letter requested return of completed surveys by 31st July 1996. A pre-addressed, pre-paid envelope was included with each copy of the survey. Each survey was coded with a unique record number and the study group was advised that the code would be used to follow-up non-responders and that individual responses would remain confidential. A follow-up letter and an additional coded survey were mailed to non-responders in September 1996. Respondents were requested to complete and return surveys by 31 December 1996. Surveys were received until 30 March 1997. The survey period lasted nine months.

4.2 Analysis

Responses were checked for consistency between the AICA database and the survey code and duplicate surveys discarded. Multiple responses to questions were discarded. Responses were analysed for central tendency and Chi χ tests. Alpha was set at 0.05.

4.3 Results

Surveys were mailed to 1078 AICA members and 7.9% (85/1078) of the study population were non-contactable or no longer worked as an ICP. The eligible study population was then identified as 993 contactable members working as ICPs. The response rate was 63.4% (630/993).

4.3.1 Demographics

The study group comprised mostly females (96.1%, CI95% 94.2%-97.5%) and most (66.4%, CI95% 62.7%-70.1%) were older than 40 years. Median IC experience was 4 years (mean 5.4 years, range <12 months to 35 years).

4.3.2 Scientific Publications

Few (31.4% 194/617) respondents reported not regularly reading any IC publication When they did read IC publications, significantly more ICPs ($P<0.001$) read local non-peer reviewed IC journals than overseas peer-reviewed IC journals (Table 4.1). The most widely read publication was Australian Infection Control which was read by 86.8% (547/630) of respondents. Infection Control and Hospital Epidemiology was the least widely read publication. Less than a third (29.7% 187/630) of respondents read American Journal of Infection Control.

Table 4.0-1 The proportion of respondents regularly reading specified publications.

Journal	n	%
Australian Infection Control Journal	547	86.8
State Public Health Bulletin	303	51.9
Hospital Infection	240	38.1
Communicable Diseases Intelligence	392	37.8
American Journal of Infection Control	187	29.7
Infection Control & Hospital Epidemiology	134	21.3

Total n=630

4.3.3 Documents Reviewed during Development of Guidelines and Policy

Table 4.2 details the documents used by ICPs when developing guidelines and policy.

Table 4.0-2 Documents reviewed during development of guidelines and policies n=630

Document	n	%
State Health Department IC Guidelines & Regulations	584	92.7
National Health and Medical Research Council Guidelines for IC	470	74.6
Policies and guidelines written by another facility's IC Committee	464	73.7
Textbooks	347	55.1
Relevant Scientific Journals	294	46.7
Other	87	13.8
None	6	1.0*

*Total n=627

When developing guidelines and policies, 92.7% (584/630) of ICPs reviewed State Health Department IC Guidelines and Regulations. National Health and Medical Research Council (NHMRC) Guidelines were reviewed by 74.6% (470/630), 73.7% (464/630) reviewed policies and guidelines written by another facility's ICC, 55.1 (347/630) used textbooks, 46.7%

(294/630) read relevant scientific journals and 1.0% (6/627) reported not using any documents during guideline and policy development.

4.3.4 Research Activity

Research relating to IC was undertaken by 21.5% (135/628) of the sample and 27.6% (37/134) of this group published their research findings. The most frequent reasons given by ICPs who did not undertake research were insufficient time (47.7% 235/493) and insufficient resources (33.3% 164/493). One quarter (26.2% 129/493) lacked research skills (Table 3).

Table 4.0-3 Proportions of respondents citing various reasons preventing them from undertaking research

REASON	n	*(%)*
Insufficient time	235	47.7
Insufficient resources	164	33.3
Nature of patients cared for in facility	150	30.4
Lack of understanding of research principles	129	26.2
Lack of support from other staff for research	99	20.1
Lack of personal computer skills	76	15.4
Insufficient access to personal computer	74	15.0
Other (unspecified)	56	11.3

Total n=493

4.3.5 Use of Personal Computers

Of the half (51.1% 318/622) of the respondents who used a computer to undertake IC tasks, the majority (89.0%) used a PC for word processing, 73.8% for preparation of presentations, 63.9% for surveillance and 46.8% for databases of nosocomial infection cases.

4.3.6 Difference in Personal Computer Amongst Participants Who Developed and Undertook Research

Of those ICPs who did use a PC, significantly more ($p<0.001$) developed and undertook research (101/316) than those respondents who did not use PCs.

4.3.7 The effect of age on PC

ICPs who were less than 40 years of age used PCs significantly more ($p<0.001$) than those ICPs who were 40 or more years old.

4.4 Discussion

4.4.1 Limitations

The absence of a publicly available database of Australian hospitals limited the identification of the study population and distribution of surveys to AICA membership. However, AICA is Australia's only professional IC Association and its membership represents ICPs from every Australian state and territory. In addition, co-ordinators of IC programs are required to hold an ICP position and it is reasonable to assume that more ICPs than not would be current AICA members. Coded surveys may have been a disincentive to some AICA members to respond. However, the response rate is at a level commonly experienced with mail-return questionnaires and is still considered sufficient to generalise findings. For questions other than years of IC experience, ICPs were provided with limited response options. The use of the "other" option by few ICPs suggests that inadvertent exclusion of options for IC publications, sources of information for policy development, factors affecting ICP ability to develop and undertake research and use of PCs may have been small.

4.4.2 Years in IC

The absence of any clearly defined entry-level qualification requirement for ICPs in Australia, (Murphy and McLaws 1999b) as well as the lack of any Australian guidelines on essential elements of an IC program infrastructure and the role of the ICP, (Murphy and McLaws 1999e) allow ICP positions to be filled by nurses with varying levels of experience and qualification. Inexperienced ICPs may struggle to perform the "basic" elements of the ICP role rather than functions that more experienced ICPs would reasonably be expected to undertake (Shorten and Wallace 1996). Critical elements of IC require an evidence-based approach, (Jackson 1997, Larson 1989) yet less than half the ICPs surveyed regularly read peer-reviewed IC and medical journals. Although the findings confirm that ICP members of AICA have worked on average for less than ten years, this does not justify the low levels of evidence-based approaches to IC. Other healthcare providers, such as Medical Registrars, with similar years of experience are expected to keep abreast of the current literature. Regardless of IC experience, Australian ICPs must be adequately prepared to contribute to, access, appraise and where appropriate, apply best evidence to their practice. Computer literacy, (Reagan 1997; Freeman 1998) an understanding of research principles (Rutala and Weber 1997) and familiarity with IC literature

(Larson and Satterthwaite 1989) are three essential skills that ICPs must possess and regularly exercise.

4.4.3 Accessing Scientific Literature

Practitioners have a professional and moral obligation to search and consider the scientific literature most appropriate to their field (Larson and Satterthwaite 1989). Reading and publishing in peer-reviewed scientific literature provides the ICP with a forum for exchanging ideas, (Larson and Satterthwaite 1989) adds to a profession's unique body of knowledge and credibility (Lacey 1994) and provides evidence and assistance to practitioners to identify best practice (Edmond 1995). Importantly, current knowledge of the literature enables practitioners to identify experts and opinion leaders within particular specialties and sub-specialties (Larson and Satterthwaite 1989).

The level of non-regular readership of specific IC publications amongst the sample in this study (31.4%) is alarming. The formidable size of biomedical and clinical literature, (Haynes et al. 1997; Larson 1998) inaccessibility and insufficient time (Larson 1998) to search and read the literature are acknowledged as contributing to the problem of non-regular readership. However, these are no longer plausible reasons for non-regular review of literature. Availability of entire or abstracted sections of premier IC journals (Harr 1996; Kelsey and Peacock 1998; Larson 1998) and advanced search tools on the Internet, (Friedman 1996; McKibbon, Wilcynski, and Walker-Dilks 1996; Haynes et al. 1997) as well as the recent introduction by AICA of a peer-reviewed IC journal, (Murphy et al. 1997) should enable Australian ICPs to access relevant material with relative ease provided they are computer and Internet literate.

4.4.4 Preparing Policies

Involvement by ICPs in policy development is important, both in Australia and internationally. North American ICPs are encouraged to assert influence on policy-makers (Horan-Murphy et al. 1999). Expert IC professionals consider preparation of IC policies and directives an essential role of a hospital ICP in the U.S.A (Scheckler et al. 1998). This task is their third most time-consuming activity (Jackson, Soule, and Tweeten 1998). Full-time ICPs in Australia report spending 2.9 hours each week on policy development (Murphy and McLaws 1999e) and ICPs in Victorian state public hospitals spend between 6.7% and 11.7% of their total IC time on activities for policy and procedure development (Coopers & Lybrand Consultants 1998). A majority of clinicians and administrators working in Australia's most populous state, NSW, agree that policy development is one of the ICP's most important roles (Murphy and McLaws 1999c). The importance of IC policy development and the far reaching implications of policy application require ICPs to access, (Haynes et al. 1997) consider, evaluate (Haynes et al. 1997) and where appropriate, apply (Muir Gray et al. 1997) the best available evidence during the policy development phase. However, the findings of this study indicate that during development of guidelines and policies, most ICPs access existing state or national IC guidelines and regulations. The extent to which state and national documents are based on evidence and supported by peer-reviewed journals is indeterminable.

In the event of litigation related to IC clinical practice or procedure variant to existing state or national policy, it is likely that an ICP or their superior would have to give a reasonable explanation for the variation (Shorten and Wallace 1996). The reliance of AICA members on national policy is a convincing argument for contributors to national policy to ensure that their recommendations are based on strong evidence. Adoption of a system of grading of evidence may be critical for this process (Canadian Task Force on Periodic Health Examination 1979; National Health and Medical Research Council 1998).

The influence of politics on policy is inevitable (Muir Gray et al. 1997) and it is possible that IC policies may reflect a preferred political or economic position rather than one which facilitates greater prevention of nosocomial infection (Wurtz 1995). ICPs must be mindful of these inherent weaknesses in policy and Australian ICPs, like their international peers, should begin lobbying policy makers to develop more realistic and evidence-based IC policy in Australia. To effectively lobby and contribute to the development of appropriate local policy positions, Australian ICPs will firstly have to increase the extent to which they regularly read literature. Secondly, they must develop and refine their ability to interpret literature. This may involve further study of research principles, epidemiologic and statistical methods and analysis of literature.

Accessing policies and guidelines written by another facility was used by 73.7% of ICPs to assist them during the development process of their own guidelines and policies. Scientifically proven practices and procedures, rather than unsubstantiated recommendations from colleagues, should be the method of choice. The importance of collaboration between peers and facilities is acknowledged. However, ICPs must exercise caution when identifying IC "experts" and "expert" sources of information. Local variation in IC needs and general IC education levels amongst staff require, in part, an individual approach to IC.

4.4.5 Undertaking IC Research

The influence of well-designed epidemiologic studies on the development of sensible IC guidelines is well documented (Edmond 1995), yet ICPs are reluctant to reduce outdated practices and recommendations within their programs (Pirwitz and Manian 1997). In view of the small proportion (21.5%) of AICA members developing and undertaking IC research, it is likely that Australian ICPs will not, to any large extent, be able to use local evidence to support their IC policies, practices and procedures. Nevertheless, ICPs should not be disheartened by these findings as similar low levels of research activity are reported amongst other nursing-based specialities (Hicks 1995; Pearcey 1995). The future challenge to ICPs is to develop a system of Australian evidence-based IC practice.

Time was the factor most often preventing ICPs from undertaking research. To maximise ICP efficiency, experts in IC have recommended ICPs overhaul their entire ISCPs (Jackson 1997; Barrett et al. 1999). Previous research of Australian IC (Murphy and McLaws 1999a; Murphy and McLaws 1999b; Murphy and McLaws 1999e) concurs with the need for restructure and advocates that Australian ICPs adopt more effective directions so that other activities can be incorporated into their ISCPs (Murphy and McLaws 1999b).

4.4.6 Publishing Research

Few (27.6%) of the AICA members ever published their research. The lack of local research available after peer review results in few local resources being made available for evidence-based IC practice. In 1998, the transition of AICA's official publication, the Australian Infection Control Journal, from a magazine/newsletter format to a peer-reviewed journal provided Australian ICPs with an appropriate local forum for submission of their work. The findings of this study suggest that Australian ICPs already favour local publications. As the AICA journal attracts more contributions and achieves inclusion on Index Medicus it will rightfully assume a position beside other leading international IC publications. Achievement of this goal is dependent on ongoing support from Australian ICPs.

Another barrier to undertaking research and publishing is due in part to limited understanding of research principles, epidemiology and poor computer skills. To overcome these barriers, undergraduate preparation is essential, as is post-graduate training through an AICA-sponsored continuing accreditation process.

4.4.7 Use of Personal Computers and the Influence of Age and Sex

Although half of the sample of AICA members was using PCs, the rapid advances in PC technology and user-friendliness of software suggest that more ICPs should be using computers to assist them. Computer use was primarily for clerical type activities. This finding suggests that age may influence ICP's general disinclination for routine PC use amongst the more experienced practitioners. Yet recent advances in locally developed commercially available and government supported software applications (McLaws and Whitby 1999) could have increased the proportions of ICPs using PCs for surveillance or database management.

Disinclination for computer use may have influenced respondents' research activity as more ICPs who used PCs undertook research than ICPs who did not use PCs. Although a PC is not essential for researchers, its ability to store, retrieve and analyse data facilitates ease of research as do word processing, database and statistical applications (Reagan 1997). Other possible applications of computers for IC activities include education (Gould and Chamberlain 1997; Wright, Turner, and Daffin 1997), surveillance and reporting (McLaws and Whitby 1999), electronic mail (Sellick 1997), literature review (Larson and Satterthwaite 1989), accessing the World Wide Web (Sparks 1996; Kelsey and Peacock 1998), implementing clinical practice guidelines (National Health and Medical Research Council 1998) and developing a World Wide Web presence (Harr 1996; Saba 1996). As computer use becomes essential for planning, co-ordinating and performing

IC surveillance and prevention activities, AICA should provide training to rectify any existing deficiencies in ICPs' levels of computer literacy.

Skills to assist ICPs to adopt evidence-based approaches to IC should begin at university with catch-up programs for currently practising ICPs. To be considered professional, ICPs must address and rectify the deficiencies within their own skill set and resources that impede them from adopting more evidence-based approaches to their work. This study provides a chilling insight into the deficiencies of current continuing-education programs that could provide skills not learnt at university.

Resource issues are historic and ongoing within the Australian IC community (Loxton 1976; Hawkins, Kohn, and Reichert 1982; Westwood and Douglas 1982). Without endorsed guidelines for ISCPs from a professional agency, such as ACHS, it is likely that clinicians' view of the requirements for IC programs will differ from those who allocate resources, that is, the hospital administrators (Brachman and Haley 1981; Murphy and McLaws 1999c). ICPs must demonstrate the overall cost-saving that their ISCP contributes to their facility. ICPs must also negotiate for greater allocation of resources to the ISCP (McGowan-JE 1982; Haley et al. 1985; Haley et al. 1987; Mehtar 1993).

4.5 Conclusion

This chapter represented an initial attempt at describing AICA members' use of skills and tools essential to the adoption and application of best practice IC in Australia. It demonstrates that ICPs require workshops and continuing education options to address deficiencies and to learn new skills. Participation in workshops could be used to provide credit points for an ICP certification process. The findings of this chapter are critical for providers of IC education, for AICA and for ICPs in Australia and in countries with similar systems of IC, regulatory control and healthcare delivery. ICPs who possess the essential skills and tools identified in this chapter will rightfully be at the forefront of the IC profession. Chapter 5 examines the surveillance activities of Australian ICPs and demonstrates the important contribution that standardised and methodologically rigorous systems of surveillance make to the pool of IC evidence.

CHAPTER 5

THE ROLE OF STANDARDISED SURVEILLANCE IN INFECTION SURVEILLANCE AND CONTROL PROGRAMS

INTRODUCTION

The objective of Chapter 4 was to establish the extent to which Australian ICPs use and contribute to evidence-based IC. The findings demonstrated that ICPs infrequently access, analyse or apply evidence in their IC-decision making. Chapter 4 concluded by recommending that Australian ICPs utilise surveillance as a principal method for increasing their evidence base. In this chapter the current surveillance methodologies of Australian ICPs are reported. The chapter demonstrates widespread variation of surveillance methods and provides an argument for the establishment of a standardised national system for epidemiologically sound and rigorous nosocomial infection surveillance.

5.0 Overview

The ACHS accredits Australian hospitals. Since its inception in 1974, ACHS has required hospitals participating in the voluntary accreditation process to report and record cases of infection (The Australian Council on Healthcare Standards 1974). In 1993, ACHS introduced CIs to the accreditation process (Collopy and Balding 1993). ACHS developed the CIs in partnership with Australian medical colleges. The CIs include two SWI indicators; clean wound infection and contaminated wound infection and an indicator for hospital-acquired bacteraemia (The Australian Council on Healthcare Standards 1997). These are the only CIs advocated by ACHS to monitor nosocomial infection. ACHS is not prescriptive in how hospitals collect data and recommends that data collection occur in accordance with existing sources of clinical data and QA strategies (Australian Council on Healthcare Standards Care Evaluation and The Royal Australian College of Medical 1995). However, ACHS does prescribe the definitions for SWI and hospital-acquired bacteraemia. Appendix 4 details these definitions.

The most recent aggregate rates of nosocomial infections for hospitals contributing data to ACHS for clean SWI, contaminated SWI and bacteraemia are 1.4%, 2.4% and 0.32% respectively (The Australian Council on Healthcare Standards 1997). Previous estimates suggest that between 5.5% (Wilson et al. 1995) and 6.3% (McLaws et al. 1988) of patients admitted to Australian hospitals acquire an infection associated with their hospitalisation. In 1984 the SWI rate from data collected in 265 Australian hospitals was 4.8% for clean surgery, and 15.0% for contaminated surgery (McLaws et al. 1988). In Australia in 1984, SWI and hospital-acquired bacteraemia accounted for 34% and 1.6% of all nosocomial infections respectively (McLaws et al. 1988). An estimated three thousand cases of intravascular (IV) catheter-related sepsis occur in Australia each year (Collignon 1994). These figures demonstrate two points; firstly, that nosocomial infection burdens the Australian health care system and secondly, the inconsistency in previous attempts to define and report nosocomial infections in Australia.

The differences between the original estimates and the recent ACHS rates may reflect the small proportion of facilities represented in each ACHS indicator. Using the number of 1995-96 public and private acute care hospitals in Australia as a denominator (Australian Institute of Health and Welfare 1998), in 1997, only 20.1% contributed clean SWI rate data and 18.2% contributed data for contaminated SWIs. The proportion of acute care hospitals and aged care nursing homes represented in the ACHS bacteraemia data is 8.8%. Suggested methods to improve ACHS methodology are described elsewhere (McLaws, Murphy, and Keogh 1997; McLaws et al 1998).

The magnitude of nosocomial infection, the time ICPs currently spend on surveillance and previous findings on IC practice (McLaws, Murphy, and Keogh 1997; McLaws et al. 1997) compelled investigation of routine nosocomial infection surveillance practices in Australia. This chapter describes the current surveillance practice of AICA members co-ordinating IC programs in acute care and surgical hospitals including the time consumed by surveillance, the frequency of surveillance, case finding methods, definitions and reporting. This chapter provides argument for the establishment of ICP training in principles of surveillance and the development of a voluntary, national, standardised, risk-adjusted system of targeted surveillance.

5.1 Method

5.1.1 QUESTIONNAIRE.

A self-administered, return-paid post questionnaire was developed and used to collect detailed data on ICPs and their IC program and activities. One hundred ICPs in NSW who attended a government sponsored IC workshop in 1995 pilot tested the questionnaire for face and content validity (New South Wales Health Department 1995). Detail of the pilot is provided in Section 2.1 of this thesis. The AICA National Executive Committee approved distribution of the questionnaire to AICA members. Methods for improving response and detail of the non-surveillance findings are described in chapters 2 to 4. The questionnaire included questions on the length of time ICPs had been working in IC and completed training and qualifications. Specific surveillance questions related to the time spent on surveillance each week, case-finding for bacteraemia and SWI, reporting of SWI, IVDRB and non-IVDRB and use of hospital-wide surveillance. The survey was mailed in 1996 to the 1,078 AICA members who were not medical industry employees or medical practitioners. The mailing did not include members who had pilot tested the questionnaire or those not residing in Australia.

5.1.2 SAMPLE.

The AICA membership was used to identify Australian ICPs. The denominator was adjusted downwards to reflect incomplete questionnaires returned either by members who indicated that they had retired from IC or marked "address unknown". The usable sample included those 608 responding ICPs who were co-ordinating an ISCP in an acute care or surgical hospital and undertaking nosocomial infection surveillance at the time of the survey. All ICPs from the sample were included in analysis for IC experience, training and qualifications, frequency of surveillance, time spent on surveillance activities and surveillance of all hospital infections. Denominator data differs for each question as not all respondents provided answers for each question. Not all ICPs routinely surveyed for both SWI and bacteraemia. Responses from ICPs who surveyed for both SWI and bacteraemia were used to describe methods of case finding whereas SWI and bacteraemia definitions and reporting formats for SWI, IVDRB and non-IVDRB were reported separately. Responses relating to IVDRB, non-IVDRB and SWI were reported separately as the manifestations, management and treatment of these infections differ.

5.2 Analysis.

Data were initially stratified by participation in the ACHS accreditation system (Collopy 1998) as the ACHS CI system represented the only, widely available system of data aggregation (Ansari and Collopy 1997). The significance of differences between ICPs' surveillance activity in ACHS and non-ACHS hospitals was calculated using Chi tests. Significance was set at $p < 0.05$. There was no significant difference in the amounts of time ICPs in ACHS and non-ACHS hospitals allocated to surveillance ($p=.34$), therefore all other responses were collapsed and reported. Data were measured for central tendency using EPI Info Version 6.1 software. The median number of years of experience was calculated as data relating to IC experience was not normally distributed.

5.3 Results

The survey was completed and returned by 65% (644/993) of AICA members. Of those completing the survey, 47.8% (308/644; CI95% 43.9%-51.7%) co-ordinated an IC program in an acute care or surgical hospital and performed surveillance for either SWI, IVDRB or non-IVDRB.

5.3.1 STUDY GROUP

Of the 308 ICPs, 78.6% (CI95% 73.5%-82.9%) worked in acute care hospitals and 21.4% (CI95% 17.1-26.5%) worked in surgical facilities. Most ICPs (93.5%;CI95% 90.0%–95.9%) participated in the ACHS voluntary accreditation process.

5.3.2 IC EXPERIENCE AND EDUCATION

The 308 ICPs had worked in IC between zero and 35 years. The median number of years was four. Of the 286 ICPs that provided detail on completed hospital based training as a registered nurse, most (97.6%:CI95% 95.0%-99.5%) had at least completed this level of training. Data regarding an undergraduate nursing degree was provided by 53 ICPs, the majority (81.1%: CI95% 68.0%-90.6%) of whom had completed the qualification. Only 26 ICPs responded to the question on continuing education in hospital epidemiology and of this group 76.9% (CI95% 56.4%-91.0%) had completed the education.

5.3.3 SURVEILLANCE PRACTICES

On average, ICPs from ACHS hospitals spent 19.5 hours a week undertaking IC duties of which 20% involved surveillance. ICPs working in non-ACHS hospitals on average spent 15.6 hours on IC and spent a similar proportion of their IC time (18%, p=.34) on surveillance to those working in ACHS hospitals.

The majority (76.0%: CI95% 70.7%-80.8%) of ICPs performed hospital-wide surveillance. The proportion of ICPs undertaking SWI, non-IVDRB and IVDRB surveillance was 92.5% (285/308; CI95% 89.6%-95.5%), 84.7% (CI95% 80.7%-88.7%) and 87.0% (CI95% 83.2%-90.7%) respectively. Table 5.1 details how often ICPs undertook each type of surveillance.

Table 5.0-1 Frequency with which ICPs undertook surveillance

	SWI N=285		Non IVDRB N=261		IVDRB N=268	
	%	95% CI	%	95%CI	%	CI
Daily	46.0	40.1-51.9	28.7	23.3-34.6	32.8	27.2-38.8
Weekly	14.7	10.8-19.4	13.4	9.5-18.2	13.1	9.3-17.7
Monthly	18.6	14.3-23.6	18.4	13.9-23.6	15.7	11.5-20.6
Quarterly	5.3	3.0-8.5	4.6	2.4-7.9	6.3	3.7-10.0
Annually	6.0	3.5-9.4	6.5	3.8-10.2	7.1	4.3-10.8
Outbreak	9.5	6.3-13.5	28.4	23.0-34.2	25.0	19.9-30.6

5.3.4 INDIVIDUAL CASE FINDING

The ICPs who undertook SWI, non-IVDRB and IVDRB surveillance reported 199 different combinations of methods of routine case finding. There were two combinations of methods most commonly used. Each combination was used by 2.4% (CI95% 0.9%-5.2%) of the ICPs. The two combinations were:

1. always use of verbal information, written forms, microbiology reports and prospective review of medical records; and

2. sometimes use of verbal information, written forms, microbiology reports, prospective and retrospective medical record review, direct observation, post-discharge follow-up and other non-specified criteria.

Table 5.2 details the proportion of ICPs who always used each individual method of case finding. Just under a quarter (22.0%) of ICPs always used microbiology reports.

Table 5.0-2 Proportion of ICPs who always use particular case finding methods.

CASE FINDING METHODS	N	%	95% CI
Verbal information	241	48.5	42.1-55.0
Written form	235	41.3	34.9-47.9
Micro laboratory reports	245	76.7	70.9-81.9
Prospective review of medical records	202	28.7	22.6-35.5
Retrospective review of medical records	225	43.1	36.5-49.9
Observation during ward rounds	227	47.1	40.5-53.9
Post Discharge follow up	225	11.6	7.7-16.5
Other	218	13.8	9.5-19.1

5.3.5 DEFINITIONS OF INFECTIONS

The variables used routinely to determine a SWI were reported by 98.2% (CI95% 96.7%-99.8%) of ICPs undertaking this type of surveillance. The 280 ICPs used 117 different combinations of variables. Purulence alone or in combination with other variables was used by 91.7% (CI95% 88.5%-94.9%) of the ICPs. The definition most commonly applied by ICPs (6.8%; CI95% 4.1%-10.4%) to define SWI was infection within 30 days after the operative procedure, plus purulent drainage, plus isolation of organisms from a culture from the incision site plus diagnosis by a medical officer. Purulence and organism plus at least one other variable was used by 67.1% (CI95% 61.6%-72.6%) of ICPs to define SWI. Purulence and organism alone was used by 1.8% (CI95% 0.6%-4.1%) of ICPs. Just purulence was used by 5.4% (CI95% 3.0%-8.7%) of ICPs.

The 235 ACHS ICPs who described their criteria for defining a case of bacteraemia used 53 different combinations of variables. A five-item definition of a patient being asymptomatic, plus afebrile on admission, plus infection occurring at least 48 hours after admission, plus the patient having a fever of >38°C plus a recognised culture from one or more bottles was used by 15.7% (CI95% 11.3%-21.0%) of ICPs. The definitions used by the remaining ICPs in both settings were a mixture of these variables. Infection occurring at least 48 hours after admission, plus a recognised culture from one or more bottles in combination with one of the remaining variables was used by 71.5% (CI95% 66.0%-77.0%) of ICPs. Just infection occurring at least 48 hours after admission, plus a recognised culture from one or more bottles was used by 5.9% (CI95% 2.9%-9.0%) of the ICPs.

5.3.6 FORMATS FOR DETERMINING RATES

There was no consistency in report formats or rates calculated by ICPs. Table 5.3 details the respective formats used by ICPs and the proportion of ICPs using raw numbers and rates to report SWI, non-IVDBR and IVDBR.

Table 5.0-3 Proportion of ICPs using raw numbers and rates to report cases of SWI, non-IVDRB and IVDRB

Infection	Raw Numbers Only		Rate & at least one other format		Rate Only	
	%	95%CI	%	95% CI	%	95% CI
SWI	7.7	4.8-11.5	76.6*	71.5-81.6	35.9	30.2-41.9
Non-IVDRB	35.5	29.3-41.7	44.7+	38.3-51.2	17.5	12.6-22.5
IVDRB	39.0	32.6-45.6	39.8+	33.5-46.1	14.7	10.4-20.0

* Calculated by dividing the number of infected wounds by total number of operations in relative wound classification eg. clean or contaminated.

\+ Calculated by dividing the number of positive cases by the total number of admissions or discharges.

5.4 Discussion

There are no available data on the number of Australian hospitals employing an ICP or having local systems for nosocomial infection surveillance. ACHS estimates that it accredits approximately 40% of Australia's acute care hospitals (Collopy and Balding 1993) and in doing so compels participating hospitals to have an ISCP that includes nosocomial infection surveillance. Membership of AICA is voluntary and as AICA is the only professional organisation for IC in Australia, its members represent the only readily identifiable group of Australian ICPs. The total membership of AICA in 1996 was 1178. The 308 responses from the sample represent only 24% of the total AICA membership and should be interpreted accordingly. Some respondents may be employed in and reporting activity from identical hospitals although the likelihood of Australian hospitals employing multiple ICPs is small (Murphy and McLaws 1999e). These findings are similar to those reported in a recent comprehensive review of IC in Australia's second most populous state, Victoria (Victorian Government Department of Human Services 1998). The 308 respondents provided a useful description of the surveillance activities of ICPs co-ordinating ISCPs in acute care facilities in Australia. Other researchers should be encouraged to describe the evolution of Australian nosocomial surveillance by undertaking a future study of the nosocomial surveillance systems in every Australian public and private hospital with inpatient beds.

Surveillance is a valuable method of evaluating and improving clinical decision-making (Haley 1985; NNIS Report 1991; Gaynes 1997; Horan and Lee 1997). There are however, no guidelines regarding the amount of time that ICPs should allocate from an ISCP to surveillance. Variation between facilities is likely to be the result of variation in the size, patient mix and range of services provided. Irrespective of their involvement in ACHS accreditation, Australian ICPs in this study spent approximately 20% of their IC time on surveillance. This commitment occurs despite the limited availability of training in surveillance and epidemiology and without a national nosocomial infection surveillance system that has rigorous definitions and epidemiologically sound methods for calculating and reporting rates. These findings were similar to those in Victorian public hospitals where surveillance consumed approximately one quarter of the ICP's total time (Victorian Government Department of Human Services

1998). In the U.S.A, ICPs allocate between almost a third to a half of their time to surveillance (Gaynes 1997; Jackson, Soule, and Tweeten 1998). The U.S.A is considering more time efficient methods of surveillance (Yokoe et al. 1998). In the U.K., surveillance is constrained by time (Emmerson et al. 1996) and staffing (Emmerson 1995), with ICTs undertaking targeted surveillance for organisms that can easily spread or cause outbreaks.

The majority of Australian ICPs are undertaking hospital-wide surveillance or collecting data required by ACHS despite promotion in the last decade of targeted, prospective surveillance as the most efficient method of surveillance (Haley 1985). Annual prevalence surveys for SWI, IVDRB and non-IVDRB were undertaken by 5% of ICPs. Although periodic surveillance does not provide reliable data on quality of care compared with targeted surveillance, it is superior to daily or weekly hospital-wide surveillance. If targeted surveillance is unsuitable, periodic prevalence is a useful and cost-effective method (Nicholls and Morris 1997).

Case finding and definitions of nosocomial infection varied. A laboratory-based system of case finding has been shown to be practical for detecting cases of device-related bacteraemia in Australia (Collignon 1994) and the U.S.A (Yokoe et al. 1998). The sensitivity issues relating to this method of case finding require further consideration before widespread adoption in Australia. The absence of a laboratory in many small, remote, acute care facilities also needs consideration. The sensitivity of the ACHS system of case finding is untested. The order of frequency of those case finding methods always used by more than a 45% of ICPs included microbiology reports, verbal information provided by nursing or medical staff and observation during ward rounds. Sensitivity for each of these methods of case finding has been reported as 0.33-0.65 for microbiology reports, 0.62 for ward liaison (Perl 1993) and 0.84 for routine surveillance without direct examination (Yokoe and Platt 1994). Training and use of qualified and aware staff also improves the accuracy of case finding (Gastmeier et al. 1998) although in Australia ICPs are not required to undertake a minimum level of training in epidemiology or IC (Murphy and McLaws 1999b).

Although this study precluded a determination of the proportion of non-responders that may have completed training in epidemiology, AICA may benefit from the development of training modules in the basic principles of epidemiology. Every Australian ICP responsible for nosocomial infection surveillance should seek this level of training.

Whatever the sensitivity of current Australian ICP surveillance practice, it will be influenced by the use of medical records (Emmerson 1995; Ansari and Collopy 1997; Emori et al. 1998) as more than half of all medical records are incomplete(Wilson et al. 1995). In Australian hospitals, 28.7 % of ICPs routinely undertake prospective medical record review, and 43.1% routinely review medical records retrospectively. ACHS recommends that review of medical records or computer databases and identification of cases of infection is routinely undertaken by either medical records administrators, QA co-ordinators or ICPs in accredited hospitals (Ansari and Collopy 1997). To improve accuracy and management of data, it is recommended that only ICPs or physicians should be given responsibility for making special notation within a medical record that a patient has a proven, validated nosocomial infection (Larson et al. 1991).

Sensitivity problems are historic (Cruse and Foord 1980) and unresolved, (Sheretz et al. 1992) plaguing even those countries with advanced, standardised surveillance systems (Emori et al. 1998). This is disheartening for countries striving to monitor patient outcomes and improve the quality of patient care. It does however, present the global IC community with a unique challenge to define and develop standardised, economic and useful approaches to surveillance of nosocomial infection.

5.4.1 DEFINING CASES

The findings demonstrate non-standard methods used by Australian ICPs to define cases. The remoteness and size of rural hospitals, as well as their dependence on external laboratories, may impede rural ICPs using sophisticated methods of diagnosing and defining infection (Sheretz et al. 1992). Restricted access to laboratories is not unique to Australia (Lee 1997).

The variety of combinations of clinical, diagnostic and observational variables used by ICPs to define cases of SWI or bacteraemia has three serious implications for Australian IC. Firstly, the variation in case definition limits the reliability of data collected. Australian ICPs are unable to and should not compare outcomes from their current surveillance activities. Secondly, in most cases, the definitions used differ from those suggested by ACHS. By adopting National Nosocomial Infection Surveillance (NNIS) system-like definitions, Australian ICPs are demonstrating a widespread preference for sensitive definitions rather than the simple definitions advocated by the ACHS (Ansari and Collopy 1997). The Victorian report that most teaching hospitals routinely use NNIS definitions concurs with findings of this study (Victorian Government Department of Human Services 1998). The current U.S.A suggestion that ACHS-like definitions for bacteraemia are equally as sensitive but less time consuming than NNIS definitions (Yokoe et al. 1998) reflects the general lack of consensus internationally on best practice for nosocomial surveillance.

5.4.2 REPORTING

U.S.A IC professionals have documented the relationship between reporting and reducing rates of nosocomial infection (Haley et al. 1985). In the U.K., reporting of results varies (Glynn et al. 1997). The many different definitions and reporting formats used by Australian ICPs in surveillance of SWI and bacteraemia demonstrates the limited usefulness of their current nosocomial surveillance activities and reinforces the recommendation that in most cases results can not be compared. These results also indicate that participation in the ACHS system did not influence the extent to which ICPs were epidemiologically rigorous. The importance of proper training to improve the quality of surveillance is well established (Victorian Government Department of Human Services 1998). The lack of epidemiologic rigour might reflect low levels of epidemiology education amongst Australian ICPs, although a recent study indicates that ICPs are beginning to undertake formal training in this area (Murphy and McLaws 1999b).

Until Australian stakeholders can agree upon, test and adopt epidemiologically sound systems of nosocomial surveillance, ICPs will continue to have difficulty in monitoring patient outcome and measuring the effectiveness of their programs. International experience suggests that gaining managerial, financial and professional support for IC surveillance programs is challenging (Boyce 1995). When epidemiologic principles routinely underpin Australian IC surveillance, it will be appropriate for ICPs to reassess their reporting practices. Reports of surveillance activity should be timely (The Quality Indicator Study Group 1995; Glynn et al. 1997) and appropriately distributed to stakeholders (Scheckler et al. 1998).

The ACHS CI system has assisted Australian ICPs to develop expertise in data collection and to change clinical practice (Portelli, Williams, and Collopy 1997). However, training in the use and application of standardised definitions, case finding and rate calculation and the provision by ACHS of regular, locally useful feedback would improve the sensitivity of the ACHS system. The epidemiologic limitations of the ACHS system and the non-standard methods reported by the study group are of concern. Study findings suggest that the time currently spent by ICPs on surveillance would be better used if ICPs had completed training in epidemiologic methods and applied greater rigour to their local surveillance activity. Alternatively, ICPs should use their experience with the ACHS system to work collaboratively with other health care professionals. Efforts should focus on lobbying the federal government and medical industry to fund and support the development and advocacy (Crede and Hierholzer 1989) of a standardised, sensitive, epidemiologically sound national system of surveillance. Health care professionals developing such a system should be formally trained in epidemiology and represent at least the ACHS, AICA and the Australian Society of Microbiology (ASM). Participation in any national, nosocomial surveillance system should be voluntary. Such systems must include appropriate local and legislative safeguards to prevent punitive action based on surveillance results.

It is common for a country to completely review its existing system of nosocomial surveillance (Glynn et al. 1997). In this case, that task presents a worthwhile and exciting challenge to the Australian IC community and in particular to the ICPs (Horan and Lee 1997). NSW has progressed in this area, with the development and piloting in 1998-99 of the Hospital Infection Surveillance System (HISS) (New South Wales Hospital Infection and Epidemiology Surveillance Unit 1998.). ICPs, microbiologists and state health departments in Queensland, South Australia and Victoria are currently investigating the feasibility of standardised surveillance in their respective States.

5.5 Conclusion

As the rest of Australia rises to the challenge of standardising national surveillance, stakeholders should remain mindful that proper surveillance is difficult and practitioners undertaking this task require commitment, support and training (Emori et al. 1998). Irrespective of involvement in ACHS accreditation, surveillance is the core business of Australian ICPs in acute—care facilities (Mitchell, Swift, and Gilbert 1999). Accordingly, the system of nosocomial surveillance that Australia develops to conduct this core business must be able to accommodate unpredictable change in health service delivery, available resources, technology and disease patterns (Lee and Baker 1996). A voluntary, national, standardised, risk-adjusted system of targeted nosocomial surveillance could accommodate these requirements and improve nosocomial infection surveillance in Australia.

Chapters 2 to 5 have illustrated the serious flaws in the current role of the Australian ICP and argued for a better-defined ICP role, increased ICP education opportunities, introduction of a system of credentialling and development of system of standardised national surveillance for nosocomial infections. Administrator support is critical to any ISCP (Brachman and Haley 1981). Administrators and clinicians must also agree on the essential elements of an ISCP and the necessary resources to implement the ISCP. Chapter 6 describes a study of administrators and clinicians in NSW in relation to their levels of agreement for various ISCP elements.

CHAPTER 6

INFRASTRUCTURE AND KEY COMPONENTS OF QUALITY INFECTION SURVEILLANCE AND CONTROL PROGRAMS

The previous chapters have described the Australian ICP role, ISCP activity, levels of skill and education and the extent to which ICPs use evidence in their ISCP. Each of these factors has the potential to affect the quality of Australian ISCPs. Also influential to ISCP quality is the degree of support offered by administrators to ISCP staff. This chapter describes the extent of agreement between clinicians and administrative staff in NSW hospitals regarding the essential elements of an ISCP and the role of the ICP. It concludes by suggesting negotiated strategies that ICPs can employ to secure administrator support.

6.0 Overview

In the U.S.A, professional IC bodies have published consensus recommendations for the role of the ICP and essential elements for IC programs in hospitals (Scheckler et al. 1998). The extent to which U.S.A and international administrators and clinicians agree with these recommendations is untested, however a recent unpublished survey of 40 U.S.A respondents demonstrated discordance between stakeholder alignment of their facility's ISCP (Kennedy and Barnard 1999). The suitability of these recommendations in countries other than the U.S.A is also untested. This chapter describes a survey of administrators and clinicians employed in 1998 in public hospitals, licensed private hospitals and free-standing day hospital facilities in NSW, Australia. The survey required participants to self-report their levels of agreement with affirmative statements regarding the role of the ICP and the essential requirements and infra structure of IC programs.

6.1 Method

6.1.1 PILOT TESTING

Subject criterion

Subjects participating in the pilot had to be involved in the co-ordination of an ISCP in a NSW health care facility.

Subject selection method

35 ICPs who were members of the NSW Health Department Infection Control Practice Group were selected to participate in the pilot as they were considered to be expert ICPs and were familiar with the overall mission and objectives of the statewide IC program.

Research question or hypothesis

The pilot sought data which would demonstrate respondents agreement with statements based on a published model of recommended infrastructure and requirements for hospital-based ISCPs.(Scheckler, 1998).

Variables

The pilot questionnaire included three questions which determined respondent's role in the ISCP, ten 5-point Likert-scale type questions relating to the ISCP and six questions relating to the respondent's perception of the ICP's role and responsibilities.

Administration of instrument

The pilot questionnaire was distributed at the July 1998 meeting of the Infection Control Practice Group where time was allocated for its completion and subsequent discussoin of it's content. Participating respondents were requested to return the survey prior to the next scheduled meal break.

Results

All members of the group completed and returned the survey. Points raised during post-completion discussion of the survey included unanimous approval that the survey be concurrently distributed to the CEO, DON and Microbiologist or Infectious Disease Physician in each facility included on the NSW health database. Members recommended that the questions remain unaltered. Responses were entered into a customised database designed using EPIN Info Version 6 software.

Data analysis

Frequencies for each variable were run. As no question had less than a 75% response rate no modifications were made. Free text responses relating to the questions about the ICP's role in the ISCP were reviewed and minor modification was made to the available options relating to job description.

Modification based on the pilot

The 5-point Likert-type scale was expanded to a 7-point scale to accommodate respondent's inability to differentiate between responses. The study population was expanded to include the DON, CEO and Infection Diseases Physician/ Microbiologist in each facility. No other modifications were made based on the pilot.

6.1.2 SETTING

NSW is Australia's most populated state with over six million residents (Australian Bureau of Statistics 1999). In 1998, the NSW health system database included 236 public and 83 licensed private and free-standing day hospitals. These facilities represent 33.5% (236/704) of Australia's public hospitals and 17.9% (83/463) of its private and free-standing day hospitals (Australian Institute of Health and Welfare 1998). Of the 319 facilities, 19 public hospitals and one private hospital had 250 or more beds (New South Wales Health Department 1998). The NSW health system is divided into seventeen Area Health Services. Each Area Health Service is responsible for the health of the local community and for the management of public hospitals and community health services within its boundaries.

6.1.3 SUBJECTS

The NSW Health Department Records Management Branch provided an electronic copy of a database detailing the mailing address of each public, private and free-standing day hospital in NSW. On 17 September 1998, separate copies of the survey (Appendix 5) were addressed and mailed to the Director of Nursing (DON), Chief Executive Officer (CEO), microbiologist/infectious diseases physician and ICP at each of the 319 hospitals. Each survey included a covering letter signed by the Chief Health Officer (CHO) that explained the purpose of the survey (Appendix 5). The letter invited DONs, ICPs, CEOs and microbiologist/infectious disease physicians to assist in the identification of best practice IC in NSW.

The letter requested return of completed surveys within three weeks in the pre-addressed, pre-paid envelope provided. Surveys were coded with a unique record number that identified the facility and the professional position. Anonymity was assured and the purpose of the code was explained as a temporary measure to identify and improve response rate so that the survey results could be used to develop Departmental Guidelines for IC Programs. A follow-up letter, signed by the Acting Manager of the AIDS/Infectious Diseases Branch, NSW Health and an additional copy of the survey were mailed to all non-responders at four weeks. The additional copy of the survey included a question about whether the facility employed a person in each of the targeted positions to assist in the estimation of the study population. Respondents were asked to return the completed surveys within three weeks. The total survey period lasted nine weeks with the

Department receiving responses up until 12 November 1998. Completion and return of the survey was considered as agreement to participate.

The study population included the ICP, DON, medical microbiologist/ infectious disease physician and CEO in each public hospital, private hospital and free-standing day hospital in NSW. NSW was targeted as it had progressed infection control through promulgation of legislative requirements, (New South Wales Health Department 1995) state IC policy (New South Wales Health Department 1995) and establishment of the Hospital Infection Surveillance System (McLaws and Whitby 1999). These advancements followed serious well-publicised IC breaches in NSW (Walton 1998). NSW is the state with the greatest number of health care facilities and in consideration of financial constraints it was considered suitable for the purpose of the study. Of the 1276 surveys distributed, 319 (25%) were returned advising that individual facilities did not have a designated position for either an ICP, DON, micro or CEO and 12 (0.9%) were returned as three hospitals had closed. The sample included completed responses from 587/945 (62.1%) of the study population. Denominator data differs for some questions as not all respondents answered each question.

6.1.4 INSTRUMENT

A two-page written survey was developed based on a 1998 U.S.A consensus panel recommendation for Requirements for infrastructure and essential activities of infection control and epidemiology in hospitals (Scheckler et al. 1998). The survey consisted of three parts that elicited data relating to the respondent's position, his/her participation as a member of the facility's ICC and his/her responsibility for IC staff. Sections one and two included closed yes/no questions. Data relating to participation in the ICC and responsibility for IC staff were collected. Analysis and reporting of these data was not considered necessary for the objectives of this study. The third part of the survey included sixteen affirmative statements. Statements one to ten related to IC program infrastructure and resources, and statements eleven to sixteen dealt with the ICP's role and responsibilities. Respondents reported the intensity of their agreement on a Likert-type scale ranging from one to seven (Henerson, Morris, and Fitz-Gibbon 1987). A "one" response indicated absolute disagreement whereas a seven indicated absolute agreement. A "four" response indicated neutrality.

The survey content was endorsed by the NSW Department of Health (DoH) Infection Control Practice Group (ICPRAC) in June 1998. ICPRAC members are senior representatives of the NSW IC profession and represent each of the seventeen Area Health Services in NSW as well as the NSW Private Hospitals Association and the DoH Private Health Care Branch. The survey and accompanying letter were approved by the DoH prior to mailout.

6.1.5 STUDY DESIGN

Received responses were checked for consistency between the respondent's current professional position and that designated by the survey code. Surveys were re-coded for the correct professional position according to that provided by respondents. Surveys addressed to the Medical

Microbiologist/Infectious Disease Physician and completed by a medical administrator were re-coded as "other". Surveys addressed to ICPs and completed by registered nurses were grouped with "ICP" surveys as registered nurses in some facilities perform IC duties without formally being designated as the ICP. Responses from respondents indicating they held joint positions as CEO/Director of Nursing were grouped with responses from DONs as all DONs in NSW are registered nurses. Surveys completed by professionals who indicated that they were Health Service Managers, Executive Officers, General Managers or Medical Administrators were grouped with responses from "CEO's". General pathologists' responses were grouped with those from Medical Microbiologists. Medical Administrators are medically trained physicians who are generally responsible for financial and administrative matters and do not provide clinical care to patients. Chief Executive Officers usually have financial rather than clinical backgrounds. Duplicate surveys were identified by checking the code and discarded as were those surveys completed by persons who did not fit within the sample. When respondents provided more than one response to a question responses for that question were also discarded.

6.2 Analysis

Initial stratification was according to the type of facility, public or private, in which the respondent worked. Data were then examined according to the respondent's occupation. As CEOs, DON's and Medical Administrators are generally responsible for financial and administrative matters in NSW health care facilities, their responses were grouped as "administrators". As

ICPs and Microbiologists in Australia work collaboratively in co-ordinating IC activities, their responses were grouped as "clinicians".

As approximately half of all respondents agreed with each statement, responses were grouped as either disagreement (responses 1-3), neutral (response=4) or agreement (responses 5-7) for the purposes of analysis. When responses from administrators and clinicians from facilities with more than 250 beds were compared, more than half agreed with each of the 16 statements.

Data were entered into a database developed with EPInfo Version 6 software and analysed using the ANALYSIS component of this program. Differences between public and private hospital responses to each statement were tested using a Chi χ test as were the differences between individual professional group's response to each statement. A Kruskall-Wallace test was used to test differences in administrator and clinician responses to each statement as the data set was non-parametric. Significance for both tests was set at 0.05.

6.3 Results

Surveys were mailed to 1276 positions. 331 of these positions were either not held or did not exist including 12 positions deleted from three hospitals whose closure had not been recorded on the DoH database. After adjusting the denominator for those hospitals without a position for either a DON, micro, ICP or CEO and the closed hospitals, the total, possible sample size was 945 professional positions at 316 hospitals. The overall response rate was 62.1% (587/945). The response rate for public hospitals was 63.4% (427/673) and 58.8% (160/272) for private facilities (p=.18). Tables 6.1 and 6.2 detail the demographics of the sample, the number of positions for each occupational group in public and private facilities in NSW and the respective proportions of the total sample that each occupational group represented. The majority 72.8% (427/587) of respondents worked in public hospitals (p=.14).

Table 6.0-1 The proportion of respondents from public hospitals by job type

	N	Study Population	Overall %	95%CI
ICP	159	187	27.1	23.6-30.9
CEO	86	151	14.7	11.9-17.8
DON	149	213	25.4	21.9-29.1
MIC	33	122	5.6	4.0-7.9
TOTAL	427	673	72.8	

KEY

ICP Infection control practitioners/ registered nurses
CEO Chief Executive Officer /, Health Service Managers, Executive Officers, General Managers or Medical Administrators
DON Director of Nursing
MIC Medical microbiologists/infectious disease physicians/ general pathologists)

Table 6.0-2 The proportion of respondents from pRIVATE hospitals by job type

Job	n	Study Population	Overall %	95%Ci
ICP	59	75	10.1	7.8-12.8
CEO	26	72	4.4	3.0-6.5
DON	67	81	11.4	9.0-14.3
MIC	8	44	1.4	0.6-2.8
TOTAL	160	272	27.3	

* calculated using respective total population as denominator

KEY

ICP	Infection control practitioners/ registered nurses
CEO	Chief Executive Officer /, Health Service Managers, Executive Officers, General Managers or Medical Administrators
DON	Director of Nursing
MIC	Medical microbiologists/infectious disease physicians/ general pathologists

ICPs were the group most frequently (37.1%; 218/587) represented while microbiologists were the least (7%; 41/587) represented group when examined by professional position.

Of the 10.4% (61/587) of the sample employed in hospitals with 250 or more beds, 19.7% (12/61) were CEOs, 31.1%(19/61) were ICPs, 27.9%(17/61) were DONs and 21.3% (13/61) were microbiologists.

Significant differences were found between public and private hospital respondents' levels of agreement with the requirements of an effective IC program. Public hospital respondents agreed more often that secretarial support ($p<.001$) and a computer ($p=.02$) were required while private hospital respondents agreed more often that IC programs required an epidemiologist ($p=.02$) in additional to an ICP.

Medical administrators agreed more than DONs and CEOs that an effective IC program required one ICP per 250 beds ($p=.01$) and that the need for IC as a specialty practice in the hospital will continue to increase ($p=.01$). However, DONs agreed more often than CEOs and medical administrators, that the microbiology laboratory should make reports from patient clinical specimens readily available to IC staff ($p=.02$). DONs also agreed more often than CEOs and medical administrators, that the ICP should be an RN with a minimum qualification of a bachelor's degree (p=.03).

When the individual professional groups were categorised into administrators or clinicians, clinicians (259/587) and administrators (328/587) accounted for 44.1% and 55.9% of respondents respectively. Clinicians included 218 ICPs and 41 medical microbiologists/infectious disease physicians or general pathologists Administrators included 216 Directors of Nursing and 112 Chief Executive Officers/, Health Service Managers, Executive Officers, General Managers or Medical Administrators.

There was consensus between the two groups with at least 40% of respondents from each group agreeing with each statement. There was however, significant difference in the administrator and clinician responses for eight of the sixteen statements (Table 6.3)

TABLE 6.0-3 ADMINISTRATOR AND CLINICIAN RESPONSES TO QUESTIONS ASKING FOR AGREEMENT WITH STATEMENTS REGARDING THE ESSENTIAL ELEMENTS AND INFRASTRUCTURE OF IC PROGRAMS AND THE ROLE OF THE ICP.

	ADMINSTRATORS						CLINICIANS						
	D		N		A		D		N		A		P value
STATEMENT	n	(%)	n	(%)	n	(%)	n	(%)	N	(%)	n	(%)	
The most important data-management activity of IC programs is developing, implementing and monitoring surveillance.	26	7.4	16	4.6	307	88.0	13	5.5	14	5.9	211	88.7	Not significant
In addition to ICPs, a trained hospital epidemiologist is an essential component of an effective hospital infection control program.	132	37.8	77	22.1	140	40.0	63	26.5	48	20.2	127	47.6	P<0.002
An effective IC program requires one ICP per 250 occupied beds.	76	21.8	113	32.4	160	45.8	48	20.2	34	14.3	156	65.5	P<.0001
Secretarial service is essential for the IC program.	90	25.8	51	14.6	208	59.6	26	10.9	28	11.8	184	77.3	P<.0001
Computer support personnel are a requisite for the IC program.	71	20.3	45	12.9	233	66.8	16	6.7	21	8.8	201	84.5	P<.0001
A desktop or laptop computer with Internet access and a printer is essential for the IC program.	71	20.3	48	13.8	230	65.9	20	8.4	20	8.4	198	83.2	P<.0001
The link between IC and performance-measurement and improvement activities in a healthcare facility is crucial	11	3.2	12	3.4	326	93.4	5	2.1	6	2.5	227	95.4	Not significant
The microbiology lab should make reports from patient clinical specimens readily available to IC staff	15	4.3	20	5.7	314	90.0	5	2.1	4	1.7	229	96.2	P<.005
ICPs should be registered nurses with a minimum qualification of bachelor's degree.	118	33.8	69	19.8	162	46.4	78	32.8	46	19.3	114	47.9	Not significant
The need for infection control as a specialty practice in the hospital will continue to increase.	17	4.9	33	9.5	299	85.7	5	2.1	8	3.4	225	94.5	P<.001

TABLE 6.3 ADMINISTRATOR AND CLINICIAN RESPONSES TO QUESTIONS ASKING FOR AGREEMENT WITH STATEMENTS REGARDING THE ESSENTIAL ELEMENTS AND INFRASTRUCTURE OF IC PROGRAMS AND THE ROLE OF THE ICP (CONTINUED).

	ADMINSTRATORS						CLINICIANS						
	D		N		A		D		N		A		P value
STATEMENT	n	(%)	n	(%)	n	(%)	n	(%)	N	(%)	n	(%)	
The ICP's role and responsibilities are to:													
Develop appropriate and feasible IC policies and procedures;	8	2.3	3	0.9	338	96.8	3	1.3	0	0.0	235	98.7	Not significant
Be responsible for ensuring that the hospital's administration and management are aware of the institution's compliance with regulations, guidelines, and accreditation requirements.	6	1.7	3	0.9	340	97.4	4	1.7	0	0.0	234	98.3	Not significant
Develop and implement systems for diagnosis, treatment and prevention of infectious diseases in healthcare workers	15	4.3	21	6.0	313	89.7	24	10.1	19	8.0	195	81.9	P<.01
Intervene directly in outbreaks of nosocomial infection	0				349	100	0	0	0	0	238	100	Not tested
Organising education and training to all healthcare workers is a vital component of IC programs	8	2.3	3	0.9	338	96.8	1	0.4	2	0.8	235	98.7	Not significant
Provide expert guidance in the selection of indicators, data collection and analysis for external reporting of infection rates	7	2.0	7	2.0	335	96.0	6	2.5	8	3.4	224	94.1	Not significant

KEY
D= disagree
N= neutral
A= agree

6.3.1 IC PROGRAM INFRASTRUCTURE AND RESOURCES

More clinicians than administrators agreed that an effective IC program required, a trained hospital epidemiologist in addition to an ICP ($p<.002$), one ICP per 250 occupied beds ($p<.0001$), secretarial support ($p<.0001$), computer support ($p<.0001$), a computer ($p<.0001$) and availability of microbiology laboratory reports ($p<.005$). More clinicians than administrators also agreed that IC will continue to increase as a speciality within hospitals ($p<.001$). (Table 6.3)

The rank of the levels of agreement reported by both groups for IC program and infrastructure elements was similar with statements being listed in common for the first seven highest ranking proportions. Statements recommending ICPs should be an RN with a bachelor's degree, one ICP per 250 occupied beds and the inclusion of an epidemiologist within the IC program, scored the lowest level from both groups. Less than half of each group agreed with each of these three statements.

6.3.2 ICP'S ROLE AND RESPONSIBILITIES

More than 80% of respondents from both groups agreed to all statements relating to the ICP's role and responsibilities. There was significant difference ($p<.01$) for those responses from administrators and clinicians regarding ICP development and implementation of systems for diagnosis, treatment and prevention of infectious diseases in healthcare workers. There was unanimous agreement from both groups that the role of the ICP included direct intervention in outbreaks of nosocomial infection. The ranking of the proportion of respondents agreeing was similar and the first, fifth and sixth ranking proportions of agreement from each group were identical (Table 6.3).

6.3.3 IC Program Infrastructure and Resources in Hospitals With 250 or More Beds

Responses from administrators working in 250 or more bed facilities to six of the statements about infrastructure and resources were significantly different compared to clinicians. These issues were identical to those with which the administrators and clinicians in the entire sample had differed significantly. More clinicians than administrators agreed that an effective IC program required one ICP per 250 occupied beds ($p<0.0001$), secretarial support ($p<0.01$), computer support ($p<0.02$), a computer ($p<0.001$), availability of microbiology laboratory reports ($p<0.01$) and that IC will continue to increase as a specialty in the hospital ($p<0.05$) (Table 6.4).

6.3.4 The ICP's role and responsibilities in Hospitals With 250 or More Beds

More clinicians than administrators in facilities with 250 or more beds agreed that the ICP's role included developing appropriate and feasible IC policies and procedures ($p<.02$) (Table 6.4).

TABLE 6.0-4RESPONSES FROM ADMINISTRATORS AND CLINICIANS WORKING IN HOSPITALS WITH MORE THEN 250 BEDS TO QUESTIONS ASKING FOR AGREEMENT WITH STATEMENTS REGARDING THE ESSENTIAL ELEMENTS AND INFRASTRUCTURE OF IC PROGRAMS AND THE ROLE OF THE ICP.

	ADMINSTRATORS						CLINICIANS						
	D		N		A		D		N		A		P value
Statement	N	(%)	n	(%)	n	(%)	n	(%)	N	(%)	n	(%)	
The most important data-management activity of IC programs is developing, implementing and monitoring surveillance.	2	6.8	1	3.4	26	89.6	0	0	2	6.9	27	93.1	Not significant
In addition to ICPs, a trained hospital epidemiologist is an essential component of an effective hospital IC program.	5	17.9	9	32.1	14	50	7	21.9	3	9.4	22	68.9	Not significant
An effective IC program requires one ICP per 250 occupied beds.	7	24.1	8	27.6	14	26.2	1	3.1	1	3.1	30	93.8	P<.0001
Secretarial service is essential for the IC program.	7	24.1	5	17.2	17	58.6	1	3.1	3	9.4	28	87.5	P<.01
Computer support personnel are a requisite for the IC program.	5	17.9	4	14.3	19	67.9	1	3.1	1	3.1	30	93.7	P<.02
A desktop or laptop computer with Internet access and a printer is essential for the IC program.	1	3.4	4	13.8	24	82.7	2	6.3	0	0	30	93.8	P<.001
The link between IC and performance-measurement and improvement activities in a healthcare facility is crucial	1	3.6	0	0	27	96.5	0	0	0	0	32	100	Not significant
The microbiology lab should make reports from patient clinical specimens readily available to IC staff	3	10.3	1	3.4	25	86.2	0	0	0	0	30	100	P<.01
ICPs should be registered nurses with a minimum qualification of bachelor's degree.	2	7.2	8	28.6	18	64.3	6	19.3	8	25.8	17	54.9	Not significant
The need for infection control as a speciality practice in the hospital will continue to increase.	2	6.8	1	3.4	26	89.6	0	0	1	3.1	31	96.9	P<.005

TABLE 6.4 RESPONSES FROM ADMINISTRATORS AND CLINICIANS WORKING IN HOSPITALS WITH MORE THEN 250 BEDS TO QUESTIONS ASKING FOR AGREEMENT WITH STATEMENTS REGARDING THE ESSENTIAL ELEMENTS AND INFRASTRUCTURE OF IC PROGRAMS AND THE ROLE OF THE ICP. (CONT)

	ADMINSTRATORS						CLINICIANS						
	D		N		A		D		N		A		P value
Statement	N	(%)	n	(%)	n	(%)	n	(%)	N	(%)	n	(%)	
The ICP's role and responsibilities are to:													
Develop appropriate and feasible IC policies and procedures;	1	3.4	0	0	28	96.6	0	0	0	0	31	100	P<.02
Be responsible for ensuring that the hospital's administration and management are aware of the institution's compliance with regulations, guidelines, and accreditation requirements.	1	3.4	0	0	28	96.5	0	0	0	0	32	100	Not significant
Develop and implement systems for diagnosis, treatment and prevention of infectious diseases in healthcare workers	1	3.4	2	6.9	26	89.7	3	9.4	4	12.5	25	78.1	Not significant
Intervene directly in outbreaks of nosocomial infection	2	7.2	1	3.6	25	89.3	0	0	0	0	31	100	Not significant
Organising education and training to all healthcare workers is a vital component of IC programs	1	3.6	0	0	27	96.5	0	0	0	0	32	100	Not significant
Provide expert guidance in the selection of indicators, data collection and analysis for external reporting of infection rates	1	3.4	0	0	28	96.5	1	3.1	1	3.1	30	93.8	Not significant

KEY

D= disagree

N= neutral

A= agree

6.4 Discussion

6.4.1 LIMITATIONS

It was assumed that the NSW Health Department database was current and that every facility employed a separate individual to perform each role and that the survey would be delivered to and completed by, the person working in the position indicated in the first line of the address as specified on the label. Completion of the survey by persons other than those matching the individual survey code indicated that some recipients passed their uncompleted surveys to colleagues for completion. This was controlled for by re-coding. Comments included on some blank returned surveys suggested that non-responders considered the statements included on the survey were not applicable to their facility. Inadvertent exclusion of some elements of an ISCP, other than those proposed by Scheckler's model (Scheckler et al. 1998) may have precluded accurate interpretation of the variation in responses from clinicians and administrators. The use of the CHO as a signatory to the covering letter may have deterred some respondents, as may have the use of the coded surveys. However, the 62.1% response rate and the inclusion of responses from each occupational group in both the public and private sector, enables the findings to be generalised to NSW.

In NSW health care facilities, the CEO usually holds the most senior position while the DON and medical administrator have responsibility for the nursing and medical or clinical divisions respectively. In Australia, ICPs are generally nurses (Murphy and McLaws 1999e) who are responsible to DONs but work collaboratively and closely with microbiologists or infectious disease physicians in the day-to-day running of IC programs. In NSW, administrative responsibility for ensuring staff compliance with regulation rests with the administration of each facility. Registered medical practitioners' and registered nurses' understanding of NSW IC Regulations may have influenced responses by these groups. Additionally, administrators in NSW may have a greater understanding of IC programs compared with administrators in other Australian states where there are no IC Regulations. However, the findings of this study have provided an insight to the different priority that administrators and clinicians allocate to IC program components and the role of the ICP. This insight may be applied to other Australian states and also in countries with sufficient resources to support developed systems of controlling hospital infection.

6.4.2 The Importance of Stakeholder Consultation

The identified divergent views of administrators and clinicians with regard to the essential elements of an ISCP and the role of the ICP provide an insight for professional IC organisations, policy-makers and standard-setting establishments. The finding of high proportions of agreement between clinicians (95.4%) and administrators (93.4%) regarding the value of IC programs in the overall quality improvement program is encouraging and suggests that consensus between the two groups in relation to specific areas of the ISCP and the ICP role is attainable.

The nature of IC work and the diversity of hospital-based departments affected and influenced by IC decisions and recommendations require broad consultation and support at a local level. Differences between stakeholder opinions must be addressed if consensus panel guidelines and recommendations are to be applied broadly as well as within facilities (Jarvis 1996).

6.4.3 LOCAL CONSULTATION

Failure to gain local stakeholder support and consensus for achieving the specified IC program goals can seriously jeopardise the effectiveness of an ISCP (McGowan 1990; Haley 1998) and its ability to achieve its overall goals as defined by Scheckler and colleagues (Scheckler et al. 1998).

6.4.4 DEBATE OVER THE CORE BUSINESS OF INFECTION CONTROL

In countries such as Australia, New Zealand, the U.K. and the U.S.A, the IC profession is about to enter its fourth decade yet global debate remains over what constitutes the core business of ISCPs (Jepsen 1995) (Pantelick 1989; McGowan 1990; Walker et al. 1994; Hambraeus 1995). Demonstration of international stakeholder agreement on the critical components and systems for measuring an effective ISCP is missing from the IC literature. Global variation in health funding and delivery make the definition and development of an "ideal" ISCP difficult (Huskins et al. 1998). Throughout the world, differences in IC training, education of ICPs (Murphy and McLaws 1999b) and variation in the routine use of advanced technologies in the delivery of direct patient care compound the extent of this problem

(Widmer, Sax, and Pittet 1999). Unique local circumstances should influence and cause variation in administrator and clinician expectations of an IC program (Jarvis 1996). Yet this study highlights the need for professional associations in countries with mature ISCPs to identify broad solutions to each of these issues before a global definition of the ideal ISCP infrastructure can be made. The adoption by Australian hospital administrators of the U.S.A Study on the Efficacy of Nosocomial Infection Control (SENIC) project's one ICP per 250 occupied beds staffing ratio (Haley et al. 1985) as an integral component of an IC program would not have occurred without the initial endorsement by the Australian Council on Health Care Standards (The Australian Council on Healthcare Standards 1981) and subsequent endorsement by the National Health and Medical Research Council (National Health and Medical Research Council 1996).

6.4.5 SCHECKLER'S MODEL

In 1998, Scheckler's panel of experts used an evidence-based approach to recommend 23 essential elements of IC in hospitals. The validity and usefulness of these recommendations outside of the U.S.A are untested. However, it is the process by which the panel's recommendations were finalised that is of paramount importance. The multi-disciplinary nature of members of Scheckler's panel, their representation of key U.S.A stakeholder organisations and publication and endorsement of their recommendations as a consensus document, suggest that all stakeholders' interests and positions were considered prior to finalisation of the recommendations (Weinstein 1998)

In addition, Scheckler and colleagues recommended three key goals for IC programs. These include cost-effective protection of patients, healthcare workers and others in the healthcare environment (Scheckler et al. 1998). Depending on whether a stakeholder consumes, funds or provides health services, their perception of the goals and effectiveness of an IC program may differ.

6.4.6 ADOPTION OF U.S.A GUIDELINES OUTSIDE OF THE U.S.A

In countries such as Australia, where individual IC programs have existed for over two decades and a well defined body of IC professionals exists (Murphy and McLaws 1999e), it is likely that IC professionals will consider and apply modified versions of U.S.A position statements. The absence of any clear-cut local guidelines for Australian IC service makes Scheckler's model attractive. Widespread Australian adoption of U.S.A-based recommendations is evident in the National Health and Medical Research Council recommendation on IC staffing levels (National Health and Medical Research Council 1996). The one ICP to every 250 beds staffing ratio suggested in the SENIC project (Haley et al. 1985) is untested in Australia although it is advocated in this country as a best practice IC staffing ratio. Australian IC professionals should locally field-test and validate international recommendations on the essential elements of an IC program and role of the ICP before recommending general adoption. In addition to being field-tested, recommendations should also be subject to market research including stakeholder consideration similar to that used by Scheckler and colleagues.

6.4.7 THE EXTENT OF DIVERGENCE & IMPORTANCE OF STRATEGIC PLANNING

This study concurs with the literature that administrators are reluctant to fully appreciate or understand the objectives and importance of ISCPs (Jarvis 1996) although they agree with clinicians that the link between IC and performance-measurement and. improvement activities in a health care facility is critical. As ISCPs do not generate direct revenue, allocation of adequate fiscal and personnel resources is often difficult (Haley 1998). The importance of administrative support for ISCPs is well documented (Jarvis 1996). However, this data suggests a significant difference in the extent to which administrators and clinicians in NSW agree with statements regarding ISCP infrastructure. The areas of greatest disagreement were primarily those requiring additional funding or personnel. Although the survey design precludes identification of the respondents' preferred position for each element it is most likely that fiscal responsibility and clinical perspective accounted for variation in the value sets of the two responding groups. In view of the administrator's usual, overall responsibility for expenditure, constraint and divergence with the clinician's view is expected.

As identified by McLaws et al, large hospitals have greater potential for nosocomial infections (McLaws et al. 1988). In hospitals with 250 or more beds, administrators and clinicians disagreed on many of the basic components of an IC program. Surprisingly, at least half of the clinicians and administrators in the 250 or more bed facilities agreed that an epidemiologist was an essential component of the program. This may indicate the realisation by professionals in larger facilities that accurate monitoring and measurement of IC outcome requires skills and training other than those held by ICPs, microbiologists or administrators. Recently, Australian IC advocates have called for increased inclusion of epidemiologic rigour in IC programs (McLaws, Murphy, and Keogh 1997; Murphy and McLaws 1999a) and training for IC professionals (Murphy and McLaws 1999b). Unlike the U.S.A, the extent to which future Australian IC practice incorporates epidemiology and an evidence-based approach to IC is unpredictable and challenging.

Rather than frustrating the well-intentioned ICP, the study findings have the potential to inspire them. Two issues of importance have been demonstrated. Firstly, the extent of divergence between administrators and clinicians is not so great that it can not be resolved. Better communication between clinicians and administrators as well as objective strategic planning is recommended. Secondly, the study results suggest that the levels of administrator support for the various elements of an IC program, as defined by Scheckler, may improve through discussion, negotiation and involvement in strategic planning. This study provides the minimum level of administrator support for each IC program element. ICPs can work with this information to improve, adjust or negotiate levels of administrator support for individual elements and for the overall IC program.

6.4.8 THE IMPORTANCE OF THE STUDY

Achieving consensus regarding the core business of IC is critical to the planning and development of strategic directions for IC programs. The overall trend amongst respondents in the study was agreement with the affirmative statements about IC. There was however, significant variation in the proportion of respondents from each category agreeing with the statements. Similar proportions of respondents from both groups agreed with the statements relating to outcome measurement and quality improvement. This may reflect the overall importance of these issues for health care generally. Agreement with statements about the role of the ICP as an educator, policy analyst and enforcer of regulatory and accreditation requirements was evident in both groups. This is possibly linked to NSW's position as the only Australian state to adopt a regulatory approach to IC. Alternatively, the listed IC role activities, other than regulatory enforcement, are identical to those advocated for the profession since its inception in NSW in the late 1970s. They are also requirements of the Australian Council of Health Care Standards during the accreditation process. As such they are unlikely to be controversial and gaining support in the form of agreement to affirmative statement is not difficult.

The generally low levels of support for recommendations regarding IC staffing, qualification, involvement of an epidemiologist and support for the IC program are noteworthy. Most probably, they demonstrate the unsophisticated nature of IC programs in NSW and the reluctance of the profession and administrators to adopt U.S.A trends of including a hospital epidemiologist as a critical member of the IC team in NSW.

6.5 Conclusion

This study represented a first attempt at identifying which elements of an IC program and roles of an ICP are most valued by clinicians and administrators. The findings of this study are unique in that they demonstrate divergence in values placed on these roles and elements by the stakeholders responsible for co-ordinating and maintaining IC programs in NSW health care settings.

The overview of Australian ISCPs and ICPs described in the findings of Chapters 2 to 6 demonstrates the respective strengths and weaknesses of IC in the Australian health care setting. The discussion sections of each preceding chapter have offered a series of strategies that could be employed to develop Australian ISCPs and to increase ICP professionalism. The final chapter of this study promotes the adoption of a strategic alliance and the establishment of an expert panel to support, nurture and guide the future direction and effectiveness of Australian ISCPs.

CHAPTER 7

CONCLUSION & RECOMMENDATIONS

7.0 Restatement of objectives

The study had six objectives. These objectives were to:

1. describe the development of Australian ISCPs. This was achieved by reviewing the relevant literature, and comparing the development and progress of Australian infection control to the U.K. and U.S.A. When necessary verbal histories were used and validated through records of committee meetings and scientific meetings;

2. provide a profile of the ICP's management responsibilities and co-ordination of ISCPs;

3. provide an overview of the existing skills, education and experience of an ICP to co-ordinate an ISCP in Australia;

4. describe ICP use and application of evidence and associated skills;

5. describe the methods with which Australian ICPs undertake surveillance of nosocomial infections; and

6. identify variation in administrator and clinician perceptions and describe their level of support for recommended essential infrastructure and criteria for ISCPs and the role of the ICP in accordance with Scheckler's model.

The study met objectives 2 to 5 by reporting the results of a survey of AICA members. The data provided by respondents contributed to a profile of Australian ICPs and the day-to-day IC activities undertaken in Australian health care facilities.

The study's final objective was met by reporting the results of the survey of administrators and clinicians in each public and private hospital in NSW. The administrator and clinician survey elicited responses indicating the level of agreement between groups for affirmative statements relating to the essential elements and resources of an ISCP and the role of the ICP as defined by Scheckler and colleagues in the U.S.A in 1998 (Scheckler et al. 1998)

7.1 Limitations of the study

The following limitations of the study should be acknowledged:

1. Generalisability of the results is limited by the choice of database used to recruit ICPs. At the time of the survey of AICA members, there was no publicly available database listing Australian health care facilities by name and address. Therefore, as Australia's only professional organisation for IC, the AICA member database which included contact details of each State and Territory Association member, provided the only possible method of surveying ICPs. There was no other similar group with which to compare data.

2. Selection bias will have occurred due to the use of the Chief Health Officer's signature and involvement of NSW Health Department in the

survey of administrators and clinicians in NSW hospitals. The response rate may have been affected, as a result of the study population considering that participation in the survey was compulsory despite assurances that participation was voluntary.

3. Content validity may have been affected by the lack of a formal and standardised IC task profile. The design of the survey tool used to elicit responses from AICA members may not have provided a complete range of possible options for describing ICP work practices. This may have been of most concern with the questions relating to IC and surveillance activities and limitations to undertaking research. However, the proportion of respondents which reported the "other" option for work practices or reasons for not undertaking research was small. The available options were based on those used in the 'best practice' profile defined by the SENIC study and literature reports of usual U.S.A and U.K. ISCPs. These sources provided the only available framework for the questions. In addition, the survey was pre-tested for content validity by 100 ICPs participating in a NSW Government-funded IC workshop.

4. Item bias may have existed because of the use of coded surveys. ICPs may have been concerned that their response to particular items were identifiable through the code used to assist the return rate. To overcome potential item bias, written assurances were given that all responses would remain confidential and would be reported only in an aggregated form. The response rates in both surveys were consistent with international IC studies targeting similar populations. Changes in the

denominator by item were small however this does not overcome the possibility of false responses.

5. The generalisability of results can only be made to individual ICPs rather than specific health care facilities. The survey design was such that for purposes of maintaining anonymity, individual hospitals were not identified. Therefore, results can only be generalised by type and size of hospital. In addition, there was no way of establishing the frequency with which respondents worked in identical facilities.

6. In the examination of ICPs, self-perception of expertise was tested against the only available external criteria, years of experience and qualifications. There was no other possible external criterion such as successful completion of a certification exam or credentialling process.

7. The generalisability of results of the NSW survey of clinicians and administrators may have been affected by legislative IC requirements in this state. No other state has any such legislation. This may result in a greater understanding of IC issues amongst administrators and clinicians in NSW.

8. The generalisability of Scheckler's model may be limited by the advanced state of IC practice and infrastructure in the U.S.A. In this study, Scheckler's model was used to measure administrator and clinician agreement with statements regarding ISCP elements and infrastructure as well as the role of the ICP in all NSW hospitals. These hospitals included public and private acute and free-standing day hospitals. The

generalisability and usefulness of applying Scheckler's model to public and private acute care settings and free-standing day hospitals and in other countries is untested. However, the content validity of the questionnaire was pilot tested on 35 members of the NSW Health Department Infection Control Practice Group. Members of this group were experienced ICPs representing each Area Health Service in NSW as well as the NSW Private Hospital's Association and NSW Health Department's Private Health Care Branch. The pilot enabled difficulties with questionnaire directions, completion or use to be identified. Minor amendments were made to the questionnaire based on the results of the pilot.

9. Piloting of the surveys was undertaken and is described however the extent of piloting was limited by the need not to confound the relatively small sample population. This precluded checking of the questionnaires for internal consistency.

10. Although self-reporting surveys are inherently subject to bias, validation interviews or more detailed interview of a subset of subjects from each survey would have strengthened the study. The deficiencies of the methodology are well described in the respective discussion sections of each chapter.

11. These limitations are noteworthy yet their importance in the overall results and conclusions of this thesis can not be estimated and may be minor.

7.2 Conclusions and recommendations

The study provided evidence that each of the following recommendations are necessary and/or will be effective in addressing the existing deficiencies in Australian ISCPs and ICPs. These recommendations have been prioritised according to urgency and available resources. Additional areas for research relating to each recommendation are included.

The strength of the following specific recommendations should be considered in the context of the limitations of the study. A discussion and proposed approach to improving the quality and effectiveness of ISCPs incorporates the central findings and recommendations and concludes this thesis.

7.2.1 LITERATURE RELATING TO ICPS AND THE EVOLUTION OF ISCPS IN AUSTRALIA

Chapter 1 demonstrated the evolution of the ICP and ISCPs in the U.S.A and U.K.. A major finding of Chapter 1 was the absence of publications detailing the role and function of the Australian ICP, the developmental stages of Australian ISCPs and the efficacy of Australian ISCP. The absence of literature or reports on ISCP activities makes comparisons between the U.K. and U.S.A ICP's and ISCPs difficult in any sense other than to map the chronological development of infection control in the respective countries.

Chapter 1 also demonstrated that the development and progression of IC in both the U.K. and in the U.S.A was related and largely dependent upon the support, infrastructure and influence of additional stakeholder bodies such as government, professional associations and centres of excellence such as the CDC.

7.2.2 SPECIFIC RECOMMENDATIONS FOR INCREASING THE PROFILE OF IC IN AUSTRALIA AND GAINING STAKEHOLDER CONSENSUS

As the premier body for IC in Australia, AICA should develop and coordinate a comprehensive national strategy for raising community and stakeholder awareness of IC. This may include immediate strategies that in priority order should include:

- Corresponding with all other stakeholders advising them of AICA's mission, vision, expertise and membership skills.

- Developing AICA promotion materials that raise community awareness of IC. These could include an information page on the AICA world wide web site.

- Initiating dialogue with state and federal government and accrediting bodies with portfolio responsibility for IC.

In the longer term of up to five years, AICA could encourage original contributions from ICPs to the AICA publication "Australian Infection Control" and other peer-reviewed scientific publications so that the scientific profile of Australian IC can be lifted as well as successful strategies and innovations being evaluated and available to other ICPs.

7.2.3 FURTHER RESEARCH TO INCREASE THE PROFILE OF IC IN AUSTRALIA AND GAINING STAKEHOLDER CONSENSUS

Whilst this study provided the first comprehensive survey of Australia ICPs and ISCPs the currency of the data could be expected to change periodically. In this case, the AICA membership was identified as the only available source of data for this purpose. By undertaking similar periodic surveys of the ICP in each licenced or public health care facility in Australia individual more valid profiles of ICPs and ISCPs could be maintained.

Replication of the NSW administrator and clinician survey in each remaining Australian state and territory would significantly enhance the usefulness of the findings at a national level. Similar surveys in other countries with similar systems of healthcare, resources and IC infrastructure may reveal the level of agreement between administrators and clinicians in those countries.

7.2.4 SPECIFIC RECOMMENDATIONS FOR IMPROVING THE ROLE OF THE ICP AND STANDARDISING ISCPS.

Recommendations for immediate implementation include:

- development and adoption by ICPs of problem-specific, goal-directed ISCPs.
- a review by ICPs of the time they spend on unimportant aspects of ISCPs;
- increased employment by facilities of persons skilled in information systems and office practice to reduce the ICP's clerical burden;
- reduction by ICPs in the ISCP time allocated to clerical and computer activities and in meeting preparation and attendance; and

The significant variation in the time allocated to various aspects of ISCP co-ordination reported by ICPs in Chapter 2 demonstrated an overview absence of problem-specific and goal-directed, strategic infection control interventions.

Chapter 2 also demonstrated that after surveillance, most full-time ICPs spend the greatest proportion of their time on computer and/or clerical activities. Preparation for and attendance at committee meetings was the next most time consuming activity undertaken by ICPs.

Longer term recommendations to address these and additional problem areas identified in Chapter 2 include:

- acknowledgement by health care facilities of the need for ICPs to receive clerical and information systems support;

- review by ICPs of the proportion of available ISCP time dedicated to policy development;

- increased priority given by ICPs to policy development and implementation as core components of ISCP;

1. development by relevant bureaucracies and professional organisations of IC policies, standards, products and services that are adaptable to smaller facilities; and.

2. increased opportunity for ICPs to undertake training in essential elements of QA.

The proportion of IC time routinely allocated to policy development and implementation was in most cases lower than that allocated to clerical activities and attending meetings. By implementing additional or alternate human or software/hardware resources in the longer term, ICPs may be able to reduce their clerical burden and increase the proportion of available time that could be allocated to policy development and/or implementation.

ICPs worked in many different facilities with only 38% of ICPs reporting responsibility for ISCPs in publicly funded, acute care facilities. Accordingly, products such as policies, standards and guidelines that target Australian ICPs should be developed so that the broad principles of IC can be extrapolated to alternate settings.

7.2.5 FURTHER RESEARCH NEEDED TO IMPROVE THE ROLE OF THE ICP AND STANDARDISE ISCPS

Chapter 2 demonstrated variation in resource allocation to Australian ISCPs by detailing the number of beds and ICP staffing levels per bed size. Justification for ICP staffing levels requires a comprehensive profiling of ICP work practices with correlation being drawn between key performance indicators and staffing. Such a study was beyond the scope of this PhD but nonetheless would provide information of value to all IC stakeholders.

7.2.6 SPECIFIC RECOMMENDATIONS FOR STANDARDISING ICP SKILLS, EDUCATION AND EXPERIENCE

1. expansion by AICA of the membership data they collect from members on renewal of membership. Minimum data should include detail on demographics and qualifications;

This study highlighted the lack of currently available demographic data describing ICPs. Collection of basic demographic data of members is usual in professional Associations in Australia and in this case would provide a foundation upon which educational initiatives could be undertaken by AICA.

Recommendations for the longer term include:

2. development by AICA of a competence-based system of IC certification or credentialling;

3. development by stakeholders of a system to identify appropriately qualified and experienced ICPs;

ICPs in this study reported wide variation in the qualifications, experience and skill-levels of ICPs. The absence of any regulatory, professional or legislative requirement prohibits administrators and health consumers from being able to establish the suitability and capacity of an ICP to provide quality IC services.

4. increased collaboration between AICA and academic institutions to develop a standardised IC career pathway. This pathway should offer staged IC qualifications and validated criteria for progression between each level.

5. development by AICA of a competence-based system of IC certification or credentialling;

6. review by stakeholders of undergraduate preparation for ICP role;

7. revision and amendment by AICA of the 1996 AICA Standard for Practice to include references to a system that measures ICP competence and defines criteria for identifying IC expertise

8. review by stakeholders of undergraduate preparation for ICP role;.

Chapter 3 demonstrated that ICPs subscribe to an informal and poorly defined system of measuring competence and expertise. Such a system gives little credibility to the profession and provides minimal reassurance to the ICPs customers. Reports from the USA indicate the success and usefulness of an ICP certification system in assuring standardised levels of education and experience (Pugliese 1986; Pugliese 1984).

9. increased collaboration between AICA and academic institutions to develop a standardised IC career pathway;

10. development by stakeholders of a compulsory system of ongoing education;

11. accreditation and endorsement by AICA of external educational programs and courses;

12. accreditation and endorsement by AICA of external educational programs and courses; and

13. consensus by key stakeholders of the necessary minimum levels of education for ICPs; and

There was wide variation in the qualifications ICPs in this study reported as being necessary for the five levels that constituted the range novice to expert practitioner. Variation is also evident in Chapter 2 where less than a quarter of ICPs reported having undertaken continuing studies relevant to their role. Only 4% of ICPs had completed post-graduate studies. These findings suggest that the development of ICP education initiatives as specified in the above recommendations is important. Implementation of these recommendations should be delayed only by the steps necessary to ensure appropriate resources and information are available.

14. progression by AICA of initiatives to acknowledge, promote and reward ICP competence and excellence.

Few of the ICPs studies considered themselves to be "experts". Self identification and acknowledgement of expertise is confronting, the burden of which can be eased by the provision of pre-determined criteria for measuring expertise.

7.2.7 FURTHER RESEARCH NEEDED TO STANDARDISE ICP'S SKILLS, EDUCATION AND EXPERIENCE

In this study the use and application of Benner's model was limited by the use of one-directional statements regarding infection control experience. More rigourous use of the model involving interviews with ICPs and recollections of their responses to various clinical and professional situations may assist the development of criteria with which to reliably measure ICP expertise.

7.2.8 RECOMMENDATIONS FOR INTRODUCING EVIDENCE INTO ICP POLICY AND PRACTICE DECISION-MAKING

Recommended immediate strategies for introducing evidence into ICP policy and decision-making include:

1. ICPs increasing their readership of scientific literature and personal computer use;

Less than a third of ICPs surveyed routinely reviewed the scientific literature and only a half used personal computers to assist IC tasks. ICPs who used computers were more likely ($P<0.001$) to undertake research.

2. ICPs developing and refining their ability to critique and interpret IC literature. This may necessitate further study of research principles, epidemiologic and statistical methods and analysis of literature;

3. ICPs adopting and applying a standardised system for grading quality of IC evidence during policy development;

4. ICPs routinely accessing, considering, evaluating and applying best evidence during clinical decision-making and development of IC policy positions;

Over a quarter of the respondents reported a lack of understanding of research principles. This inability impedes the ICPs capacity to evaluate and apply evidence. The reported use by less than half of the respondents of scientific literature in policy development confirms the immediacy of the above recommendations.

Suggested long-term recommendations for improving the use of evidence in IC policy and ICP decision-making include:

5. progression and support by AICA of the transition of Australian Infection Control to a peer-reviewed journal including its listing in the Index

Medicus increasing ICP's contributions to a unique Australian pool of IC evidence;

Of the 21.5% of respondents who undertook research just over a quarter published their findings. One of the key steps in encouraging Australian ICPs to publish their work is to ensure that an adequate forum exists in which they can submit material for publication.

6. development and marketing by AICA of staged computer training for ICPs; and

7. ICPs increasing their use of computer applications for education, surveillance, reporting, electronic transfer of information, accessing and reviewing literature, implementing clinical practice guidelines and establishing an individual presence on the World Wide Web.

Lack of personal computer skills was cited by 15.4% of respondents reporting the reasons that they did not undertake research. That half of respondents routinely using personal computers used them primarily for common simple tasks such word processing, database management and preparation of presentations. Advancements in IC and other software and hardware subsequent to this study would possibly gaurantee more user friendly applications which ICPs would find useful in their work.

7.2.9 Further research needed to introduce evidence into ICSPs

This study pre-dated routine use of electronic transfer and the world wide web in Australia. To more accurately assess routine use of these capabilities and predict possible applications of electronic networking to IC, a further study should be undertaken to establish the proportion of Australian ICPs current;y using the world wide web and their uses of the web and internet capacity.

A state-of-the-art review of software and hardware applicaatiosn available in other similar specialty health groups may enabled some comparison between ICPs and another group or additionally, give rise to innovative applications for IC.

7.2.10 Recommendations for improving surveillance in ISCPs

Immediate recommendations for improving the quality of ISCP surveillance activity include:

1. implementation by ICPs of targeted surveillance of restricted populations to improve usefulness and quality of surveillance outcomes and provide evidence for clinical decision making;

2. reduction by ICPs of hospital-wide surveillance;

The majority of respondents (76.0%) reported undertaking hospital-wide surveillance which includes determination and recording of all nosocomial infections. The proportion of non-preventable nosocomial infections is significant and attempts to monitor and/or eradicate such infections in most cases may constitute an inadvertant waste of scarce resources (Haley 1985). Targeted surveillance based on specific achievable objectives is a much more realistic and cost-effective option (Haley 1985).

Long-term recommendations to improve the quality of ICP surveillance activity include:

3. recommendation by AICA and ACHS regarding the minimum and maximum proportion of total available ICP time that should be allocated to surveillance;

4. promotion by AICA and ACHS of targeted, prospective surveillance;

There was no siginificant difference in the respective proportions of available IC time ICPs in ACHS and non-ACHS hospitals allocated to surveillance, with ICPs usually spending between 16-20% of their available time on surveillance. By providing a broad guideline on an appropriate amount of time ICPs could begin their necessary attempts develop more strategic targeted surveillance initiatives as well as undertake other tasks which may be equally important but currently external to the measures reviewed by ACHS during the accreditation process. The joint endorsement of these recommendations by AICA and ACHS potentially enhances the attraction and legitimacy of the recommendations.

5. development and provision by ACHS and AICA of training for ICPs in surveillance and application of epidemiologic rigour;

6. development and provision by appropriate experts of ICP training in the use and application of standard definitions, case finding and rate calculation; and

7. development and provision of regular, locally useful feedback to hospitals contributing data to recognised formal surveillance systems.

8. local authorisation of only ICPs or medical practitioners to make special notation of proven nosocomial infection in patient medical records and any related patient database;

9. development by AICA of distance-education training modules in the basic principles of epidemiology. All ICPs responsible for and undertaking nosocomial infection surveillance should complete such modules;

The proportions of Australian ICPs undertaking routine surveillance of either SWI, non-IVDR and/or IVDRB, 92.5%, 84.7% and 87.0% respectively are high and demonstrate the importance placed upon surveillance as a primary ICSP activity. It is therefore alarming to note that this group of ICPs used 199 different combinations of methods for routine case and 117 different combinations of varaibles to define SWI and 53 different combinations of variables to define nosocomial bactereamia. The series of recommendations 5-9 listed above provide strategies to standardise surveillance, to promote collection and interpretation of valid and reliable data and to maximise the usefulness of surveillance data as an indicator of quality of care and ISCP efficiency. These objectives have been achieved elsewhere, most obviously in the U.S.A through the SENIC study and the subsequent implementation of the NNIS program. The provision of training in epidemiology will also potentially rectify the ICPs' self-reported deficiencies in being able to interpret scientific literature as described in Chapter 4.

7.2.11 AREAS FOR FURTHER RESEARCH

1. Measurement of the sensitivity and specificity of current ACHS case finding methods for SWI and cases of nosocomial bacteraemia;

Nearly all (93.5%) of the ICPs surveyed participated in the ACHS accreditation system and undertook surveillance usually at least the ACHS criteria. The sensitivity of the surveillance methods recommended by ACHS are unreported. Validation of these methods would be useful in informing the development of a national system of surveillance.

2. Lobbying by ACHS and AICA of federal/state and territory governments and medical industry to assist in the piloting of a standardised, sensitive, epidemiologically sound national system of surveillance.

The wide variation in current surveillance methodolgy and reporting of data described in Chapter 5 strengthens the argument for the establishment of a standardised system of national surveillance. The absence of standard methodology and risk adjustment in the methods used by ICPs currently precludes either local or external comparison of outcome. Such comparison has proven useful in the U.S.A. where a benchmark rate of specific infections is calculable. This rate provides a useful measure for all hospitals collecting data according to the NNIS methods irrespective of their involvement in the NNIS program (Horan 1997). However, the investment in both human and financial terms, in developing such a system is significant and piloting would be most appropriate so that usefulness, validity, reliability and return for investment can be considered.

7.2.12 RECOMMENDATIONS FOR THE ESSENTIAL ELEMENTS AND INFRA-STRUCTURE OF ISCPS AND THE ROLE OF THE ICP

The nature of the suggested recommendations for essential elements and infrastructure are complex and therefore best expplored and introduced over the longer term. No immediate recommendations would either partially or completely rectify the current divergent viewpoints of administrators or clinicians.

Long term recommendations to clarify the essential elements and infrastructure of ISCPs and the role of the ICP include:

1. development by stakeholders of Australian guidelines defining the essential elements, requirements and infrastructure of ISCPs;

Chapter 6 demonstrated significant difference between administrators and clinicians regarding seven aspects of an ISCP. These were the inclusion of a hospital epidemiologist, the ration of one ICP per 250 beds, provision of secretarial and computer support, routine availability of a PC with Internet access, routine availability of microbiology reports to the ICP and the perception that IC will continue to be increasingly important as a specialty practice within the hospital setting. In view of the extent of variation between the two groups' levels of agreement clear-cut definition and guidance is required to define the essential elements and infrastructure of IC programs.

2. consideration by ICPs of local IC requirements through consultation with individual specialty areas/departments of health care facilities;.

The variations demonstrated in Chapter 6 provide evidence that clinicians and adminsitrators need to work collaboratively to define mutually agreeable goals for ISCPs.

3. commitment by health care administrators to at least mutually agreeable minimum levels of managerial, financial and resource support for ISCPs;

4. formalisation of the ICP/management relationship through development of negotiated work plans with prioritised measures of outcome;

Administrator disagreement with clinicians occurred most often in relation to elements that required either additional staffing or capital. These included a definitive staffing ratio, additional clerical or computing staff and availability of a personal computer. For the ICP to deliver IC products and services they must be resourced at a level which is mutually agreeable and also facilitates the achievement of key performance indicators. These indicators should be documented and measured according to a negotiated work plan.

7.2.13 AREAS FOR FURTHER RESEARCH

1. judicious field-testing and validation by Australian ICPs of international IC staffing recommendations prior to widespread adoption.

Chapter 6 demonstrated that almost all (93.8%) of clinicians agreed that one ICP was required for each 250 beds. In contrast, just over a quarter (26.2%) of clinicians agreed with this ration. The recommendation originated in the early SENIC findings (Haley 1985) and as such is untested in Australia.

2. review by the IC profession and hospital administrators of the need to introduce the routine position of hospital epidemiologist as a critical member or ad-hoc consultant to hospital-based IC teams in Australia.

Half of the administrators and 70% of clinicians agreed that a trained hospital epidemiologist is an essential component of an effective hospital ISCP. The unique contribution of the epidemiologist and their impact on Australian ISCPs is unproven. A comparison of productivity and outcome of ISCPs with and without a hospital epidemiologist may clarify this.

3. a national study of validity and usefulness of Scheckler's model for essential elements and infrastructure for ISCPs in acute care hospitals and non-acute care residential settings; and.

This thesis only report testing of Scheckler's model in NSW. The extent to which clinicians and administrators in other Australian states and territories concur with Scheckler's recommendations is unknown. A replication of this study in the other non-NSW parts of Australia would provide a comprehensive view of the applicability of Scheckler's model to Australia.

7.3 COMPREHENSIVE RECOMMENDATION: AN APPROACH TO HOSPITAL INFECTION SURVEILLANCE AND CONTROL IN AUSTRALIA

Formalisation of Australian ISCPs requires a major overhaul of the traditional ICP role and implementation of more stringent standards of education and advanced skills. Core business activities of ISCPs also require revision and consensus. The following approach provides a useful and attainable action plan that ACHS, administrators, AICA, clinicians, government and ICPs should employ to enhance the evolution of Australian IC.

The development of standardised national recommendations for clinical policy, surveillance, ICP education and IC research will promote collegiality (Murphy and McLaws 1999a; Murphy and McLaws 1999b). Collegiality through joint intellectual and financial investment would achieve a unified national approach to IC. This approach would facilitate definition of best practice, and promote the use of Australian evidence in decision making.

7.3.1 Multidisciplinary panel

Historically, Australian hospitals have appointed only one person to co-ordinate ISCPs. This single appointee has usually been a nurse who either works directly with a microbiologist or consults externally on an ad hoc basis (Murphy and McLaws 1999e). Other healthcare professionals with different expertise and skills have usually only been consulted in times of outbreak (Westwood and Douglas 1982). This arrangement is unlike that of other healthcare specialists who routinely consult colleagues for advice, peer review and for the purpose of collaboration. The nature of IC requires a multidisciplinary approach that should include input from clinicians and administrators as well as accreditation agencies, professional organisations and hospital epidemiologists. It has previously been identified that consensus has yet to be reached between Australian clinicians and administrators regarding the essential elements of ISCPs and the role of the ICP (Murphy and McLaws 1999c).

Since 1974, the only external agency for accreditation of Australian health care facilities has been the ACHS. Approximately 40% of Australian hospitals voluntarily participate in the accreditation process (Collopy and Balding 1993). To date, ACHS has supported IC through two distinct avenues - the inclusion of IC as a separate area for scrutiny during the accreditation survey (The Australian Council on Healthcare Standards 1998); and by prescribing surveillance methods for SWI and hospital-acquired bacteraemia nosocomial quality indicators (Ansari and Collopy 1997). The proposed approach, Figure 7.1 recommends an extension of ACHS's current role as an accrediting agency. This extension could enhance ACHS’s influence on IC in Australia. The extension of ACHS should include the formation of an alliance with AICA and state government endorsed hospital infection surveillance agencies. "The Alliance" could advise and inform a multidisciplinary panel of recognised and appointed IC experts. The NHMRC should fund and administer “the Panel”. Panel experts must include representatives of each organisation included in the Alliance as well as clinicians. The Alliance could provide the Panel with data to guide national clinical policy recommendations. The Alliance could recommend a minimum level of ICP skill and qualification for Panel consideration and endorsement. AICA could use the Panel's recommendations to develop a formal system of mentorship for ICPs, to provide opportunities for ongoing training. ACHS and

AICA could collectively seek Panel endorsement and assistance to co-ordinate a system of peer review and evaluation of ISCP

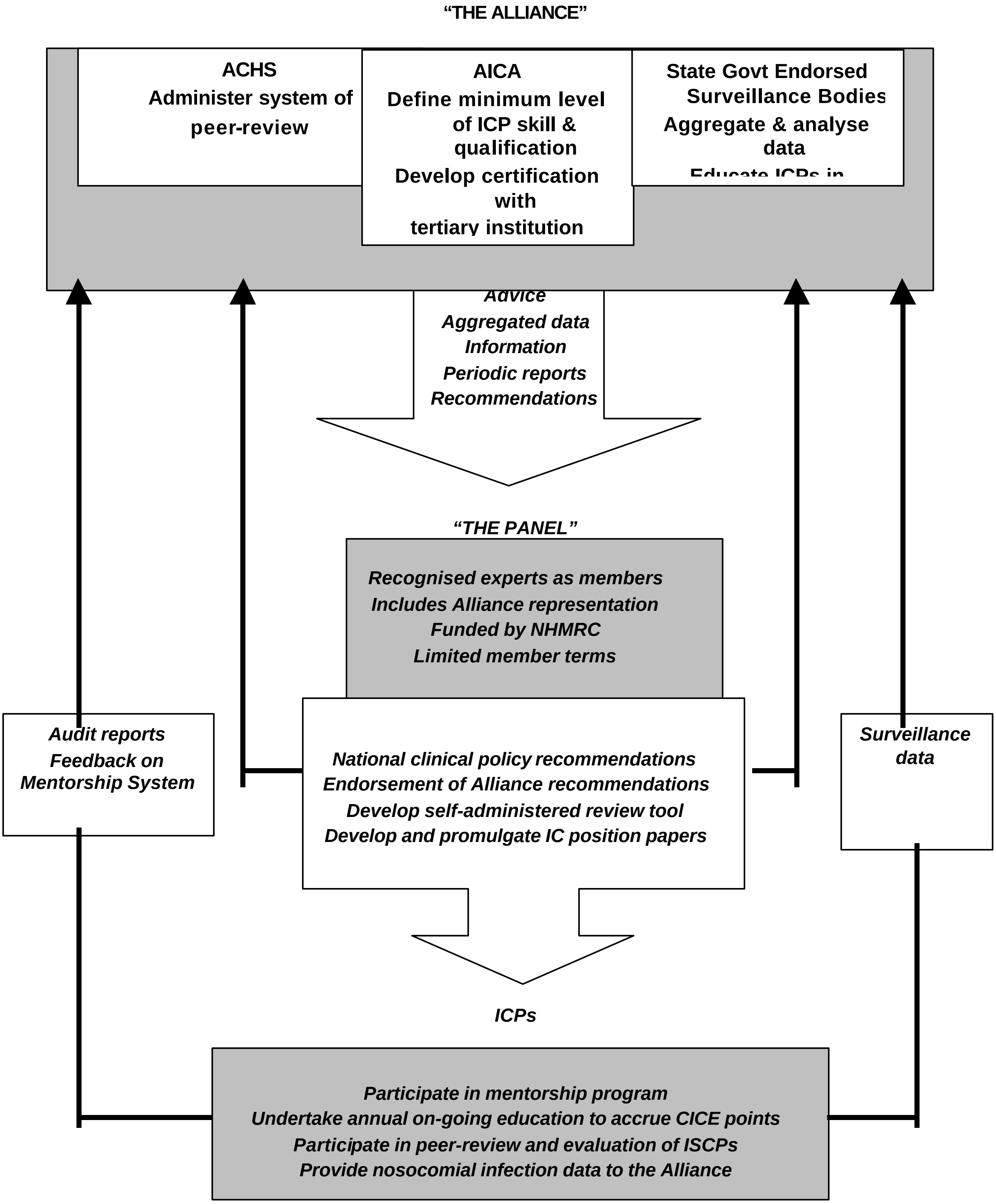

Figure 7.1 An approach to hospital infection surveillance and control in Australia

Terms of reference for the Panel should specify the minimum level of qualification and experience required of participating members with a rotation of membership where possible. Members should have made significant contributions to the discipline with publications. These safeguards ensure peer acknowledgement of the expertise of Panel members. The U.S.A Hospital Infection Control Practices Advisory Committee Terms of Reference provide a useful comparative model (Garner 1993; Garner 1996)(Appendix 6) To overcome problems with volunteerism and commitment, NHMRC funding should be used to fund Panel activity and to reimburse Panel members commensurate with their salary.

7.3.2 Surveillance

ACHS's current surveillance requirements are deliberately non-prescriptive (Portelli, Williams, and Collopy 1997). With limited understanding of epidemiological rigour, (Murphy and McLaws 1999b) ICPs in most states are performing surveillance in accordance with ACHS (Murphy and McLaws 1999a) resulting in data of limited validity (McLaws, Murphy, and Keogh 1997). The quality of data would be improved by detailed methodology, recommended by the alliance and endorsed by the Panel. The Panel would use these data to develop NHMRC national policy and practice recommendations and to publish reports of aggregated surveillance data. ICPs would use these recommendations and reports to co-ordinate local ISCPs. Participation in a standardised surveillance system would enable ICPs to demonstrate to ACHS an ongoing commitment to quality and simultaneously contribute to the national pool of Australian evidence.

7.3.3 Endorsement of a minimum level of ICP skills and qualification

To contribute to a national standardised surveillance system and to implement panel recommendations ICPs would require a minimum level of skill (Horan-Murphy et al. 1999). The U.S.A IC profession identifies a bachelor degree as the minimum qualification for an entering practitioner. A "grand-mothering" clause permits non-baccalaureate prepared ICPs to practise in IC provided they maintain certification (Horan-Murphy et al. 1999). As a priority AICA would need to establish the minimum ICP skill level and work with tertiary educational institutions to develop a nationally recognised system of certification (Murphy and McLaws 1999b). The minimum level could be established through an examination of the experiences of overseas ICPs (McArthur et al. 1984; McGuire N 1984; Pugliese et al. 1984; Bjerke et al. 1993; Turner, Kolenc, and Docken 1999), the range of skills Australian ICP require to provide services to a generic healthcare facility (Murphy and McLaws 1999d) and available educational opportunities (Murphy and McLaws 1999b).

7.3.4 A system of mentorship for ICPs

Mentors and role approachs play an important role in professional development (Benner 1984; Weinstein 1986). Intimidation and vulnerability, as well as the novice practitioner's inability to identify true IC experts and expert advice may prevent novices from being able to identify a true expert for such advice. The Panel's role is to provide an authoritative source of documentation rather than individual mentoring therefore the AICA-arm of the alliance should develop and oversee a mentorship system. This system would operate as a quasi internship (Weinstein 1986).

AICA should use its Panel-endorsed recommendations regarding minimum training to identify experts willing to volunteer to mentor novices for a 12-month period. Experienced ICPs seeking to be mentors should apply to AICA for consideration. To qualify as a mentor an ICP must have at least a tertiary qualification or equivalent in IC or related field and must be an AICA member. To maintain currency, they must publish at least one IC-related article every two years in a peer-reviewed journal. On completion of the mentorship term, AICA should interview the novice as a formal feedback process to assess the mentor's contribution. This process could also be used for AICA to identify and inform other Alliance members and the Panel of current IC issues requiring publication of a Panel position statement.

7.3.5 Opportunities for ongoing training

Educational opportunities and continuing education programs in IC are limited and rarely involve tertiary qualifications (Murphy and McLaws 1999b). Continuing medical education (CME) is a requirement for medical graduates (Postgraduate Medical Council of New South Wales 1999). A similar continuing IC education (CICE) system should be developed and be a compulsory requirement for AICA practitioner members and ICP appointments in ACHS-accredited facilities. CICE courses would need AICA endorsement to ensure that content is consistent with Panel directives and addresses topical issues.

7.3.6 A peer-reviewed system of monitoring the quality of Australian ISCPs and development of a self-administered ISCP audit tool

A system of peer review is a natural progression of the Panel's mandate to define best practice and AICA's professional responsibility to direct its members. ACHS's commitment to quality and expertise in reviewing health care facilities would assist it to jointly administer with AICA a voluntarily system for ICPs to participate in peer review. The system would provide peer review of an ISCP, local IC policy development and in-service education and would enable ICPs to be evaluated by experts while accruing CICE points. This system would provide Australia with improved formal networks, standardised Australian IC programs and bilateral ISCP learning opportunities.

This system would also provide material for periodic publication by the Alliance of a de-identified report of the levels of ISCP compliance with the Panel's recommended policy and position statements. An alternative option would be the development by the Panel of a self-administered review tool to review IC programs. The tool would ensure that the content of local ISCPs is consistent with panel standards. This option offers less opportunity for networking but may be more practical. NSW Department of Health is drafting a review tool for this purpose in 1999.

7.3.7 Position papers

Unlike U.S.A professional associations, (Underwood and Pirwitz 1999) there have been no formal position statements by AICA on the essential elements of ISCPs, the role of the ICP or the measurement of quality of ISCPs in Australia. Through the ongoing revision of accreditation requirements over the last 25 years, (The Australian Council on Healthcare Standards 1974; The Australian Council on Healthcare Standards 1976; The Australian Council on Healthcare Standards 1977; The Australian Council on Healthcare Standards 1978; The Australian Council on Healthcare Standards 1981; The Australian Council on Healthcare Standards 1986; The Australian Council on Healthcare Standards 1987; The Australian Council on Healthcare Standards 1988; The Australian Council on Healthcare Standards 1989; The Australian Council on Healthcare Standards 1990; The Australian Council on Healthcare Standards 1991; The Australian Council on Healthcare Standards 1992; The Australian Council on Healthcare Standards 1993; The Australian Council on Healthcare Standards 1994; The Australian Council on Healthcare Standards 1996; The Australian Council on Healthcare Standards 1998) ACHS has provided a number of revised statements on the role of the ICP, the structure of ISCPs, the practice of IC surveillance and facilitated improvement to clinical IC practices (Portelli, Williams, and Collopy 1997). These statements are used as a guide by hospitals participating in the accreditation process. However, these statements are not considered authoritative. In the U.S.A, HICPAC assumes this role for clinical issues and a consensus approach has been used to define essential elements for IC (Scheckler et al. 1998). In Australia, the Panel, would be the natural choice as the authority to develop and promulgate IC position papers.

7.4 Conclusion

The usefulness of these strategies and the ultimate responsibility for championing Australian IC is dependent on sensitive and thoughtful negotiation between ACHS, AICA, the IC profession, IC experts and administrators. As a vast continent with a relatively small population and relatively few experts in IC compared with the U.S.A, Australian State and Territory borders should be ignored so that the development of IC can be focused and rapid. The formation of collegiate bonds, the Alliance and the Panel and local implementation of their recommendations will facilitate this development.

PUBLICATIONS AND CONFERENCE PAPERS ARISING FROM THIS THESIS

Publications

Murphy C and McLaws M-L. 1999. Australian Infection Control Association members' use of skills and resources that promote evidence-based infection control. Submitted for publication American Journal of Infection Control - May 1999.

Murphy C and McLaws M-L. 1999. Variation in administrators' and clinicians' attitudes towards critical elements of an IC program and the role of the infection control practitioner in New South Wales, Australia. Accepted for publication American Journal of Infection Control - May 1999.

Murphy C and McLaws M-L. 1999. Surveillance of surgical site infections and bacteraemia in accredited and non-accredited hospitals in Australia. Accepted for publication American Journal of Infection Control - January 1999.

Murphy C and McLaws M-L. 1999. Credentialling, diversity and professional recognition - foundations for an Australian infection control career path. Accepted by the American Journal of Infection Control - December 1998.

Murphy C and McLaws M-L. 1999. Who co-ordinates infection control programs in Australia. Accepted for publication. American Journal of Infection Control - October 1998.

Conference Presentations

C.Murphy & ML McLaws. Australian infection Control Practitioners - Who are they and what do they do?. Australian Infection Control Association National Conference, Melbourne. May 1997.

C.Murphy & ML McLaws. State of origin: Infection Control In Queensland vs New South Wales. Queensland Practitioners in Infection Control State Conference, Brisbane. October 1997.

C.Murphy & ML McLaws. Infection Control in NSW. NSW Infection Control Association State Conference, Coffs Harbour. October 1997.

C.Murphy & M-L McLaws. A Profile of Australian Infection Control Practitioners: Who Are They and How Do They Practice. APIC 25th Annual Educational Conference. San Diego, California. May 1998. (Poster)

C. Murphy & M-L McLaws. Australian Infection Control Surveillance - How We Do It and How Should We Do It in Future. Australian Infection Control Association National Conference Perth, Western Australia. 1998.

C. Murphy & M-L McLaws. Surfin' the Net - Will we sink or swim? Australian Infection Control Association National Conference Perth, Western Australia. 1998.

C. Murphy. A Day in the Life of Australian Infection Control. Invited International Speaker. APIC 26th Annual Educational Conference. Baltimore, Maryland. June 1999.

APPENDICES

APPENDIX 1 JOINT COMMISSION IC ACCREDITATION STANDARDS

SURVEILLANCE, PREVENTION AND CONTROL OF INFECTION.

Joint Commission on Accreditation of Healthcare Organisations; Surveillance, prevention and control of infection in Comprehensive Accreditation Manual for Hospitals: The Official Handbook. Oakbrook Terrace, IL: Joint Commission on Accreditation of Healthcare Organisations. 1996, pp IC-1-IC-26.

OVERVIEW

All hospitals run the risk of nosocomial infections - that is, infections acquired in the hospital - as well as infections brought into the hospital. These infections may be endemic (common cause) or epidemic (special cause) and they may affect patients, health care workers and others who come into contact with patients. The goal of this function is to identify and reduce the risks of acquiring and transmitting infections among patients, employees, physicians and other licensed independent practitioners, contract service workers, volunteers, students and visitors.

Surveillance, prevention and control of infection covers a broad range of processes and activities, both in direct patient care and in patient care support that are coordinated and carried out by the hospital. This function also links with external organisation support systems to reduce the risk of infection from the environment, including food and water sources.

STANDARDS

The following is a list of all standards for this function. They are presented here for your convenience without footnotes or other explanatory text. If you have any questions about a term used here, please look up the standard as it appears in the next section of this chapter - Intents and Standards.

IC.1 The organisation uses a coordinated process to reduce the risks of endemic and epidemic nosocomial infections in patients and health care workers.

IC.1.1 The infection control process is managed by one or more qualified individuals.

IC.2 Case findings and identification of demographically important nosocomial infections provide surveillance data.

IC.3 The hospital reports, when appropriate, information about infections both internally and to public health agencies.

IC.4 The hospital takes action to prevent or reduce the risk of nosocomial infections in patients, employees and visitors.

IC.5 The hospital takes action to control outbreaks of nosocomial infections when they are identified.

IC.6 The hospital's infection control process is designed to lower the risks and to improve the (proportional) rates or (numerical) trends of epidemiologically significant infections.

IC.6.1 Management systems support the infection control process.

IC.6.2 The infection control process includes at least one activity aimed at preventing the transmission of epidemiologically significant infections between patients and staff.

STANDARDS, SCORING GUIDELINES AND AGGREGATION RULES.

Following are the standards, scoring guidelines and aggregation rules for this function. Marginal notes further clarify terms and other issues. Examples of implementation and examples of evidence of performance accompany many of the standards.

Please note: Examples of implementation offer various strategies, activities or processes that can be used to comply with the standards. They are not requirements. These examples are simply ideas for your organisation to consider. Scorable requirements are included only in the standards and intent statements.

SURVEILLANCE, PREVENTION AND CONTROL OF INFECTION.

Standards

IC.1 The organisation uses a coordinated process to reduce the risks of endemic and epidemic nosocomial infections in patients and health care workers.

IC.1.1 The infection control process is managed by one or more qualified individuals.

Intent of IC.1 and IC.1.1

The hospital's infection control process is based on sound epidemiologic principles and research on nosocomial infection.

The specific program for controlling infection may differ from hospital to hospital, depending on factors such as the

- hospital's geographic location;
- patient volume;
- patient population served;
- hospital's clinical focus;
- number of employees.

The hospital's infection control program addresses issues defined by that hospital to be epidemiologically important. Depending on the hospital, these may include:

- device-related infections, especially those associated with intravascular devices, ventilators and tube feeding;
- surgical site infections;
- nosocomial infections in special care units;
- infections caused by organisms that are antibiotic-resistant or in other ways epidemiologically important;
- nosocomial tuberculosis and other communicable diseases, especially vaccine-preventable infections and infections in neonates.

The hospital connects its infection control program with the local health department to ensure appropriate follow-up and control of infection.

One or more qualified individuals oversee the infection control process. Their qualifications depend on the activities they will carry out and may be met through

- education;
- training;
- experience;
- certification or licensure. (Certification by the Certification Board for Infection Control (CBIC) is often a requirement for infection control practitioners).

Examples of Implementation for IC.1

1. The infection control committee meeting minutes include the selection of surveillance programs. The selection process considers the following nine elements:

2. Criteria used for defining nosocomial infections and for differentiating them from community acquired infections;

3. Rationale for selecting a specific surveillance approach or combination of approaches and the time frame for using that approach or combination (for example, as related to scope of service: high volume, frequent infections complications, high potential for adverse patient outcome, substantial potential for prevention);

    - Patient population studied;
    - Data-collection methods employed;

- Quality control procedures for ensuring accuracy and completeness of case findings;
- Assignment of responsibility for data collection evaluation and follow-up;
- Method for reporting and follow-up;
- Reporting of infections to public health authorities as required;
- Documentation of infections of epidemioligical significance among employees.

4. The meeting minutes also indicate that the following four factors have been considered in the selection process and design of surveillance programs:

   ▪ Evidence of a continuous, ongoing and effective system;

   ▪ Use of the information obtained from the infection prevention, surveillance and control program in improving patient care;

   ▪ Evaluation that results in assessment of rates rather than in raw numbers and that uses valid epidemiological methods;

   ▪ Linkage to the hospital-wide program to assess and improve quality.

5. If central services are discussed, such as the dietary service, employee health, engineering or maintenance, housekeeping, laundry, material management, the operating suite or the pharmacy, at least one individual with appropriate background who can speak for the relevant department(s) attends the meeting or is consulted.

6. At least annually, the infection control committee evaluates, revises as necessary and approves the type and scope of surveillance activities by reviewing the following three items;

    - Data trend analyses generated by surveillance activities during the past year;
    - Effectiveness of prevention and control intervention strategies in reducing the nosocomial infection risk;
    - Services instituted and procedures, priorities or problems identified in the past year.

7. As a result of the committee's work, the infection control committee meeting minutes reflect the plan that will be used in the annual evaluation of the program for infection surveillance, prevention and control.

8 A large urban teaching hospital employs two full-time infection control practitioners. Both practitioners work closely with the infection control committee chairperson (the hospital epidemiologist) to coordinate a decentralised outcome-based approach to surveillance prevention and control of infection. In addition, individual departments develop specific policies and procedures utilising clinical expertise and practical experience. Policies and procedures are first reviewed by the infection control staff for consistent demonstration of sound epidemiological principles before submitting to the infection control committee for final approval.

9. Administrative and staff-level representatives from each department make up the committee, including participation from the medical staff, surgery, critical care and laboratory departments maintain medical directors. The

infection control staff members, including the hospital epidemiologist, serve as in-house consultants and work with individual departments to develop needs assessments, design and present continuing education programs and help in department-specific and hospital-wide orientation. The employee health department shares responsibility for educating staff about the risk of transmission and appropriate exposure precautions for communicable diseases.

Examples of Evidence of Performance for IC.1

- Document review of policies and procedures of the organisation's demographics and definitions of epidemiologically important issues;
- Review of IC program description;
- Interview with staff, ICP, physician advisor, chair of ICC and administration;
- Review of scope of Employee Health Program.

Examples of Implementation for IC.1.1

An individual with training in infection surveillance, prevention and control functions assumes the responsibility of managing those functions. This person also has knowledge of job experience in the areas of epidemiological principles and infectious disease, as well as sterilisation, sanitation and disinfection practices.

This individual is also knowledgeable in adult education principles or patient care practice. Additionally, successful completion of a course in infection control and certification through the CBIC may be a benchmark for competence in this area.

The hospital epidemiologist is an infectious disease specialist and an active member of the Society for Healthcare Epidemiology of America (SHEA). The coordinator of the infection control program is a registered nurse with a master's degree in public health who has been certified through the CBIC. The second infection control practitioner is a medical technologist who has successfully completed a course of study in infection control provided by the Association for Practitioners in Infection Control and Epidemiology, Inc. (APIC).

Examples of Evidence of Performance for IC.1.1

- Record(s) for training and continuing education;
- Clinical privileges;
- Job description;
- Scope of responsibility statement in by-laws, rules or regulations.

Scoring for IC.1

Does the hospital's infection control process address epidemiologically important issues appropriate to its particular characteristics?

Score 1 Yes.

Score 3 One epidemiologically important issue is not addressed

OR

An issue that is addressed is not appropriate to the hospital.

Score 5 No.

Scoring for IC.1.1

Is the infection control process managed by a qualified individual?

Score 1 Yes.

Score 5 No.

Standards

IC.2 Case findings and identification of demographically important nosocomial infections provide surveillance data.

IC.3 The hospital reports, when appropriate information about infections both internally and to public health agencies.

IC.4 The hospital takes action to prevent or reduce the risk of nosocomial infections in patients, employees and visitors.

IC.5 The hospital takes action to control outbreaks of nosocomial infections when they are identified.

1 2 3 4 5 a

Intent of IC.2 through IC.5

The hospital's infection control process is comprehensive, encompassing both patient care and employee health services. The mechanisms that support this process are based on current scientific knowledge, accepted practice guidelines and applicable law and regulation. They address the infection issues that are epidemiologically important to the hospital.

Example of Implementation for IC.2

The hospital participates in the adult and paediatric intensive care unit surveillance protocol of the CDC's National Nosocomial Infections Surveillance (NNIS) system during the past three years. This protocol was picked because of the high volume of critical care patients, the high number of device-use days and the associated risks of nosocomial infections. Primary responsibility for denominator information and device-use data collection is assumed by the critical care staff. Physicians actively participate in identification of potential numerator cases, guided by CDC definitions of primary blood stream infections and pneumonia. The findings of the physicians are reported as appropriate to the infection control staff. Respiratory therapy provides detailed tracking of all mechanically ventilated patients.

In addition to the targeted surveillance focused on the intensive care units, outbreak detection for antibiotic-resistant organisms is conducted by observing frequency of event occurrence above a process control limit. The microbiology department plays a key role in surveillance by monitoring weekly isolate recovery frequencies. Thresholds are set at two standard deviations from the mean.

The infection control team does routine surveillance of surgical site infections (SSI) for all inpatient procedures. Post-discharge surveillance has been attempted. However, because of the patient population served and the high numbers lost to follow-up, the response rate has remained too low to encourage any level of confidence in the reliability or validity of the resulting rate.

Process surveillance monitoring of the use of universal precautions has been implemented at the departmental level and is conducted monthly. Departmental standards are set and department specific tasks identified. The responsibility for direct observation and data collection is shared within each department, providing for immediate feedback to staff on compliance levels.

Examples of Evidence of Performance for IC.2

Documentation or another process relating to the following:

- Definition of nosocomial infection;
- Review of case findings;
- Defined employee health issues.

Examples of Implementation for IC.2 Through IC.2.4

1. The infection control officer maintains records and logs of incidents related to infections and communicable diseases.

2. An organisation develops and maintains a functioning process supported by policies and procedures (in either written or electronic formats). The policies and procedures discuss the prevention and control mechanisms in all patient care and service areas (for example, dietary, AIDS/immunosuppressed unit, surgery, special care, textile management, decontamination, sterilisation) and employee health services including the prevention of the transmission of infection among patients, employees, medical staff, contractors, volunteers, visitors and specific environmental issues. The policies and procedures are based on recognised guidelines and applicable law and regulation and they address preventing the transmission of infection among patients, employees, medical staff, contractors, volunteers and visitors; they also address specific environmental issues.

Copies of all written and approved policies and procedures for the infection surveillance, prevention and control program are maintained in a master set of books, which is located in the hospital's infection surveillance, prevention and control program manager's office.

There is a current copy maintained of all infection control committee-approved infection surveillance, prevention and control policies and procedures specific to its patient care activities at the department level. A complete master set of all hospital policies and procedures in each department is not necessary.

For instance, policies and procedures for the inpatient psychiatric unit that uses the community care model, by which patients are encouraged to carry out their own day-to-day activities, address the rules for using detergents and sorting and handling personal clothing with patient-operated washers and dryers.

Policies and procedures can address the following:

- Measures that are scientifically valid, applicable in all settings and practical to implement; for example, some are based on new Centres for Disease Control's (CDC) Guidelines for the Prevention of Nosocomial Pneumonia, 1994. Other measures are based on other valid sets of guidelines:

- The relationship between employee health activities and the infection prevention and control program;

- Various methods used to reduce the risk of transmission of infection between or among staff members and patients;

- Appropriate patient care practices, sterilisation, disinfection and antisepsis and pertinent environmental controls;
- Educational and consultative roles of the infection control committee and personnel.
- Policies and procedures exclude activities proven ineffective in reducing or preventing infection.

References for policies and procedures include:

- the CDC's Guidelines for the Prevention and Control of Nosocomial Infections;
- the hospital's personnel department policies and procedures manual;
- the hospital's hazardous and infectious waste management program.

Methods used to identify pertinent risk factors may include:

- a review of the hospital's known patterns of microorganism resistance to anti-infective agents;
- a literature review for published risk factors;
- the use of hospital-specific historical data.

Examples of surveillance approaches include the following;

- Total house surveillance.

This system detects and records all nosocomial infections that occur on every service and in every area of the hospital. The goal of the system is to calculate infection rates that will identify potential infection problems in specific areas. Appropriate analyses should include the collection of appropriate denominators and reports of sufficiently specific infection rates to find infection problems. This may be conducted continuously or periodically by plan (for example, ongoing limited periodic surveillance, kardex review screening systems).

- Priority-directed, targeted surveillance.

This system may be conducted for specific units or areas, specific patient populations or specific procedures. Unit-specific or area-specific surveillance, for instance, would involve all patients who have class 1 surgical wounds and develop wound infections or patients who acquire pneumonia while dependent on a ventilator. Targeted surveillance, for instance, would involve patients who after receiving enteral feedings suffer a higher-than-expected incidence of diarrhoea, including certain antibiotic-resistant bacteria. Targeted surveillance may also focus on different units, populations or procedures on a planned basis, depending on the objectives of the infection control program.

Problem-oriented or outbreak-response surveillance.

This system may be conducted to measure the occurrence of specific infection problems. If the problem is an outbreak or infection cluster, surveillance might involve such case-finding methods as the review of microbiology reports or number of infections, as, for instance, a cluster by type of organism or procedure. If so, the investigation should be extended to collect comparable data from appropriate control groups to identify statistically significant risk factors for which control measures can be developed. After control measures are applied, surveillance continues to determine whether the problem is controlled.

In addition to the use of planned surveillance methods, special studies may be conducted that include:

- the investigation of clusters of infections above expected levels;
- the investigation of single cases of unusual or epidemiologically significant nosocomial infection (for example, nosocomial group A streptococcal bacteraemia);
- a focus on procedures with significant potential for nosocomial infection, particularly when the procedure is new or substantially changed;
- the comparison of a group of infected patients with an uninfected control group to detect statistically significant risk factors for which control measures can be developed.

Providing clinical practitioners with valid epidemiological measures of the risk of infection in their patients often allows them to take action to reduce those risks and decrease infection rates. Comparison of the hospital's infection rates with the rates for other hospitals is difficult because of differences in patient mix. Comparison within each hospital generally has more impact. For valid comparisons, the infection rates may need to be adjusted for patient risk to properly examine similar patient groups. Consideration of the data and their validity includes discussions documented in the infection control committee minutes, conclusions drawn from those discussions, recommendations for actions (including other individuals with whom the information is to be shared) and any prevention or control activities.

Following are some interventions to reduce infection risks related to transmission:

Institution of policies and procedures based on relevant contemporary infection control research, including:

- practical measures shown empirically to be useful in reducing the risk of infection (a potential source of information is the current category/recommendations from the CDC's Guidelines for the Prevention and Control of Nosocomial Infections);
- Hospital-wide barrier precautions and isolation protocol as adopted by the infection control committee;
- Orientation and continuing education of personnel;
- Reporting of infections to public health authorities, as required;
- Documentation of epidemiologically significant infections among employees;
- A method for required waste identification (for example, colour-coded bags);
- Protective supplies and equipment in the following categories:
- Provision of patient care, including
    - sterile and non-sterile supplies
    - hand-washing sinks and related hand-washing articles;
- Protective personnel apparel, including:
    - gowns, aprons, gloves (appropriate in type and size to the procedures, activity and type of exposure)

  - protective eyewear (for example, glasses or goggles)
  - masks;
- Engineering controls, including consideration of:
  - needles or sharps designed to reduce the risk of accidental puncture
  - puncture-proof containers for needles or sharps
  - splash guards (in the lab), if in use
  - containers to hold contaminated items for transport,
  - disposal or re-processing.

Interventions to reduce infection risks other than those directly related to prevention of transmission may include the following:

- The surveillance and feedback function itself and the assessment of reasons for infection rates not being reduced by surveillance or feedback alone and interventions undertaken to address problems in the following areas:
- Knowledge - innovative educational approaches beyond the routine or standard inservices;
- Behaviour - activities by managers to change behaviour;
- Systems - such as staffing, sink number and placement, control of overcrowding, lack of proper equipment and supplies.

Each department performing decontamination and sterilisation activities has policies and procedures, which are consistent in intent and application throughout the hospital, related to the following nine elements:

1. The receiving, decontaminating, cleaning, preparing and disinfecting or sterilising of reusable items;

2. The assembly, wrapping, storage, distribution and quality control of sterile equipment and medical supplies;

3. The use of sterilisation process monitors, including temperature and pressure recordings and use and frequency of appropriate chemical indicator or bacteriological spore tests for all sterilisers;

4. Processes designed to provide for the continued sterility of hospital-sterilised and commercially prepared items through appropriate packaging, storage and other methods to provide for package integrity;

5. The designation of time-related or event-related shelf life for hospital-sterilised medical items;

6. The designation of time-related or event-related shelf life for commercially prepared items that do not have a specified expiration date and are labelled by the manufacturer as being sterile;

7. A process that provides for recall and disposal or reprocessing of out-dated sterile supplies, if a time-related designation is used;

8. Emergency collection and disposition of supplies when special warnings have been issued by the manufacturer or appropriate governmental agencies or when warranted by the hospital's quality control or assurance process;

9. A process that provides for timely notification of the attending physician and members of the hospital's risk management program of any emergency collection of supplies.

In addition, policies and procedures address the infection surveillance, prevention and control in the operating room, the obstetrical delivery room, other special invasive procedure rooms (for example, endoscopy suite, cardiovascular laboratory) and other areas of the hospital where patients undergo procedures with surgical, invasive or anaesthesia risks. At a minimum, the following six areas should be addressed:

1. Principles of asepsis;

2. Sterilisation and disinfection;

3. Sanitation of all rooms and equipment used;

4. Selection of draping and gowning materials;

5. Wearing apparel for surgery and anaesthesia personnel;

6. Methods for traffic control in areas used for surgical or anaesthesia services and post-anaesthesia recovery to limit unnecessary access to these areas by staff members and visitors.

Examples of Evidence of Performance for IC.2 and IC.4

Tours of all anaesthetising locations and selected patient care units to review implementation of strategies for the following:

- Surveillance
- Prevention
- Control
- Observation of interviews with staff
- Tours may also include:
- Diagnostic treatment areas
- Linen storage areasDietary and food service areas
- Employee health

Example of Implementation for IC.3

Data from all surveillance systems within the hospital are first reviewed and analysed by the infection control team. When information from NNIS is received for inter-hospital comparisons, appropriate statistical tests are applied as necessary to adjust for differences in patients' risks, small numbers of procedures or differences in the distributions of procedures. Findings are then presented to the infection control committee.

Active dissemination of information proceeds throughout the organisation, specifically targeting those individual practitioners who can have a direct impact on patient care outcomes. SSI information is risk-adjusted (using the NNIS risk index) and reported in aggregate form to the surgical subcommittee. Surgeon-specific rates are reported directly to the individual surgeons. Findings from the ICU monitoring are presented to respiratory therapy, pulmonary medicine, internal medicine, anesthesiology and critical care.

Aggregate rates of compliance in the use of universal precautions are compiled on a quarterly basis and reported to the department of education and training and to employee health. Individual departments are already aware of their departmental rates through the monitoring process.

The infection control team maintains a close working relationship with the local department of public health, submitting timely information on all reportable communicable and infectious diseases.

Example of Evidence of Performance for IC.3

Documentation or another process relating to the following:

- Reporting to the public health agencies;
- Reporting within the hospital;
- Reporting of employee illness of epidemiological significance.

Example of Implementation for IC.4

Interhospital comparisons provided by the NNIS system for rates of ventilator-associated nosocomial pneumonia indicated a hospital endemic rate far below thresholds. A review of the hospital's control charts indicated a process consistently in control without special cause variation. However, applying the principle of continuous quality improvement (CQI), the institution sought to reduce the endemic rate of ventilator-associated pneumonia. A multidisciplinary team composed of representatives from nursing, respiratory therapy, pulmonary medicine, internal medicine, anesthesiology, education and training and infection control analysed the processes of respiratory and nursing care and medical management to identify risk factors and potential root causes. This group designed interventions founded on scientific principles and supported by recommendations published in the literature. Since baseline data had been collected, they were used to compare to post-intervention data.

The hospital's employee health department has been inspired by the success of the mandatory (OSHA) Hepatitis B vaccination program and its experience with the Joint Commission's infection control indicator IC-8 (Beta tested for use in the IM-System) that focused on employee health. The department identified at-risk employees and initiated an immunisation program that addresses other significant preventable infectious and communicable diseases.

Examples of Implementation for IC.4

1. In addition to the requirements of local and federal regulations, the dietary department has policies and procedures to address the following infection prevention issues:

    - Proper food storage including security, temperature and the separation of food and non-food items;
    - Proper labelling of food and non-food items;
    - Procurement of food from sources that process food under regulated quality and sanitation controls;

- Control of lighting, ventilation and humidity to prevent the condensation of moisture and growth of moulds;
- Methods to prevent contamination in the production, storage and dispensing of ice;
- The use of separate or non-absorbent and sanitised cutting boards for meat, poultry, fish, raw fruits, vegetables and cooked foods;
- Cleaning of work surfaces after each use;
- Hand-washing techniques and provision of adequate hand-washing equipment for dietary staff members;
- Dishwashing and utensil washing techniques including adequate space;
- Appropriate discarding of china, glassware, plasticware, utensils and disposables;
- Control of traffic in food service areas;
- Garbage holding, transfer and disposal.

2. All patients undergoing transthoracic needle biopsies and myelograms by invasive radiologists are prepared with the use of aseptic techniques and by following universal precautions.

3. Hyperbaric oxygen treatments for wounds are carried out with the use of strict adherence to universal precautions for all patients. The unit is cleaned

and disinfected between each use consistent with strict policy and use of the authorised aseptic techniques and germicide agents.

Example of Implementation for IC.5

The infection control team conducts outbreak investigations whenever appropriate. Data collected are recorded, tabulated and reviewed to summarise common host factors and exposures. Based on this analysis, a hypothesis on the likely reservoir, source and mode of transmission is developed. Strategies for prevention and control are designed based on the nature of the causative agent, characteristics of high-risk groups and sources of contamination.

Examples of Evidence of Performance for IC.5

- Documentation regarding control of outbreak of nosocomial infection.
- Documentation of actual case findings when available.

Scoring for IC.2 Through IC.5

NOTE: This set of scoring guidelines applies to each standard IC.2 through IC.5.

Does the hospital address the activities noted in the standard, both in patient care areas and in employee health services?

Score 1 Yes

Score 5 No

Standards

IC.6 The hospital's infection control process is designed to lower the risks and to improve the (proportional) rates or (numerical) trends of epidemiologically significant infections.

IC.6.1 Management systems support the infection control process.

IC.6.2 The infection control process includes at least one activity aimed at preventing the transmission of epidemiologically significant infections from patients to staff.

Intent of IC.6 Through IC.6.2

The infection control process is integrated with the hospital's overall process for assessing and improving organisation performance. The hospital tracks risks, rates and trends in nosocomial infections. It uses this information to improve its prevention and control activities and to reduce nosocomial infection rates to the lowest possible levels. The infection control program works with the employee health program to reduce the transmission of infections, including vaccine-preventable infections from patients to staff and from staff to patients.

Management systems, including staff and data systems, help the hospital achieve these objectives. The specific role of management systems depends on the hospital's infection control process. Generally, they support activities such as data analysis, interpretation and presentation of findings.

Example of Implementation for IC.6 and IC.6.1

A 200-bed community hospital has one full-time and one part-time certified infection control practitioner as well as secretarial help to manage both the hospital's infection control and employee health programs. The rates chosen for reduction include those for surgical site infections, urinary catheter-induced bladder infections, intravenous catheter site infections and infections in decubitus ulcers. One personal computer and appropriate software supports the practitioners in their work.

Whereas a large teaching hospital across town has 6-1/2 full-time and one part-time certified infection control practitioners managing its program to measure and reduce the rates of five nosocomial infections. The practitioners are using processes approved by its infection control committee. The rates chosen by the committee for reduction in the current fiscal year are those related to transmission of multidrug-resistant tuberculosis and those for nosocomial pneumonia, surgical site infections, urinary catheter-induced bladder infections, intravenous catheter site infections and infections in decubitus ulcers. Two personal computers and appropriate software support the infection control practitioners in measuring and analysing data and in reporting the results of improvement activities.

Examples of Implementation for IC.6 Through IC.6.2

1. The employee health program identifies and maintains lists of staff members who are currently immune and those who need to be immunised to be in compliance with hospital policy and procedure and applicable law and regulation.

2. An objective described in the infection control program addresses a component of the hospital's overall performance-improvement plan that relates to improving trends in nosocomial infection rates.

3. A hospital has identified an opportunity to reduce the endemic rate of ventilator-associated nosocomial pneumonia. At the end of one year, a line

graph of the incidence rate by month is generated. Post-intervention rates are reviewed and compared with the baseline. As anticipated, the rate initially increases as intensified surveillance and increased case findings begin. However, when the annual rate is compared with a cumulative incidence rate for the previous two years, a substantial reduction is noted. Reducing the variation in the process of ventilatory care significantly lowers the morbidity and mortality of a high-risk subgroup of patients. A cost savings is also noted.

Examples of Evidence of Performance for IC.6 Through IC.6.2

A statement of objectives in the IC program.

A description of the hospital's performance-improvement plan, including nosocomial rate improvement activities, such as graphics showing rate improvement.

A plan showing how the employee health program activities are integrated with infection control activities.

Example of Implementation for IC.6.1

To support the efforts of the infection control team, the hospital purchases two additional PCs, PRO DOS (software) and an additional printer. One additional full time employee is added to the infection control department for data entry and secretarial support. The hospital information systems department writes download programs specifically designed to facilitate data collection. Reorganisation of departments is undertaken to emphasise a functional multidisciplinary approach. The administration fully funds continuing education in the areas of CQI, statistical analysis and clinical epidemiology.

Examples of Evidence of Performance for IC.6.1

Documentation in the budget for IC support in the following areas:

- Equipment
- Software
- Clerical support
- Reports of achieved Nosocomial Infection Risk Reductions (NIRRs)
- Geographical representation of achieved NIRRs

Scoring for IC.6

Does the hospital collect, analyse and take appropriate action on infection rates or trends?

Score 1 100% compliance

Score 2 95% to 99% compliance

Score 3 90% to 94% compliance

Score 4 80% to 89% compliance

Score 5 Less than 80% compliance

Scoring for IC.6.1

Do management systems support the infection control process?

Score 1 Yes

Score 3 Not consistently

Score 5 No

Scoring for IC.6.2

Does the hospital take action to reduce the risk of transmitting epidemiologically significant infections from patients to staff?

Score 1 At least one such activity has been implemented.

Score3 The hospital has a plan to reduce such risks but it has not been implemented.

Score 5 No such activity has been implemented.

Aggregation Summary

______ Enter the worst score after applying the caps.

Enter This is the score for the Surveillance, Prevention grid and Control of Infection grid element score

APPENDIX 2 SURVEY DISTRIBUTED TO AICA MEMBERS

Dear Infection Control Practitioner

The following study has been funded by the Australian Infection Control Association (AICA). AICA believes that the information you provide by completing this questionnaire will assist in establishing a profile and description of work practices of Australian Infection Control staff. This information is **essential** for the planning of the future direction of AICA and will ensure that future initiatives in education, surveillance and professional activity meet minimum standards and fit in with the particular needs of the membership.

It is estimated that completing this entire questionnaire should take less than 20 minutes.

The data you return will be separated from your identifying details to maintain your anonymity. Should you have any queries about this questionnaire please call **Cathryn Murphy**, President ICA NSW Inc on 02 380 6114 or Mobile 0419 258 264. Please complete the questionnaire and return it **before July 31st 1996** in the **enclosed pre-paid envelope**.

Non-identifiable feedback to participants will be provided on request and also in periodic reports provided to AICA for publication in the Australian Infection Control Journal.

Madeleine McPherson

President AICA

RETURN SLIP

Each ICP who completes a questionnaire and returns it and the enclosed slip before close of business July 31st 1996 will be put into a draw to win a $250 gift voucher for your textbook of chocie.*

Name

Preferred Mailing Address

Telephone number Fax number

* Prize draw dependent on a 60% return rate being achieved.

QUESTIONNAIRE FOR ALL MEMBERS OF AICA - 1996

1. Which best DESCRIBES YOUR FACILITY?

Please tick

Hospital ☐ **If yes, please answer Q1A, Q1B & Q1C**

Non-hospital ☐ **If yes, please go to Q1D**

1A. Is your hospital:

Teaching ☐

Non-teaching ☐

1B. How many *inpatient* beds are in your facility?

Please write answer in box ☐ BEDS

1C. Is YOUR HOSPITAL FUNDED as a:

Public facility ☐

Private facility ☐

Combination of public & private funding ☐

1D. Is YOUR NON- HOSPITAL FUNDED as a:

Public facility ☐

Private facility ☐

Combination of public & private funding ☐

2. Please tick the box which best describes the PRIMARY FUNCTION of your facility's service.

ALL RESPONDENTS

Acute care ☐

Outpatient ☐

Mental health ☐

Nursing home/ long-term care ☐

Surgical hospital ☐

General practice ☐

Other ☐ (Please specify)...

3. Please tick the box which best describes the LOCATION of your facility.

Metropolitan ☐

Country city ☐

Country town ☐

Remote area ☐

4. In which STATE OR TERRITORY is your facility located?

Australian Capital Territory ☐

Northern Territory ☐

New South Wales ☐

Queensland ☐

South Australia ☐

Tasmania ☐

Victoria ☐

Western Australia ☐

5. How long have you been WORKING IN HEALTH CARE?

No. of years ☐ If less than one year - how many months? ☐

6. How long have you been practising in Infection Control?

No. of years ☐ If less than one year - how many months? ☐

7. Are you RESPONSIBLE FOR CO-ORDINATING the Infection Control program for your facility?

Please tick the appropriate box: Yes ☐ No ☐

If no, please explain why...

8. Are you EMPLOYED to perform the role of an "Infection Control" practitioner/ nurse only?

Please tick the appropriate box:

Yes ☐ **If Yes go to Q9**

No ☐ **If No go to Q8A**

8a. Please indicate the nature of ALL the roles you perform AND the approximate number of hours you spend on each in a typical week?

ALL RESPONDENTS

Infection Control ☐ No. of hours per week ☐

Quality Assurance ☐ No. of hours per week ☐

Administration ☐ No. of hours per week ☐

Clinical care ☐ No. of hours per week ☐

Other ☐ No. of hours per week ☐

9. How many INDIVIDUAL STAFF MEMBERS, BOTH FULL AND PART TIME, are allocated to Infection Control duties <u>in your establishment?</u>

Total Staff working ***full time*** in Infection Control ☐

Total Staff working ***part time*** in Infection Control ☐

10. What is the TOTAL NUMBER OF WORKING HOURS allocated by the above listed staff to Infection Control duties each week?

Total hours worked by ***full time staff*** in Infection Control ☐

Total hours worked by ***part time staff*** in Infection Control ☐

11. In a TYPICAL week of Infection Control duties, HOW MANY HOURS do you PERSONALLY spend on each of the following tasks?

TASK	NUMBER OF HOURS
Surveillance of nosocomial infections	
Ward Consultations	
Committee meetings, including preparation and minute taking	
Computer/ clerical activities	
Policy development	
Policy implementation	
Staff health activities	
Teaching/ training	
Own professional development **Please specify type of professional development.**	
Other, please specify	**TOTAL =** **Please complete**

12. Please read the list below and tick EACH of the tasks that you perform in your infection control role.

	YES	NO
Participation in infection control policy development		
Distribution of the infection control policy and guidelines		
Orientation of new staff		
Provision of in-service education		
Membership of hospital's Infection Control Committee		
Evaluation of new products		
Provision of advice in matters relating to Infection Control in areas external to your employing institution eg. schools, private practices		
Provide advice in the planning of redevelopment or capital works		

13. WHEN YOU ARE UNDERTAKING surveillance for cases of surgical wound infection which of the following criteria do you ALWAYS use to detect a case:

Tick one or more boxes

Infection within 30 days after the operative procedure ☐

Purulent drainage ☐

Organisms isolated from a culture of fluid or tissue from the incision site ☐

Pain ☐

Tenderness ☐

Local swelling ☐

Redness ☐

Heat ☐

Diagnosis of wound infection by medical officer ☐

Histopathology/ Radiography ☐

Other ☐ (please specify)

____

14. WHEN YOU ARE UNDERTAKING surveillance for cases of NOSOCOMIAL BACTERAEMIA which of the following criteria do you ALWAYS use to detect a case:?

Tick one or more boxes

Patient was asymptomatic on admission ☐

Patient was afebrile on admission ☐

Infection occurs at least 48 hours after admission ☐

Organisms isolated from a culture of fluid or tissue from the incision site ☐

Patient has fever > 38°C ☐

Patient has a recognised culture from one or more blood cultures ☐

Other ☐ (please specify)

____

15. How FREQUENTLY DO YOU USE the following methods to identify patients with nosocomial infection?

Tick one or more boxes

METHODS OF CASE FINDING	**Always**	**Sometimes**	**Never**
Verbal information provided by the nursing, medical staff or a designated ward based liaison person			
Written form specifically for the notification of infection *completed* by the nursing, medical staff or a designated ward based liaison person			
Microbiology reports/ Laboratory generated lists			
Prospective review of medical records			
Retrospective review of medical records			
Observation during **your** ward rounds			
Post discharge follow up			
Information from Infection Control staff at **OTHER** health care facility			

16 How often do you UNDERTAKE SURVEILLANCE for each of the following:

Please answer by placing the relevant number (denoting time) in each box.

1 = Daily
2 = Weekly
3 = Monthly
4 = Quarterly
5 = Annually
6 = Outbreak response
7 = Never
8 = N/A

Infectious diarrhoea ☐
IV device related bacteraemia ☐
MRSA ☐
Needlestick injury/ splash ☐
Non IV device related bacteraemia ☐
RSV (Bronchiolitis) ☐
Surgical site ☐
TB ☐
Other ☐ (please specify) ____________________________________

17. How often do you REPORT RATES for each of the following?

Please answer by placing the relevant number (denoting time) in each box.

1 = Daily
2 = Weekly
3 = Monthly
4 = Quarterly
5 = Annually
6 = Outbreak response
7 = Never
8 = N/A

Infectious diarrhoea ☐
IV device related bacteraemia ☐
MRSA ☐
Needlestick injury/ splash ☐
Non IV device related bacteraemia ☐
RSV (Bronchiolitis) ☐
Surgical site ☐
TB ☐
Other ☐ (please specify) ____

18. Which FORMAT(S) do you use TO REPORT the following infection rates to the appropriate committee(s)?

Please answer by placing the relevant number in each box.

1 = By Ward/ Unit
2 = By Procedure
3 = Surgeon specific
4 = Physician specific
5 = By Clinical Specialty
6 = N/A

If more than one format please record in the boxes below.

Infectious diarrhoea	☐	☐	☐
IV device related bacteraemia	☐	☐	☐
MRSA	☐	☐	☐
Needlestick injury/ splash	☐	☐	☐
Non IV device related bacteraemia	☐	☐	☐
RSV (Bronchiolitis)	☐	☐	☐
Surgical site	☐	☐	☐
TB	☐	☐	☐
Other (please specify)	☐	☐	☐

19. Do you UNDERTAKE POST DISCHARGE SURVEILLANCE for surgical wound infections?

Yes ☐ No ☐

20. Which FORMAT(S) do you use to report infections/outcomes in your facility?

Please answer by placing the relevant number in each box.

1 = Raw number of cases
2 = Percentages
3 = No. of positive cases/ total no. of admissions or discharges
4 = No. of infected wounds/ total number of operations in relative wound classification eg. clean or contaminated
5 = Other - Please specify

If more than one format please record in the boxes below.

Infectious diarrhoea	☐	☐	☐
IV device related bacteraemia	☐	☐	☐
MRSA	☐	☐	☐
Needlestick injury/ splash	☐	☐	☐
Non IV device related bacteraemia	☐	☐	☐
RSV (Bronchiolitis)	☐	☐	☐
Surgical site	☐	☐	☐
TB	☐	☐	☐
Other (please specify)	☐	☐	☐

21. How are recommended Infection Control procedures and practices MONITORED within your facility?

Tick one or more boxes

Test / audit knowledge or practice before recommendation ☐

Test / audit knowledge or practice after recommendation ☐

Use infection rates before recommendation ☐

Use infection rates after recommendation ☐

No formal assessment is made ☐

Other (please specify) ___________________________________

22. Which of the following PRACTICES are included in your facility's infection control programme?

Tick one or more boxes

Annual staff CXRs for TB surveillance ☐

Dedicated equipment for HIV/AIDS patients only ☐

Disposable food trays for patients in isolation ☐

Double bagging of linen from isolated patients ☐

Double bagging of waste from patients in isolation ☐

Routine aprons or gowns used by nursery staff ☐

Routine aprons or gowns used by ICU staff ☐

Total surveillance of all nosocomial infections ☐

23. Do you MEASURE QUALITY CARE in relation to nosocomial infections by:

Tick one or more boxes

Change in the **number** of cases detected ☐

Change in the **percentage** of cases detected ☐

Change in **rates** of cases detected/ number of admissions or discharges ☐

Change in ACHS **threshold** rates ☐

Other ☐ (please specify)

---

24. Which of the following ARE EMPLOYED within your facility?

PERSON	**EMPLOYED** **Tick one or more boxes**
Director of Nursing	☐
Director of Surgery	☐
General Manager/ Chief Executive Office	☐
Infectious Diseases Physician	☐
Medical Officer	☐
Microbiologist	☐
Nurse Unit Manager	☐
Practice Manager	☐
Senior Infection Control Practitioner	☐
Scientific officer	☐
Other (please specify) _______________	☐

25. Of the following (either on site or off site) personnel that are available to you, list IN ORDER the first three (3) you would consult in matters relating to Infection Control.

PERSON	**RANKING**
Director of Nursing	☐
Director of Surgery	☐
General Manager/ Chief Executive Officer	☐
Infectious Diseases Physician	☐
Medical Officer	☐
Microbiologist	☐
Nurse Unit Manager	☐
Practice Manager	☐
Senior Infection Control Practitioner	☐
No resource people are available to consult	☐

Other ☐ (please specify)________________________

26. How supportive is THE MANAGEMENT of your facility to the Infection Control program?

Please tick the most appropriate box

Very ☐

Moderately ☐

Not very ☐

Not at all ☐

26a. Please give reasons for your response:

---

27. What is the professional background of the Chairperson of YOUR hospital's Infection Control Committee?

- Medicine - Administration ☐
- Medicine - Microbiology ☐
- Medicine - Physician ☐
- Medicine - Surgery ☐
- Nursing - Infection Control ☐
- Nursing - Other ☐
- Other - Please specify ☐
- No infection control committee ☐

28. Does your facility participate in the Australian Council on Healthcare Standards (ACHS) accreditation process?

YES ☐ NO ☐

29. How could your infection control program BE IMPROVED?

Tick one or more boxes

- More information ☐
- Different information ☐
- More clerical support ☐
- More equipment ☐
- More Infection Control staff ☐
- Reorganisation of Infection Control duties ☐
- No improvement needed ☐
- Other ☐ Please specify ________________________________

____

____

____

30. Please tick ALL the areas in which you have <u>COMPLETED</u> formal training.

a. Enrolled nurse ☐

b. Registered general nurse ☐

c. Laboratory Technician ☐

d. Scientific Officer ☐

e. Medical officer ☐

31. Please tick each of the categories of training/ education you are either CURRENTLY UNDERTAKING or <u>HAVE COMPLETED</u>

	Currently Undertaking	Have Completed
Undergraduate		
a) General registered nurse (hospital based school of nursing)	☐	
b) General registered nurse (undergraduate degree in nursing)	☐	
c) Other post registration nursing course leading to certification	☐	
d) Diploma	☐	
Post Graduate		
e) Postgraduate diploma obtained from CAE or University	☐	☐
f) Masters in health field	☐	☐
g) Doctorate	☐	☐
Continuing Education relating to the study of:		
h) Infection Control	☐	
i) Hospital Epidemiology	☐	☐
j) Sterilisation / Disinfection	☐	☐

k) Other ☐ Please specify

____

32. Which of the following courses have YOU UNDERTAKEN in the PAST YEAR?

Please tick all that apply.

Basic IC course ☐

Post basic IC certificate ☐

IC Seminar ☐

Short IC course ☐

Tertiary IC qualification ☐

None ☐

Other ☐ Please specify ____________________________

____

____

33. Benner (1984) suggests that there are five LEVELS OF SKILL development in nursing. These range from *NOVICE to EXPERT*.

NOVICE:

Beginners who have no experience of the situations in which they are expected to perform.

ADVANCED BEGINNERS:

Can demonstrate marginally acceptable performance.

COMPETENT:

Typified by a practitioner who has been on the job in the same or similar situation for two to three years and is able to see her/his actions in terms of long-range goals or plans of which she/he is constantly aware.

PROFICIENT:

Perceive situations as wholes rather than in terms of aspects and performance is guided by principles. The proficient nurse learns from experience what typical events to expect in a given situation and how plans need to be modified in response to these events.

EXPERT:

Have an “enormous” background of experience and intuitively grasp situations zeroing in on the accurate region of the problem.

Considering the above statements please indicate, with a tick, the level which you believe best describes *YOUR COMPETENCE* as an Infection Control practitioner.

a) Novice ☐

b) Advanced beginner ☐

c) Competent ☐

d) Proficient ☐

e) Expert ☐

34. Place a tick against the QUALIFICATION(S) you consider an *Infection Control Practitioner* SHOULD HAVE to function at EACH LEVEL.

QUALIFICATION	NOVICE level
General Registered Nurse Hospital trained	☐
Undergraduate Degree in Nursing	☐
Basic Infection Control Course	☐
Post Basic Infection Control Certificate	☐
Hospital Epidemiology Workshop	☐
Master in a health field eg. Public Health	☐

Other ☐ (please specify)

____

QUALIFICATION	ADVANCED BEGINNER level
General Registered Nurse Hospital trained	☐
Undergraduate Degree in Nursing	☐
Basic Infection Control Course	☐
Post Basic Infection Control Certificate	☐
Hospital Epidemiology Workshop	☐

Master in a health field eg. Public Health ☐

Other ☐ (please specify)

QUALIFICATION **COMPETENT** level

General Registered Nurse Hospital trained ☐

Undergraduate Degree in Nursing ☐

Basic Infection Control Course ☐

Post Basic Infection Control Certificate ☐

Hospital Epidemiology Workshop ☐

Master in a health field eg. Public Health ☐

Other ☐ (please specify)

QUALIFICATION **PROFICIENT** level

General Registered Nurse Hospital trained ☐

Undergraduate Degree in Nursing ☐

Basic Infection Control Course ☐

Post Basic Infection Control Certificate ☐

Hospital Epidemiology Workshop ☐

Master in a health field eg. Public Health ☐

Other ☐ (please specify)

QUALIFICATION **EXPERT** level

General Registered Nurse Hospital trained ☐

Undergraduate Degree in Nursing ☐

Basic Infection Control Course ☐

Post Basic Infection Control Certificate ☐

Hospital Epidemiology Workshop ☐

Master in a health field eg. Public Health ☐

Other ☐ (please specify)

____

35. Of which of the following Associations are you a MEMBER ?

Tick one or more

American Practitioners in Infection Control & Hospital Epidemiology(APIC) ☐

Membership of State or Territory Infection Control Association ☐

Australian Infection Control Association (AICA) ☐

Australian Society for Microbiologists (ASM) ☐

Other ☐ Please specify...

36.Which of the following meetings have you ATTENDED IN THE PAST YEAR?

Tick one or more boxes.

National Infection Control Conference (AICA) ☐

State Infection Control Conference ☐

Regional meetings relating to Infection Control ☐

Other ☐ Please specify ____

37. Which publications do you REGULARLY read?

Tick one or more boxes.

American Journal of Infection Control ☐

Australian Infection Control ☐

Communicable Diseases Intelligence ☐

Hospital Infection ☐

Infection Control & Hospital Epidemiology ☐

State Public Health Bulletin ☐

Other ☐ Please specify ____

None ☐

38. When developing guidelines and policies, which of the following do you review?

Tick one or more boxes.

Policies and guidelines written by another facility's Infection Control Committee

National Health & Medical Research Council Guidelines for Infection Control

Relevant scientific journals

State Health Department Infection Control Guidelines & Regulations

relating to Infection Control

Textbooks

Other ☐ Please specify ____

None

39. When seeking answers to CLINICAL ISSUES relating to Infection Control, which of the following do you REVIEW?

Tick one or more boxes.

Policies and guidelines written by another facility's Infection Control Committee

National Health & Medical Research Council Guidelines for Infection Control

Relevant scientific journals

State Health Department Infection Control Guidelines & Regulations

relating to Infection Control

Textbooks

Other ☐ Please specify ____

None

40. Do you develop and undertake RESEARCH relating to Infection Control?

Please tick the appropriate box:

Yes ☐ **Go to Q40A**

No ☐ **Go to Q41**

40a. Do you PUBLISH Infection Control research findings?

Please tick the appropriate box: Yes ☐ No ☐

41. From the following possible reasons, list IN ORDER the THREE (3) which prevent you from undertaking research.

Tick one or more boxes.

Insufficient access to personal computer ☐

Insufficient resources ☐

Insufficient time ☐

Lack of personal computer skills ☐

Lack of support from other staff for research ☐

Lack of understanding of research principles ☐

The nature of the patients cared for in your facility ☐

Other ☐ Please specify ____

42. Do you use a COMPUTER in your Infection Control tasks?

ALL RESPONDENTS

Yes ☐ **Go to Q42A**

No ☐ **Go to Q43**

42A. For which of the following do you use the computer?

Tick one or more boxes

Surveillance (entering and analysing data, reporting information) ☐

Word processing ☐

Databases of cases of nosocomial infection ☐

Presentations ☐

Other ☐ (please specify) ____________________

For purposes of analysis, could you please complete the following personal details:

ALL RESPONDENTS

43. Female ☐ **Male** ☐

44. Age group

20 - 24 ☐

25 - 30 ☐

31 - 40 ☐

41 - 50 ☐

51 - 60 ☐

over 61 ☐

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE

APPENDIX 3 - BENNER'S MODEL OF NOVICE TO EXPERT.

NOVICE:

Beginners who have no experience of the situations in which they are expected to perform.

ADVANCED BEGINNERS:

Can demonstrate marginally acceptable performance. Has approximately one year of experience.

COMPETENT:

Typified by a practitioner who has been on the job in the same or similar situation for two to three years and is able to see her/his actions in terms of long-range goals or plans of which she/he is constantly aware. Has approximately 2 to 3 years of experience.

PROFICIENT:

Perceive situations as wholes rather than in terms of aspects and performance is guided by principles. The proficient nurse learns from experience what typical events to expect in a given situation and how plans need to be modified in response to these events. Has between 3-5 years of experience.

EXPERT:

Have an “enormous” background of experience and intuitively grasp situations zeroing in on the accurate region of the problem. Has more than 5 years experience.

Appendix 4 ACHS Definitions for Nosocomial Infection Clinical INDICATORS

SURGICAL WOUND INFECTIONS

Dirty:

Operations in which a perforated viscus or pus is found.

Contaminated:

Operations breaching the gastrointestinal, respiratory and genitourinary tracts, or in which a break in aseptic technique occurs and in traumatic wounds.

Clean:

All other operations where the criteria set out in "dirty" and contaminated" do not apply.

Wound infection:

Any surgical wound from which purulent material drains or is obtained.

HOSPITAL-ACQUIRED BACTERAEMIA:

A positive blood culture for inpatients who were afebrile on admission (i.e. temperature less than 37.4° C) on blood collected 48 hours after admission.

DATA FORMAT

Clean and contaminated wound infection

Numerator:

The number of patients who develop wound infection from the fifth post-operative day after (i) clean surgery, (ii) contaminated surgery.

Denominator:

The total number of patients undergoing (i) clean and (ii) contaminated surgery within the time period under study who have a post-operative length of stay of 5 or more days.

HOSPITAL-ACQUIRED BACTERAEMIA

Numerator.

Total number of patients who acquire bacteraemia as defined above.

Denominator:

Total number of patients in hospital during the study period.

APPENDIX 5 COPY OF NSW HEALTH DEPARTMENT LETTER AND SURVEY

Dear Colleague

The New South Wales Department of Health is currently developing *Guidelines for Infection Control Programs in NSW Hospitals.* The primary aim of these guidelines is to define the core elements of infection control programs in NSW hospitals. The Guidelines will facilitate standardisation and increase the capacity of NSW hospitals to comply with the relevant infection control policy and regulatory requirements.

The Guidelines will progress the Department s early work reported in the *Report of the NSW Nosocomial Infection Taskforce.* Additionally they will complement the *Hospital Infection Surveillance System* pilot project in defining and applying an evidence-based approach to IC program planning in NSW hospitals.

Following a review of literature and international infection control priorities the Department has identified a need to clarify the core business of infection control practitioners and the existing local IC infrastructures and activity. We are inviting Directors of Nursing, Infection Control Practitioner(s), Chief Executive Officers and Medical Microbiologist/Infectious Disease Physician or Chair of Infection Control Committee to identify best practice infection control for NSW.

To assist the Department in this initiative and to enable your opinion to influence the Guideline development I would be grateful if you could complete the attached very brief survey which should take less than 5 minutes. Surveys have been coded for the purposes of improving response rate only. All responses will be de-linked and if appropriate, the findings will be used in a forthcoming publication describing the infrastructure and essential activities of infection control in NSW hospitals.

In order to progress the guideline development please complete the attached two page survey and return it in the pre-addressed envelope to Cathryn Murphy, Senior Policy Analyst Infection Control, NSW Health Department, LMB 961, North Sydney 2065 by 5 October 1998.

Thank you for your cooperation. If you require any further information on this survey or the *Guideline* development please contact Cathryn Murphy, Senior Policy Analyst - Infection Control on (02) 9391 9869 or by e-mail at cmurp@doh.health.nsw.gov.au

Yours sincerely

Andrew Wilson

Chief Health Officer

NSW INFECTION CONTROL GUIDELINES SURVEY – 1998 Page 1/2

1. Which ONE of the following best describes your current position? Please tick ONE only

☐Chief Executive Officer ☐Director of Nursing (Services)

☐Infection Control Practitioner ☐Medical Microbiologist

☐Infectious Disease Physician ☐Other (please describe)

2. Are you a member of your facility's infection control committee? (Tick one)

☐YES ☐NO ☐NO- Facility does not have an IC Committee

If yes- are you the chair of your facility's infection control committee?

(Tick one)

☐YES ☐NO

3. Do you have line responsibility for the Infection Control staff in your facility?

☐YES ☐NO (Tick one)

If No, to whom are they responsible ______________________________

NO4. The table on the following page contains statements about the infrastructure and essential activities of infection control in NSW hospitals.

Please check the box that most closely describes your opinion of the ideal Infection Control program.

These responses should not reflect the structure or function of your facility's existing IC program or the skills or educational of your facility's current IC staff.

ACTIVITY	Absolutely disagree	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Absolutely agree
THE IC PROGRAM							
The most important data-management activity of infection control programs is developing, implementing and monitoring surveillance.							
In addition to ICPs, a trained hospital epidemiologist is an essential component of an effective hospital infection control program							
An effective IC program requires one ICP per 250 occupied beds.							
Secretarial service is essential for the infection control program.							
Computer support personnel are a requisite for the IC program.							
A desktop or laptop computer with Internet access and a printer is essential for the IC program.							
The link between IC and performance-measurement and improvement activities in a healthcare facility is crucial.							
The microbiology lab should make reports from patient clinical specimens readily available to IC staff.							
ICPs should be registered nurses with a minimum qualification of bachelor's degree.							
The need for infection control as a specialty practice in the hospital will continue to increase.							
THE ICP's ROLE & RESPONSIBILITIES ARE TO:							
develop appropriate and feasible IC policies and procedures;							
be responsible for ensuring that the hospital's administration and management are aware of the institution's compliance with regulations, guidelines, and accreditation requirements.							
develop and implement systems for diagnosis, treatment, and prevention of infectious diseases in healthcare workers.							
intervene directly in outbreaks of nosocomial infection.							
organise education and training to all healthcare workers is a vital component of IC programs.							
provide expert guidance in the selection of indicators, data collection and analysis for external reporting of infection rates.							

APPENDIX 6 HOSPITAL INFECTION CONTROL PRACTICES ADVISORY COMMITTEE

HOSPITAL INFECTION CONTROL PRACTICES ADVISORY COMMITTEE

PURPOSE

The Secretary, the Assistant Secretary for Health, and by delegation the Director, Centers for Disease Control and Prevention, are authorized under Section 301 (42 U.S.C. 241) and Section 311 (42 U.S.C. 243) Public Health Service Act, as amended, to: (1) conduct, encourage, cooperate with, and assist other appropriate public authorities, scientific institutions, and scientists in the conduct of research, investigations, experiments, demonstrations, and studies relating to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases, and other impairments; (2) assist States and their political subdivisions in the prevention of infectious diseases and other preventable conditions, and in promoting health and well-being; and (3) train State and local personnel in health work.

AUTHORITY

42 U.S.C. 217a, Section 222 of the Public Health Service Act, as amended. The Committee is governed by the provisions of Public Law 92-463, as amended (5 U.S.C. App. 2), which sets forth standards for the formation and use of advisory committees.

FUNCTION

The Hospital Infection Control Practices Advisory Committee shall provide advice and guidance to the Secretary, the Assistant Secretary for Health, the Director of the Centers for Disease Control and Prevention, and the Director of the National Center for Infectious Diseases, regarding the practice of hospital infection control and strategies for surveillance, prevention, and control of nosocomial infections in U.S. hospitals. The Committee shall advise the Centers for Disease Control and Prevention on periodic updating of guidelines and other policy statements regarding the prevention of nosocomial infections.

STRUCTURE

The Committee shall consist of 11 public members, including the Chair, and 1 Federal member. Members shall be selected by the Secretary, or designee, from authorities knowledgeable in the fields of infectious diseases, nosocomial infections, epidemiology, public health, and related fields.

Members shall be invited to serve for overlapping four-year terms; terms of more than two years are contingent upon the renewal of the Committee by appropriate action prior to its termination. Members shall serve after the expiration of their terms until their successors have taken office.

There shall be one standing subcommittee called the Subcommittee on Prevention and Control of Antimicrobial Resistant Microorganisms in Hospitals, composed entirely of members of the parent committee. The Department Committee Management Officer will be notified upon establishment of any additional subcommittee(s) and will be provided information on name, membership, function, and estimated frequency of meetings.

Management and support services shall be provided by the Hospital Infections Program, National Center for Infectious Diseases, CDC.

MEETINGS

Meetings shall be held approximately two times per year at the call of the Chair with the advance approval of a Government official, who shall also approve the agenda. A Government official shall be present at all meetings.

Meetings shall be open to the public except as determined otherwise by the Secretary or other official to whom the authority has been delegated; notice of all meetings shall be given to the public.

Meetings shall be conducted, and records of the proceedings kept, as required by applicable laws and Departmental regulations.

COMPENSATION

Members who are not full-time Federal employees shall be paid at the rate of $188 per day, plus per diem and travel expenses in accordance with Standard Government Travel Regulations.

ANNUAL COST ESTIMATE

Estimated annual cost for operating the Committee, including compensation and travel expenses for members, but excluding staff support, is $31,833. Estimate of annual person-years of staff support required is .90, at an estimated annual cost of $59,160.

REPORTS

In the event a portion of a meeting is closed to the public, a report shall be prepared annually which shall contain, as a minimum, a list of members and their business addresses; the Committee's functions, dates, and places of meetings; and a summary of Committee activities and recommendations made during the fiscal year. A copy of the report shall be provided to the Department Committee Management Officer.

TERMINATION DATE

Unless renewed by appropriate action prior to its expiration, the Hospital Infection Control Practices Advisory Committee will terminate on January 19, 1999.

APPROVED:

Date Director, Centers for Disease Control and Prevention

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