Nurse survey of infection prevention and control practice in Irish public and private general hospitals in the context of the COVID-19 pandemic

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Thesis submitted for the Award of MSc

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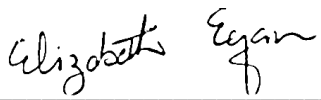
I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Master of Science is entirely my own work, and that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge breach any law of copyright, and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.



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Glossary of Irish and International Institutions

(In alphabetical order)

Centers for Disease Control
The Centers for Disease Control (CDC) is the United States of America's health protection agency.

Department of Health
The main role of the Irish Department of Health (DoH) is to support the Minister for Health and Minister of State to develop and implement health service policies. The department also monitors the health services performance.

Health Service Executive
The Health Service Executive (HSE) is the organisation charged with running public health services in Ireland.

Health Information and Quality Authority
The role of the Health Information and Quality Authority is to develop standards, inspect and review health and social care services in Ireland.

Health Protection and Surveillance Centre
The Health Protection and Surveillance Centre (HPSC) is the specialist organisation in Ireland responsible for the surveillance and monitoring of communicable diseases.

International Centre on Nurse Migration
The International Centre on Nurse Migration (ICNM) plays a key role in developing policy and practice for the facilitation of good practice environments for nurse migrants.

Institute of Medicine
The Institute of Medicine (IOM) is a non-profit, independent organization in the United State of America, with a goal of providing unbiased and authoritative advice to policy makers and the public.

International Council of Nurses
The International Council of Nurses (ICN) is an umbrella organization for over 130 national nurse organisations. It is a representative organisation with a goal of advancing nursing as a profession.

Irish Nurses and Midwives Organisation
The Irish Nurses and Midwives Organisation (INMO) is the largest union representing nurses and midwives in Ireland.

Nursing and Midwifery Board of Ireland
The Nursing and Midwifery Board of Ireland (NMBI) is the statutory body that regulates and sets the standards for education, registration and professional conduct of nurse and midwives in Ireland.

Glossary of Irish and International Institutions

Organisation for Economic Co-operation and Development
The Organisation for Economic Co-operation and Development (OECD) is a forum for governments of countries with market-based economies who collaborate to promote economic growth.

World Health Organisation
The World Health Organisation (WHO) is the United Nations agency charged with promoting health across nations and partners and directing responses to health emergencies across the globe.

List of Abbreviations and Acronyms

Abbreviations and Acronyms	Explanation
AE	Adverse Event
ANOVA	Analysis of Variance Statistical Test
BERNCA	Basel Extent of Rationing of Nursing Care research tool
CAUTI	Catheter-associated urinary tract infection
CDI	*Clostridium difficile* Infection
CLABI	Central-line associated bloodstream infection
CNM	Clinical Nurse Manger
COVID-19	Disease caused by the SARS-CoV-2 virus
HAI	Healthcare-acquired Infection Hospital-acquired Infection
HH	Hand Hygiene
HSE	Health Service Executive
ICU	Intensive Care Unit
ICN	International Council of Nurses
INMO	Irish Nurses and Midwives Organisation
IOM	Institute of Medicine
IPC	Infection Prevention and Control
MISSCARE	Missed Care Survey research instrument
MDRO	Multi-drug resistant organisms
MNC	Missed Nursing Care
MNCIPC	Missed Nursing Care Infection Prevention and Control
NMBI	Nursing and Midwifery Board of Ireland
MRSA	Methicillin-resistant *Staphylococcus aureus*
NV-HAP	Non-ventilator hospital-acquired pneumonia
NWI	Nursing Work Index
OECD	Organisation for Economic Development
PES-NWI	Practice Environment Scale – Nursing Work Index
PN	Pneumonia
RN	Registered Nurse
RN4CAST	Registered Nurse Forecasting: Human Resources Planning Study
SD	Standard Deviation
SP	Standard Precautions
TP	Transmission Precautions
TU-7	Task Undone research instrument
SSI	Surgical site infection
UTI	Urinary tract infection
VAP	Ventilator-associated pneumonia
WHO	World Health Organisation

Abstract

Title: Missed Infection Prevention and Control (IPC) practices in general hospitals in Ireland in the context of COVID-19: an online national survey of nurses.

Author: Elizabeth Egan

Background: Some healthcare-acquired infections (HAIs) can be associated with missed nursing care (MNC) and may result in adverse outcomes for patients. IPC activities are important in reducing HAIs and while MNC is a well-researched phenomenon, data on missed nursing care infection prevention and control (MNCIPC) as a specific component of MNC is limited. COVID-19 brought the role of IPC into sharp focus as IPC practices continue to play a critical role in combating the disease.

Aim: The purpose of the study is to understand the factors that influence missed IPC practices in hospitals, including nurse compliance and non-compliance with IPC guidelines.

Methods: The study employed a quantitative cross-sectional online survey using the Practice Environment Scale of the Nursing Work Index, the World Health Organisation COVID-19 Healthcare Worker and the MNCIPC tool, which was developed to explore the failure to perform IPC activities through the lens of MNC. Data were analysed using SPSS Statistics Version 27.

Findings: There were 113 registered nurse responses. COVID-19 IPC procedures added strain to nurse workload with staff nurses showing significant differences on 'risk to families of COVID-19 infection', and 'lack of control over IPC activities' compared to other nurses. 'Hand hygiene' and 'minimising hospital acquired infections' were most frequently missed. Factors that hindered best practice occurred at systemic (staffing/resources) and environmental level (patient room overcrowding/bathroom sharing). At unit level, EDs showed significantly greater dissatisfaction with 'IPC Resource Support'. ICU/Critical Care reported significantly greater dissatisfaction with 'Staffing/Resource Adequacy Subscale'.

Conclusion and implications: Best practice IPC care is hampered by factors outside nurse control. Unit-specific IPC training, including support staff recommended because infection risk is associated with unit characteristics.

Chapter 1: Introduction

1.1 Missed Nursing Care and Infection Prevention and Control

Over the past twenty years missed nursing care (MNC) has been extensively studied with researchers documenting both the predictors and outcomes of the phenomenon. As conceptualised by Kalisch, Tschannen and Hee Lee, (2011) MNC is a nursing process measure that is connected to both quality of care and patient outcomes. It is well documented that MNC impacts patient outcomes through the occurrence of adverse events (Ball *et al*., 2018, Aiken *et al*., 2011, Lucero, Lake and Aiken 2010). Adverse events (AE) include falls, pressure ulcers, healthcare-acquired infections (HAIs) and medication errors (Jingxia *et al*., 2022, Aiken *et al.,* 2011) all of which contribute to poor patient outcomes and increased mortality. One element of AEs are HAIs which have been shown to be associated with MNC (Boev and Kiss, 2017; Ausserhofer *et al*., 2013; Lucero, Lake and Aiken, 2010) and can be mitigated by implementing high quality IPC practices, which are a core part of nursing care. The latest World Health Organisation (WHO) report on IPC has shown that seven out of every 100 patients hospitalised in high income countries will be infected with a HAI, resulting in 16 million deaths annually, in what can be termed a silent pandemic. This risk is further magnified, and the consequences even more deadly for patients who are elderly, more ill, or immune-compromised (WHO, 2022).

Until recently, there has been little evidence in the MNC literature focussed on IPC within MNC and consequently HAIs. However, studies emerging from Australia (Henderson *et al*., 2021; 2020, Blackman *et al*., 2021) have, for the first time in the field of MNC focused on the elements of IPC activities that nurses miss in hospital care. COVID-19, while highlighting the importance of IPC, has also brought to public attention how healthcare settings can also contribute to infection spread, harming patients, healthcare workers and visitors alike. As the largest caregiver group in hospital settings, nurses and nursing management are involved in almost every step of patient care and are key players in the prevention of HAIs. However, nursing as a profession, is under pressure as never before.

1.2 Nursing in the context of COVID-19

The World Health Organisation declared 2020 the year of the nurse to mark the 200th birthday of Florence Nightingale, founder of the first professional school of nursing, a woman who turned hygiene and handwashing into a public health weapon (McDonald, 2020). SARS-CoV-2 (COVID-19) also came dominate what was happening in healthcare settings in 2020, affecting not only patient care, but also the administration of that care on a day-to-day basis. The top priority for

hospitals became the prevention of nosocomial spread of COVID-19, with nurses at the frontline in that task.

Initially, nursing appeared to benefit from its raised profile with an increase in applications for nursing training up by 117% in Canada, over 30% in the UK and Sweden and over 20% in the US (Castonguay, 2021; NMBI, 2021). This enthusiasm was also evident in Ireland, with applications for nursing places up by 21% in 2021 (NMBI, 2021). However, since 2022 the largest decreases ever observed in applications for Irish health sector courses has occurred, with nursing and midwifery applications down by 27% on the previous year (O'Brien, 2022). A further 10% decrease in demand for nursing places has occurred in the 2023 application process to date (Donnelly, 2023).

However, as the pandemic progressed, the reality of the pressure COVID-19 brought to bear on the profession was highlighted by the International Council of Nurses (ICN) who, by October 2020, approximately nine months into the pandemic, reported the deaths of 1,500 nurses from COVID-19, while estimating the actual figure to be much higher (ICN, 2020). Perhaps unsurprisingly, the number of experienced nurses indicating their intention to leave the profession also rose with the ICN highlighting that 20% of National Nurse Associations reported an increase in the number of nurses leaving the profession (ICN, 2021). The impact of the pressure and additional workload can be seen in results from a Swedish Nurses Association survey showing that one in four nurses were considering resigning while 7% were considering leaving healthcare altogether (Vanforbundet, 2020). Similar findings were noted by the Danish Nurses' Organisation with nine out of ten nurses also considering leaving their job and one-third of those reporting considering leaving the profession completely (ICN, 2021). The picture in Ireland appears to be equally bleak with 74% of nurses and midwives responding to a 2023 Irish Nurses and Midwives Organisation (INMO) survey stating they are considering leaving due to stress, exhaustion and feeling undervalued. More concerning in terms of both IPC and HAIs, 66% of nurses said they felt patient safely was put at risk 'very often' or 'always'. The picture is very similar in undergraduate nurses with the majority (73%) stating that workplace conditions, inadequate staffing levels and pay were driving them to consider emigrating when qualified. Over half (54%) identified increased pay as a priority with 33% identifying improved staffing levels and working conditions to be necessary to encourage them to remain working in Irish healthcare (INMO, 2023a; INMO, 2023b).

Aside from COVID-19, there are several other challenges facing nurses and hospitals including overuse of antibiotics, HAIs and the emergence of multi-drug resistant organisms (MDRO).

Within this context, nurses are required to implement adequate IPC practices to keep patients safe, against a backdrop of overcrowded hospitals, insufficient resource and an estimated 5.9m global shortage of nurses, a factor that is impeding recruitment to many healthcare services, including Ireland (WHO, 2020).

1.3 COVID-19 Impact on Nursing and IPC

One of the major challenges nurses working in hospitals faced at the outset of the pandemic was being required to care for unfamiliar patient populations often needing interventions for which the nurses were insufficiently trained (Retzlaff, 2020; Shinners and Cosme, 2020). The impact of this lack of expertise coupled with understaffing and compromises of 'traditional' hospital IPC practices has been shown in a US nurse study to lead to near misses in terms of patient care during the pandemic (Andel *et al*., 2021). Acknowledging that data in the area at the outset of the pandemic were limited, Stevens *et al*., (2020), highlighted concerns within the US hospital epidemiology community that traditional IPC practices were being compromised with resources being diverted towards COVID-19 outbreaks at the expense of other aspects of infection prevention, risking an increase in the more common HAIs. The concerns expressed in this early research have come to pass in the US with increased numbers of HAIs in areas outside of those expected in ventilator-associated pneumonia (VAP) which can be attributed to COVID-19. These include central-line-associated bloodstream infection (CLABI) rate increases of between 28% and 47% observed across several states. Increases in methicillin-resistant *Staphylococcus aureus* (MRSA) and catheter-associated urinary tract infections (CAUTI) of 33.8% and 18.8% respectively have also been recorded up to the end of 2020 (CDC, 2020; Weiner-Lastinger *et al*., 2020). As of yet, there is no available published data for post-COVID-19 HAI rates in Ireland, but the increase observed in the research outlined here is likely to be mirrored across hospital systems in most countries, including Ireland.

1.4 Hospital Care Delivery and HAIs

Safety is an aspiration to better care and, according to Vincent and Amalberti (2015), once a safety issue has been named, it can be monitored, and its' outcomes measured. What was once considered acceptable in healthcare can now be prevented, and HAIs, which in the 1980s were considered unfortunate but inevitable, are one such example. A HAI that is picked up in hospital is called a 'hospital acquired infection', HPSI, (2020) and is connected to greater patient morbidity and mortality and considerable additional healthcare service costs. Of the patients who acquire a HAI, it is estimated that 3.5% will die as a result (Cassini *et al*., 2016). The drivers of HAIs are, in the main, sub-optimal IPC practices, coupled with poor environmental cleaning and overuse of antimicrobials (Fernando, Gray and Gottlieb, 2017).

Higher regulatory oversight combined with a greater understanding of the processes of transmission and prevention of HAIs as they relate to nursing should translate into better outcomes for patients and nurses. However, patient outcomes as related to nursing care, IPC and HAIs are complex. Several factors come into play including staff ratios, education levels, organisational factors, inadequate leadership and poor management support, insufficient resources, and time along with factors in the work practice environment. Despite greater knowledge of transmission processes, the reality in Irish hospitals is that this knowledge is not translating into improvements in patient HAI rates.

1.4.1 Understanding the impact and costs of HAIs in Ireland

It is important to understand the incidence level of HAIs, which are costly to the healthcare services and can be injurious and fatal for patients. The latest available figures for HAIs in acute Irish hospitals are drawn from a 2017 European-wide point prevalence survey in which sixty acute Irish hospitals with a bed capacity of between 72 and 588 participated. The prevalence of HAIs at 6.1% - increased from 5.2% in 2012 - is higher than the European average of 5.5%. Adult intensive care units (ICUs) and surgical wards recorded the highest prevalence at 24% and 9% respectively. Pneumonia (PN), surgical site infections (SSI), urinary tract infections (UTI) and bloodstream infections (BSI) had the highest prevalence rate in that order. Between 2012 and 2017, PN incidence as a proportion of all HAIs increased to 28.9% from 17%. Of the recorded BSIs, 25% occurred due to an in-dwelling vascular catheter (Clancy, Shine and Hennessy, 2023). Many HAIs can be prevented by the rigorous implementation of IPC measures, with a recent retrospective chart review using hospital data from acute public hospitals in Ireland, demonstrating that nearly three-quarters of the HAI adverse events that had occurred were considered preventable. Seven per cent contributed to patient death with 7% causing permanent impairment, while the estimated cost of the 10 additional bed days per event was €9,400 (Rafter, *et al.* 2019).

Preventing HAIs and nosocomial spread of COVID-19 is a top priority of hospitals. Nurses at the frontline are charged simultaneously with both patient care and protecting patients against HAIs. If their IPC practices, particularly in relation to hand hygiene (HH) are substandard, they risk become a source of infection transmission to both patients and themselves. In the Irish context, little is known about nurse IPC practices as they relate to both MNC and HAIs. COVID-19 has further demonstrated the importance of learning from the past to allow hospitals to better prepare for the future. Within this context, it is important to understand what facilitates and hinders nurses in the delivery of high-quality IPC practices to patients in their care.

1.5 Conclusion and Justification for the Study

Patient safety is compromised by the risk of acquiring infections during a hospital stay. These HAIs are connected to MNC, resulting in greater patient morbidity, mortality, and additional healthcare service costs. Recent research emerging from Australia has demonstrated that missed IPC in nursing is an important part of MNC, which goes on to play a significant role in HAIs. IPC as a component of MNC is under-studied and the research instrument developed to capture this data has yet to be used in Ireland. COVID-19 has also made this study more pertinent because understanding what elements of IPC are missed, may provide knowledge to help prevent infection spread in hospitals, protecting not only patients but also nurses and other hospital workers.

Outline of the following Chapters

Chapter 2 presents an analysis of the literature relating to HAIs in the context of MNC and IPC in nursing care delivery.

Chapter 3 outlines the study methodology, research framework, along with descriptions of the research instruments used, data analysis approaches and ethical considerations relating to the study.

Chapter 4 presents the quantitative findings of the study.

Chapter 5 discusses the implications of the study findings.

Chapter 6 concludes the study, making recommendations for future research while also discussing the limitations of the study.

Chapter 2: Literature Review

2.1 Introduction

This chapter reviews the literature relating to patient safety, MNC and the factors that contribute to HAIs, including the IPC practices of nurses. The main objectives of this review are:

1. To discuss the implications of patient safety research

Hospital patient safety entered a new phase in the 1990's with the publication of the Harvard Medical Practice Study and *To Err is Human*. The impact of these and further patient safety research as they relate to nursing practice will be evaluated.

2. To examine the emerging field of nursing research as it relates to patient safety

Research on missed/rationed/care or nursing tasks left undone and their bearing on patient outcomes will be examined and critiqued.

3. To appraise three MNC conceptual frameworks and examine the consequences of MNC

The research evidence as measured by the missed care theoretical frameworks will be critically reviewed. An assessment of the consequences of MNC will be evaluated, taking account of the influence of factors such as nurse education and staffing levels. Emerging research on the impact of COVID-19, and elements of the nurse practice environment on MNC will also be considered.

4. To analyse the factors that influence IPC and HAIs in hospitals

Factors within hospital environments that influence nurse IPC practices and their relationship with patient safety and HAIs will be critiqued. Emerging research on IPC as a component of MNC will also be appraised.

2.2 Search Strategy and Eligibility Criteria

The search strategy employed for this review included both empirical, grey literature reports, policy documents and guidelines. The selection was refined by using the following search criteria: full-text available in the English language, inclusion of peer-reviewed quantitative and qualitative research published from the early 1980s through to the date of the search in December 2022. This timeframe was chosen to ensure the inclusion of early nursing research measured by the Nursing Work Index (McClure *et* al, 1983) along with early patient safety studies through to recent nurse IPC practice and HAI literature in the context of COVID-19. All retrieved articles were evaluated against the inclusion criteria. Articles were included if they featured (i) missed/rationing care or care/task undone related theories or frameworks, (ii) were quantitative research reporting results and/or psychometric properties of studies conducted

using established MNC instruments; (iii) qualitative and quantitate research associated with the fields of MNC, nurse leadership, IPC, hand hygiene, HAIs, nurse practice environment and COVID-19 and (iv) were reports of instrument development used to measure missed, rationed or unfinished nursing care. Papers were excluded if the research was carried out in community, outpatient, dental or residential/nursing home settings. National and international reports were sourced mainly from the World Health Organisation, International Council of Nurses, Centers for Disease Control and the Irish Nurses and Midwives Organisation.

The following databases were searched: Medline via PubMed, EMBASE, the Cochrane Library, ScienceDirect via DCU Summon service, Scopus and Google Scholar. The search terms *omitted care, unfinished care, implicitly rationed care, incomplete nursing care, missed care and care left undone,* were used, and combined with Boolean search terms *AND* (narrows the search)*, OR* (broadens the search) *and NOT* (exclusion of defined terms to make the search more precise). Key words and phrases such as *nurse, incidence, relationship, patient safety, infection prevention and control, association, adverse events, consequences* were combined with hospital and healthcare acquired infections and COVID-19.

2.2.1 Screening Process

Using the criteria outlined above, 109 studies were found. The abstracts, executive summaries and key findings were screened with the final 94 papers included. Appraisal of these final papers resulted in the inclusion of 81 for the review.

The literature included in this review is presented under four themes.

1. A Focus on Patient Safety
2. Nursing Research on Patient Safety
3. Missed Nursing Care
4. Factors influencing IPC in Hospitals

2.3 A Focus on Patient Safety

When in 1999, Americans became aware that due to hospital medical errors the number of patients dying was equivalent to a jumbo jet crashing every day, their response, unsurprisingly, was one of shock (Leape, p. xi and 23, 2021). While awareness of medical injury in the United States of America (US) dates back primarily to the Harvard Medical Practice Study in 1991, it was not until the publication of *To Err is Human* in 2000 that patient safety came into public focus (Leape, 2009; Brennan *et al*., 1991). A series of headline grabbing articles about the role nurses play in keeping patients safe or not, was published by *The Chicago Tribune* in 2000. One article headlined “Dangerous Care: Nurses’ Hidden Role in Medical Error” by Berens, (2001) outlined

how “overwhelmed and under-trained nurses kill and injure thousands of patients every year”. Taking a more pragmatic approach the work of the Institute of Medicine (IOM) ‘To Err is Human’ concluded that, instead of blaming individuals for medical errors, more could be achieved by designing safety into the processes and delivery of healthcare (IOM, 1999). Factors such as strong leadership, teamwork and supportive organisational cultures were considered more likely to achieve greater outcomes for patients and nurses than fostering a culture of individual blame (Kohn, Corrigan and Donaldson 2000). Arising from these studies, the discipline of patient safety was born, along with a realisation that ‘systems level’ change was required to build in checks and balances to help prevent errors leading to ‘adverse events’, a term first introduced into healthcare research by the Harvard Medical Practice Study (Brennan *et al*., 1991).

Further learnings followed for healthcare organisations with the work of error expert Reason (2004) who argued that safety is about relationships, good communication and working in teams. The application of these principles was evidenced in a study to reduce catheter-associated bloodstream infections (CABIs) in ICUs. By assigning and providing education and process interventions to nurses and physician, introducing team working and evidence-based IPC procedures, the median rate CABIs decreased from 2.7 per 1000 catheter-days at baseline to 0 three months after the intervention. At follow-up eighteen months later, the zero rate was sustained (Pronovost *et al.*, 2006). This intervention showed almost twenty years ago that focussing on one element of IPC could produce impressive and more importantly, long-lasting results.

2.4 Nursing Research on Patient Safety

Now that safe patient care was in the spotlight nurse researchers, in particular Linda Aiken, sought to measure patient safety outcomes as they relate to nursing care by modifying the Nursing Work Index (NWI), a tool originally developed by Kramer and Hafner (1989) to measure factors that influenced nurse job satisfaction using the organisation as unit of analysis. The original NWI was developed from studies that identified hospitals across the US (termed ‘magnet’ hospitals’) that demonstrated low nurse turnover, quality nursing care and were rated as positive places to work by nurses (McClure *et al*, 1983). The identification of the magnet hospitals involved a limited number of nurse ‘experts’ – American Academy of Nursing members - nominating US hospitals known for good nursing practice and employment conditions. The selection process has been criticised because of the limited numbers involved in the nomination process. Nevertheless, the inclusion criteria were sufficiently stringent that only 41 of the 165 nominated hospitals were designated Magnet status. Follow-up research by Kramer, (1990) established that these hospitals had a culture of excellence, which positively influenced patient

outcomes and nurse job satisfaction.

The role nursing plays in safe patient care was explored further in an international IHORC study of 43,000 nurses across 700 hospitals each with distinct healthcare systems (Aiken *et al*., 2001). In Germany only one in nine and in the remaining four countries, one in three nurses rated the quality of care provided in their units as excellent. Tasks left undone included oral hygiene, skin care and patient education, with tasks not reliant on professional skills (room cleaning or food tray removal) being prioritised. Attention was brought to what was termed *nursing care left undone,* paving the way for further research into what is still recognised today, as a widespread problem for patients, hospitals and nursing.

Over the last twenty years, a body of research has built up around the consequences of care left undone by nurses. The impact of missed care on patient outcomes are well documented, and include increased risk of falls, medication errors, infections and pressure ulcers (Schubert, Clarke, Aiken and de Gees 2007; Schubert *et al*., 2008; Ausserhofer *et al*., 2013). Various conceptual analyses and frameworks have been developed to describe the factors that influence nurse care planning. These include *unfinished care* and *nursing tasks left undone* (Sochalski, 2004), *implicit rationing of nursing care* (Schubert *et al*., 2005; Schubert *et al*., 2007), *missed nursing care* (Kalisch, 2006) *unmet nursing care needs* (Lucero *et al*., 2009; Lucero *et al*., 2010) *task incompletion* (Al-Kandari and Thomas, 2009) *care left undone* (Ausserhofer *et al*., 2014) *work left undone* (Leary, White & Yarnell, 2014) and more recently an elderly care in hospital conceptual framework known as *failure to maintain* (Bail & Grealish, 2016).

Despite the differences in terminology used to describe the phenomenon, it is a pervasive issue occurring across international hospitals with between 55-98% of nurses acknowledging that at least one necessary care task remained undone at the end of their shift (Jones *et al*., 2015). The variation in the prevalence estimates of 55-98% is due to the differing characteristics of the survey instruments used. These instruments include the *TU-7 Task Undone Scale* (Aiken et al., 2001), the *Basel Extent of Rationing of Nursing Care* BERNCA (Schubert *et al*., 2007) and the *MISSCARE Survey (Kalisch & Williams, 2009*).

A review of the three most used instruments in research is set out below.

2.5 Missed Nursing Care

2.5.1 *MISSCARE* Survey

Within the MNC model, missed care is defined as any aspect of required patient care that is delayed or omitted in part or whole. This model includes individual nursing processes and

factors within the care environment such as skill mix, staffing and resources, each of which influence nurse decision-making, leading to interactions that can result in missed care incidences (Kalisch 2006; Kalisch and Williams, 2009a; Kalisch, Landstrom and Williams, 2009b).

The identification by Kalisch, (2006) of high rates of missed nursing activities led to the development of the *MISSCARE* Survey by Kalisch and Williams (2009a) which was further modified to include 'teamwork' as a variable (Kalisch and Lee, 2010). Findings from a study using the modified version indicated that nursing teamwork directly impacted the type and extent of MNC. The *MISSCARE Survey* was revised further in 2019 to include five additional reasons for MNC. This new *Survey* has been piloted and psychometric testing has shown evidence of reliability, acceptability and construct validity (Dabney, Kalisch and Clark, 2019).

2.5.2 Implicit Rationing of Nursing Care

The term 'rationing' was introduced by Schubert *et al*., (2005) as part of the Rationing of Nursing Care in Switzerland (RICH) study that measured levels of nursing care in Swiss hospitals. Rationing in healthcare is often reported in a macro-economic context, however the 'implicit rationing' framework developed by Schubert *et al*, (2007) was based on empirical data and reasoning of nursing professionals when making decisions about what care to prioritise and what could remain undone due to resource constraints. The extent of rationing needed to be measured, which led to the development and validation of the Basel Extent of Rationing of Nursing Care (BERNCA) by Schubert *et al*., (2008). Rationing in this model recognises organisational factors, nurse skills/expertise, patient acuity, hospital attributes, nurse practice environment and individual nurse values.

2.5.3 Task Left Undone

Arising from the IHORC, the *Task Undone* tool (TU-7 scale) was developed by Aiken to measure unfinished care. This approach listed a set of seven necessary nursing tasks with nurses asked what elements of work remained undone due to time constraints on their most recent work shift (Aiken *et al*., 2001).

A comprehensive review of three of the most used tools (*MISSCARE* survey, the BERNCA and the Task Undone) by Palese *et al*., (2020) established that the *MISSCARE* survey is the only one that identifies the antecedents and causes of missed care allowing interventions to be evaluated. In conclusion, the concepts of missed, rationed or care/tasks left undone, have three dimensions, according to Kalánková *et al*., (2019), firstly *the problem* (lack of time and/or resources), *the process* (nurse decision-making) and *the result* (errors of omission, unfinished care and FTM).

2.5.4 Consequences of Missed Care

Missed nursing care (MNC) to use an umbrella term has consequences. In some cases, these can be serious or even fatal for patients. To answer the question 'what is the impact of MNC in hospital settings?' Kalánková *et al*., (2020) reviewed 44 studies. Medication errors were found to pose the greatest risk to patient condition, with falls and nosocomial infections the most likely patient outcome because of MNC. The prevalence of patient harm based on 70 studies conducted between 2000-2019 was estimated to be 12%, with 6% considered preventable (Panagioti *et* al., 2019). Preventable harm was more prevalent in ICU and surgical units. Errors of omission (missed care) are, according to Kalisch, Landstrom and Williams, (2009) more prevalent and dangerous than errors of commission (doing something wrong). Not all patient harm results from MNC, but failure to complete nursing care adequately results in adverse patient outcomes. Nurse IPC education and the effect of RN staffing levels on MNC are examined below.

2.5.5 Nurse IPC Education and RN Staffing Levels

Nurses make up 59% of the healthcare workforce, yet the spend on nurse specific education is just 25% of the global healthcare education budget (WHO, 2020). Scrutiny has been applied to some aspects of current nurse education as they relate to IPC knowledge (Pearce, 2022), patient safety (Kirwan *et al*, 2019) and what Rajput *et al*., (2017) term the 'hidden curriculum', which refers to an accepted reality that what is being 'taught' is not what will be 'learned or applied' in clinical settings. These intersecting elements have been identified by (Blackman, *et al*. (2022) as contributing to MNC being normalised, witnessed, and practiced by nursing students affecting formative IPC learning. Great Ormond Street Children's Hospital's IPC director has said there is an assumption that trainee nurses are being taught more about IPC in university than is borne out in reality (Pearce, 2022). Perhaps this is unsurprising, given that patient safety is addressed in undergraduate training across different modules with no specific patient safety syllabus to prepare nursing students for the reality of IPC or MNC in practice. A Kirwan *et al*., (2019) study established that out of 67 Higher Education Institutes in 27 countries, only 16 teach IPC as a separate subject. Similarly, no dedicated HAI prevention modules are taught to Portuguese nursing students, who identified a lack of co-ordinated teaching of HAI prevention in academic and clinical settings (Parreira *et al*., 2022). Nursing is a profession characterised by migration with nurses from across the globe working in different health systems and the fact that, according to Kirwan *et al*., (2019) there is an absence of standardised guidelines or directives at European/global level determining how patient safety (of which IPC and HAI are a core part), should be taught is concerning.

2.5.6 MNC and Staffing Level Impact on Patient Outcomes/Mortality

Staff nurses provide most of the direct patient care playing a crucial role in positive patient outcomes. Research in the area of nurse staffing and nurse to patient ratios is examined below. It is well documented, but not uncontested (discussed further below) that higher RN to patient ratios mean better care and outcomes for patients (Kalisch, Tschannen & Hee Lee, 2011; Ball *et al*., 2018, Haegdorens et al., 2019). A seminal study by Needleman *et al*., (2002) established that lower levels of UTIs, pneumonia and cardiac arrest were all associated with a higher RN:patient ratio. A later Needleman *et al*., (2011) study also demonstrated that poorer patient outcomes follow exposure to lower levels of RN staffing. When RN hours fell 8 hours or more below the unit target level, or when staff turnover was high, the risk of patient death for each below target shift increased by 2% and by 4% for each high turnover shift. The implication of this finding is that when nurse to patient ratio is lower, patient surveillance decreases with a greater likelihood of adverse patient outcomes, including mortality.

Some years later, researchers using data from 25,000 nurses and 400,000 patients in 300 European hospitals found that patients exposed to higher level of MNC by RNs following common surgical procedures were at greater risk of dying. An increase of one patient to a nurse workload *and* a 10% increase in percentage of MNC were associated with a 7% and 16% increase in the odds of a patient dying within 30 days of admission, respectively. Despite the cross-sectional nature of the research study, the authors state that because they tested a hypothesized causal pathway (that MNC mediates the relationship between RN staffing and patient mortality risk), they have confidence in the inference of causality (Ball et al., 2018).

Researchers also began to examine the impact of mandated nurse to patient ratios when California implemented mandatory nurse to patient ratios of 5-6 patients per nurse (depending on unit). Analyses of the changes brought about by this mandate differ, with Aiken *et al*., (2002) documenting sizeable and significant effects on preventable patient deaths. Conversely, a Donaldson *et al*., (2005) study of increased staffing in medical/surgical units showed no significant change in patient falls or hospital-acquired pressure ulcers compared to a six-month period before the mandated ratios. Similarly, Schubert *et al*., (2008), found insufficient evidence when examining care rationing in Swiss hospitals to show that nurse staffing levels directly affected patient outcomes, concluding it is only one aspect of what is occurring with other factors including complexity of the patient case mix and resources in the practice environment, playing a part in patient outcomes. Despite the recent introduction of mandated nurse to patient ratios in an Australian tertiary hospital, persistent MNC was identified by patients and staff, with nurses reporting MNC and patients reporting missed patient care. Half of the nurses in this study

said they experienced unbalanced patient assignments, indicating that greater planning at unit level is required beyond nurse patient ratios (Albsoul, FitzGerald and Alshyyab, 2022). Like Schubert *et al*., (2008), the findings of this study suggest that MNC is complex and that workforce measures alone may not be able to deal with care delivery in a busy unit. Nurses cited 'urgent patient situation' and unexpected rise in the number of patients' as reasons for MNC. Unexpected events are part of the unpredictability of providing nursing care and the solution for MNC may be beyond macro resourcing formulae.

There is evidence that increasing nurse-patient staffing ratios, while helpful, may not enhance patient safety unless other challenges within the work practice are also targeted. According to Aiken *et al*., (2011) lowering patient-nurse ratios has no effect on patient outcomes in hospitals with poor work environments, but a positive work environment markedly improves patient outcomes. Regardless of the work environment, having 10% more degree-level educated nurses also plays a role in patient safety with a 4% decrease in the odds occurrence of both patient deaths and FTR events. Similarly, findings by Kirwan, Matthews and Scott (2013) indicated that a positive work environment along with a proportion of degree educated ward nurses can enhance patient safety and when nursing staff feel supported, they are more likely to report AEs in turn benefitting patients and facilitating organisational learning.

2.5.7 MNC, COVID-19 and Practice Environment Factors

Research on the impact of COVID-19 on MNC is just emerging and studies that compare MNC both during and before the pandemic have been included here. Using the *MISSCARE survey*, a comparative study conducted in May/June 2020 in an acute Swedish hospital compared a reference sample from the same two specialised medical wards and intensive coronary care units to one collected six months before the pandemic. No substantial increase in the levels of MNC were found during the pandemic with just four items significantly higher and no significant differences in the reasons for MNC. Despite the pressure on staffing due to COVID-19 related illness, the RN to patient ratio remained the same across the two timeframes. However, all patients were in single rooms, which likely helped nurses in care delivery. (Nymark, Vogelsang, Falk and Göransson, 2022). A similar study set in four Swedish critical care units, compared MNC before the pandemic, and at two points during the second and third wave of COVID-19. Reduced levels of MNC were reported during the pandemic across care items such as patient ambulation, assessment of vital signs and assistance with toilet needs. Only oral care showed a significant increase during the pandemic care periods. In terms of the reasons for MNC - 'medications available when needed' and 'supplies not available when needed' - decreased significantly during the pandemic. Although useful, in providing data, both studies were cross-

sectional, and in common with many nursing studies garnered low response rates.

A higher response rate of 67% was achieved in a study conducted to ascertain whether aspects of the work environment could predict MNC in four Czech Republic hospitals during COVID-19 (Gurková, Mikšová, and Šáteková, 2022). Findings demonstrated higher frequencies of MNC by the 37% of nurses who rated their practice environment unfavourably. The link between higher levels of MNC and unfavourable work environments is regularly reported in the literature (Jingxia *et al*, 2022; Blackman *et al*., 2021; Kirwan, Matthews and Scott, 2013; Aiken *et al*., 2011).

2.6 Factors influencing IPC in Hospitals

Alongside MNC, several IPC related factors contribute to HAIs in hospitals including issues relating to the hospital environment, each of which are examined below.

2.6.1 IPC Measures, HAIs and COVID-19

HAIs are connected with greater patient morbidity, mortality, and considerable additional healthcare costs. It has been estimated that of patients who acquire a HAI, 3.5% will die due to the infection (Cassini *et al*., 2016). While HAIs are not always preventable, they can be considered an indicator of patient care quality. Interventions have been trialled to help reduce the most common HAIs and a 2011 systematic review of interventions conducted in the US to help reduce HAIs showed that between 65%-70% of CABSI and CAUTI along with 55% of cases of VAP and surgical site infections (SSI) could be prevented by using known evidence-based strategies (Umscheid *et al*., 2011).

Since the 2011 review, changes brought about by the implementation of increased IPC measures have resulted in a widespread decrease in the incidence of HAI across US hospitals (Dubberke et al., 2014; Yokoe *et al*., 2014; CDC, 2019). This focus on IPC came about when the Medicaid Services stopped providing hospitals with reimbursements for the treatment of three HAIs - CABSI, CAUTI and SSI - they considered preventable (Wald, Kramer & Andrew; 2007; Pronovost, Goeschel & Wachter 2008). The prevention of HAIs then became a national strategy bringing together several healthcare organisations to guide hospitals in efforts to limit and control HAIs (Yokoe *et al*., 2014). Significant progress was made with a drop of almost 50% in both CLABSIs and CAUTIs between 2009-2016. A reduction of just over 30% was recorded on SSIs between 2010/11-2016 and a decline of 15% on *Clostridium difficile* infection (CDI) was also observed (CDC, 2017)**.** While these reductions are very positive, it is notable the reason for the focus on reducing these HAIs was related to potential financial losses rather than patient safety.

The progress made in the reduction of HAIs suffered a setback because of COVID-19. Analysis showed national CLABIs rose by 27.9%, 46.4% and 47% in each of the second, third and fourth

quarters of 2020 compared to 2019. Arizona, Georgia and Florida showed increases of between 97%-148% in Quarter 3 of 2020 compared to the same quarter in 2019 (Nkwata *et al*., 2020). Ventilator-associated events also rose by 44.8% nationally in the fourth quarter of 2020, an increase likely due to COVID-19 patients requiring ventilation. The greater emphasis on hand hygiene and reduction in the number of surgeries may have helped keep the rate SSIs and CDIs stable over the two years (CDC, 2020; Weiner-Lastinger *et al*., 2021).

HAIs are not confined to the US, with over 2.5 million HAIs occurring annually in the European Union (EU). A total of 91,130 deaths each year in the EU were attributable to six HAIs according to a study using EU point prevalence data. Sixty percent of the total burden of HAIs in this study were attributable to HAP (including ventilator-associated pneumonia) and HA primary bloodstream infections. The researchers also reported that the total burden of the six included HAIs was greater than all other communicable diseases (including influenza and tuberculosis) under surveillance by the ECDC. Given it is estimated that half of all cases of HAIs could be prevented, it is even more pressing the IPC practices are appraised to help prevent unnecessary deaths and injuries (Umscheid *et al*., 2011).

An aspect of HAIs that appears to be under-studied, or not often reported is the number of HCWs who contract HAIs in the course of their duties. Its' prevalence is reported in 2016/2017 data from NHS hospitals in England. The focus of the report is the incidence of 653,000 HCAIs among 13.8 million adult patients and the consequent 22,800 patient deaths resulting from their infection. However, this same study also reports that 13,900 HCWs (approximately 2%) of the 810,000 frontline healthcare professionals also contracted a HAI in that period (Guest, Keating, Gould & Wigglesworth, 2020).

2.6.2 MNC and HAIs

Some patient categories are at greater risk of acquiring an infection including those who have had surgery, are immuno-compromised, with those most at risk in ICUs (Pearce, 2022; Barnett *et al.,* 2013; Nseir *et al.,* 2011). Nursing care quality influences the incidence of HAIs but nurses can also play a role in decreasing HAIs (Boev and Kiss, 2017). The following studies examine whether HAIs are associated with MNC.

Focusing on patient outcomes, Lucero *et al*., (2010) re-analysed data collected from nurses in the 1999 Pennsylvanian study looking at the influence of the work practice environment at hospital level on unmet patient needs, which as it relates to nursing care, can be defined as necessary work left undone. Using the individual nurse composite score on the PES-NWI, aggregating it to hospital level, and simplifying the responses on the occurrence of AEs into two categories - 'frequent' or 'infrequent' – the researchers examined the association between AEs, unmet nursing care needs and the practice environment. The findings indicated that unmet nursing care inflicted a slightly greater influence on the proportion and frequency of nosocomial infections compared to other AEs. The implication of this finding is that the nurse care activities are likely to have a greater clinical relevance to nosocomial infections than other AEs examined. The researchers further showed that almost one-third (31%) of the influence of unmet nursing care needs on nosocomial infections was accounted for by the nurse practice environment. In summary, these findings show an association between MNC and HAIs, which are further influenced by the practice work environment.

The relationship between patient outcomes and the patient safety climate was explored by Ausserhofer *et al*., (2013), in 35 Swiss hospitals, with findings demonstrating that the patient safely climate did not predict AEs. The most robust predictor of AEs was rationing of nursing care which was found to be significantly associated with pneumonia and bloodstream infections and a significant relationship was also found between pneumonia and nurse skill-mix levels. Although a representative sample of Swiss acute-care hospitals were included in the survey, the RNs and patients were from general medical, mixed medical-surgical and surgical wards only, limiting the generalisability of findings.

2.6.3 Nurse-led IPC Intervention

Turning now to specific HAIs - non-ventilator hospital-acquired pneumonia (NV-HAP) and ventilator-associated pneumonia (VAP), both of which are problematic, prevalent and, to a certain degree, preventable in hospital care. Oral care in ventilated patients is, or should be, standard practice (Fernando, Gray and Gottlieb, 2017), however, in medical or surgical units, oral care is routinely not documented in patient care plans and is often overlooked. Evidence suggests that the two main factors that contribute to NV-HAP and VAP, are the presence of oral bacteria and plaque as well as patient periodontitis (Munro, 2014). A retrospective chart review conducted by Salamone *et al*., (2013) identified 205 NV-HAP over a one-year period in an acute US hospital. Fewer than half of the patients that acquired NV-HAP had any oral care provided in the twenty-four-hour period prior to their diagnosis. A nurse-led intervention targeting patient oral care brushing for two minutes every four hours (six time daily) led to a statistically

significant decrease in NV-HAP from 52 (baseline) to 26 (intervention) while death rates between the two groups differed with 20 (baseline) compared to 4 (intervention). What is interesting about this intervention is that what began as a pilot in one medical-surgical unit, led by two nurses was successfully expanded hospital-wide with the prevention of an estimated 16 deaths and avoided costs of over $1m over the seven-month trial period (Warren, 2019).

2.6.4 MNC and IPC

How nurses carry out IPC and what influences their practices has been the subject of research with Jackson, Lowton and Griffith (2014) finding that nurse perceptions, including fear, around contact with patients meant they did not always respond to clinical situations in a rational manner. This fear can result in unnecessary precautions being taken in some cases, while at other times IPC practices were missed. Despite having adequate knowledge of IPC, participants admitted letting their guard down as they became more familiar with patients, while being more cautious on first encounter. RNs working in acute care hospitals in the UK, identified personal risk as a factor in how they carry out IPC practices when dealing with bodily fluids or situations they perceive to be unclean. By making judgements based on personal beliefs, they deviate from IPC policies they have been taught, and more importantly, understand. The researchers contend that this response is outside the purely 'scientific' and is not related to lack of knowledge but can instead be attributed to be beliefs, values and social interpretation of infection (Jackson and Griffith, 2014). As mentioned previously researchers have highlighted the need to reform IPC education for nursing students. As part of any review process, it may be useful to consider also the cultural and social factors that influence nurse decision-making, in tandem with the normal scientific IPC instruction.

Much of the published research in the MNC area has focussed on nurse education, practice environment and staffing. Recently however, Australian researchers have sought to measure missed IPC activities as part of MNC. Factors shown to be contributors to poor nurse IPC practices in a recent qualitative study by Henderson *et al*., (2020) include both systemic (funding deficits, poor staffing, and skill mix), environmental factors (ward layout, poor access to PPE) and organisational factors (insufficient priority given to IPC practices and a lack of management support). Priority given to IPC at nurse level, including knowledge (or lack thereof) in terms of applying the principles of IPC care correctly was also identified as a factor. The role of ward hygiene is often underestimated by healthcare staff as a means of reducing nosocomial infections, according to Blackman *et al*., (2021), who regards surveillance as being more likely to have the greatest impact in reducing MNCIPC care.

When the views of specialist IPC and other nurses were compared in a later study by Henderson *et al*., (2021), the specialist nurses were more likely to identify deficits compared to staff nurses. The study reported that several activities, but notably HH was poorly performed. Similar factors influencing the poor adherence to IPC practices included unexpected increases in patient volume/acuity, lack of support for IPC practices from management, cleaning, and ward layout along with failure to apply IPC principles to practice were found across both Henderson *et al*., (2021; 2020) studies. Organisational and management factors were highlighted by specialist IPC nurses as playing a role in preventing correct IPC practices being carried out. The authors concluded that the role IPC plays in HAIs is often the focus of surveillance and education, while factors happening 'on the ground' such as hospital layout, management support and organisational elements get overlooked.

Having conducted a comparative analysis on missed IPC practices, using data from nurses employed in Australia, Lithuania, and Slovakia the findings strongly implicate missed IPC procedures with HAIs (Blackman *et al*., 2021). Poor adherence to hand hygiene guidelines were observed across all three countries, pre-operative patient showering along with oral care and sanitising of IV sites adequately were reported as missed by Australian and Slovakian nurses. Across all three countries, when nurses attended mandatory IPC training, they identified as being more likely to undertake specific precautions in relation to minimising HAIs and missed care.

These three studies show that missed IPC care in nursing is a part of MNC, which goes on to play a significant role in HAIs. Two of these studies were conducted using the recently developed MNCIPC survey. It is important, according to Kirwan and Schubert (2020) that the research instrument used to measure missed IPC practices should capture the intricacies involved, because the antecedents and effects of MNC are already well documented, while research on missed IPC activities is more limited. One concern highlighted by several researchers is the danger posed by the same elements of MNC being routinely overlooked. If MNC activities are IPC-related there is potential for patient harm, and because MNC is not an explicit practice, unless nurses disclose at handover what care remains undone, the problem goes unnoticed from shift to shift. When missed care elements are not communicated, the opportunity to take corrective action is missed, further increasing the likelihood of adverse outcomes for patients. The risk is that this reduced level of nursing becomes normalised and embedded into nursing care in hospitals resulting in irreversible changes to the delivery and standards of nursing care (Griffiths et al, 2018; Kirwan and Matthews, 2020).

2.6.5 Hospital Environment and IPC

Environmental cleaning in hospitals is more important than ever because of the rise in MDROs which have been declared by the WHO to be one of the top ten global public health threats (WHO, 2020). Research in the area of hospital cleaning has highlighted the risk of infection spread to patients from environmental surfaces, particularly in ICUs. Admission to an ICU room of a previous carrier of certain drug resistant organisms has been shown to be an independent risk factor for acquisition (Nseir *et al*, 2011). While 'acquisition' does not necessarily mean that a patient will go on to develop a nosocomial infection, it does place them at greater risk. Similar outcomes were demonstrated by Russotto *et al.* (2017) in a meta-analysis with patients who were admitted to an ICU bed where the previous occupant were carriers of bacterial pathogens found to be at greater risk of acquisition. These findings are further supported by Dancer (2014) who states there is a direct and clear correlation between the number of ICU acquired infections from previous patients and cleaning hygiene failures.

In terms of preventing infection transmission, cleaning, how to clean, who should clean, what agents to use for greatest effectiveness have all come under scrutiny in the literature. One study demonstrated that whole room cleaning (even at 100% efficiency) if only carried out once a day is less efficient in terms of controlling MRSA than wiping high-touch surfaces with appropriate cleaning agents three times per hour. Recommendations include frequent wipe cleaning of high touch surfaces *during healthcare delivery* and *care activities* (Lei, Jones and Li, 2017). Requirements such as these would place an onerous amount of additional work on nursing staff if they have to be carried out as frequently as is required for infection reduction. However, it is possible they could be implemented by healthcare assistants under the supervision of nurses and all evidence-based practice interventions should be considered given patient lives are at stake.

Difficulties exist in monitoring the quality of hospital cleaning because it is not what is visible that causes infection. In one hospital, a new nurse role was created to monitor hospital cleaning. As part of the IPC department and with training specific to the role a 'hospital environment hygiene nurse' (HEHN) was appointed to monitor daily discharge cleaning, ascertain contamination levels, and provide real-time feedback to cleaners. Measuring pre and post HEHN appointment, MDRO-acquired infection rate reduced from 4.3% v 2% with the MDRO-acquired colonisation rate down from 10.4% to 7.9%. What was deemed important in this intervention was that cleaning control was kept internal to the hospital, but external to the outsourced cleaning contractor (Paz *et al*., 2020).

The literature examined demonstrates the complexity involved in IPC in hospital settings with several intersecting factors influencing outcomes for patients and nurses alike.

A summary of the key issues is outlined below.

2.7 Summary

The studies included in the literature review highlight several points of interest.

1. Patient safety should be built into the delivery of healthcare with the emphasis placed on asking why AEs and HAIs occur, and what can be done to prevent recurrences.
2. MNC is a ubiquitous problem and is associated with HAIs. Patient and nurse safety is compromised by the risk of acquiring infections in hospitals, but little is known about the HAI rate of nurses.
3. At undergraduate level, nurses seem underprepared in the area of patient safety, IPC and HAIs.
4. The hospital environment presents many challenges in terms of IPC delivery.
5. Nurse-led IPC interventions have been successful in reducing HAIs.
6. The development by Henderson *et al.,* (2020), of a research instrument builds on the extensive earlier MNC work, providing researchers with a new angle with which to examine nurse IPC practices and HAIs as they relate to MNCIPC.

It is evident from the literature reviewed that missed IPC is part of MNC and is connected to HAIs. However, little is known about the rates of MNCIPC in Ireland.

Chapter 3: Methodology

3.1 Introduction

The study aims and expanded objectives are outlined below. Included also in this chapter is a description of the methods used and an outline of the research framework. An overview and justification of the research instruments included in the questionnaire design is also presented. The final section of this chapter sets out the ethical, data protection, and eligibility criteria along with the survey distribution, data collection and analysis processes.

3.2 Aims and Objectives

This aim of this study is to examine if IPC care is missed by nurses in acute general public and private hospitals in the context of COVID-19, and if so, what type of care is missed, and to explore nurses' perceptions around why this might be happening in their workplaces. The study involves the identification of factors that contribute to MNCIPC care in the daily work of nurses. The data collected will help us understand the reasons why nurses miss IPC activities and examine how IPC practices can differ across different types of hospitals and wards/units and across different groups of nurses. The study is intended to provide new evidence to support practice development, education and policymaking to improve IPC practices and patient outcomes.

Objectives

The objectives of the study were:

1. To measure and compare the frequency of missed IPC practices across nurse group, hospital and ward/unit types.
2. To identify and compare the reasons for missed IPC care by nurse group, hospital type and clinical setting.
3. To measure and compare practice environment conditions across staff roles, units of work and age groups in relation to missed IPC practices.
4. To explore nurses' perceptions of their own and the health system IPC response to COVID-19.

3.3 Study Theoretical Framework

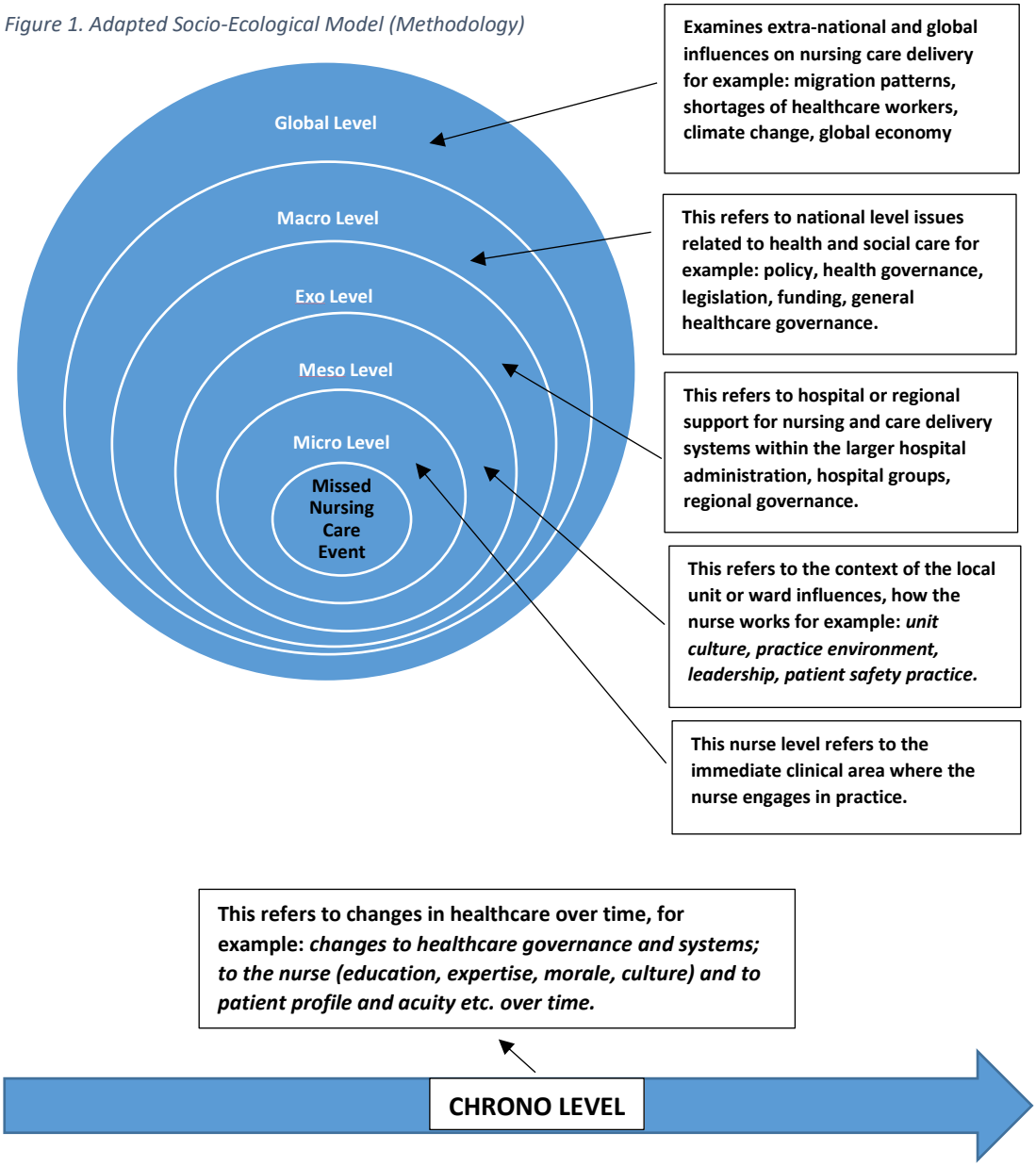
3.3.1 Adapted Socio-ecological Framework

An adapted socio-ecological model - based on the Bronfenbrenner (1979) model illustrated in *Figure 1* overleaf - is being used for the research design and data interpretation in this study. Applying this framework (from survey design stage) allows the researcher to examine the multiple factors that influence MNCIPC from micro level (at nurse practice/clinical stage) to understanding the impact of Global Level events that shape and influence nursing practice. In

order to build on the Henderson *et al*., (2020) work, and to understand the impact of hospital layout, organisational and management support on MNCIPC care, it was considered, that along with the MNIPC instrument, the PES-NWI instrument should be included to capture this data at meso and exo level. Because the study was carried out during COVID-19, the WHO Healthcare Worker IPC instrument was included to help evaluate the impact on nurses and healthcare providers trying to deliver safe patient care at a time of heightened uncertainty about the transmission of COVID-19. These three instruments were included to obtain a range of data to illuminate the complexity involved in providing safe nursing care locally, while taking account of global events that impact healthcare delivery.

Adapted socio-ecological approach for understanding missed nursing care events - based on Bronfenbrenner's, 1979 model - (Phelan & Kirwan 2020)

Figure 1. Adapted Socio-Ecological Model (Methodology)



3.3.2 Study and Research Design

Research design, according to De Vaus (2013, p. 16), refers to the structure of an enquiry and provides a plan that governs how research is conducted to ensure the evidence gathered answers the research question). The design provides a blueprint for the collection, measurement and analysis of the data. When deciding on a research methodology it is necessary to take into account the nature of the phenomenon under study and the purpose of the research in order to provide a structure so that meaningful comparisons of data can be made (Minayo, 2017). Paradigms are patterns of beliefs and practices that regulate inquiry in a research discipline and the positivist paradigm is one of the most common philosophical foundations used in research (Weaver and Olson, 2006). Within a positivist paradigm, the researcher follows a scientific deductive process by conducting research in a systematic and objective manner. The 'findings' in positivist methodologies are useful for building general theory according to Schwartz-Shea, and Yanow (2012, p. 48). in order to explain and predict outcomes One advantage of a positivist approach is that it produces precise and verifiable theoretical answers to research questions. Positivists argue that the answers provided are neutral and technical and can be generalised. However, the positivist paradigm is not without its critics. Weber quoted in (Polit and Beck, p. 56, 10th ed, 2022) argues that this approach does not consider the complexities of human behaviour or capture the wealth of the human experience particularly in relation to groups/group behaviour.

Quantitative research designs can be descriptive, where subjects are measured only once, or experimental, using before and after subject measurement. The overarching aim of quantitative research is to gather numerical data, primarily through survey research with an emphasis on categorising and counting features and creating statistical models to explain what is being observed (Babbie, 2010, p. 23). It places emphasis on objective measurements with the goal of determining relationships or associations between an independent variable (presumed cause) which influences the dependent variable (effect or outcome). The role of the researcher in quantitative research is to scrutinize and analyse the phenomena under investigation in an unbiased and impartial manner (De Vaus, 2013, pp. 11-19). A positivist approach was taken in this study, using a non-experimental descriptive survey to produce quantifiable data. Each element of the research design is discussed below.

3.3.3 Survey Design

Surveys are often used in quantitative descriptive studies to provide in-depth information about the characteristics of the subjects under study, enabling measurements of associations (Ponto, 2015). Concepts that are important when conducting quantitative survey research include measurement, causality and generalisability. Measurement in quantitative survey research allows the researcher to determine patterns of association. Therefore, the choice of statistical methods for data analysis needs to be considered carefully at the design stage. Variables in descriptive survey design are not manipulated by the researcher, limiting their use in terms of establishing causality (Pronto, 2015).

A cross-sectional survey design was used in this study and has the advantage that the data is collected at one point in time, allowing the researcher to obtain and analyse the data quickly. It is criticised for not being able to show causal relationships with researchers instead drawing on theory to make inferences between variables (Van der Stede, 2014). However, De Vaus (2013, pp. 178-179) argues that cross-sectional data can play a valuable role in eliminating variables as being causal, where it is shown that no correlation exists. Equally, it is true that although a correlation between two variables does not confirm causation, it is a *requirement* to determine a causal relationship. There can, according to De Vaus (2013), be as much scientific value in eliminating variables as causes as there is in locating causes in a study. However, a difficulty with cross-sectional data is while correlations can be established, their causal direction cannot be verified. Additionally, confounding variables (an unmeasured third element) that can influence both the supposed cause and effect needs to be dealt with at the data analysis stage to ensure results are valid. One way this can be achieved is by statistically removing differences between the groups to ensure a like for like. In addition, statistical techniques such as multiple and hierarchical regression models can be used to show contributing or predictive factors between variables that may help explain an outcome in a cross-sectional study comparison (Bhandari, 2022). The survey methodology employed in this study used a questionnaire distributed electronically through Qualtrics, an online survey platform.

3.3.4 Questionnaire

A questionnaire is a research tool used to collect data. Within questionnaire design, multiple variables can be used to measure a single concept (such as satisfaction) by combining individual scores to achieve an overall total, known as a research scale instrument. Frequently the concepts within these scales are further divided into sub-scales to allow for measurement of

sub-components of the overall research concept. When researchers want to measure unobservable characteristics like opinions, feelings, or attitudes in a more nuanced manner than a simple yes/no, Likert scales are often used and have the advantage of offering a range of responses from negative to positive with a midpoint neutral option with items usually given a score from one to five or one to seven depending on answer range (Sullivan and Artino, 2013). Because the Likert scale is an ordinal scale, methods employed in analysing and presenting data have been criticised for providing unclear meanings. This criticism has been directed at the use of parametric statistics when the data collected is ordinal and the descriptive statistics presented in terms of means and standard deviations. For example, what does the average of 'disagree and agree' really mean in numerical terms? While responses can be ranked in an ordinal scale, the meaning of differences between the responses are not necessarily equal. To overcome this issue, many experts have argued that the 'median' should be used as a measure of the data's central tendency (Sullivan *et al*., 2013). However, using real and simulated data Norman (2010) has provided powerful evidence that even with ordinal data provided by Likert scales, parametric tests provide more robust results than non-parametric tests, even when statistical assumptions such as normal distribution are violated. Norman (2010) has dissected arguments relating to criticisms of parametric statistical tests (ANOVA, *t*-tests) being used incorrectly because of small sample sizes and that significant results might result in a Type II error. He concludes that parametric statistics under these conditions are robust and can be used without concern in these circumstances.

3.3.5 Advantages of Online Questionnaires

Online questionnaires are a convenient, economical, and flexible data collection method enabling the collection of data from a widespread geographical area. They can be custom edited to suit the target group, with the inclusion of graphics to increase visual appeal and structured so sections not applicable to particular respondents can be by-passed quickly. Because of the structured and pre-determined nature of questionnaires the data returned from respondents is in the same format making comparison straightforward (Jaeger and Cardello, 2022). Participants can answer at a time convenient to them completing the questionnaire over more than one timeframe if wished. They anonymity provided when no identifiers are requested is reassuring for respondents and may facilitate honest responses.

3.3.6 Disadvantages of Online Questionnaires

Despite all the advantages, high abandonment rates can be an issue with respondents unwilling to give over their time to fully complete questionnaires, particularly if they are overly long.

Respondent bias can prove a difficulty with participants reporting inaccurately to avoid judgement. Additionally, the order in which answers are presented to respondents can introduce a priming effect. Primacy bias refers to a tendency to pick the first answer presented while recency bias refers to the inclination of respondents to choose the last offered option (Nikolopoulou, 2023). Clarification and follow-up of responses is also an issue with questionnaires. The differing nature of devices used to access the online survey can affect how the respondent sees and how user-friendly the questionnaire is. The researcher needs to ensure the way it is displayed is optimised across a range of devices (mobile, laptop, tablets), which can be challenging given the ever-changing nature of online operating systems (Toepoel *et al.*, 2021).

3.3.7 Reliability and Internal Validity

Reliability testing of scales within questionnaires used in survey research is necessary to show that if the study was repeated similar results would be obtained. Internal validity explains the ability of the research design to measure what the researcher claims it is measuring. For a research design to be internally valid, it should be structured to ensure the conclusions drawn from the results are clear and unambiguous. External validity refers to the extent to which research results can be generalised beyond the study and is often linked to the sampling strategy employed (De Vaus, 2011, pp 240-245). The reliability test results of the three questionnaires used in this study are set out in Tables 8, 16, 22 and 24 in Chapter 4 (pages 44, 54, 59, and 65 respectively).

3.3.8 External Validity and Survey Sampling Strategy

External validity affects the generalisability of research and is related to sampling methods used along with sample size and response rates. A non-random purposive snowball sampling technique was considered appropriate for this study. However, this method can narrow the sample because it targets a specific group or groups which was necessary for this study because the eligibility criteria was quite specific (Allen, 2017).

It is important to acknowledge that sampling errors may occur. It is possible, for example, that data collected from a sample may, simply by chance, greatly deviate from the population of study resulting in an incorrect research statement affecting the generalisability of the study. This chance occurrence can create type I (false-positive) errors where a study finds a significant difference where none exists. Type II (false-negative) errors occur when no differences or associations between study groups are declared, when there are (Banerjee *et al*. 2009). Closely linked to type II errors is statistical power, which is a statistical test that is dependent on sample

size, level of significance and effect size. Smaller sample size studies are more prone to Type II errors but can be overcome where the effect size is large (Shreffler and Huecker, 2023). Similarly, Norman (2010) states that parametric statistical tests (tests of significance between quantitative and categorical variables) are sensitive enough to be used with small sample sizes with unequal variances without "coming to the wrong conclusion".

3.4 Questionnaire Design

3.4.1 MISSCARE Survey and Missed Nursing Care Infection and Control Survey

In advance of the study, and as part of the literature review, an evaluation of three of the most used measurement tools in nursing research (MISSCARE, BERNCA and Task Undone - *TU-7*) was carried out to help inform the study design. Particular attention was paid to a comprehensive assessment of the three instruments outlined above, which determined that the MISSCARE Survey was the only instrument that could identify the causes of missed care thereby supporting relevant interventions (Palese *et al*., 2020). This finding was considered relevant to this study question and the further refinement of the MISSCARE Survey to assess the role of missed nursing care in IPC in the form of the MNCIPC Survey was then explored and deemed suitable for inclusion in the survey design.

The rationale for using the MNCIPC tool, developed in 2017 by Australian researchers was to provide a greater understanding of the relationship between MNC, HAIs and the way IPC activities are carried out by nurses (Henderson *et al*., 2019). This instrument was developed to capture a greater number of the components of IPC activities that relate to HAIs not fully explored by the *MISSCARE* Survey instrument developed in 2009 and further modified in 2010 (Kalisch and Lee, 2010; Kalisch and Williams, 2009). Although the *MISSCARE* Survey measures some nursing tasks associated with HAIs - handwashing, IV care, wound care, patient skin/bathing and mouth care - a more focussed instrument was required to evaluate MNC in IPC activities. A further 37 items along with 24 reasons for their omission were incorporated into the MNCIPC Survey which was designed by replicating the same process as outlined in the original *MISSCARE* survey. The MNCIPC Survey comprises two scales, and although it has yet to be used in an Irish context, it has been translated and validated (with modifications) for use in Lithuania. The Survey was evaluated using Rasch analysis providing evidence of reliability and validity of both scales to investigate the frequency and reasons for MNCIPC care within nursing practice (Riklikiene *et al*., 2020).

3.4.2 IPC CARE Fundamentals Questions

Four additional questions relevant to healthcare delivery in Ireland were included. These were drawn from the literature review carried out before the questionnaire design and are outlined in *Table 2* of the *Research Design Framework* on p.30.

3.4.3 Practice Environment Scale of the Nursing Work Index (PES-NWI)

The practice environment scale (PES) was developed from the nursing work index (NWI) with the objective of understanding the contribution of the nurse practice environment to nurse and patient outcomes. This addition to the NWI facilitated the identification of aspects of nurse practice environment that needed improvement. The NWI scale designed by Kramer and Hafner (1989) to measure factors that contribute to nurse job satisfaction and nursing care quality consisted originally of 65 items which were subsequently revised and shortened to 57 items (NWI-R) and 31 items (PES-NWI) both of which have been used widely in nursing research (Lake, 2002; Aiken and Patrician, 2000).

Comprehensive evaluations of the use of PES-NWI in research have been carried out since it was developed in 2002, including an overview of its use in global research conducted by Warshawsky and Havens (2011). Having considered its use in studies conducted over an eight-year period the authors recommend the use of the PES-NWI to current researchers to help identify areas of weakness within the nurse work environment associated with patient health outcomes, safety and quality of care and nurse outcomes. Similarly, a meta-analysis of seventeen articles (based on studies conducted over 16 years) also using the PES-NWI and reporting on cumulative data in over a million patients in 22 countries also concluded that meaningful comparison data and accurate assessments of nurse practice environments can be achieved using the PES-NWI.

It was considered important to include the PES-NW1 to help identify factors within the nurse work environment that could enhance or interfere with the ability of nurses to carry out IPC practices across different units and hospitals. The elements within the practice environment of nurses are grouped into five dimensions in the PES-NWI and outlined in *Table 3* of the *Research Design Framework* on p. 31.

3.4.4 WHO COVID-19 Healthcare Worker Survey

Because the study was designed during the COVID-19 pandemic, the inclusion of a number of questions from the WHO Research Template, a validated cross-sectional survey designed to evaluate healthworkers' individual and organisational preparedness to follow IPC practices in

the context of COVID-19 was considered appropriate. Details of these questions are provided in *Table 4* of the *Research Design Framework* on p. 32.

3.4.5 Research Instrument Components

A detailed breakdown of the research instruments is outlined in Tables 1, 2, 3 and 4 below.

- Section A asks demographic related questions.
- Section B of the MNCIPC tool asks about the frequency of MNCIPC, with Section C asking about the reasons for MNCIPC.
- Section D asks questions relating to IPC care fundamentals.
- The Practice Environment Scale of the Nursing Work Index (PES-NWI) is included to assess the quality of the nurse practice environment in Section E.
- Section F asks COVD-19 related questions adapted from the WHO Research Template.

Table 1. MNCIPC Section A-C

Research Design Framework Questionnaire Components	
MNCIPC Survey	
SECTION A	
Questions 1-20 **Questions 14-17** **Questions 18-20** **Questions 19-20**	Consent, Background and Demographic information IPC Training Career and Job Satisfaction IPC Care Fundamentals
SECTION B	
Question 21 (37 items)	The frequency of elements of IPC activities that are missed measured using six Likert-type scales from *'Unsure or Not Applicable* to *Always Missed*'
SECTION C	
Question 22 (24 items)	Reasons why IPC care might be missed measured using five Likert-type scales from *'Strongly Disagree to Strongly Agree'*

Questions 23 to 26 outlined in *Table 2* below, query compliance with care fundamentals relating to SPs, TPs, IPC and HAI inevitability.

Table 2. MNCIPC Section D

Research Design Framework Questionnaire Components	
IPC Care Fundamentals	
SECTION D	
Question 23	Compliance with SPs
Question 24	Compliance with TPs
Question 25	Priority given to IPC
Question 26	HAI Inevitability in the Workplace

As part of the questionnaire, the researchers have been granted permission by the author to include the PES-NWI which is used to measure and assess nursing practice environments (Lake, 2002). Likert rating scales were used to estimate what types of IPC practices are perceived as being omitted, or not, by nurses who directly care for patients.

Table 3. PES-NWI Section

Research Design Framework Questionnaire Components	
PES-NWI	
SECTION E	
Questions 27 (31 items)	Quality of Nursing Practice Environment • Nurse Participation in Hospital Affairs • Nursing foundations for quality of care • Nurse Manager Ability, Leadership and Support of Nurses • Staffing and Resource Adequacy • Collegial Nurse-Physician Relations The subscales above were measured using four Likert-type scales from *'Strongly Agree to Strongly Disagree'*

Questions 28 to 31 of the study Questionnaire have been adapted from the World Health Organisation (WHO) Research Template (with permission) and are outlined in *Table 4* overleaf. These survey questions were measured using five Likert-type scales from *'Strongly Disagree* to *Strongly Agree'* and were designed to evaluate both individual and organisational preparedness to follow IPC practices in the context of COVID-19 (WHO, 2021).

Table 4. WHO COVID-19 Healthcare Worker Questions

WHO COVID-19 Healthcare Worker Survey on IPC Measures	
SECTION F	
Questions 28 (1 item)	If you have provided care to a COVID-19 or suspected COVID-19 infected patient
Question 29 (3 items)	Managing patients in a healthcare setting in the context of COVID-19 • Environmental Context and Resources
Question 30 (9 items)	Managing patients in a healthcare setting in the context of COVID-19 • Emotional Responses
Question 31 (5 items)	Managing patients in a healthcare setting in the context of COVID-19 • Trust in Health Provider/Facility

See *Appendix H* for complete questionnaire.

3.5 Study Considerations

This section outlines the ethical, data protection, pilot study, eligibility criteria, survey sampling strategy and promotion details.

3.5.1 Data Protection and Consent

Research can present ethical issues for participant confidentiality, anonymity and consent. It is important to put in place safeguards to ensure participants do not experience harm as a result of a study. To protect the participants in this study a Personal Data Security Schedule (*Appendix D*) was drawn up in line with DCU guidelines relating to the use/processing of personal data. Participant consent was obtained by 'clear affirmative action'. All participants had to read a Plain Language Statement (*Appendix E*), which clearly outlined how their data would be processed and then agree with the consent questions. Participants were informed that the online questionnaire was anonymous, and that no individual could be personally identifiable from their response. Participants were clearly informed that it would not be possible for them to withdraw their data once they had completed the questionnaire because the researcher has no way of knowing which response belongs to which participant. However, participants still retained the right to withdraw from the study before completion of the questionnaire, without reason and without this decision affecting them in any way. Contact details of the Principal Investigator and the DCU Data Protection Office were made available to the participants in the event they experienced any adverse outcome due to taking part in this research.

3.5.2 Ethical Approvals

DCU Research Ethics Committee (REC) granted ethical approval in March 2020 for a project titled 'A survey exploring missed infection and control practices in acute hospitals in Ireland in the context of the COVID-19 pandemic'. A minor amendment was required due to COVID-19 restrictions and following submission to DCU REC approval for the amendment was granted in October 2020. The project as intended involved a partnership with two acute hospitals who, subject to ethical approval, would distribute the Survey to the target group of RNs. However, due to increasing pressure on the partner hospitals because of COVID-19, the project could not go ahead as planned. A further amendment was requested to conduct the Survey online using the Qualtrics platform recruiting participants online using social media platforms such as Facebook, LinkedIn, Twitter and Instagram. Ethical approval (Ref: DCUREC/2020/044) was granted in December 2022 for the current Survey titled 'Nurse Survey of infection prevention and control practice in Irish public and private general hospitals in the context of the COVID-19 pandemic'.

3.5.3 Pilot Study

In late February/early March 2022 a link to the Survey was emailed or sent by WhatsApp to RNs known to the researchers for their feedback. A number of participants said they considered the survey too long. In response to this, fifteen WHO research template items were removed from the questionnaire. These items were considered less relevant because of the point reached in the pandemic. Two further changes were made in the demographic section of the questionnaire. One question asked participants to indicate which Model Hospital they worked in out of a choice of five. Feedback indicated that a fuller explanation of each Model number was required to help participants determine which applied and this was reflected in the final questionnaire. Feedback also indicated that the number of nursing positions offered to participants to choose from - staff nurse, clinical nurse manager and IPC nurse - did not adequately reflect the grades in nursing. In response to this, a text box was added to allow participants to indicate their role.

3.5.4 Eligibility Criteria

Registered staff nurses, IPC nurses and Clinical Nurse Managers on general medical units, surgical units, ICUs or the ED of any public or private general hospital in Ireland were invited to participate.

3.5.5 Survey Distribution and Promotion

An internet link with the survey details were distributed on social media by DCU academics and researchers involved in the Irish nursing community. Articles promoting the Survey were also circulated to DCU alumni in the March and April monthly newsletters. DCU School of Nursing Psychotherapy and Community Health emailed an article and link to their nursing graduates in April, following up with a reminder in May 2022.

The Irish Nurse and Midwives Organisation (INMO), the largest professional union representing 42,000 registered nurses and midwives published an article with the survey link in the April edition of the World of Irish Nursing and Midwifery periodical which is distributed to their membership in digital and print formats *(Appendix B)*. To help distribute the survey geographically, an information article and survey link was printed and provided digitally in the health section of The Mayo News, a regional paper in the western part of Ireland, with a weekly circulation of approximately 12,000 (*Appendix C).*

The Survey link also distributed by WhatsApp and Facebook to RNs known to the researchers to facilitate Snowball subject recruitment. This recruitment strategy allows participants to share the digital survey link with other RNs using the snowball sampling method to facilitate the distribution of the survey link to the appropriate eligible subjects. The Survey was distributed through Qualtrics - an online survey platform - over a period of six weeks from March 21st to May 26th 2022.

3.6 Data Analysis

Details of factor analysis carried out on the reasons for MNCIPC data, along with explanations of the inferential tests used in the analysis of the data collected are outlined below.

3.6.1 Factor Analysis on Reasons for MNCIPC

Exploratory factor analysis was carried out to help determine the underlying factors that exist within the data collected in Section C of the MNCIPC survey. Principal axis (PA) is a type of factoring that analyses only common variance and is, according to Hooper (2012), appropriate for theory development, which was considered appropriate for the current study.

Twenty-four 'Reasons for MNIPC' were analysed using PA factoring to assess the underlying data dimensions. The Kaiser-Meyer-Olkin measure of sampling adequacy was .834, above the recommended baseline of .6. Statistical significance of ≤.001 was achieved showing that correlations were adequately large for exploratory factor analysis. Four factors were finally extracted accounting for 57% of the variance. This decision was based on the observed

eigenvalues, inspection of the scree plot and cumulative variance. The rotation method used was Oblimin with Kaiser Normalisation (Pallant, 2016; Hooper, 2012).

The loadings suggested four dimensions or subscales.

- Resource Support for IPC (10 items)
- Staffing Allocation (8 items)
- IPC Education (2 items)
- Adequate Storage (2 items)

3.6.2 Hospital Groupings for Comparison

Respondents worked across five hospital models, a brief description of the characteristics of each model are set out below (HSE, 2013). Responses from staff in Models 1, 2, 2-S and 3 hospitals were grouped together and compared to staff responses in the larger Model 4 hospitals.

Model 1: Sub-acute inpatient beds providing respite, rehabilitation and palliative care.

Model 2: Provides care for low risk differentiated medical inpatients and outpatients.

Model 2-S: As above but providing stay as well as day surgery.

Model 3: Make up most hospitals in the country, admitting approximately half of all medical patients. Acute medical, surgical, critical care and emergency department services are provided in these hospitals.

Model 4: Provide care as Model 3 plus specialist and supra-regional care. Nevertheless, a large volume of the workload involves routine specialist in-patient care.

3.6.3 Descriptive Analysis

Descriptive statistics for categorical data are reported in terms of percentage and frequency with continuous and numerical data reported by means and standard deviation for each group.

3.6.4 Inferential Relationships

Analysis of collected data allows the researcher to draw inferences about the population of interest from which the sample is drawn. Several factors determine the choice of statistical tests including whether the data is normally distributed and the measurement levels of both the independent and dependent variables (Parab and Bhalerao, 2010). Tests of normality were carried out on the distribution of scores of each scale instrument used in this study to determine which statistical tests were appropriate.

The use of independent *t-tests* and ANOVA tests were considered appropriate to interrogate the data in the current study. A requirement for ANOVA and independent t-tests is that comparison group variances are equal (Pallant, 2016). The Levene's statistical test was applied to assess group variances for all test outlined in the results chapter. A significance value greater than .05 is required to ensure that the assumption of equal variance has not been violated. A significant result (less than .05) would suggest a real difference between the variances.

3.6.5 Independent *t*-test

An independent *t*-test allows for the comparison of mean scores on continuous variables for two independent groups. This parametric test assumes that the data is normally distributed. For comparison purposes, responses from RNs working in private hospitals were excluded in the hospital's groups independent-samples *t*-tests. Results of *t*-tests are presented to show where significant differences exist between two groups on scale data. Two-tailed *t*-tests were run on each subscale of the MNCIPC Survey, the PES-NWI and the WHO COVID-19 Health Worker Survey on IPC measures to ascertain if differences existed between groups. For the purpose of this study, the p-value of less than or equal to 0.05 is considered statistically significant at a 95% confidence level.

3.6.6 Analysis of Variances Tests (ANOVA)

ANOVA is an analysis of variance test used to investigate differences between the means of more than two groups. ANOVA tests the change in the dependent variable (continuous data) based on categorical independent variable (for this study the nurse role or unit of work). The independent variable should have three or more groups or categories. A one-way ANOVA test is a non-directional, two-tailed statistical test and can be used to examine study hypotheses that do not specify the direction of the differences among the sample means (Satake, 2015, p.292). One-way ANOVA tests were used to compare the means of more than three groups and continuous dependent variables. The significance value of the test results is reported, along with the *F* value, degrees of freedom (within and between subject comparisons).

Post-hoc tests were carried out where significant differences were observed across groups in ANOVA tests. Ramsey and Ramsey (2008) recommend using the Tukey HSD procedure to compare group means between groups of unequal sized but *with homogenous variances* (tested by Levene's statistic). The Tukey procedure tracks the harmonic means of group sizes meaning that when the sample sizes in the groups are not equal (as was the case in this study), it will estimate an average group size (IBM, 2022).

3.6.7 Regression Analysis

For results to be generalisable, sample size is an important factor in all regression analysis. Guidelines for the number of cases differ between authors with Tabachnick and Fidell (2013, p.123) providing a formula (N>50 + 8m) with m equalling the number of independent variables. This equates to five independent variables needing ninety cases. The number of cases in this study although low was suitable for the regression analyses carried out. As outlined earlier, normality tests were applied to the data before proceeding with inferential testing.

3.6.8 Multiple Linear Regression Analysis

Multiple linear regression is used to estimate the strength and predictive ability of two or more independent variables on a continuous variable according to Pallant, (2016, p.108). It differs from hierarchical regression analysis in that all the predictor variables are entered into the statistical model simultaneously. It was used in this study to test whether the practice environment subscales could significantly predict the reasons for missed IPC care. For results to be generalizable, sample size is an important factor in all regression analysis.

3.6.9 Hierarchical Multiple Regression Analysis

Hierarchical regression is a framework for model comparison and a way of showing if independent variables explain a significant amount of variance in the dependent variable once previous variables have been controlled for (Pallant, 2016, p.150). It was used in the current study to assess whether the subscales of the PES-NWI would predict the reasons for missed IPC care.

3.6.10 Direct Logistic Regression Analysis

Direct Logistic regression assesses how well a set of predictor variables explains a categorical dependent variable by providing an indication of the interaction and importance of the predictor variables. For the purpose of the current study, it was used assess the impact of independent variables on participant intention to leave current hospital job.

3.6.11 Correlational Analysis

Correlation analysis is used to describe the strength and direction of linear relationships between two variables. The Pearson correlation method (*r*) was chosen for analysis of numerical variables with 0 indicating no correlation between variables, 1 being a total positive correlation and -1 a total negative correlation. Positive correlations indicate that if Variable A increases, then B will also increase, whereas a negative correlation indicates that if A increases then B decreases. Correlation values that lie between ± 0.50 and ± 1 indicate a significant and positive relationship between two variables (strong correlation). Values between ±0.30 and ± 0.49 indicate a moderate correlation while values below ± .29 are considered a small or weak

correlation (Puth, Neuhäuser & Ruxton, 2015). Correlational analysis was carried out within and between survey scales used in the current study.

3.7 Methodology Summary

The survey methodology used in this study outlined above is summarised below.

- The aim of the study was to examine the frequency of and reasons for MNCIPC care in the context of COVID-19.
- The study employed quantitative cross-sectional survey through an online questionnaire.
- Data collection used three validated research instruments with the addition of four study-specific questions.
- The survey data were analysed descriptively and inferentially.
- Approval for the study was granted by DCU Research Ethics Committee.
- Data Protection Approval was granted by the DCU Data Protection Officer.
- The collection, storage, processing of data and respondent welfare was carried out in accordance with the provisions outlined in 3.5.1 and 3.5.2 above.

Chapter 4 presents the descriptive results of this study along with inferential data analysis results.

Chapter 4: Results

4.1 Introduction

Presented in this chapter are the study results. The results of the descriptive and inferential statistical tests are presented in tables and graphs where appropriate.

4.1.1 Response Rate

The survey was viewed by 250 nurses with 113 questionnaires considered suitable for analysis. The remaining 137 had not completed any IPC scale questions and were excluded from data analysis. In total 113 respondents completed the MNCIPC Survey, 96 the PES-NWI Survey and 95/96 partially and fully completed WHO COVID-19 Health Worker Survey.

4.2 Nurse Characteristics

Demographic characteristics are summarised in *Table 5* overleaf.

4.2.1 Demographic Profile

Most respondents 86.7% (*n*=98) are female, working full-time 85% (*n*= 96), as staff nurses 54% (*n*= 61), in the public hospital sector 86.7% (*n*=98). Over half 50.4% (*n*=57) in the public hospital sector work in a Model 4 hospital with a further 26.5% (*n*=30) in a Model 3 hospital. Overall, 46% (*n*=52) worked in a dedicated Medical or Surgical Unit or Mixed Medical Surgical Unit with a further 33.6% (*n*=38), in Critical Care Units.

4.2.2 Nurse Education and Experience

More than half 51.4% (*n*=58) had additional postgraduate qualifications with 41.6% (*n*=47) educated to Batchelor Degree level. Of the sample 34.5% (*n*=39) had worked as a RN for over twenty years while 16.8% (*n*=19) had between five and ten years nursing experience. CNMs were older, half had postgraduate qualifications and a quarter had undertaken additional specialist IPC training. Half of the staff nurse group were under 35 years, less likely to hold postgraduate qualifications with four having specialist IPC education. The IPC group was older, with all except one having postgraduate qualifications. Similarly, the specialist nurse group were older, all having postgraduate qualifications but only one had specialist IPC training. A more detailed breakdown of all demographic characteristics is presented in *Table 26* (*Appendix A*).

Table 5. Demographic Profile

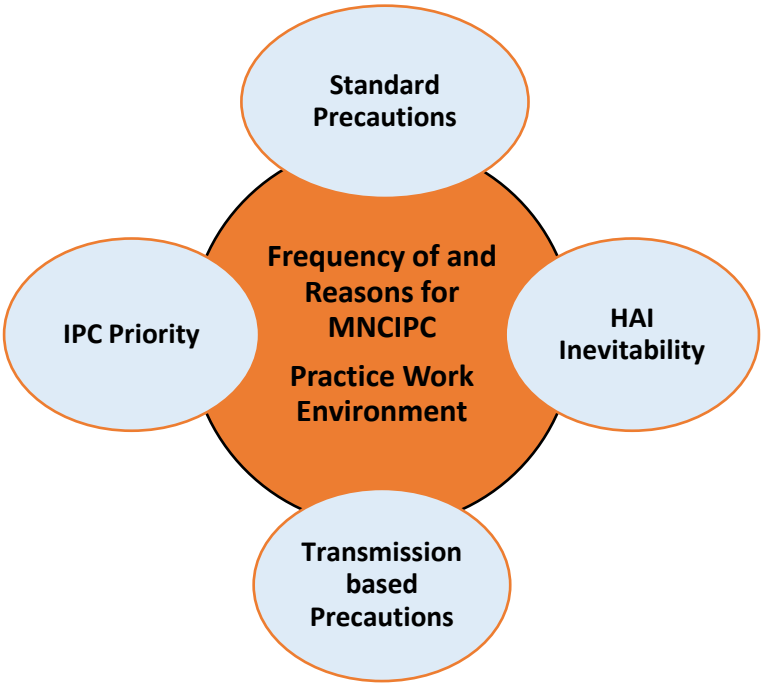
Demographic Profile	N	%
Gender		
Female	98	86.7
Male	15	13.3
Age Profile		
Up to 30 years	31	27.4
31 to 40 years	33	29.2
41 to 50 years	29	24.8
51 to 65 years	21	18.6
Working Pattern		
Full-time	96	85.0
Part-time	17	15.0
Nursing Role		
Staff Nurse	61	54.0
Clinical Nurse Manager	36	31.9
Infection Prevention & Control Nurse	9	8.0
Other Nursing Roles*		
Advanced Nurse Practitioner	2	1.8
Clinical Facilitator	2	1.8
Clinical Nurse Specialist	2	1.8
Nurse Practice Development	1	0.9
Working in		
Public Hospital Sector	98	86.7
Private Hospital Sector	15	13.3

* The 'Other Nursing Roles' have been recoded into 'Specialist Nurses group' (*n*=7) for the purpose of analysis and comparison of mean scores with other nurse roles.

4.3 Frequency of MNCIPC, IPC Care Fundamentals Descriptives and Comparisons

Alongside the MNCIPC survey, nurses were asked questions about IPC care fundamentals, encompassing SPs and TPs, IPC priority and HAIs which are related to the practice work environment and feed into MNCIPC. Results are presented in the following sections as they relate to both the MNCIPC survey, Practice Work Environment, across objectives 1, 2 and 3.

Figure 2. Care Fundamentals



Objective 1: **To measure and compare the frequency of missed IPC practices across nurse group, hospital and ward/unit types.**

4.3.1 IPC Training by Nurse Role

To understand the frequency of IPC training and provide context for the MNCIPC survey nurses were asked to indicate when they last undertook IPC training.

Table 6. IPC Training

When was the last time you completed any IPC training?	N	Within the last 6 months %	Within the last year %	Within the last 2 years %	Over 2 years %
Staff Nurse	61	59.0	27.9	9.8	3.3
Clinical Nurse Manager (CNMs)	36	36.1	30.6	22.2	11.1
Infection Prevention & Control Nurse	9	66.7	22.2	11.1	0.0
Specialist Nurse Group	7	28.6	28.6	14.2	28.6

4.3.2 IPC Priority and HAI Inevitability

More than 65.4% (n=68) of respondents 'strongly agree/agree' that IPC activities are given enough priority compared to other nursing activities, yet 39.4% (n=41) of nurses consider that HAIs are inevitable in healthcare setting, with a further 15.4% (n=16) 'undecided'.

4.3.3 IPC Priority and HAI Inevitability by Hospital Model

When asked if IPC activities are given enough priority compared to other nursing activities, staff working in Model 3 (27% and 7%) and 4 (19%, 0%) hospitals were more likely to disagree/strongly disagree compared to responses from Model 1, 2 and 2-S where no disagreement was recorded. Thirty-three percent of staff in Model 2 hospitals were 'undecided', while 8% of staff in private hospitals also disagreed with the statement. There was agreement by staff working in all hospital models that HAI are inevitable in healthcare settings. Percentage agreements of 40%, 33%, 50%, 33%, 39% were recorded for Models 1, 2, 2-S, 3 and 4 hospitals and of 25% for private hospitals on the variable 'HAIs are inevitable in healthcare settings'.

4.3.4 Frequency of Missed IPC Care

The MNCIPC questionnaire queried how often IPC activities are likely be missed. The descriptive analysis set out in *Table 7* overleaf displays the ten most frequently missed care activities addressing the first study objective with all responses set out in *Table 32* (*Appendix A*).

Table 7. Ten most frequently missed IPC Care Activities

How **FREQUENTLY** are the following elements of infection control/care **MISSED** (including by you) in your place of work?

		Unsure %	Never Missed %	Rarely Missed %	Occasionally missed %	Frequently Missed %	Always Missed %
21_33.	The patient's bed table is cleaned before the patient receives food tray	14.2	9.7	15.9	21.2	23.9	15.0
21_5.	HH is completed before drug administration	0.9	17.7	23.9	31.9	23.9	1.8
21_6.	Equipment is cleaned before it touches a patient	2.7	19.5	24.8	30.1	21.2	1.8
21_1.	HH is performed before touching a patient	0.0	18.6	31.0	30.1	20.4	0.0
21_4.	Hand hygiene is completed after touching a patient	0.0	18.6	37.2	23.9	20.4	0.0
21_37.	HH is completed after drug administration	1.8	19.5	31.9	28.3	15.9	2.7
21_17.	Patients are invited or assisted to perform hand hygiene following use of a bedpan or urinal in bed	10.6	14.2	30.1	17.7	23.9	3.5
21_19.	Catheter care is performed TDS (8hourly)	14.2	15.9	21.2	26.5	15.9	6.2
21_8.	Correct order is used when donning PPE: gown first, then gloves to ensure that they are pulled over the gown cuff so no skin is exposed	0.0	27.4	40.7	25.7	6.2	0.0
21_10.	Touch contamination avoided. Not scratching nose/adjusting glasses after hands have been in contact with a patient/surface in a room of a patient with a MDRO	5.3	20.4	43.4	22.1	8.8	0.0

4.3.5 Internal Reliability Test for Frequency of MNCIPC Subscales

The MNCIPC scale authors have used path modelling to align IPC survey items with underlying defining constructs on Section B of the instrument, resulting in five subscales. The scale reliability was tested by the authors using Rasch analysis, requiring the removal of the 'unsure' answer option in the questionnaire. It was considered appropriate to include the 'unsure' answer to help understand whether confusion existed in relation to responsibility for particular care items. For this reason, Cronbach's analysis was used to assess the reliability of the subscales.

Table 8. Reliability Analysis of Frequency of MNCIPC

Subscales	Cronbach's Score	Number of Subscale Items
Hand Hygiene	.778	10
Minimising Bacterial Colonisation	.628	6
Surveillance	.722	8
Minimising Hospital Acquired Infection	.705	6
Using Specific Precautions	.602	5

Three of the subscales scored above 0.7 showing high internal consistency with two scoring below 0.7. However, both subscales have fewer than ten items which can, according to Pallant (2016) explain the lower alpha values. When this occurs, Pallant (2016), recommends reporting the mean inter-item correlation for the items. Optimal mean inter-item correlation values range from 0.15 to 0.50 (Glen, 2023). The 'Minimising Bacterial Colonisation' subscale has a mean inter-correlation of .292 and 'Specific Precautions' a value of 0.232.

- 'Minimising Bacterial Colonisation' has a mean inter-correlation of .292 with values ranging from .094 to .496.
- 'Specific Precautions' has a mean inter-item correlation of .232 with values ranging from .082 to .521.

4.3.6 Frequency of MNCIPC Scale Mean Score

The mean score at 1.98 (possible range 0 to 5) across all items on this scale shows good overall compliance with IPC measures. Lower mean scores indicate the care item is less frequently missed.

Table 9. Frequency of MNCIPC Scale/Subscale Scores

Frequency of MNCIPC (37 Items)	**N**	**Mean**	**Std. Deviation**
Frequency of Missed Care Scale	113	1.98	0.52
Frequency of MNCIPC Subscales	113	**Mean**	**Std. Deviation**
Hand Hygiene		2.13	0.58
Minimising Bacterial Colonisation		1.91	0.65
Surveillance		1.93	0.56
Minimising Hospital Acquired Infection		1.97	0.78
Using Specific Precautions		1.92	0.68

(0) Unsure (1) Never Missed to (5) Always Missed

4.4 Frequency of MNCIPC Subscale by Nurse Role on each Subscale

A comparison of means and standard deviations by nurse role for all variables on each Subscale are summarised overleaf and presented from most to least likely items to be missed.

4.4.1 Hand Hygiene Subscale

On this subscale, items 1, 4 and 5 were more likely to be missed. While item 12 had a low mean score for all respondents, significant differences were found between staff and IPC nurses, indicating the care item is perceived as being missed more often by IPC nurses.

Table 10. Hand Hygiene Nurse Mean Scores

HAND HYGIENE SUBSCALE Variables	Staff Nurse Mean/Std. Dev N=61	Clinical Nurse Manager Mean/Std. Dev N=36	IPC Nurse Mean/Std. Dev N=9	Specialist Nurse Mean/Std. Dev N=7	All Respondent Total Mean/Std. Dev N=113
5. Hand hygiene is completed before drug administration	2.57 ± 1.16	2.72 ± 1.11	2.56 ± 1.01	3.14 ± 0.70	2.65 ± 1.01
1. Hand hygiene is performed before touching a patient	2.43 ± 1.02	2.56 ± 0.94	2.78 ± 1.30	2.86 ± 1.07	2.52 ± 1.02
4. Hand hygiene is completed after touching a patient	2.44 ± 1.04	2.47 ± 1.00	2.33 ± 1.12	2.71 ± 0.95	2.46 ± 1.02
37. Hand hygiene is completed after drug administration	2.39 ± 1.11	2.50 ± 1.11	2.33 ± 0.87	2.86 ± 1.46	2.45 ± 1.11
17. Patients are invited or assisted to perform hand hygiene following use of a bed pan or urinal in bed	2.39 ± 1.30	2.53 ± 1.36	1.44 ± 1.33	3.14 ± 1.68	2.41 ± 1.37
30. Cleaning/Support staff adhere to signage posted for transmission-based precautions	1.97 ± 1.08	2.11 ± 0.98	1.78 ± 0.83	1.57 ± 0.79	1.97 ± 1.01
3. Hand hygiene is performed after a procedure is completed	1.82 ± 0.87	1.97 ± 0.81	2.56 ± 0.53	2.29 ± 0.95	1.96 ± 0.85
12. Hand hygiene is undertaken following gown removal	**1.72 ± 0.93**	**2.08 ± 1.00**	**2.67 ± 1.12**	**1.71 ± 1.11**	**1.91* ± 1.00**
2. Hand hygiene is completed before a procedure is undertaken (Moment 2 before a clean/aseptic task)	1.79 ± 0.82	1.81 ± 0.75	2.00 ± 0.50	2.00 ± 0.58	1.82 ± 0.76
36. Hand hygiene is performed after exposure to body fluids	1.13 ± 0.43	1.28 ± 0.51	1.78 ± 1.30	1.29 ± 0.49	1.24 ± 0.59

(0) Unsure (1) Never Missed to (5) Always Missed

* $p \leq .05$

4.4.2 Minimising Bacterial Colonisation Subscale

With the exception of items 6 and 33, all other 'cleaning' related variables recorded low mean scores, but a significant difference was found between IPC nurses and the other three nurse groups on item 33 with IPC nurses identifying the item as less likely to be missed.

Table 11. Minimising Bacterial Colonisation Nurse Mean Score

MINIMISING BACTERIAL COLONISATION SUBSCALE Variables	Staff Nurse Mean/Std. Dev **N=61**	Clinical Nurse Manager Mean/Std. Dev **N=36**	IPC Nurse Mean/Std. Dev **N=9**	Specialist Nurse Mean/Std. Dev **N=7**	Total Mean/Std. Dev N=**113**
33. The patient's bed table is cleaned before the patient receives food tray	**2.77 ± 1.51**	**3.00 ± 1.64**	**1.11 ± 1.36**	**3.57 ± 1.71**	**2.76* ± 1.62**
6. Equipment is cleaned before it touches each patient	2.41 ± 1.24	2.72 ± 1.06	2.78 ± 0.97	2.29 ± 1.11	2.53 ± 1.16
34. Staff decontaminate spills of blood & other body substances (vomit, urine) & spills are correctly contained	1.75 ± 0.94	1.89 ± 0.82	1.44 ± 0.88	2.14 ± 1.21	1.80 ± 0.92
31. Cleaning/Support staff fully clean rooms in between different patients' movement from bed units	1.69 ± 1.15	1.69 ± 1.14	1.11 ± 0.33	1.57 ± 0.98	1.64 ± 1.09
32. Cleaning/Support staff fully clean rooms following discharge/transfer of an infectious patient	1.43 ± 0.90	1.42 ± 0.73	1.56 ± 1.33	1.29 ± 0.49	1.42 ± 0.86
35. Packaged sterile instruments & equipment are stored correctly to ensure sterility prior to patient use	1.20 ± 0.51	1.53 ± 0.77	1.44 ± 1.13	1.29 ± 0.49	1.33 ± 0.67

(0) Unsure (1) Never Missed to (5) Always Missed

* $p \leq .05$

4.4.3 Surveillance Subscale

All items show a low mean score indicating they are not frequently missed but there was a significant difference on item 27 between CNMs and staff nurses with the CNM group considering the item to be more often missed compared to staff nurses.

Table 12. Surveillance Nurse Mean Score

SURVEILLANCE SUBSCALE Variables	Staff Nurse Mean/Std. Dev N=61	Clinical Nurse Manager Mean/Std. Dev N=36	IPC Nurse Mean/Std. Dev N=9	Specialist Nurse Mean/Std. Dev N=7	Total Mean/Std. Dev N=113
8. Correct order is used when donning PPE: Gown first, then gloves to ensure that they are pulled over the gown cuff so no skin is exposed	2.16 ± 0.92	2.06 ± 0.83	2.11 ± 0.78	1.86 ± 1.07	2.11 ± 0.88
10. Touch contamination avoided. Not scratching nose/adjusting glasses after hands have been in contact with a patient/surfaces in a room of a patient with MDRO	2.00 ± 1.02	2.31 ± 0.82	1.67 ± 1.41	2.29 ± 0.95	2.09 ± 1.00
13. Facial equipment is removed before hands are washed	1.93 ± 0.95	2.28 ± 1.03	2.11 ± 0.78	2.29 ± 1.50	2.08 ± 1.00
29. Cleaning/Support staff wear appropriate personal protective equipment (PPE)	1.97 ± 1.03	2.14 ± 1.17	2.00 ± 1.50	1.57 ± 0.98	2.00 ± 1.11
16. Appropriate signage displayed informing staff & visitors of the need for transmission-based precautions when managing a patient with a MDRO	1.80 ± 1.03	2.03 ± 1.08	1.89 ± 1.05	1.57 ± 0.79	1.87 ± 1.03
9. Gloves are changed when staff move from a contaminated/dirty site (e.g. wound) to a clean site	1.85 ± 0.87	1.86 ± 0.72	2.33 ± 1.58	1.29 ± 0.49	1.86 ± 0.89
15. All new admissions are screened for MDROs	1.75 ± 1.04	1.72 ± 1.03	1.89 ± 1.36	1.57 ± 1.13	1.74 ± 1.06
27. Nurses' handover/communicate information re patient MDRO/infection status at staff handover/change time	**1.52 ± 0.67**	**1.97 ± 0.74**	**1.78 ± 0.67**	**1.71 ± 1.11**	**1.70* ± 0.74**

(0) Unsure (1) Never Missed to (5) Always Missed

* $p \leq .05$

4.4.4 Minimising Hospital Acquired Infection Subscale

For item 18, 21% of respondents indicated they were 'unsure' and 5% said the item is 'always missed'. Similarly, 'Unsure or N/A' scores of 14%,13%, and 5% were observed on items 19, 20 and 21. For Item 19 'catheter care', 6.2% of respondents indicated the item is 'always missed'.

Table 13. Minimising Hospital-Acquired Infection Nurse Score

MINIMINISING HOSPITAL ACQUIRED INFECTION SUBSCALE Variables	Staff Nurse Mean/Std. Dev N=61	Clinical Nurse Manager Mean/Std. Dev N=36	IPC Nurse Mean/Std. Dev N=9	Specialist Nurse Mean/Std. Dev N=7	Total Mean/Std. Dev N=113
19. Catheter care is performed TDS (8 hourly)	2.28 ± 1.39	2.50 ± 1.52	1.56 ± 1.51	2.86 ± 1.34	2.33 ± 1.45
21. Intravenous cannulas are swabbed with an alcohol based cleansing agent for 15 seconds, allowed to dry for 15 seconds before flushing or administering meds	2.16 ± 1.25	2.00 ± 1.22	1.78 ± 1.30	2.00 ± 1.00	2.07 ± 1.22
22. Gloves are always worn for both preparing and administration of all antibiotics	1.90 ± 0.98	2.11 ± 1.09	1.89 ± 0.93	2.29 ± 1.11	1.99 ± 1.01
20. Oral care/teeth are cleaned at least daily	1.98 ± 1.27	2.03 ± 1.34	1.33 ± 1.00	1.86 ± 1.68	1.94 ± 1.30
28. Nurses handover/communicate patient MDRO/infection status on transfer to new department (x-ray, theatre or new ward)	1.70 ± 0.92	2.06 ± 0.89	2.00 ± 1.00	2.00 ± 1.00	1.86 ± 0.92
18. Patients are showered pre-operatively	1.61 ± 1.33	1.78 ± 1.42	1.56 ± 1.42	1.43 ± 1.72	1.65 ± 1.37

(0) Unsure (1) Never Missed to (5) Always Missed

4.4.5 Using Specific Precautions Subscale

A significant difference was found between CNMs and staff nurses on item 11, with CNMs considering this item to be missed more frequently.

Table 14. Using Specific Precautions Nurse Score

USING SPECIFIC PRECAUTIONS SUBSCALE Variables	Staff Nurse Mean/Std. Dev N=61	Clinical Nurse Manager Mean/Std. Dev N=36	IPC Nurse Mean/Std. Dev N=9	Specialist Nurse Mean/Std. Dev N=7	Total Mean/Std. Dev N=113
11. Gloves are removed before taking off the gown	**1.74 ± 1.12**	**2.36 ± 0.93**	**2.11 ± 0.60**	**2.43 ± 0.97**	**2.01* ± 1.05**
14. Goggles and mask or mask-face shield is always worn when caring for a patient on respiratory/droplet precautions	1.95 ± 0.92	2.03 ± 1.13	1.78 ± 0.67	2.00 ± 0.82	1.96 ± 0.96
24. Healthcare organisation documentation specifies the MDRO status (with or without) of patients on their admission	1.89 ± 1.11	1.97 ± 1.11	2.00 ± 1.50	2.14 ± 1.57	1.94 ± 1.16
25. Documentation about the MDRO status of a patient is completed when patient is discharged	1.82 ± 1.44	2.08 ± 1.32	1.33 ± 1.41	2.57 ± 1.72	1.91 ± 1.42
7. Appropriate PPE (gloves/gowns, are used when providing direct care to patients who have a transmissible disease (MDRO)	1.79 ± 0.80	1.78 ± 0.76	2.00 ± 0.71	1.86 ± 0.70	1.81 ± 0.77

(0) Unsure (1) Never Missed to (5) Always Missed

* $p \leq .05$

4.5 Examining Group Differences on Frequency of Missed IPC Care

Summary results of independent t-tests and ANOVA one-way tests set out below address the first study objective. Detailed statistical explanations relating to each test are displayed in *Tables 33* to *41* (*Appendix A*).

Objective 1 **To measure and compare the frequency of missed IPC practices across nurse group, hospital and ward/unit types.**

4.5.1 Frequency of MNCIPC and IPC Care Fundamentals *t-test* results

4.5.1.1 Favourable or Unfavourable Practice Environment and MNCIPC Scale

There was *no statistically significant difference* in the scores for unfavourable (*M* = 88.07, *SD* = 22.96) and favourable environments (*M* = 80.65, *SD* = 20.55); *t* (96) = 1.66 *p* = .259, two-tailed). The higher mean score, while ***not*** *a significant result*, indicates that respondents in unfavourable environments consider care items more likely to be frequently missed.

4.5.1.2 Comparison between Staff and Other Nurses on Frequency of MNCIPC

There was *no statistically significant difference* in the scores for staff nurses (M=70.82, SD = 18.66) and 'Other Nurses' (M=75.94, SD = 19.85) *t* (111) = -1.41 *p* = .161, two-tailed). The lower mean score, while ***not*** *a significant result* indicates that staff nurses perceive they miss IPC care less frequently compared to other nurses.

4.5.1.3 Intention to Leave on Frequency of MNCIPC

Mean differences, while ***not*** *significantly different* show the group expressing 'intention to leave' (*M* = 2.02 *SD* = 0.54) identify more incidences of MNCIPC care compared to those intending to stay (*M* = 1.92, *SD* = 0.50); *t* (111) = 0.99 *p* = .320, two-tailed). The magnitude of the difference in the means (mean difference 0.10, *CI*: -0.97 to .29) is large as interpreted by Cohen's d (.52) which measures the effect size by standardising the differences between two groups.

4.5.1.4 Grouped and Model 4 Hospital Comparison MNCIPC Surveillance Subscale

This subscale covers PPE use, touch contamination, screening/communication of patient MDRO status and observations relating to PPE use by ancillary staff. There was a statistically significant difference in the scores for Grouped (*M* = 16.97, *SD* = 4.57) and Model 4 Hospitals (*M* = 14.47, *SD* = 4.26); *t* (96) = 2.78 *p* = .007, two-tailed. The higher mean score on this subscale indicates that respondents from Grouped hospitals consider care items more likely to be missed.

4.5.1.5 Grouped and Model 4 Hospital Comparison on SPs Compliance

A statistically significant difference in the scores on compliance with Standard Precautions (SPs) was shown for Grouped (*M* = 2.65, *SD* = 0.58) and Model 4 Hospitals (*M* = 3.02, *SD* = 0.69); *t* (91)

= -2.72, *p* = .008, two-tailed). The magnitude of the difference in the means (mean difference -0.37, *CI*: -0.64 to -0.10) is moderate as interpreted by Cohen's d (-.570) which measures the effect size by standardising the differences between two groups. Grouped hospital staff indicated lower compliance with SPs in their workplace than staff in Model 4 hospitals.

4.5.1.6 Grouped and Model 4 Hospital Comparison on TPs Compliance

A statistically significant difference occurred in the scores on compliance with Transmission-based Precautions (TPs) between Grouped (*M* = 2.70, *SD* = 0.69) and Model 4 Hospitals (*M* = 3.08, *SD* = 0.67); *t* (91) = -2.64, *p* = .010, two-tailed). The magnitude of difference in the means (mean difference -0.37, *CI*: -0.66 to -0.92) is moderate as interpreted by Cohen's d (-.552) which measures the effect size by standardising the differences between two groups. Grouped hospital staff indicated lower compliance with TPs compared to Model 4 staff.

4.5.2 ANOVA Results on Frequency of MNCIPC Variables (*between Nurse Groups*)

4.5.2.1 Gloves are removed before taking off the gown

There was a statistically significant difference at the *p*<.05 level in the sub-scale scores for the four groups – *F*(3, 109) = 3.26, *p*= .024. Staff nurse indicated they were least likely to consider this item to be frequently missed compared to CNMs.

4.5.2.2 Hand Hygiene is undertaken following gown removal

There was a statistically significant difference at the *p*<.05 level in the variable score for the four groups – *F*(3, 109) = 3.02, *p*= .033. IPC nurses indicated the care item to be more frequently missed compared to staff nurses.

4.5.2.3 Nurses handover/communication re patient MDRO/infection status

There was a statistically significant difference at the *p*<.05 level in the sub-scale scores for the four groups – *F*(3, 109) = 2.92, *p*= .037. CNMs indicated they perceive the activity to be missed more frequently with staff nurses least likely to consider the item to be frequently missed.

4.5.2.4 Bed table is cleaned before patient receives the food tray

There was a statistically significant difference at the *p*<.05 level in the sub-scale scores for the four groups – *F*(3, 109) = 4.30, *p*= .007. The low mean score reported by the IPC nurse group indicates they perceive the care item, less likely to be frequently missed, compared to all other nurse groups.

4.6 Reasons for Missed IPC Care

Part two of the MNCIPC questionnaire queries the reasons why IPC care might be missed. Each item is scored on a scale of 1 to 5, with (1) Strongly Disagree to (5) Strongly Agree. Responses

to all items are displayed in *Table 42* (*Appendix A*) with the ten most cited reasons for MNCIPC below.

Table 15. Ten most-cited reasons for MNIPC

REASONS for missed care in your Ward/Unit	Strongly Disagree %	Somewhat Disagree %	Neither Agree or Disagree %	Somewhat Agree %	Strongly Agree %
22_3. Urgent patient situation (e.g. patient condition worsening)	5.7	5.7	4.8	42.9	41.0
22_15. Patients have to share bathrooms	12.4	2.9	14.3	32.4	38.1
22_4. Unexpected rise in patient volume and/or acuity on the ward/unit	4.8	14.3	11.4	38.1	31.4
22_16. Inadequate places to store belongings **(**blankets, patient personal belongings)	10.5	10.5	7.6	41.0	30.5
22_8. Unbalanced patient assignment/allocation to nursing staff	7.6	12.4	9.5	43.8	26.7
22_2. Inadequate skill mix of nursing staff allocated for patient care	7.6	15.2	6.7	42.9	27.6
22_1. Inadequate no. of nursing staff on ward/unit	11.4	15.2	6.7	30.5	36.2
22_5. Inadequate number of medical staff	9.5	15.2	13.3	37.1	24.8
22_14. Patient room overcrowded/cluttered with equipment/supplies	13.3	13.3	6.7	48.6	18.1
22_9. Inadequate handover from previous shift	7.6	21.0	23.8	34.3	13.3

4.6.1 Factor Analysis of Reasons for MNCIPC Care

To help determine the underlying factors that exist within the data collected in part two of MNCIPC survey, exploratory factor analysis was carried out, resulting in four subscales.

4.6.2 Internal Reliability Test

The internal reliability of each subscale was tested with all subscales scoring above 0.7 showing very good internal consistency for this scale.

Table 16. Reliability Analysis of MNCIPC Reasons

Subscale	Cronbach's Score	No. of Subscale Items
Resource Support for IPC	.903	10
Staffing Allocation	.838	8
IPC Education	.844	2
Adequate Storage	.700	2

4.6.3 Reasons for MNCIPC Scale Mean Score

The overall scale mean score is above 3 on this five-point Likert Scale indicating a moderately high level of dissatisfaction by nurses.

Table 17. Reasons for MNCIPC Scale/Subscale Scores

Reasons for MNCIPC	N	Mean	Std. Dev.
Reasons for MNCIPC Care Overall Scale Score	105	3.03	0.75
Resource Support for IPC		2.55	0.99
Staffing Allocation		3.54	0.87
IPC Education		2.34	1.12
Adequate Storage		3.58	1.12

(1) Strongly Disagree to (5) Strongly Agree

4.7 Nurse Role Reasons for MNCIPC

Reasons for MNCIPC are rated on a five-point Likert Scale. A score above 3 indicates strong agreement with the statements. Variables for all subscales are displayed in descending mean score order with variables that exert a greater influence on the reasons for MNCIPC care listed first.

4.7.1 MNCIPC IPC Resource Support Subscale

Higher mean scores on items 20 and 21 indicate a lack of support from hospital management for IPC activities. A significant difference exists between staff, IPC and Specialist nurses regarding item 18, with staff nurses expressing a greater 'lack of nursing control over infection control activities'.

Table 18. IPC Resource Support Nurse Score

IPC RESOURCE SUPPORT SUBSCALE Variables	Staff Nurse Mean & Std. Dev N=57	Clinical Nurse Manager Mean & Std. Dev. N=34	IPC Nurse Mean & Std. Dev N=7	Specialist Nurse Mean & Std Dev N=7	All Respondents Mean & Std. Dev N=105
21. Lack of support from hospital management for committees governing infection control activities	3.11 ± 1.28	2.85 ± 1.42	2.86 ± 1.86	2.29 ± 1.25	2.95 ± 1.36
20. Lack of support from hospital management for resources to undertake infection control activities	2.98 ± 1.30	2.85 ± 1.40	2.29 ± 1.70	2.57 ± 1.51	2.87 ± 1.37
18. Lack of nursing control over infection control activities	**3.07 ± 1.22**	**2.74 ± 1.40**	**1.57 ± 0.79**	**1.71 ± 1.11**	**2.77* ± 1.32**
13. Patient room allocation made without consideration to principles of Infection control	2.88 ± 1.36	2.62 ± 1.35	2.57 ± 1.81	2.43 ± 1.27	2.74 ± 1.37
23. Lack of cleaning schedule for environmental cleaning in clinical areas	2.72 ± 1.42	2.53 ± 1.50	1.86 ± 1.46	2.14 ± 1.46	2.56 ± 1.45
22. Patient room/bays lack sinks for handwashing	2.49 ± 1.40	2.65 ± 1.61	2.14 ± 1.46	2.00 ± 1.53	2.49 ± 1.47
17. Ward culture does not support infection control activities	2.49 ± 1.30	2.62 ± 1.41	2.43 ± 1.51	1.43 ± 0.53	2.46 ± 1.33
12. Sterile supplies/equipment not available when needed	2.44 ± 1.28	2.62 ± 1.37	1.86 ± 1.46	1.57 ± 0.53	2.40 ± 1.30
24. Insufficient plastic puncture-proof containers for sharps/used needles	2.35 ± 1.34	2.15 ± 1.39	1.43 ± 0.79	1.86 ± 1.46	2.19 ± 1.34
19. Lack of prompts in patient records to check for pyrexia or any other signs of infection	2.07 ± 1.21	2.26 ± 1.35	2.14 ± 1.07	1.57 ± 0.79	2.10 ± 1.22

(1) Strongly Disagree to (5) Strongly Agree

* $p \leq .05$

4.7.2 MNCIPC Staffing Allocation Subscale

Except for two items relating to cleaning/clerical staff, the mean scores of all other items were above 3.5 with nurses expressing concern across all other items.

Table 19. Staffing Allocation Nurse Score

STAFFING ALLOCATION SUBSCALE Variables	Staff Nurse Mean & Std. Dev N=57	Clinical Nurse Manager Mean & Std. Dev N=34	IPC Nurse Mean & Std. Dev N=7	Specialist Nurse Mean & Std. Dev N 7	All Respondents Mean & Std. Dev N=105
3. Urgent patient situation (patient condition worsening)	4.32 ± 0.95	3.79 ± 1.22	3.14 ± 1.34	4.43 ± 0.53	4.08 ± 1.10
4. Unexpected rise in patient volume &/or acuity on the ward/unit	3.86 ± 1.17	3.74 ± 1.19	3.43 ± 1.51	3.57 ± 0.98	3.77 ± 1.18
8. Unbalanced patient assignment/allocation to nursing staff	3.74 ± 1.22	3.76 ± 1.20	3.43 ± 1.27	3.29 ± 1.25	3.70 ± 1.21
2. Inadequate skill mix of nursing staff allocated for patient care	3.72 ± 1.24	3.50 ± 1.30	3.71 ± 1.25	4.14 ± 1.07	3.68 ± 1.24
1. Inadequate no. of nursing staff on ward/unit	3.88 ± 1.28	3.44 ± 1.46	3.14 ± 1.77	3.29 ± 1.60	3.65 ± 1.40
5. Inadequate no. of medical staff	3.77 ± 1.16	3.18 ± 1.42	3.86 ± 0.69	2.86 ± 1.46	3.52 ± 1.28
7. Inadequate number of cleaning/support staff	3.02 ± 1.33	3.15 ± 1.56	2.86 ± 1.21	2.57 ± 1.40	3.02 ± 1.39
6. Inadequate no. of clerical staff	2.89 ± 1.37	3.06 ± 1.45	2.86 ± 1.34	2.57 ± 1.40	2.92 ± 1.38

(1) Strongly Disagree to (5) Strongly Agree

4.7.3 MNCIPC IPC Education Subscale

IPC nurses, with the highest mean scores indicated they consider IPC education and knowledge of TPs among nurses more likely to be inadequate.

Table 20. IPC Education Nurse Score

IPC EDUCATION SUBSCALE Variables	Staff Nurse Mean & Std. Dev N=57	Clinical Nurse Manager Mean & Std. Dev N=34	IPC Nurse Mean & Std. Dev N=7	Specialist Nurse Mean & Std Dev N=7	All Respondents Mean & Std. Dev N=105
11. Nurses have inadequate understanding of transmission-based precautions	2.21 ± 1.18	2.53 ± 1.16	3.00 ± 1.63	2.29 ± 1.38	2.37 ± 1.22
10. Nurses have inadequate education/knowledge of infection control practices	2.26 ± 1.17	2.47 ± 1.24	2.57 ± 1.51	1.71 ± 0.76	2.31 ± 1.19

(1) Strongly Disagree to (5) Strongly Agree

4.7.4 Adequate Ward Storage Subscale

Both items have a mean score in excess of 3 indicating high dissatisfaction.

Table 21. Adequate Ward Storage Nurse Score

ADEQUATE WARD STORAGE SUBSCALE Variables	Staff Nurse Mean & Std. Dev N=57	Clinical Nurse Manager Mean & Std. Dev N=34	IPC Nurse Mean & Std. Dev *N=7*	Specialist Nurse Mean & Std Dev N=7	All Respondents Mean & Std. Dev N=105
16. Inadequate places to store belongings (e.g., blankets, patient personal belongings)	3.72 ± 1.32	3.88 ± 1.15	3.43 ± 1.40	3.00 ± 1.63	3.70 ± 1.29
14. Patient room overcrowded/cluttered with equipment/supplies	3.67 ± 1.14	3.35 ± 1.40	2.43 ± 1.62	3.14 ± 1.46	3.45± 1.30

(1) Strongly Disagree to (5) Strongly Agree

4.8 Examining Group Difference on Reasons for MNCIPC

Summary results of independent t-tests, ANOVA one-way tests and correlations set out below address the second study objective. Detailed statistical information relating to each test is displayed in *Tables 43, 44, 47, 48, 49* and *50* (*Appendix A*).

Objective 2: To identify and compare the reasons for missed IPC care by nurse group, hospital type and clinical setting.

4.8.1 Reasons for Missed IPC Care Subscale *t-test* results

4.8.1.1 Hospital Comparison on IPC Resource Subscale

There was a statistically significant difference in the scores for Grouped (M = 28.47, SD = 9.73) and Model 4 Hospitals (M = 22.71, SD = 9.50); t (91) = 2.86 p = .005, two-tailed) on the IPC Resource subscale. Grouped hospital staff were more satisfied with IPC support. Lack of support from hospital management for resources to undertake IPC activities, having control over IPC activities along with environmental issues in patient rooms such as lack of sinks to support handwashing contributed to the lower scores for Model 4 Hospital respondents on this Subscale.

4.8.1.2 Hospital Comparison on MNCIPC Staffing Allocation Subscale

There was a statistically significant difference in the scores for Grouped (M = 30.62, SD = 6.65) and Model 4 Hospitals (M = 26.75, SD = 7.20); t (91) = 2.65, p = .009, two-tailed). Grouped hospital staff indicated that they were more satisfied with staffing allocation. Inadequate staff numbers, unbalanced nurse to patient ratio and worsening patient situation and/or rise in patient volume all contribute to the lower mean scores of Model 4 hospital respondents.

4.8.2 Reasons for MNCIPC Variables ANOVA Test Results

4.8.2.1 Between Nurse Groups Lack of Nursing Control over Infection Control

There was a statistically significant difference at the p<.05 level in the sub-scale scores for the four groups – F(3, 101) = 4.86, p= .003. Staff nurses' high mean score indicates greater agreement on 'lack control over infection control activities' compared to IPC and specialist nurses.

4.8.2.2 Between Work Units Reasons for MNCIPC Scale

There was a statistically significant difference at the p<.05 level in the overall scale scores for the seven groups – F(6, 98) = 3.18, p= .007. ED higher means score indicates greater dissatisfaction on the scale with Critical Care/ICU showing lower dissatisfaction. All other units did not differ significantly from ED or CC/ICU.

4.8.2.3 Between Work Units Reasons for MNCIPC IPC Resource Support Subscale

There was a statistically significant difference at the $p<.05$ level in the overall scale scores for the seven groups – $F(6, 98) = 2.41$, $p= .033$. The higher mean scores for ED respondents indicate greater dissatisfaction with IPC resource support while the score for Critical Care/ICU indicates less dissatisfaction. All other units did not differ significantly from ED or CC/ICU.

4.8.3 Associations between MNCIPC Reasons for Missed Care and PES-NWI Factors

Correlational analysis using Pearson's *r* correlation coefficient showed that the reasons for MNCIPC Staffing Allocation Subscale had a significant moderate negative correlation with the PES-NWI Staffing & Resource Adequacy Subscale ($r = -.524$, n = 96, $p \leq .01$).

4.9 PES-NWI

The PES-NWI helps identify elements of the work environment that facilitate and support nurses in the delivery of high-quality patient care.

All responses are set out in *Table 51* (*Appendix A*). The descriptive analysis set out in below addresses:

Objective 3: To measure and compare practice environment conditions across staff role, units of work and age groups in relation to missed IPC practices.

4.9.1 PES-NWI Internal Reliability Test

The internal reliability of each PES-NWI subscale was tested using SPSS 27 and the values are outlined below.

Table 22. Reliability Analysis of PES-NWI

Subscale	Cronbach's Score	Number of Subscale Items
Nurse Participation in Hospital Affairs	.851	9
Nursing Foundations for Quality of Care	.837	10
Nurse Manager Ability, Leadership & Support of Nurses	.867	5
Staffing and Resource Adequacy	.867	4
Collegial Nurse Physician Relations	.758	3

A Cronbach's Alpha value of >0.7 indicates acceptable correlations. Each subscale scored above 0.7 with the first four items scoring greater than 0.8, indicating very good internal consistency for the scale in this study.

4.9.2 PES-NWI Subscale Mean Scores

The PES-NWI uses a four-point Likert scale with (1) strongly disagree to (4) strongly agree. The neutral midpoint for this response set is 2.5 with values above 2.5 demonstrating favourable work practice environments and below 2.5 considered unfavourable (Lake, 2002). To help interpret the composite subscale scores, Lake and Friese, (2006) developed a three-level classification of (favourable, mixed and unfavourable). Scores greater than 2.5 for four or five subscales are considered favourable work environments, with mixed settings having two or three subscale scores greater than 2.5 and unfavourable settings none or one subscale with a greater than 2.5 score.

Three subscales have favourable scores with the remaining two – 'nurse participation in hospital affairs' and 'staffing and resource adequacy' unfavourable scores. The composite score at 2.61 in this dataset indicates a 'mixed' work environment.

4.9.3 PES-NWI Subscale Scores

Subscale mean scores are reverse scores as recommended for this scale. (1) Strongly Agree became (4) Strongly Agree

Table 23. PES-NWI and RN4CAST Scale Comparison

PES-NWI Overall Subscale Scores	**Current Study Mean & Std Dev N=96**	**Irish RN4CAST Mean & Std Dev N=1,406**
Nurse Participation in Hospital Affairs	2.40 (0.60)	2.30 (0.60)
Nursing Foundations for Quality of Care	2.82 (0.51)	2.90 (0.50)
Nurse Manager Ability, Leadership & Support of Nurses	2.67 (0.70)	2.70 (0.70)
Staffing and Resource Adequacy	2.26 (0.78)	2.00 (0.70)
Collegial Nurse Physician Relations	2.90 (0.58)	2.70 (0.60)
Composite	2.61 (0.51)	2.50 (0.60)

4.9.4 Practice Environment, MNCIPC, Job Satisfaction and Intention to Leave

Nurses were asked about job/career satisfaction and intention to leave because they are related to MNC and practice environment (Plevova *et* al., 2021; Dorigan and Guirardello, 2018). The majority (76%) said they were very/moderately satisfied with nursing as a career and 72% with their hospital job. However, 54% indicated they would leave their current job due to dissatisfaction. Direct logistic regression was carried out to assess the impact of three independent variables (age, unit of work, and years working as a RN) on intention to leave due to job dissatisfaction. Those working as RNs for between 10 and 20 years were statistically significantly (odds ratio 4.07) four times more likely to express intention to leave controlling for all other factors in the model. Full test results set out in Tables *45, 46, 52* and *53* (*Appendix A*).

4.10 Practice Environment Subscale Satisfaction by Nurse Group

Nurse groups were compared on satisfaction with practice environment subscales with full results set out in *Tables 55* to *59* (*Appendix A*).

4.10.1 Nurse Participation in Hospital Affairs

IPC nurses recorded the highest mean score (*M*= 2.81, *SD* = 0.45) followed by the Specialist nurse group (*M*= 2.69, *SD* = 0.61 indicating higher satisfaction on this subscale compared to CNMs (*M*= 2.38, *SD* = 0.54) and staff nurses (*M*= 2.34, *SD* = 0.63).

4.10.2 Nursing Foundations for Quality of Care

IPC nurses recorded the highest mean score (*M*= 3.18, *SD* = 0.35) followed by the Specialist nurse group (*M*= 2.95, *SD* = 0.40) indicating higher satisfaction on this subscale compared to CNMs (*M*= 2.80, *SD* = 0.51) and staff nurses (*M*= 2.76, *SD* = 0.53).

4.10.3 Nurse Manager Ability, Leadership and Support of Nurses

The specialist nurse group reported the highest mean score (*M*= 2.83, *SD* = 0.37) followed by IPC nurses (*M*= 2.80, *SD* = 0.36) indicating higher satisfaction on this subscale compared to CNMs (*M*= 2.78, *SD* = 0.66) and staff nurses (*M*= 2.57, *SD* = 0.77).

4.10.4 Staffing and Resource Adequacy

IPC nurses recorded the highest mean score (*M*= 2.58, *SD* = 0.74) followed by both the Specialist nurse group (*M*= 2.25, *SD* = 0.63) and staff nurses (*M*= 2.25, *SD* = 0.77) indicating higher satisfaction on this subscale compared to CNMs (*M*= 2.20, *SD* = 0.84).

4.11 Practice Environment Satisfaction by Unit/Ward of Work

4.11.1 Nurse Participation in Hospital Affairs

The IPC unit recorded the highest mean score (*M*= 2.85, *SD* = 0.41) followed by Mixed Medical/Surgical units (*M*= 2.48, *SD* = 0.34) indicating higher satisfaction on this subscale compared to Medical Units (*M*= 2.38, *SD* = 0.54), ED (*M*= 2.35, *SD* = 0.76), CC/ICU (*M*= 2.33, *SD* = 0.69) and Surgical Units (*M*= 2.30, *SD* = 0.58).

4.11.2 Nursing Foundations for Quality of Care

The highest satisfaction rating was recorded by the IPC units (*M*= 3.22, *SD* = 0.39) followed by the Surgical and Mixed Medical/Surgical Units with an identical score (*M*= 2.92, *SD* = 0.38). EDs (*M*= 2.80, *SD* = 0.80), CC/ICU (*M*= 2.78, *SD* = 0.55), while Medical Units (*M*= 2.70, *SD* = 0.46) indicated greater dissatisfaction with this subscale.

4.11.3 Nurse Manager Ability, Leadership/ Support of Nurses

EDs with higher mean scores (*M*= 3.13, *SD* = 0.75) and IPC Departments (*M*= 2.93, *SD* = 0.41) showed greater satisfaction on this subscale. Lower means scores by Mixed Medical/Surgical Units (*M*= 2.80, *SD* = 0.65), CC/ICU (*M*= 2.63, *SD* = 0.74), Surgical Units (*M*= 2.56, *SD* = 0.77) and Medical Units (*M*= 2.45, *SD* = 0.63) show greater dissatisfaction.

4.11.4 Staffing and Resource Adequacy

Of all the PES-NWI subscales, this recorded the lowest mean scores with Mixed Medical/Surgical Units (*M*= 1.63, *SD* = 0.64), Medical Units (*M*= 2.03, *SD* = 0.66), EDs (*M*= 2.09, *SD* = 0.93), Surgical Units (*M*= 2.13, *SD* = 0.75) recording scores below the neutral midpoint of 2.5. CC/ICU (*M*= 2.61, *SD* = 0.74) and IPC departments (*M*= 2.72, *SD* = 0.67) slightly above.

4.11.5 Collegial Nurse Physician Relations

The highest level of satisfaction overall was recorded on this subscale. EDs (*M*= 3.29, *SD* = 0.58), IPC units (*M*= 3.00, *SD* = 0.33), Surgical Units (*M*= 2.94, *SD* = 0.51), CC/ICU (*M*= 2.93, *SD* = 0.67), Medical Units (*M*= 2.71, *SD* = 0.53) and Mixed Medical/Surgical (*M*= 2.70, *SD* = 0.53).

4.12 Examining Group Differences (Hospital Comparison) *t-test* result

4.12.1 Satisfaction with nursing as a career

Scores for Grouped Hospitals (Models 1,2,2-S and Model 3) and Model 4 hospital scores were compared. The result obtained is based on *Levene's Equal Variance not assumed. There was a statistically significant difference in the scores for Grouped Hospitals (*M* = 2.68, *SD* = 0.93) and Model 4 Hospitals (*M* = 3.09, *SD* = 0.74); *t* (73.48) = -.2.30 *p* = .024, two-tailed). The magnitude of the difference in the means (mean difference -0.40, *CI*: -0.75 to -0.55) is low as interpreted by Cohen's d (-.490) which measures the effect size by standardising the differences between two groups. Mean differences show greater dissatisfaction among nurses working in Grouped Hospitals compared to Model 4 hospital nurses. Full results set out in Table 54 (*Appendix A*).

4.13 PES-NWI Responses by Nurse Role on each Subscale

A summary of the results of each subscale is provided here with the full subscale results displayed in *Tables 55* to *59* in (*Appendix A*).

4.13.1 Nurse Participation in Hospital Affairs

Over 60% of nurses disagreed that their director of nursing is visible/accessible to staff with 61% disagreeing that staff nurses are involved in 'governance/practice/policy'. Over 65% of nurses disagreed that 'senior management listen/respond to employee concerns' while 67% and 53% disagree that 'staff nurses have the opportunity to participate in policy' or 'serve on hospital/nursing committees'. The most positively rated items on this subscale related to career development (65% agreement) and advancement (66% agreement).

4.13.2 Nurse Foundation for Quality of Care

Except for one item 'nursing diagnoses are used' with a mean score of 2.40 (54% disagreement), all other items scored above 2.5 indicating mid-level satisfaction on this sub-scale. In percentage terms 95% of nurses said that 'high standards of nursing are expected by the administration and 77% agreed that they 'work with clinically competent nurses'

4.13.3 Nurse Manager Ability, Leadership and Support of Nurses

Only one item on this subscale scored below 2.50 indicating moderate satisfaction with this subscale overall. The majority of nurses (75%) agree with the statement 'a nurse manager who is a good leader' while the lowest scoring item was 'praise and recognition for a job well done' with a mean score of 2.20 and 64% disagreement with the statement.

4.13.4 Staffing and Resource Adequacy

The mean scores on all variables in this subscale are below 2.5 for all respondents. IPC nurses are the only group to score above 2.50 and this is on two items 'enough staff to get work done' and 'enough time to spend with patients'. The low scoring across the subscale highlights nurse dissatisfaction with staff numbers and time available to provide adequate patient care. In percentage terms, 54% of nurses disagree that there are 'enough RNs to provide quality patient care' while 87% disagree that there are 'enough staff to get the work done'.

4.13.5 Collegial Nurse-Physician Relations

Higher mean scores (above 2.5) on this subscale indicate good working relationships and teamwork between nurses and physicians. Nevertheless, over 31% disagree that there is 'collaboration between nurses and physicians'.

4.14 Examining Group Differences on Practice Environment Conditions

Summary results of independent t-tests, one-way ANOVA tests and correlations set out below address the third study objective. Detailed statistical information relating to each test is displayed in *Tables 60* to *63* (*Appendix A*).

Objective 3 **To measure/compare practice environment conditions across staff role, units of work & age groups in relation to missed IPC practices.**

4.14.1 PES-NWI Staffing & Resource Adequacy Subscale (units of work) ANOVA

There was a statistically significant difference at the $p<.05$ level in the overall scale scores for the seven units of work – $F(6, 89) = 3.42$, $p= .004$. The lower mean scores from Critical Care/ICUs and IPC Department indicate greater dissatisfaction on this Subscale with the Mixed Medical/Surgical unit staff showing greater satisfaction.

4.14.2 Nurse Participation in Hospital Affairs (between Age groups) ANOVA

There was a statistically significant difference at the $p<.05$ level in the sub-scale scores for the four age groups – $F(3, 92) = 3.34$, $p= .023$. The higher mean score of the 31 to 40 age group indicates greater satisfaction on this subscale compared to the 41 to 50 age group.

4.14.3 Practice Environment Predictors of Missed IPC Care

Two PES-NWI subscales 'Nursing Foundations for Quality of Care' ($\beta = -.466$, $p\leq .004$) and 'Staffing and Resource Adequacy' ($\beta = -.466$, $p\leq .000$) significantly predicted the reasons for missed IPC care.

4.14.4 Practice Environment Predictors of Missed IPC Care

The PES-NWI subscale 'Staffing and Resource Adequacy' (β = -.390, p≤ .001) and Education level (β = -.203, p≤ .026) significantly predicted the reasons for missed IPC care.

4.15 WHO COVID-19 Healthcare Worker Survey

The WHO COVID-19 Healthcare Worker Survey was designed to evaluate individual and organisational preparedness to follow IPC practices during COVID-19.

The descriptive analysis related to this survey addresses:

Objective 4 **To explore nurses' perceptions of their own and the healthcare system IPC response to COVID-19.**

4.15.1 WHO COVID-19 Healthcare Worker Survey Internal Reliability Test

The internal reliability of each subscale was tested using SPSS Version-27 and the values are reported below.

Table 24. Reliability Analysis of WHO COVID-19 Survey

Subscale	Cronbach's Score	Number of Subscale Items
Healthcare Service ability to manage COVID-19	.846	3
Personal risk relating to COVID-19	.735	8
Hospital protocols	.747	6

Each subscale scored above 0.7 demonstrating very good internal consistency for the scale in this study.

4.15.2 WHO Healthcare Worker Survey Scale and Subscale Mean Scores

Higher mean scores indicate greater satisfaction with scale and subscale variables with lower mean scores indicating greater concern re COVID-19 risk. The overall scale mean score at 3.42 shows a moderately high level of confidence in the ability of the health service, hospitals and personal ability to deal with the risks associated with COVID-19. All other subscales were above 3.2 also indicating moderately high satisfaction.

Table 25. WHO Healthcare Worker Survey Scale/Subscale Scores

	N	Mean	Std. Dev
WHO Healthcare Worker Survey Scale	96	3.42	0.61
Subscale Mean Scores			
Healthcare Service Ability to manage COVID-19	96	3.27	1.09
Personal Risk relating to COVID-19*	95	3.54	0.58
Hospital Protocols*	95	3.21	0.66

(1) Strongly Disagree to (5) Strongly Agree. * Negatively worded variables were reversed

Detailed percentage and mean scores across all the WHO COVID-19 variables are set out in *Tables 65* to *68* inclusive (*Appendix A*). A summary of each subscale result is set out below.

4.15.3 Healthcare Service Ability to Manage COVID-19 by Nurse Group

Data were collected during Wave 4 of COVID-19, at a point when vaccination was well advanced and there was no shortage of PPE, and nurses in this study expressed moderately high levels of confidence in the healthcare service ability to cope with COVID-19. However, 34% disagreed that the healthcare service could manage COVID-19 related patient demand. Additionally, 36% also disagreed that the healthcare service could manage patient demand over the following 3-month period.

4.15.4 Personal Risk Related to COVID-19 by Nurse Group

Almost 90% of nurses in this study said they had cared for a suspected or confirmed COVID-19 patient with the majority indicating they were not 'afraid of' looking after COVID-19 patients (69%) or would not 'try to avoid' contact with COVID-19 patients (65%). The two lowest mean scores of 2.57 and 2.87 (indicating greatest concern) related to family and personal safety. Half expressed concern about family safety and 40% about personal health. When asked if they accepted the risk of contracting COVID-19 as part of their job, 67% agreed and 22% disagreed.

Over 67% agreed they had received sufficient specific IPC training to deal with COVID-19 and 93% expressed confidence in their ability to don and doff PPE correctly. Just over 10% of nurses indicated that they were looking for or thinking of leaving their current job due to COVID-19 risk with 78% indicating they were not. A significant difference was found between IPC and staff nurses with IPC nurses less concerned about COVID-19 risk to their families compared to staff nurses.

4.15.5 Hospital Protocols Related to COVID-19 by Nurse Group

The lowest mean score (3.21) on this subscale related to concern about additional COVID-19 related procedures/regulations. Over 44% of nurses disagreed that they were able to access dedicated isolation facilities for suspected COVID-19 patients, with 42% agreeing they could. More than 68% (mean 3.68) of nurses agreed that following IPC recommendations would protect them from getting COVID-19. However, 75% said that following these procedures added significant strain to their workload. The majority (75%) indicated that COVID-19 related hospital policies/protocols were clear to follow. Although 24% of nurses disagreed that hospital management would be honest with staff when managing a COVID-19 outbreak, 63% agreed they would.

4.16 Examining Group Differences on the WHO COVID-19 Healthcare Worker Survey

A summary of all inferential test results (*t-tests* and one-way ANOVA) are set out below. Detailed statistical information relating to each test are displayed in *Tables 69, 70* and *71* (*Appendix A*).

Objective 4: To explore nurses' perceptions of their own and the health system IPC response to COVID-19.

4.16.1 WHO Healthcare Worker *t-test* results (between hospital groups)

4.16.1.1 Comparison between Hospital Groups COVID-19 Personal Risk Subscale

There was a statistically significant difference in the scores for Grouped (M = 30.67, SD = 5.18) and Model 4 Hospitals (M = 32.95, SD = 5.16); t (81) = -1.996, p =.049, two-tailed). The lower mean score by respondents working in the Grouped Hospitals indicates greater concern about COVID-19 personal risk compared to Model 4 respondents.

4.16.2 WHO Healthcare Worker Variables ANOVA results (*between Nurse Groups*)

4.16.2.1 Comparison between nurse groups on COVID-19 family risk

There was a statistically significant difference at the $p<.05$ level in the sub-scale scores for the four groups, $F(3, 91) = 3.33$, $p= .023$. The IPC nurse higher mean score indicates less concern about COVID-19 risk to family, while staff nurses lower mean score illustrates greater concern about family risk.

4.16.2.2 Comparison between nurse groups on WHO Personal Risk Subscale

There was a statistically significant difference at the $p<.05$ level in the sub-scale scores for the four nurse groups – $F(3, 91) = 3.72$, $p= .014$. The IPC nurses higher mean score indicates less concern on the overall WHO personal risk subscale with the CNMs and staff nurses lower mean scores indicating more concern about overall COVID-19 risk.

4.17 Correlations - factors of the PES-NWI and WHO Hospital Protocols

There was a moderate significant correlation between the PES-NWI Overall Scale and WHO Covid-19 'Hospital Protocols as measured using Pearson's r ($r= .552$, n=95, $p \leq .01$).

4.18 Summary of Key Results

4.18.1 Results on Frequency and Reasons for MNCIPC Care

The low MNCIPC care mean score (at 1.98), shows that frontline nurses working in Irish hospitals during the COVID-19 pandemic had a low tendency to miss vital IPC care tasks. Of the five subscales examined, care activities relating to Hand 'Hygiene', 'Minimising Bacterial Colonisation' and 'Minimising Hospital Acquired Infection' were reported as being missed most in this study. The reported reasons for missed IPC care indicate that the 'Staffing Allocation' and 'Adequate Storage', with subscale mean scores above 3.5, on a 0-5 scale, have the greatest impact on missed IPC care. This is mirrored in hierarchical regression modelling showing that the PES-NWI 'Staffing and Resource Adequacy' subscale and education level significantly predict the reasons for missed IPC care. Overall, frequency of missed IPC nursing care, while not significantly different, was higher for staff working in 'Unfavourable Work Environments' compared to those in 'Favourable Environments' and for those who expressed 'intention to leave their current hospital job'. Staff nurses, when compared to IPC, CNMs and Specialist nurses, reported significantly lower frequencies of MNIPC care across three items 'gloves are removed before taking off the gown', 'HH is undertaken following gown removal' and 'Nurses handover/communication information re MDRO/infection status at staff handover'.

In terms of reasons for missed IPC care, a significant difference was found between staff nurses, IPC and specialist nurses with staff nurses indicating that they 'lack control over IPC activities'. At unit level, nurses working in EDs showed significantly greater dissatisfaction compared to other units on 'IPC Resource Support' subscale with nurses working in ICU/Critical Care Units indicating least dissatisfaction. Despite recording an overall favourable practice environment score, nurses working in Critical Care/ICU reported significantly greater dissatisfaction on the 'Staffing and Resource Adequacy Subscale' compared to nurses working in Mixed Medical/Surgical units.

4.18.2 Differences between Grouped and Model 4 Hospitals Summary

Of the nursing characteristics examined, bivariate analyses show hospital size (defined by comparing Model 4 hospitals to Grouped Hospitals) is correlated with MNC Surveillance (t=2.78, p=.007), WHO Personal Risk Subscale (t=-1.99, p=.049), compliance with Standard Precautions (t=-2.72, p=.008), compliance with Transmission-based Precautions (t=-2.64, p=.010) and Career Satisfaction (t=-2.30, p=.024). In all the above cases, Model 4 Hospital respondents reported missing the least amount of care, indicated greater with compliance with SPs and TPs and rated their work environment more favourably. Model 4 hospital respondents also expressed less concern about COVID-19 risk, while also indicating greater career satisfaction. Only on the MNCIPC IPC Resource Subscale (t=2.86, p=.005) and Staffing Allocation Subscale (t=2.65, p=.009), did the Grouped Hospitals record greater satisfaction compared to Model 4 respondents.

4.18.3 IPC Education Subscale (Reasons for MNCIPC subscale)

While no significant difference was found between the nurse groups when asked if 'Nurses have inadequate education/knowledge of infection control practices', and 'Nurses have inadequate understanding of TPs', IPC nurses reported the highest mean score on both items indicating they are more likely to consider IPC education and knowledge of TPs among nurses is inadequate.

4.18.4 Between Nurse Groups WHO COVID-19 Healthcare Worker Survey

Staff nurses expressed significantly greater levels of concern on the WHO Personal Risk Subscale (F=-3.72, p=.014) and the variable measuring 'concern related to personal and family COVID-19 risk' (F=-3.33, p=.023). IPC nurses expressed lowest concern relating to COVID-19 risk on both of the above.

4.18.5 IPC/Healthcare-association Infection Variables

More than 65 % (n=68) of respondents agree that IPC activities are given enough priority compared to other nursing activities, yet 39% consider HAIs inevitable in healthcare settings. More details are available in *Table 30* and *31* (*Appendix A*).

The implications of the results of this study will be discussed in Chapter 5.

Chapter 5: Discussion

5.1 Introduction

The results of this study were presented in chapter four. The findings from this exploratory study using the MNCIPC and the WHO COVID-19 healthcare worker research instruments, used for the first time in the Irish context, will be discussed in relation to international published research. Previous studies that have used the PES-NWI will also be compared to this study and recommendations based on the findings made in the final chapter.

This study arose from an extensive literature review into MNC and its impact on patient outcomes focusing particularly on the link between nurse education, patient safety, IPC and HAIs. Arising from this review, one area emerged as being under-studied, missed IPC care as a specific component of MNC. Understanding the frequency of, and reasons for, missed IPC activities is particularly important in addressing and reducing HAIs. Because there is a paucity of studies in the literature on missed IPC as part of MNC, and no available Irish data, an exploratory approach was taken, and the study findings are discussed under each objective.

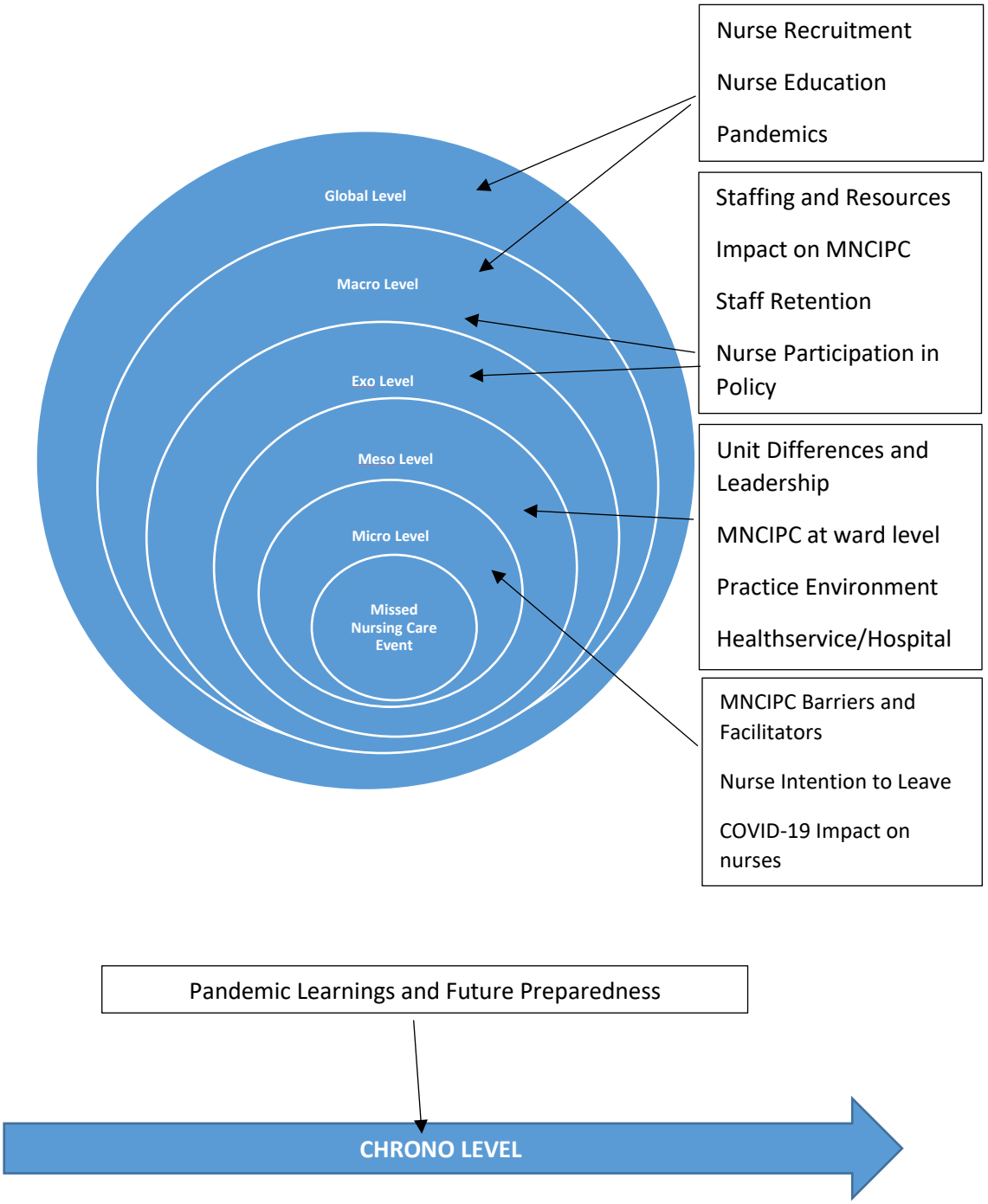
5.2 MNCIPC Survey Use in Research

MNCIPC research is in its infancy and the findings of this study are primarily compared to two quantitative studies that have used the Australian MNCIPC research instrument. While this study relates closely to that carried out by Henderson *et al*., (2021), some differences exist. Four nurse groups were surveyed in the current study compared to two in the Henderson *et al*., (2021) study. Similarly, the international study carried out by Blackman *et al*., (2021) included three countries, Australia, Lithuania and Slovakia, and differs from the present study insofar as it does not identify whether MNCIPC varies according to nurse role or unit and did not survey participants on the reasons for MNCIPC. The aim of the international study was to develop a theoretical model relating to nurse consensus scores on missed IPC care and because it uses a multivariate design, scores are not individually itemised making item comparisons limited, while still allowing subscale result comparison. When comparing results on the frequency of, and reasons for missed IPC care between all three studies, higher scores indicate a perception that the task is more often missed and has a greater impact on the reasons for MNCIPC.

This thesis applied an adapted socio-ecological framework (defined in Chapter 3, p.21) to examine the confluence of MNCIPC from micro-level hospital care delivery through to the effect of global events on care delivery. The frequency and reasons for MNCIPC were examined at a micro-level (direct patient care) meso-level (ward/unit) and exo-level (hospital). The influence

of the PES-NWI and COVID-19 related findings of the study will be discussed taking account of the framework (illustrated below).

Figure 3. Adapted Socio-Ecological Model (Discussion)



5.3 Micro-System

The nurse interacts with and provides care to patients at this level. Patient safety and the patient/nurse relationship is paramount within the micro-system. Findings are discussed under:

Objective 1 **To measure and compare the frequency of missed IPC practice across nurse groups, hospital models and ward/unit types.**

5.3.1 Frequency of MNCIPC

The most frequently missed activity in both the current and Henderson *et al*., (2021) studies was 'cleaning of patient table before food delivery'. In contrast with Australian IPC nurses who rated this item more likely to be missed, IPC nurses in this study, with their significantly lower mean score compared to other nurses, reported it least likely to be missed. Two items 'patients are showered pre-operatively' and 'all new admissions are screened for MDRO' were not cited in this study as being frequently missed although they were ranked second and third in the Australian study.

5.3.2 Uncertainty

A feature of this study's findings is uncertainty among nurses relating to the frequency of MNCIPC care across some activities. On both items in 5.3.1 above, over 20% said they were 'unsure' how often these activities were missed. While it is understandable that not all nurse roles will be responsible for, or know whether patients are showered pre-operatively, it is reasonable to expect that respondents from all nurse groups would know whether, as a policy, new patient admissions in their hospital are screened for MDROs, yet over 7% said they were unsure and over 20% stated the item is frequently/occasionally missed. Similarly, over 14% of respondents (including seven staff nurses in medical and surgical wards and five ICU nurses) were unsure if 'catheter care is performed TDS'. Again, it would seem reasonable to assume that these nurses would be clear that if, and when required, this care item would be carried out as mandated.

This uncertainty was articulated by all nurse groups across care items on 'Specific Precautions' relating to 'Healthcare documentation specifying (with/without) MDRO', 'All new admissions are screened for MDRO' and 'MDRO documentation is completed when patient is discharged' elicited 'unsure' responses of 6.2%, 7.1% and 20.4% respectively. It is likely that MDRO discharge documentation is completed by CNMs or IPC nurses, yet five CNMs and three IPC nurses in this study, along with fourteen staff nurses said that they were 'unsure' in answer to this question. It was not possible to clarify why nurses in these categories were unsure in relation to these items.

5.3.3 Cleaning Responsibility and Missed IPC Care

'Equipment is cleaned before it touches each patient' was third in terms of being missed by Irish nurses compared to twelfth by Australian nurses, with a significant difference between staff and IPC nurses in their study, with IPC nurses identifying the item more likely to be missed. Similarly, IPC nurses in this dataset reported the item more likely to be missed compared to other nurses, albeit no significant difference exists. It is not surprising that this item featured highly in terms of being missed given that 23% said it was frequently/always missed and 30% occasionally missed. It is difficult to ascertain whether items in this study that should be cleaned are missed due to nurse uncertainty relating to responsibility for cleaning. Guidance from the Health Service Executive (HSE) states that *all* staff should take responsibility for ensuring patient equipment in their work area is cleaned and each hospital should clearly define and document who is responsible for items of equipment (HSE, 2006). As detailed in the literature review (p.19) the introduction of a new nurse role, a hospital environment hygiene nurse (HEHN) proved successful in reducing incidences of MDROs with the researchers recommending the role as part of an institutional programme for the systematic reduction of HAIs (Paz *et al.,* 2020). Given the 6.1% prevalence rate of HAIs in Ireland and the particularly high 24% rate in adult ICUs and 9% in surgical wards, such a role on a pilot basis could prove effective (Clancy, Shine and Hennessy, 2023).

Inspections by the Health Information Quality Authority (HIQA) found breaches of equipment hygiene standards in University Hospital Limerick (UHL), attributed to staff having insufficient time to carry out routine cleaning. The inspectors also raised concerns that only 64% of the relevant staff had attended HH training in the previous year. Attendance at SPs training was also extremely low with only three staff members (the overall number is not stated in their report) having attended TPs training in 2020 (HIQA, 2021; 2020). In common with this study, a 2020 HIQA Report on equipment hygiene in ten acute Irish hospitals found equipment cleanliness to be inadequate in four, with regular auditing of equipment hygiene not taking place in one hospital. More positively, well-maintained, and clean equipment, with few exceptions, was reported in the remaining five hospitals inspected (HIQA, 2021).

Confusion and ambiguity relating to hospital equipment cleaning has been identified in international research. A recent Australian study found that 10% of nurses and midwives did not know whose responsibility it is to clean shared medical equipment including items like blood pressure cuffs, IV pump and pole (Curryer, *et al*, 2021). Although the nurses and midwives in question understood the importance of cleaning, in practice they acknowledged using personal

judgement rather than applying consistent clinical cleaning standards, risking cross-contamination and heightening infection risk. Cleaning blood pressure cuffs was also a source of confusion for nurses in Turkey with just 27% considering they should be responsible for cleaning this item while 64% thought cleaning staff should be responsible. In reality, the responsibility for cleaning the cuff lay with nurses (Sahan and Günay Ismailoğlu, 2021).

There is further evidence of unclear guidelines this time in the UK, where an audit of clinical equipment in a medical ward found contamination across 37 of 44 items audited. Cleaning duties for equipment were spread across HCWs, doctors, nurses, and domestic staff, with 12 items having no specific staff role designated cleaning responsibility (Meyer, Nippak, and Cumming, 2021). Regarding the most frequently missed item in this study 'cleaning of patient table before food', cleaning staff interviewed in a study conducted by Dumigan *et al*., (2010) cited reluctance to move patient items or medical equipment on the table as reasons why the tables were found to have high bacterial counts. COVID-19 has heightened this confusion with nurses in an Iranian study stating that ambiguity, confusion, and changes in care protocols have all contributed to MNC in their hospital (Safdari *et al*., 2023).

5.3.4 Missed Hand Hygiene

While Minimising HAIs was shown to exert the greatest influence on MNCIPC in the international study, 'Hand Hygiene' was identified in the current study as the greater contributor to missed IPC care. Four HH items (before ***and*** after drug administration; before ***and*** after touching a patient), were reported in this study as being the second, fourth, fifth and sixth most frequently missed care activities with nurses in the Henderson *et al*., (2021) study ranking these tenth, fourteenth, eighteenth and fifteenth. However, Australian IPC nurses differed significantly to staff nurses on five HH related items, rating these more likely to be missed. This accords with the current study, with IPC nurse groups identifying five HH items more likely to be missed compared to staff nurses although the difference is significant only on 'HH is undertaken following gown removal'. CNMs were most likely to consider 'gloves are removed before taking off the gown' to be missed more frequently. Previous research has shown that allied health professionals enter wards moving between patients without performing HH adequately or at all. The researchers point out that peripatetic HCWs have a large and diverse number of contacts which may contribute to pathogen spread in hospitals (FitzGerald, Moore and Wilson, 2013). Patient mobility can also play a part in the spread of bacteria, particularly where patient touchpoints (toilets and showers, door handles and nurse call button) are heavily contaminated as shown in a study conducted in a UK hospital (Muzslay *et al*., 2013). It is important to ensure that patient HH is also prioritised, given that 'assisting

patient to carry out HH following bedpan/urinal use' was the seventh most missed care activity in this study.

CNMs in this study rated all ten HH items higher compared to staff nurses and on five care items compared to IPC nurses. The CNM group in this study are older, with half holding postgraduate qualifications and a quarter having undertaken specialist IPC training, factors which may help explain this finding. It is to be expected that staff nurses would miss more care than nurse managers given they are patient facing with CNMs supervising and coordinating unit activities. It is likely, according to Henderson *et al*., (2021), that difference in perceptions of adherence to HH may occur with nurses who do not work in infection control overestimating their levels of compliance.

Slovakian nurses in the international Blackman *et al*., (2022) study identified similar missed HH items as nurses in the current study, with Lithuanian nurses identifying lower rates of missed HH overall. Compared to novice nurses, staff in the international study with between five to ten years work experience identified more missed HH care and age was found to be a predictor of higher instances of missed HH, and items related to minimising bacterial colonisation. This does not accord with findings in this study with neither length of clinical experience nor age exerting any significant difference on frequency of missed HH or Bacterial Minimisation subscales.

5.3.5 IPC Nurse Reasons for MNCIPC (IPC Education Subscale)

While no significant difference was found between the nurse groups when asked if 'nurses have inadequate education/knowledge of infection control practices and 'nurses have inadequate understanding of TPs, IPC nurses reported the highest mean score on both items indicating they consider IPC education and knowledge of TPs among nurses inadequate. Qualitative findings from the Henderson (2021) study, found that while non-infection control nurses considered work pressure as inhibiting IPC measures, IPC nurses were more likely to consider time constraints *as an excuse* rather than a reason for poor IPC practices.

5.3.6 Clinical Nurse Managers and MNCIPC

CNMs play a pivotal role in supervising, managing and leading activity within their clinical area. In the current study, CNMs were significantly more likely than other staff to identify - **'**gloves are removed before taking off the gown' and 'Nurses handover/communication information re patient MDRO/infection status at staff handover as being more frequently missed. It is recommended that CNMs have a fully supervisory role, but this is not the reality in Irish hospitals (Drennan, 2018). Supervision of IPC activities increase compliance so it is likely the frequency

of MNCIPC could be reduced if CNMs had more time to oversee IPC activities on their units (Bahegwa, *et al*., 2022).

5.4 MNCIPC, Practice Environment Effect on Intention to Leave

While not a significant result, the 54% of nurses in this study expressing 'intention to leave current hospital job' identified more incidences of MNCIPC care compared to those intending to stay. This is in line with findings from the Blackman *et al*., (2022) study using the same survey instrument, showing that staff retention influences both the rates and types of MNCIPC care with staff intending to leave reporting more instances of MNCIPC care compared to staff planning to stay.

In the current study, nurses reported unfavourable scores on 'nurse participation in hospital affairs' and 'adequate staffing and resources', subscales of the PES-NWI. In practice, this equates to 43% of nurses in this dataset rating their work practice environment unfavourably. It is well documented that nurse work environments are related to job satisfaction and intention to leave (Aiken *et al*., 2018; 2012a; 2012b; 2011). Low scores on 'nurse participation in hospital affairs' and 'adequate staffing and resources' explained job dissatisfaction and intention to leave, with higher practice environment satisfaction contributing significantly to nurse retention in five university hospitals in Thailand (Nantsupawat *et al*., 2017). Their findings resonate with the current study with the same PES-NWI subscales rated unfavourably by nurses and stated intention to leave high.

Nurses in Italy reported significantly lower odds of intention to leave when they were satisfied with 'participation in hospital affairs' and 'nurse-physician relationships' subscales. However, other factors, including nurse assessment of patient safety was also related to intention to leave. Using the RN4CAST protocol, these Italian researchers found that nurse perception of patient safety significantly contributes to burnout, further influencing nurse likelihood of leaving their job. Negative patient outcomes cited by nurses include HAIs, incorrect medication, and post-admission pressure sores. If nurses believe mistakes are being held against them by management, this factor was found to be significantly related to turnover intention (Sasso *et al*., 2019). In the current study running parallel with high intent to leave, 47% and 63% of nurses disagreed with the statements that 'supervisors use mistakes as learning opportunities and not criticism' and 'praise and recognition for a job well done'. The perceived lack of support on these two elements of the practice environment subscale Nurse Manager/Leadership and Support may, for some nurses, be an influencing factor on intent to leave. Other aspects of the 'nurse manager' subscale was more positively scored by nurses in

the current study indicating that, across many items, nurse managers play a significant role in creating a fair and supportive work environment. The fear of being infected with COVID-19 has been a major source of stress for RNs, along with fear that in the event of illness, they would not be supported by their organisations (Blake *et al*., 2020; Shanafelt, Ripp and Trockel, 2020). Having supportive high quality clinical and managerial leadership has been found to be crucial for the health and wellbeing of nurses (Gavin *et al*., 2020) with low staff morale also linked to poorer patient outcomes (Hall *et al*., 2016).

5.5 Standard Precautions and Hand Hygiene

SPs are key to preventing infection spread and include good practice relating to PPE use, HH, cough etiquette and sharps safety. TPs are additional safeguards required when SPs alone prove inadequate in preventing transmission of infections such as TB, influenza, or *Clostridium difficile*, all commonplace in healthcare settings (HSE, 2017). HH is one of the most clinically and cost-effective strategies in the prevention of HAIs. SPs are also fundamental in preventing HAIs and should be practiced prior to all direct patient care activities. The WHO stress that "the implementation of SPs for *all* patients *all* the time" is key in the prevention of HAIs and that "HH is the most important measure among SPs." (WHO, 2014, *p*1). Four additional questions related to fundamental IPC care, SPs, TPs, and priority given to IPC activities were included in this study. Findings relating to these variables show that while most respondents rated compliance with both SPs and TPs in their workplace as being excellent or good, a quarter considered compliance to be fair. There is a contradiction in these findings given the importance of HH within SPs and the earlier finding that HH was the most frequently missed activity in this study. This may be explained by results from a recent hospital study showing that nurses are unclear about the purpose, indication and principles of SPs. Nurses in the Cunha et al., (2021) study indicated that they only consistently apply SPs when dealing with patients they deemed high risk, while most of the nurses referred to SPs in terms of PPE use with HH included by very few in terms of their understanding of the application of SPs in their workplace.

In line with this study, Australian research has also demonstrated failure at nurse level to carry out SPs and basic care activities to a high standard. The researchers concluded that it is not one single missed event but a convergence of a series of failures to perform care activities that can lead to missed IPC opportunities and consequently HAIs (Bail *et al*., 2021). They further stress that there are several factors at the meso, exo and macro-system levels occur outside of nurse control impeding nurses from doing the right 'thing'. Acceptance of SPs varied across units, with ED staff exhibiting higher compliance while ICU and medical unit staff showed lower compliance in a study conducted in Polish hospitals. Staff in units with lower SP compliance

indicated that their IPC practice was influenced by their unit culture. Seniority was also shown to negatively affect acceptance of SPs with the greatest decrease observed between the third and eighth year of work in this study (Rosiński *et al*., 2019).

A cornerstone of SPs is the assumption that any patient could have an asymptomatic blood-borne infection (Siegel *et al*., 2022). Yet nurses make ad-hoc assessments of patient risk and, using their own judgement, deviate from SP guidelines, particularly when they consider themselves to be skilled in a procedure (Hessels and Wurmser, 2019). Factors including time constraints, lack of dexterity, particularly in relation to glove use, along with emergency patient situations influence the decision-making process (Cutter and Jordan, 2012). Nurses have to deal with emergency patient circumstances frequently, and this is one of the top cited reasons for MNCIPC in this study. According to Loro and Zeitoune, (2017), workers regularly exposed to urgent work situations become desensitised to the risk involved, even if the scientific evidence states otherwise. The researchers recommend continued SP related education throughout the entirety of nursing careers to help modify the way nurses interpret risk in their day-to-day work.

Although HH adherence in this study was sub-optimal, the greater emphasis put on HH during the pandemic has delivered real benefits with one direct observation Italian study reporting compliance with HH practices of 85% during the pandemic compared to 57% during 2019 (Perna *et al*., 2022). This analysis also showed a reduction of 67% in patient surgical wound infections for procedures carried during the pandemic. Similarly, a Finnish study conducted between 2013 to 2020 using direct observation of HH showed a greater than 10% increase in compliance in medical wards and a 32% increase in surgical wards, with corresponding significant decreases in HAIs over the same period (Ojanperä, *et al*., 2022). However, attempts to increase HH compliance among healthcare workers shows inconsistent results over time. Swiss research, using the gold standard direct observation method, demonstrated that *despite* ongoing COVID-19, HH declined from the baseline over the two-year observation period. The researchers suggest that overestimation of contact transmission at the beginning of the pandemic, vaccine introduction or adaption to the new reality may have played some part in this outcome (Rüfenacht *et al*., 2023). While some studies show an increase in HH compliance among nurses, their long-term effectiveness is less certain. Sustainable HH compliance requires the implementation of multiple strategies including multimodal and leadership support along with changes in facility layout and educational interventions (Sands & Aunger, 2020; Jones *et al*., 2017). A meta-analysis of the 2020 COVID-19 literature outlined how HCWs follow IPC guidelines when they are well communicated and they see the value of them with compliance

also being influenced by workplace culture and management support (Houghton *et al*., 2020). Receiving training in the institution of work significantly increases nurse level of adherence to SPs (Cunha *et al*., 2020; Felix *et al*., 2013). Unit-specific risk education and training results in more positive attitudes towards IPC risk and better quality of patient care (Gülen, Baykal & Göktepe., 2022) because nurse/patient exposure to infection risk is associated with characteristics of the unit of work (Kowalczyk *et al*., 2018).

5.6 HAI Inevitability

A surprising finding in the current study was the high level of acceptance by nurses of HAI inevitability in their hospital. It appears this acceptance is present also among nurses in Australia with results from a qualitative study carried out by Henderson *et al*., (2020) finding that IPC activities can be missed because of an acceptance of HAIs along with failure to recognise the risks associated with substandard performance of care fundamentals. A 2015 HSE Framework document on IPC knowledge and skills in healthcare in Ireland states "HCAI are not an inevitable consequence of providing patient care" (HSE, 2015, p4). Yet nearly forty percent of nurses in this study do, in fact, consider HAIs to be inevitable in healthcare settings and a further fifteen percent are 'undecided'. This may indicate a tacit acceptance by nurses that healthcare organisations are unable to provide the conditions to ensure optimum patient and staff safety. While many HAIs can be prevented by adherence to SPs and TPs along with environmental and organisational structures that facilitate staff and patients to follow IPC guidelines, it must be acknowledged that complete elimination of HAIs is not possible (Barranco *et al*., 2021). Nevertheless, the level of nurse acceptance of HAI inevitability shown in this study, may lead to a lowering of standards and an embedding of less than optimum practices in healthcare. Deviating from SPs may offer perceived short-term advantages such as time saving and increased productivity. However, if shortcuts become a cultural norm they have the potential to lower safety standards, in turn, leading to AEs (Wright, 2022). A failure of healthcare organisations to react to signs of gradual decline in care standards leads to what is termed by de Vries and Timmins (2016) as care erosion. The phenomenon as related to nursing care delivery is perpetuated the authors argue, by cognitive dissonance, which to some degree is a coping mechanism for nurses when the reality of work time pressures clash with patient care needs. The solution, they suggest, lies in creating an organisational climate that facilitates critical reflection of care processes to ensure that inconsistencies between standards is followed by real efforts to enhance care. Undoubtedly, the delivery of safe healthcare is complex and challenging but the patient-safety literature stresses that it is more productive to

prevent errors from happening by focusing on system fixes than trying to perfect human behaviour (Price, 2018).

5.7 COVID-19 and MNCIPC

Nurse in this study were questioned about the impact of COVID-19 on their ability to provide safe patient care. Their views were sought on how the healthcare service was likely to be able to manage COVID-19 and finally their assessment of COVID-19 related personal and family risk.

5.7.1 Nurses' Perceptions of the Healthcare Service's ability to manage COVID-19

Nurses in this study expressed confidence in the ability of the healthcare service to manage COVID-19 related patient demand, with fifty-four percent asserting that their workplace had an effective system for triaging COVID-19 patients. Nevertheless, over thirty-six percent expressed concern about the ability of the healthcare service to deal with demand in the following three months. The 3-month period referred to was late summer/autumn 2022 and may well reflect concern (which turned out to be correct) about an upsurge in COVID-19. It is generally accepted the Irish healthcare service managed COVID-19 reasonably well compared to other countries, but in the context of one of the strictest lockdowns in Europe (Stayt *et al*, 2022). Future retrospective enquiries into how the pandemic was handled may impact how these findings are viewed when greater insight is provided into the decision-making processes by policymakers and healthcare services.

5.7.2 COVID-19 related Personal Risk

Nurses in this study expressed concern relating to COVID-19 infection risk because of their occupation, and not without justification. US based researchers modelled risk based on a variety of occupations, including individual-level factors and, in the case of HCWs, patient characteristics and the interventions required before concluding that RNs were the highest risk occupation for COVID-19 infection (Huynh et al., 2022).

Forty percent of nurses expressed concern relating to COVID-19 personal risk with a higher fifty percent concerned about risk to family. Staff nurses in the current study exhibited significantly, different scores from IPC nurses, with staff nurses, based on their role, expressing greater concern about 'COVID-19 risk to their families'. Again, this is unsurprising because of the patient facing nature of staff nurse work and the likely greater COVID-19 exposure. Respondents in this dataset were less concerned about personal health risk than were the much larger 83% of nurses and midwives surveyed for the INMO with the majority (90%) stating they were stressed about infecting family and friends (Lambert and Mahon, 2021). The timing of this INMO survey in during the second wave of COVID-19 in August/September 2020, may explain this result.

The dilemma for nurses of balancing duty of patient care with duty to protect families has been highlighted by McConnell (2020). Informal social interactions are known to be protective factors in dealing with stress in the workplace. However, these interactions became a source of additional stress for nurses who were concerned about infecting others. Having a favourable work practice along with managerial support is also key in helping to mediate stress (Gavin *et al*., 2020). Yet 43% of nurses in this study rated their practice environment unfavourably. Many nurses (57%) said they had received sufficient training in IPC practices. This is in contrast with other countries where specific COVID-19 related IPC training was more limited (Houghton *et al*., 2020; Labrague and de los Santos, 2020; Vindrola-Padros *et al*, 2020). However, in the initial stages of the pandemic *only* nurses dealing directly with COVID-19 patients had access to PPE in Ireland, which indicates, that had this survey been carried out earlier, responses may well have differed (O'Leary *et al*., 2021). Most nurses in the current study, stated that they 'were *not* afraid of looking after patients with COVID-19' (67%) and 'would *not* try to avoid contact with patients with COVID-19' (65%). This is in direct contrast to findings from the Philippines with just 15.2% of nurses reporting to be 'absolutely willing' to care for infected patients (Labrague & de los Santos, 2020). The evidence shows however, that nurses in higher income countries were less fearful of the risk of COVID-19, likely due to being prioritised for vaccination and having adequate PPE and testing (Marev-Sarwan *et al*., 2022; Nahidi *et al*., 2022).

5.7.3 COVID-19 and Intention to Leave Hospital Job

Seventy-eight percent of nurses in the current study said they were 'not looking for or thinking of leaving their current job because of COVID-19.' This contrasts with the fifty-four percent in the MNCIPC survey who expressed intention to leave their current job. It appears that COVID-19 was not a major factor at play in that decision-making process. This finding contradicts the available evidence that nurse turnover has increased during the COVID-19 period with approximately 20% of nurses having left their jobs and profession (Falatah 2021; ICN, 2021). The most prevalent theme in a global overview of the reasons HCWs cited for leaving or intending to leave their jobs was fear of COVID-19 exposure, adverse working conditions brought about by the pandemic and individual socio-economic factors (Poon *et al*., 2022). However, turnover intention by HCWs has been found to be mediated by organisational trust and support (Sklar, Ehrhart and Aaorons, 2021) which, given the confidence nurses expressed in the healthcare service ability to manage COVID-19, may help explain why COVID-19 did not play a part in intent to leave in this current study.

5.8 Meso-System

Situated within the meso-system is the nursing ward/unit where nurses provide care to specific patient groups. Factors that influence the reasons for missed IPC care, nurse participation and COVID-19 are discussed under three objectives.

Objective 2 **To identify and compare the reasons for missed IPC care by nurse group, hospital types and clinical setting.**

Objective 3 **To measure and compare practice environment conditions across staff roles, units of work and age groups in relation to missed IPC practices.**

Objective 4 **To explore nurses' perceptions of their own and the healthcare system IPC response to COVID-19.**

5.8.1 Reasons for MNCIPC at Unit/Ward Level

Situated at both the exo and meso-level, 'Staffing Allocation' and 'Adequate Ward Storage' – subscales of the MNCIPC instrument - recorded the highest nurse dissatisfaction rating in this study. Systemic factors including 'urgent patient situation' and 'unexpected rise in patient volume/acuity', organisational factors - 'unbalanced patient assignment/allocation to nursing staff' and environmental factors - 'inadequate place to store patient belongings', 'patients having to share bathrooms' and 'patient room overcrowded with supplies' were the top six reasons cited for MNIPC care in *both* the Australian and this current study. These findings are very much in line with the factors identified in the literature including poor nurse-patient ratios (Aiken *et al*, 2018; Jones *et al*, 2015; Lucero, Lake and Aiken, 2009) systemic and environmental factors (Henderson *et al*., 2021; Bail *et al*., 2020; Lacotte, Årdal and Ploy, 2020) all of which are linked to higher levels of missed care.

The findings in this study are also borne out in a 2020 HIQA Report with six out of ten acute Irish hospitals non-compliant with one or more national standards guidelines on IPC procedures. Similar reasons for MNCIPC were reported by nurses in the current study and by the HIQA inspectors. Poor infrastructure, inadequate physical environments, staffing issues, limited bed capacity are all cited by the inspectors as the cause and reasons for IPC non-compliance (HIQA, 2021). A qualitative study carried out by Bail *et al*., (2020), with IPC nurse experts on MNCIPC identified similar organisational deficits as outlined above, but the researchers stress that while nurses are key in IPC, they are just one part of a larger system. Identifying gaps in the chain of infection at nurse level is necessary but serves little purpose if a 'whole of organisation' approach is not taken to address MNCIPC. This involves recognising that infection can be spread

by patients, visitors, kitchen and cleaning staff and that infection control is a whole of hospital responsibility with MNCIPC just one aspect (Bail *et al*., 2020).

One example of the challenges that has occurred in hospitals is demonstrated by a study conducted in a tertiary German hospital before and during COVID-19 showing a 77% increase between 2012 and 2021 in the number of HCWs carrying a personal smart phone on them while working. Laboratory tests conducted on 295 of these devices from HCWs working across 26 different wards in 2021 showed that over 99% of the screens were bacterially contaminated (Tannhäuser *et al*., 2022). This illustrates the difficulties hospital IPC teams have in controlling outside elements likely to contribute to cross-infection.

5.8.2 EDs, MNCIPC Care and Practice Environment

Nurses working in EDs showed significantly greater dissatisfaction compared to other units on 'IPC Resource Support' subscale with ICU/Critical Care Units indicating least dissatisfaction. This finding is unsurprising given the rise in patient numbers presenting to EDs since the pandemic with the number of patients on trolleys in the late summer/early Autumn 2022 higher than any of the previous five years for the same time period (DOH, 2022a). Overcrowding and understaffing impacts ED staff wellbeing and morale with 78% of nurses and 70% of doctors in Irish EDs meeting the criteria for burnout (Sheehan *et al*., 2022; Chernoff *et al*., 2019). For comparison, the rate of burnout in the general working population ranges between thirteen and twenty-seven percent (Adriaenssens *et al*., 2015).

The 'Nursing Foundations for Quality of Care' subscale measures the organisational expectation of nursing and its value within organisations. A slightly lower mean score of 2.82 was recorded by nurses in this study compared to the Irish RN4CAST score of 2.89 (Scott *et al*., 2013). Although a positive score, studies have shown that this subscale is a significant predictor of nurse burnout which suggests that improving this element at organisational level could help decrease nurse burnout, a significant issue in nursing, even more so since the pandemic (Sheehan *et al*., 2022; Dordunoo *et al*., 2021).

5.8.3 Impact of Favourable/Unfavourable Work Practice Environments on Care

The frequency of MNIPC care in the current study is higher (albeit not significantly so) for staff working in unfavourable work practice environments compared to nurses in favourable work settings. Positive work practice environments and safety climate, when combined with other factors such as degree-educated nurses and a reduction of nurse workload can help reduce MNC, enhancing patient outcomes (Jingxia *et al*, 2022; Kirwan, Matthews and Scott, 2013, Aiken *et al*., 2011). The frequency of MNC events was shown in a Swedish study conducted during

the first COVID-19 wave to not have differed from a reference sample. The researchers attribute the results to maintaining nurse/patient ratios, having adequate staff skill mix to cope with patient dependency level along with supportive nursing managers. While this is just one study involving 130 nurses, it shows that even during a pandemic, with supportive factors, nurses can be enabled to deliver care that does not compromise patient safety (Vogelsang *et al*., 2021).

It is important for recruitment and retention of nurses that work practice environments are favourable. Ireland, in common with many other countries, has a shortage of nurses and needs to compete on the international stage to recruit nurses (Drennan & Ross, 2019). As previously outlined the Irish health workforce itself is characterised by high levels of emigration due to dissatisfaction with employment conditions.

5.8.4 Practice Environment Influence on Nurse Units of Work

The five PES-NWI subscales measure the supportive and inhibiting factors that exist in the nursing workplace on a scale of 1-4 (negative to positive). Because the scale is limited from 1-4, small differences in mean scores reflect considerable differences in perceptions of the presence, or otherwise, of items in the workplace. Higher scores indicate a greater degree of consensus on nurse-positive organisational characteristics. Scores above 2.5 demonstrate a favourable work practice with those below 2.5 considered unfavourable (Lake, 2002).

In this study, 'Nursing Foundations for Quality of Care', 'Nurse Manager Ability, Leadership and Support of Nurses' and 'Collegial Nurse Physician Relations' had favourable nurse scores while 'Staffing and Resource Adequacy' and 'Nurse Participation in Hospital Affairs' show unfavourable scores. The 2.61 composite score indicates a 'mixed' work environment.

5.8.5 Practice Environment and ICU Units

Favourable unit level work settings were reported by nurses working in IPC departments and Critical Care/ICUs in the current study. Nurses in IPC departments rated all five subscales above 2.50 and ICU rated four subscales above 2.50, the exception being 'Nurse Participation in Hospitals Affairs'. This is an encouraging finding because evidence has shown that favourable work environments are associated with patient safety, employment retention and job satisfaction (Dorigan & Guirardello, 2018; Nayback-Beebe *et al*, 2013; AACN, 2005).

Pre-pandemic Ireland's public hospital ICU bed capacity was among the lowest in Europe (5 per 100,000) but bed capacity doubled (Berger *et al*., 2022) and additional staff were re-assigned to

ICU and IPC departments during COVID-19 (Ryder *et al*., 2022). However, despite recording an overall favourable practice score, nurses working in Critical Care/ICU reported significantly greater dissatisfaction on the 'Staffing and Resource Adequacy Subscale' compared to nurses working in Mixed Medical/Surgical units. This is in line with other research showing that ICU nurses have expressed concern over patient safety, which they perceive to be unsatisfactory due to staff shortages (Stayt *et al*, 2022; Lucchini, Iozzo & Bambi, 2020). It is possible that despite the increase in staffing mentioned previously, it still has not reached the required level to allow nurses enough time to influence the incidences of MNCIPC care. ICU nurses are required to look after the highest risk patients, not only in terms of their condition but also their risk of contracting HAIs, so it is unsurprising that resourcing and staffing feature prominently in these units.

Concern has been raised in Ireland (Lambert and Mahon, 2021), the UK (Marks, Edwards and Jerge, 2021) and Spain (García-Martín *et al*., 2021) by nurses redeployed from medical, surgical and other units who underwent rapid upskilling over a short period of time to work in other units including ICUs during COVID-19. Nurses, principally those redeployed to ICU, felt overwhelmed and anxious, particularly when caring for patients with inadequate support. Team trust is an essential element within critical care units and building trusting relationships between critical care managers and staff is dependent on good communication and competence of team members, which is likely to be difficult to achieve in a short time period (Mullarky *et al*., 2011). Safe practice relies on nurses being able to recognise the limit of their competence and this principle is jeopardised when untrained staff are required to deliver patient care beyond their capability (Lubbe and Roets, 2014). These studies illustrate the additional pressure and stress that many nurses had to endure working during COVID-19.

5.8.6 Practice Environment, Surgical Units and Mixed Medical/Surgical Units

Nurses in both Surgical Units and Mixed Medical/Surgical in this study rated following three subscales above 2.50 - 'Nursing Foundations for Quality of Care ', 'Nurse Manager Ability, Leadership & Support of Nurses' and 'Collegial Nurse Physician Relations'. This indicates a mixed setting and is in line with the overall finding of this study. This result may reflect that little has changed since the 2013 RN4CAST report (Scott *et al*., 2013) which found that nurses in these units in the acute hospital sector expressed little confidence in management's commitment to patient safety or that reported patient care problems would be addressed.

5.8.7 Practice Environment and Medical Units

Stand-alone Medical Units in the current study rated only two subscales - 'Nursing Foundations for Quality of Care' and 'Collegial Nurse Physician Relations' - above 2.50, indicating a mixed setting, in line with the overall finding of the current study. Medical Unit staff make up 15.9% of the nurses in this dataset. The nursing unit is the clinical microsystem in which nurses provide care to distinct patient groups. Improving the unit work environment also improves patient care quality and nurse job satisfaction. Patient outcomes were shown in a comparative study across 577 US hospitals to vary by unit type with higher care quality associated with better work practice environments. Like the current study findings, staff nurses in adult medical units reported the lowest quality of care followed by medical-surgical units (Ma *et al*., 2015).

5.9 Staff Nurses, Nurse Participation in Hospital Affairs, COVID-19/MNCIPC

In line with the Australian findings, staff nurses in the current study, identified fewer incidents of MNCIPC compared to other nurses. In terms of reasons for MNCIPC, staff nurses stated that they 'lack control over IPC activities' which was not the case in the Henderson *et al*., (2021) study. It is difficult to ascertain why this so, but frontline nurses, were by and large disenfranchised from the decision-making process during COVID-19, while bearing the brunt of decisions made by others relating to new ways of working (Pattison and Corser, 2023). Additionally, when dealing with COVID-19 patients, frontline nurses were required to prioritise tasks relating to oxygen status monitoring and patient position while having to forego patient hygiene maintenance and communication to comfort patients, a factor made all the more difficult by the requirement to wear PPE (Danielis and Mattiussi, 2020).

'Nurse Participation in Hospital Affairs' examines the involvement, role and status of nursing at hospital level. A significant difference exists between staff age groups in the current study with nurses in the 31 to 40 age group recording greater satisfaction compared to the 41 to 50 age group. Under and postgraduate levels of education are similar in both groups so is not likely to be a factor in the difference. It possibly relates to career stage but there is no available evidence to confirm this.

Of note, 67%, 68% and 51% of nurses in this study disagreed that staff nurses are given the opportunity to (1) participate in policy decisions, (2) be involved in internal governance, and (3) have the opportunity to serve on hospital/nursing committees. Participation in hospital affairs allows frontline nurses to play a role in decision-making related to policy and practice (Lake, 2002) and employee engagement is linked with positive work environment and employees taking on more responsibility and contributing more to their organisations (Li, Li and Wan,

2019). The fact that nurses consider staff nurse participatory role to be unfavourable may reflect the reality that most healthcare decisions are made at a higher management level with unit-level managers having more limited decision-making powers. This may also help explain why staff nurses perceive that they 'lack control' of IPC activities. The value and recognition of degree-educated RNs has not been fully realised according to Ball (2020) and they should play a more pivotal role in leading healthcare policy to bring about changes in the practice environment required to ensure safe healthcare delivery. Such recognition does not appear to have translated to the workplace for nurses in this study.

5.9.1 Nurse-Physician Collaboration during COVID-19

Nurse physician collaboration is a key driver of safe patient care and is also related to job satisfaction (Brandt *et al*., 2014). A notably higher score (2.90) was recorded on this subscale by nurses in this study compared to (2.70) the Irish RN4CAST study (Scott *et al*., 2013). Internationally, nurse physician relations are rated one of the highest subscales and the positive result in this study, is not unexpected (Phillips *et al*, 2022). The high score may well illustrate the level of collaboration across these two professions during COVID-19.

5.10 Exo-System

The exo-system includes factors relating to hospital and regional support for nursing care delivery and findings are discussed under two objectives:

Objective 3 **To measure and compare practice environment conditions across staff roles, units of work and age groups in relation to missed IPC practices.**

Objective 4: **To explore nurses' perceptions of their own and the healthcare system IPC response to COVID-19.**

5.10.1 Hospital Missed IPC Comparison

Findings in this study show that working in Model 4 hospitals is positively correlated with higher MNC Surveillance, greater compliance with SPs and TPs, career satisfaction and a more positive work environment. The evidence on the impact of hospital size on nurse work satisfaction is inconsistent. Some research shows greater satisfaction by those working in tertiary and large teaching hospitals because of greater career, training and education opportunities (Al Yahyaei, *et al*., 2022; Abdul Rahman, 2015). But Wang *et al*., (2020) and Abad-Corpa *et al*., (2013) report greater nurse satisfaction with working environment and organisational management in smaller hospitals. Research related to HAIs (Sreeramoju, *et al*., 2010) has shown that hospital size and quality partly contributes to rates of patient re-admission within 30 days of discharge (Brotman, Hoyer and Deutschendorf, 2017). In Ireland 10 out of 29 hospitals, have higher patient re-

admission rates than the HSE target of 11%, with all 10 of these hospitals either Model 2 or 3 hospitals (HPSC, 2017).

Only on the MNCIPC 'IPC Resource' and 'Staffing Allocation' subscales did the Grouped Hospital respondents record greater satisfaction compared to Model 4 nurses. The latter finding may reflect that the staff mix in smaller hospitals tends to be more experienced and the patient acuity level lower (Scott *et al*., 2013). Although measures are underway with Safe Staffing Programme to address nurse staffing and skill-mix on units/wards, it is unlikely the issue of unbalanced staffing and skill mix highlighted earlier has been fully addressed given the project is still being rolled out (DOH, 2022c; Drennan *et al*., 2018).

5.10.2 Hospital Protocols related to COVID-19

This subscale with the lowest mean score (greater concern) covers PPE and infection regulations. Most respondents indicated that 'management would be honest about a 'COVID-19 outbreak' with just under a quarter disagreeing. Not being able to 'access dedicated isolation facilities for suspected COVID-19 patients' added additional stress for nurses in this study. Being able to isolate patients is a central pillar of IPC programmes, but a lack of isolation facilities mean it is not always attainable as evidenced in this study. Lack of isolation rooms can lead to infection spread and deaths and was cited as one of the main reasons for the difficulties in preventing the spread of *Clostridium difficile* at Stoke Mandeville Hospital that resulted in 334 cases and at least 33 deaths (Healthcare Commission, 2006). The hospital environment made control of the infection extremely difficult and the primary factor in the spread was the failure to isolate patients with the infection because there were few isolation rooms available. Some infectious patients were moved from A&E into open wards rather than to isolation facilities with this movement contributing to the chain of infection. The chain of infection is an important concept and one that is often overlooked in terms of interventions to increase IPC compliance which tend to focus on education of specific healthcare groups. There are so many more possible modes of transmission in hospitals including *all* hospital staff, visitors and patients along with the physical environment and high touch surfaces that need to be addressed simultaneously (Bail *et al., 2021)*.

Nurses in this study indicated that 'additional IPC procedures' added significantly to their workload. Adjusting to changing protocols at the outset of the pandemic (often with little supporting rationale) and having to adapt to varying workplace rules particularly in relation to PPE, was shown to be a major source of stress for other nurse groups in Ireland (Nestor, O'Tuathaigh and O'Brien, 2021) the UK (Vindrola-Padros *et al*, 2020) and across the globe

(Houghton *et al*., 2020). The increased requirement for PPE during COVID-19 was viewed by 53% of HCWs surveyed in the EDs of St. James's Hospital, Dublin and Cork University Hospital as having a negative impact on their wellbeing, with just 29% viewing PPE as positive (Sheehan *et al*., 2022). Attitudes to PPE usage are likely to differ post-COVID-19. Awareness of the benefits of PPE have undoubtedly been heightened but, conversely, so too has the burden of wearing PPE and may this possibly influence IPC practices in the coming years. Serum-testing for prevalence of SARS-CoV-2 on HCWs in a hospital in Poland concluded that the use of PPE is only one element of IPC and unless combined with correctly executed HH, it can, in fact contribute to self-infection (Żółtowska *et al*, 2022). This is corroborated by US research showing that 90% of fifty-one participants examined, self-contaminated when doffing their gown. Neither double-gloving or applying HH to gloves was shown to be more effective at preventing self-contamination in these simulations (Osei-Bonsu *et al*., 2019).

Dealing with infectious outbreaks is time-consuming and varies across staff role with staff nurses reporting greater than sixty-minute direct patient care and patient/family education workload increase when dealing with illnesses such influenza. IPC nurses in the same study stated that documentation, chart reviews and exposure preventative measures also added more than an hour to their daily workload (Hessels *et al*., 2019). This is in line with findings in the current study and internationally with nurses citing the impact of IPC measures on work efficiency and patient care, leading directly to MNCIPC.

5.10.3 Staffing and Resource Adequacy and MNCIPC

Adequate staffing and resources have the biggest impact on nurses' ability to deliver safe patient care. In the current study, the highest level of dissatisfaction (2.26) was recorded on this practice environment subscale, higher than that recorded by the 2013 RN4Cast Irish study (2.00). Between 2012-2021 the number of nurses employed has increased by 20% and by the end of 2021, an additional 1,700 nurses were working for the HSE compared to the end of 2020 (DoH, 2022b). It is surprising therefore, that these staff increases have not translated into greater satisfaction from nurses. It possibly may reflect the additional pressures brought about by COVID-19 and other health service demands. Additionally, the high turnover rates in 2021 for HSE employed nurses at 7.7% up slightly from the 7.3% in 2019, which is an increase of 4.4% from 2014, a possible further complicating element. The 2021 turnover rate of staff nurses is even higher at 8.5%.

It is not just in Ireland that staffing and resources are regarded as the least favourable workplace dimension. In a systematic review of 46 PES-NWI studies conducted between 2010 and 2016 across 28 countries, scores relating to staffing and resource adequacy were most often the

lowest across high and lower-income countries, each with differently resourced healthcare systems (Swiger *et al*, 2017).

5.11 Macro-system

The macro system includes national policy level issues relating to nursing.

In this study, nurses working in all units (ICU, Surgical, Mixed Medical/Surgical, and ED) except for the IPC department, all rated 'Nurse Participation in Hospital Affairs' to be unfavourable. It is difficult, to know why this is so, but as previously outlined, frontline nurse, particularly during COVID-19 were not involved in decision-making processes and were often redeployed with little say in where they were being sent. As Salvage and White, (2019) outline, it is imperative that nurses do not ignore what is happening at the macro level. Nursing is influenced by politics and policies that fund the health systems in which nurses' work. By not being involved in the making of these policies, nurses inevitably must carry out policies devised by others, with little say in the decision-making process. If nursing as a profession ignores these processes, then inevitably they become bystanders with little influence. In Ireland, nurses hold positions of power, in hospitals and at governmental level, the chief nursing officer being the most senior position, equivalent in grade to the chief medical officer (DoH, 2023). As a result of daily COVID-19 media briefings, it can be assumed that most people in Ireland would be familiar with the role and indeed name of the then chief medical officer. However, if the same question were posed in relation to the chief nursing officer, it is unlikely the many would be able to name the person who holds the post or identify what the role involves. Yet nurses were the largest group involved in providing patient care during the pandemic. It would likely have been reassuring to the greater than 75,000 practising nurses and midwives in the country to have seen nursing placed centrally in the media given their important role in keeping patients safe during COVID-19 (NMBI, 2022).

5.11.1 Nurse Participation in the COVID-19 Decision-Making Process

Because staff nurses work at the frontline, it is concerning if they feel 'they lack control over IPC activities' and have no input into the decision-making processes around the care they deliver. According to the ICN, nurses make up 59% of the global healthcare workforce but senior nurse leaders in a quarter of national nursing associations have not been involved in high-level decision-making during COVID-19 (ICN, 2022). Forty percent of national nurse associations also report that IPC nurses have also not been involved in establishing IPC policies/plans during COVID-19.

The lack of involvement of IPC nurses was evidenced in the wake of an outbreak of *Clostridium Difficile* at Stoke Mandeville Hospital. The outbreak involved 334 cases, 33 deaths and a lot of negative media publicity (Healthcare Commission, 2006). In the UK the Code of Hygiene is legislative and sets the IPC compliance standards for healthcare providers who are subject to sanction if they fail to comply. The IPC nurses revealed that in response to public fear and anger, change was implemented, using a top-down approach, driven by senior managers' fear of both external censure and media scrutiny'. While the change was welcome and the nurses felt they had greater authority, nevertheless they considered that it had been driven through without dialogue or engagement with them (Randle and Clarke, 2011). Long-term success in reducing HAIs is dependent on quality leadership, engagement and empowerment of staff. A distinction needs to be made, according to Turner (2011), between the skill sets of nurses and non-clinical management in health service delivery. Hospitals that have been run well within the NHS have done so when non-clinical managers and clinicians have operated in equal partnership, gaining insight from each other, respecting, and reciprocating when clinical needs should be prioritised and likewise when management efficiencies, productivity or value need to be considered. Staff morale within hospitals run in this co-operative management style have thrived and been successful.

Difficulties can arise when management disregard the professionalism of nurses. The ICN have expressed concern that nurses are often seen as 'functional doers' who follow instructions, which is in total contrast to the reality of the profession, members of which are educated and informed decision-makers whose actions are scientifically based (ICN, 2022). One such example of nurses being expected to 'do' was evidenced by a UK NHS hospital trust asking specialist clinical nurses to spend part and/or whole shifts 'cleaning', 'decluttering' and 'tidying' wards. This action prompted criticism from unions and healthcare professionals alike in what clearly is inefficient use of nurse expertise, training and a total disregard and lack of respect for nurse competence (Thomas, 2022).

To that end, it is essential that nurses, as the largest providers of frontline healthcare are involved in policy and decision-making not just within hospitals but at local, regional and national level and on the international stage. However, to sit at the top table, nurses need to develop the competencies to be effective in these testing environments. That involves educating nurses in leadership skills, which will serve to enhance, not only policy and decision-making, but also patient safety and nursing care quality (Labrague *et al*., 2021; Salvage, Montayre and Gunn, 2019). In terms of nurse participation and leadership, seventy percent of

all healthcare jobs are held by women, yet almost seventy percent of the world's health organisations are headed up by men (WHO, 2019). The WHO point out, that while women face discrimination and the glass ceiling in male-dominated professions when men enter female-dominated professions like nursing, they are more likely to be promoted in what is termed the 'glass escalator' effect (WHO, 2019).

5.12 Global-Level Effects

Staffing and resource adequacy was identified in this study as compromising safe IPC practices. One of the most pressing issues in nursing today both in Ireland and internationally is recruiting and retaining RNs. These difficulties combined with a growing and ageing population present a strategic risk to hospitals in Ireland. The inter-connected nature of the world was evidenced in how quickly the COVID-19 pandemic took hold across the globe highlighting the challenges that exist in the provision of healthcare when events on one continent can rapidly impact already pressurised healthcare systems elsewhere. Ireland, in common with many other countries must compete for nurses on a global stage. Thirty-one percent of the total staff employed in the Irish public health service are nurses (DoH, 2022b). At a glance, the number of nurses per head of population in Ireland at 14.69 per 1,000 population (fourth highest) looks well above the OECD average of 8.8. However, this headline figure includes nurses working not only in clinical positions but also in management, research and education. Therefore, it needs to be viewed with caution because of how the numbers are computed.

5.12.1 Nurse Participation in Global Policies

Participants in this study rated 'nurse participation in hospital affairs' unfavourably. While this relates to participation at an Irish level, as a profession nurses should expect to be represented at global level.

While there are many thousands of organisations involved in the global health arena, as a profession, nursing has had a much longer presence globally than both the UN and the WHO. The ICN was established in 1899, predating the WHO by almost fifty years and was responsible for sponsoring the first WHO nurse. The main function of the ICN is to represent nursing globally, progress nursing as a profession and influence health policy. Yet nurse led organisations are not major players or decision-makers and nursing is seriously under-represented in global health decision-making according to Salvage and White, (2020). Nursing care delivery at local level does not operate in a vacuum and is impacted at global and systems-level where political and organisational factors intersect. Healthcare systems, and consequently those involved in frontline care delivery, have to adapt to what is happening on the global stage, whether it is a

pandemic, funding cuts or responding to cyber-attacks as happened to the Irish healthcare system in 2021.

5.12.2 Nursing Education

The global nature of the nursing workforce was evident in this study with almost a quarter of respondents receiving their education outside of Ireland. There is a heavy reliance on recruiting nurses educated outside of Ireland to meet current workforce needs. The proportion of newly registered nurses with the INMO educated in Ireland fell from 74% of all new registrations in 2014 to 31% in 2021. Nurses educated in India accounted for 49% the new registrations in Ireland in 2021. While international nurses make a valued contribution to the provision of healthcare in Ireland, the over-reliance on recruitment of international nurses leaves the health service vulnerable to future shocks, such as pandemics and the knock-on effects of travel bans. Ireland has signed up to the voluntary WHO Code of Practice on International Recruitment of Personnel requiring healthcare systems to attain self-sufficiency in workforce needs by training staff locally. The International Centre on Nurse Migration (ICNM) commissioned a report into the state of nursing worldwide to consider the impact of COVID-19 on nurses. The authors, in an effort to 'sustain and retain' the nursing workforce have set out an agenda at national and international level urging countries to plan to grow the nurse workforce, provide early access to vaccinations for nurses and ensure sustainability of the global nurse workforce in lower income countries (ICNM, 2022). However, reducing Ireland's reliance on foreign educated nurses to 30%, would require an increase of 251% in the numbers of nursing graduates trained locally over a ten-year period. In 2021, Ireland educated 30.77 nurses per 100,000 population compared to the OECD average of 44.5. This expansion can only be achieved with significant investment in the higher education sector as well as a scoping exercise to identify the capacity of the education system to deliver such increases (Caulfield, Hynes, & O'Connor, 2022).

5.13 Chrono-System Level

5.13.1 COVID-19 Impact and Future Preparedness

Nurses in this study reported additional stress because of working at the frontline during the pandemic with concern related to personal and family health risk and the higher workload brought by COVID-19. All of which was set against working in understaffed units, crowded environmental conditions with inadequate storage for patient belongings, factors which impeded their ability to carry out IPC care activities to the required standard.

The chrono-system allows us to examine historical events and evaluate responses to previous public health threats. An issue of concern as it relates to this study is that despite the heightened

awareness of the need to prepare for future pandemics in the aftermath of the 2009 (H1N1) influenza pandemic, 60% percent of Irish hospitals did not compile a 'lessons learned' from exercises carried out to revise emergency response plans. At a systemic level, there were shortfalls in the percentage of hospitals that had taken part in emergency/infectious disease exercises (15%) or had sufficient airborne isolation facilities to cope with demand (55%). Although thirty out of forty-six Irish public and private hospitals had a plan in place to vaccinate their HCWs, only two had a prioritisation plan to vaccinate HCW families and administer anti-infective/viral therapy in the event of an emergency (Reidy, *et al*., 2015). Considering the findings of this study that the risk posed by COVID-19 to personal and particularly family health was a major concern for nurses, the lack of adequate forward-planning to protect HCWs and their families is concerning.

It is estimated there is a future annual probability of an influenza pandemic of between three and seven percent (Smith, 2021). Key to dealing with future pandemics is the provision of cross-training of staff to enable them to care for patients outside their own area of expertise. Despite recommendations by the Irish expert Pandemic Review Group, only 20% of the forty-six hospitals surveyed provided such training to staff and fewer than half had stockpiled or planned with the HSE to have reserve stocks of FFP2/FFP3 respirators (Reidy, *et al*., 2015). Irish and international research mentioned earlier in (chapter 2, 2.5.5, p, 11) demonstrated that IPC and HAI education is not explicitly taught to undergraduate students as part of the nursing curriculum. This would appear to be failing nursing students in terms of preparing them for the reality of clinical practice on a day-to-day basis, let alone a pandemic.

As raised in previous research, a major issue in healthcare is addressing concerns as separate entities, and not considering and addressing the totality of influencing factors that lead to care deficits for patients (Phelan & Kirwan, 2020). It is little use carrying out emergency response plans if the 'lessons learned' are not implemented, system deficits identified, and plans put in place that can be quickly activated in response to emergencies. Findings from this study suggest that multi-systems deficits contribute to MNCIPC care, and a proactive response by the healthcare service is required to protect, not only patients from care deficits but also the healthcare workforce who are required to risk their own and their families' health when dealing with infection. Such a response is needed not only during pandemics, but daily given the rise in HAIs and multi-drug resistant organisms.

Chapter 6: Conclusion, Recommendations and Limitations

6.1 Introduction

Using a socio-ecological lens, this exploratory study sought to measure and explain, in the context of the Covid-19 pandemic, IPC activities that were missed by nurses in acute hospitals in Ireland. The results of this study are outlined in Chapter 4 with a summary of the main results on (pp. 68-70). Based on the conclusions below, recommendations for nursing education, practice and research are presented, followed by a discussion of the study limitations and final concluding words.

6.2 Key Conclusions

This study offered participants the opportunity to provide their perspectives on the frequency and reasons for MNCIPC in their working environment, adding a new dimension to previous knowledge of MNC in Irish hospitals by measuring IPC as a separate element.

6.2.1 MNCIPC at Nurse Level

At the micro level, the accounts of nurses who participated in this study demonstrated a low tendency to miss vital IPC care activities. A picture emerged of RNs under time pressure to complete IPC care activities, particularly HH. This was due to inadequate staffing, challenging practice environments, having to deal with emergency patient situations, over-crowded units and patients having to share bathrooms. From the findings of this study as they relate to nurses, it can be concluded that:

- Although the overall measure of MNCIPC was moderately low, fundamental elements of IPC care were frequently missed, particularly in relation to HH. This is an important finding because the WHO has shown that if good HH along with other low-cost practices are followed, 70% of HAIs can be prevented (WHO, 2022a).
- A theme of this study is a level of 'uncertainty' in relation to important IPC care activities that were *frequently* missed and are key in the prevention of HAIs for patients such as 'catheter care' and 'assisting patients to complete HH'. This 'uncertainty' indicates a lack of role clarity in relation to responsibility for items of care, including the most frequently missed item in this study 'patient table being cleaned'. There can be no place in nursing care for 'uncertainty' relating to responsibility for IPC activities.
- A further conclusion of this study is that staff nurses, in particular need greater support to facilitate them to do their job. Compared to other nurse groups, staff nurses indicated a significantly higher level of dissatisfaction across several measures including 'lack of control over IPC activities', 'nurse participation in hospital affairs', greater

concern relating to both personal *and* family COVID-19 health risk due to their job, along with very high (65.6%) intention to leave.

- Nurse interpretation of SPs in this study contradict findings from the MNCIPC survey. This ambiguity casts doubt (which is need of clarification but is outside the scope of this study) whether the nurses in this study are clear on the fundamentals of SPs. To ensure IPC practices are carried out as they should be, there can be no ambiguity in relation to how these practices should be implemented.
- Nurses in this study indicated a high level of acceptance of HAI inevitability in their hospital and like the point above re. SPs, it is not possible to glean why this is so because of the cross-sectional nature of this study, but it is worthy of further research to determine the factors that lead nurses to make such a judgement.

6.2.2 The Practice Environment

Nurses cannot provide safe patient care and carry out IPC activities adequately if their practice environment does not support them in this endeavour. Unit responses on practice environment and factors that influence MNCIPC are important insofar as they indicate a measure of quality and safety within each unit. However, what can be more difficult to measure, is the unit cultural context within which IPC activities are undertaken and what influence the established norms have on incoming, particularly more recently graduated staff. Key conclusions drawn from unit of work measures are outlined below.

- Nurses, in this study who rated their practice environment unfavourably, were shown to have missed more IPC activities.
- Additional support is required for nurses working in stand-alone Medical Units in this study. These nurses demonstrated the lowest practice environment rating scores indicating only two practice environment subscales favourably.
- ED nurses are, in terms of IPC resources, inadequately supported, reducing their ability to carry out IPC practices to the highest standard.
- Both staffing and resource adequacy has been shown in this to study to significantly impede staff working Critical Care/ICU in their efforts to keep patients safe and needs to be addressed. With a HAIs prevalence rate of 24% in Irish ICUs, it is essential these shortages are addressed (Clancy, Shine and Hennessy, 2023).

6.2.3 Hospital Factors Affecting Staff Outcomes

Comparisons were made in this study between the largest hospital model in Ireland against the other models with one key conclusion drawn:

- Nurses in the largest hospital model – Model 4 hospitals – reported better outcomes across most measures indicating that support structures in terms of facilitating staff in the smaller hospitals to undertake IPC measures to the required standards need greater focus.

6.3 Recommendations

This study provided preliminary insights into MNCIPC care using a socio-ecological lens. By examining MNCIPC through these six system levels, it is possible to devise interventions that can be targeted at each level. As demonstrated by this and other studies (Henderson *et al*., 2021; 2020, Bail *et al*., 2021; Blackman *et al*., 2020), MNIPC care does not occur in a vacuum but results from multiple factors. MNCIPC in hospitals often arise not just because of one single event but a series of failures to perform basic care activities some of which involve staff beyond the nurse (Bail *et al*., 2021). The socio-ecological model emphasises the need for change, not only in relation to individual factors, but also those within the physical and social/cultural environment (Gargari *et al*., 2018). Stepping back and examining the intersecting contexts that both enabled and impeded nurses from delivering safe IPC measures to patients in this study, particularly during the pandemic, can help provide a more comprehensive picture from which lessons can be learned. With the right support, these lessons can be applied to ensure nurse IPC practice can be facilitated to help prevent HAIs daily, and in the likely event of a future pandemic.

Because the nature of the study was exploratory, the study findings have been placed in the context of the literature in the broader area of patient safety, nurse education, IPC, and therefore the recommendations reflect this reality. In making these recommendations, it is important to capitalise on a more IPC literate public because of COVID-19. A key learning for patients and the public alike has been the IPC protects others and saves lives.

- These findings emphasise the need for **nursing managers** to instigate sustainable multimodal educational interventions at *unit* level because each unit has its own culture and differing environmental needs. This training would likely provide better outcomes if *all* unit staff including allied medical professions, cleaning, and hospitality staff along with visitors are included. The provision of clear written guidelines to staff on role responsibilities in terms of HH practices, cleaning, and equipment responsibility as it relates to IPC practices should be prioritised. Only when there is role clarity in relation to the delivery of IPC care can the best outcomes be achieved for patients. Effective HH programmes are also dependent on systemic elements within hospitals, including balanced and adequate nurse staffing which was shown in this study to be sub-optimal.

- Domains of the work practice environment, which were rated unfavourably by nurses in this study, and particularly in relation to ICU and EDs, are modifiable and could, with intervention by **hospital managers** help reduce MNCIPC, alongside increasing job satisfaction.
- High intention to leave by staff in this survey indicates a workforce under pressure. Nurses who have worked through COVID-19 are at greater risk of burnout. Providing **psychological supports** to frontline workers is important, particularly those considering leaving their current job.
- While not a finding of this study, the literature explored shows that IPC and HAIs are not explicitly taught to undergraduate nursing students as stand-alone modules. Given the importance of IPC, it is timely that a needs analysis and review of the educational landscape should take place by **educators and those involved in curriculum development in higher education institutes** that are responsible for nurse education at both undergraduate and postgraduate level.
- One possible benefit of the COVID-19 pandemic is that patients are much more aware of the importance of hygiene practices and the role of IPC in keeping patients safe. As far back as 2009, researchers in patient safety have been calling for patients to be more active participants in their own IPC care (Leape *et al*., 2009). Perhaps now is the time to capitalise on the learnings from COVID-19 and **hospital managers** could take the opportunity to implement measures to educate patients on infection prevention within hospital care settings for their own benefit.
- In the context of hospital care delivery, IPC concerns not only nurses and patients, but everyone who enters a hospital. A **public health-led** publicity campaign like those seen during the pandemic aimed at the public highlighting the importance of IPC in hospital and healthcare settings in the prevention of HAIs would likely increase understanding and compliance by the general public which could help in the fight against HAIs.

6.4 Study Limitations

Data for this survey was captured at a point in time and needs to be interpreted in that context. For example, access to PPE was assured for most hospital staff, which had the survey been conducted earlier in the pandemic, may not have been the case. COVID-19 vaccination for nurses was already well underway by March 2022 when the study was conducted, and as such, represents nurse experiences at that time. Because this study was conducted in the context of COVID-19, it is difficult to isolate the experiences of nurses or understand what IPC challenges pre-existed the pandemic. Repeating this study post-COVID-19 may offer comparative data.

Additionally, the low response rate was likely affected by a combination of the convenience sampling technique used combined with research fatigue and survey length. There was a lower response from the private hospitals compared to the public hospitals, which meant they had to be excluded from a number of the inferential tests. Because of the low number of participants, there was an uneven distribution of nurse roles, a factor that had to be considered in terms of the inferential tests that could be applied. Details of the tests used to analyse the data in this study are explained in the methodology chapter (3.6 to 3.6.11 on pp. 34-38). The use of self-reported data may underestimate the amount of MNCIPC care but using a number of previously validated research instruments together can improve response validity. Additionally, the use of the WHO research template meant this study reflected individual factors which enhances responses on both the MNCIPC and PES-NWI instruments which focus on structural factors.

A criticism of quantitative survey research is that it does not allow for clarification of answers, and this was a limitation of this study. A further limitation of self-reported data is that it can introduce bias with the participation of groups with a greater degree of accountability. However, for this study respondents with greater accountability are likely to have provided answers that are a true reflection of their practices. Because of the cross-sectional design of the study, the relationships between factors established in this study are correlational and causal relationships cannot be determined or conclusions generalised.

Despite the limitations outlined above, the use of the three validated research instruments has provided a multi-faceted picture of the barriers and facilitators of IPC care at an individual, organisational, and structural level in the acute Irish hospital sector. Additionally, a pilot study was conducted in advance of the main study to examine the suitability of research tools and feedback was considered in the final survey. Further details of the pilot study can be found in in the methodology chapter (3.5.3, p. 33). The study also provides new knowledge in the area of MNCIPC care, using a research instrument not used previously in Ireland.

6.5 Recommendations for future Research

Repeating this study with the co-operation of the acute hospital sector and in collaboration with directors of nursing in each hospital as was originally intended, would likely result in greater promotion of the study, a higher response rate and more even distribution of nurse roles for comparison purposes. The addition of a qualitative element, also previously intended, could help provide clarity and insight into areas of uncertainty such as nurse interpretation of SPs, TPs and aspects of MNCIPC shown in this study to have a degree of uncertainty attached to them. Given the finding in this study of high levels of missed HH, the opportunity to carry out an

observational study on HH practices alongside the quantitative and qualitative elements would triangulate the data to allow researchers to develop a comprehensive understanding of MNCIPC.

It is also recommended that a scoping exercise be carried out with the co-operation of the acute hospital sector to understand the level of preparedness and what lessons have been learned from COVID-19 to deal with future pandemics. It is suggested that all nurse grades have a voice in future research around COVID-19, given they have the lived-experience of caring for patients at a time of heightened anxiety. The current study shows that staff nurses, in particular, have felt excluded from decision-making processes. It is, therefore, particularly important they be front and centre in future research, given they were front and centre in patient care during COVID-19.

6.6 Concluding Comments

The prevention and control of infection is critical in high-functioning healthcare systems and remains the cornerstone strategy in the prevention of HAIs. Nurses in this study with their low tendency to MNCIPC have demonstrated their commitment to infection prevention but have to contend with multiple and dynamic responsibilities in their effort to provide safe patient care. The findings of this study point to a need for additional resources, including changes in the physical environment and at organisational level. Inadequately staffed and resourced units also prevent nurses from carrying out IPC care to the standard required and needs to be addressed.

The raised and positive profile of nursing in the early stages of the pandemic appeared to bring benefits in terms of potential recruitment to and retention in the profession. Three years later, that enthusiasm appears to have dwindled. Recruitment and retention of nurses is challenging for the health service, but unless additional staff are employed and effectively supported and retained, nurses will not be able to implement IPC measures to the standard required to help prevent HAIs, keep patients safe and respond quickly to future pandemics.

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8. Appendices

Appendix A (Table 26 to Table 75 and Figures 4 and 5)

Table 26. Workplace and Service Length

Place of Work and Length of Service		N	%
Hospital Model			
Model 1	Community/District Hospital	5	4.4
Model 2	General with in/outpatient care to low risk patients	3	2.7
Model 2-S	As Model 2 plus intermediate elective surgery	3	2.7
Model 3	General/Teaching, Acute Medical, Surgical, ED & ICU	30	26.5
Model 4	As Model 3 plus tertiary referral & higher level	57	50.4
Unit			
Medical Unit		18	15.9
Surgical Unit		23	20.4
Mixed Medical/Surgical Unit		11	9.7
Critical Care/Intensive Care Unit		38	33.6
Emergency Department		9	8.0
Infection Prevention & Control Department		11	9.7
None of the Above		3	2.7
Length of Service as a Registered Nurse			
Up to 1 year		8	7.1
1 to 5 years		24	21.2
5 to 10 years		19	16.8
10 to 20 years		23	20.4
Over 20 years		39	34.5
Received your basic nursing education			
Republic of Ireland		87	77.0
UK		10	8.9
India		8	7.0
Philippines		5	4.4
France		1	0.9
Spain		1	0.9
Romania		1	0.9

Figure 4. Nurse Age Profile

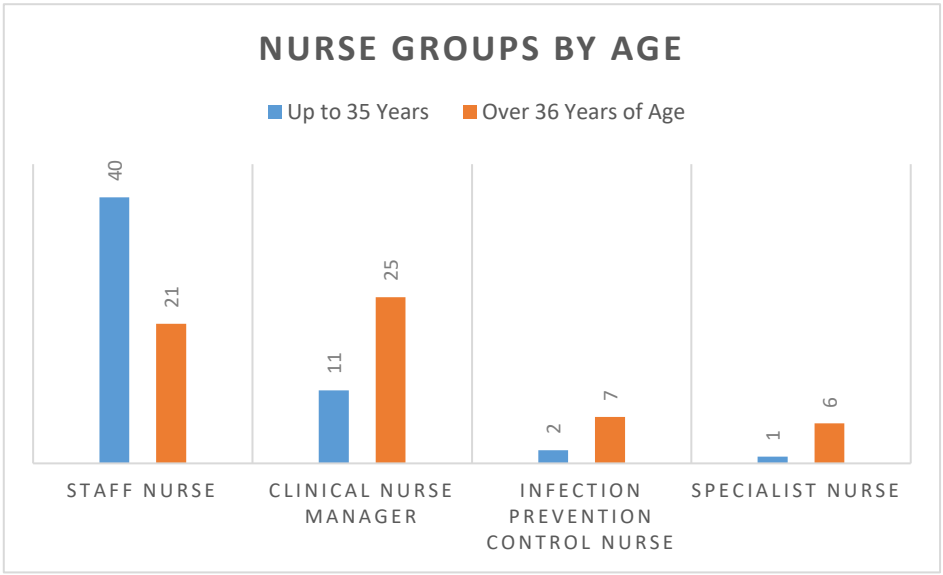


Table 27. Intention to Leave

Intention to Leave Breakdown		YES	NO
Working	N	%	%
Full-time	96	57.3	42.7
Part-time	17	35.3	64.7
Years working as a Registered Nurse			
Up to 10 Years	51	70.6	29.4
10 to 20 Years	23	43.5	56.5
Over 20 Years	39	38.5	61.5
Hospital Sector			
Private Hospital	15	20.0	80.0
Model 1 Public Hospital	5	20.0	80.0
Model 2 Public Hospital	3	66.7	33.3
Model 2-S Public Hospital	3	100.0	0.0
Model 3 Public Hospital	30	63.3	36.7
Model 4 Public Hospital	57	57.9	42.1
Nursing Role			
Staff Nurse	61	65.6	34.4
Clinical nurse Manager	36	44.4	55.6
Infection Prevention & Control Nurse	9	33.3	66.7
Specialist Nurse Group	7	28.6	71.4
Unit			
Medical Unit	18	83.3	16.7
Surgical Unit	23	43.5	56.5
Mixed Medical/Surgical Unit	11	45.5	54.5
Critical Care/Intensive Care Unit	38	55.3	44.7
Emergency Department	9	55.5	44.5
Infection Prevention & Control Department	11	36.4	63.6
None of the above units	3	33.3	66.7
Age Groups			
Up to 30	31	74.2	25.8
31 to 40	33	48.5	51.5
41 to 50	28	46.4	53.6
51 to 60	17	52.9	47.1
Over 60	4	00.0	100.0

Figure 5. Nurse Education Level

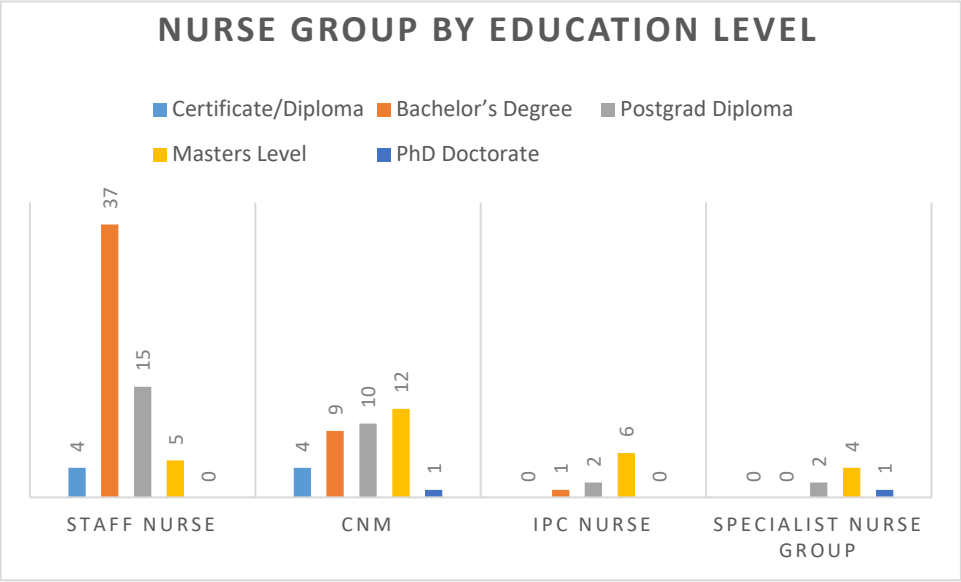


Table 28. SP and TPs compliance by Hospital

	N	Poor %	Fair %	Good %	Excellent %
23. How would you rate **Standard Precautions compliance** in your place of work?					
Private Hospital	12	8.3	8.3	83.4	0.0
Model 1	5	0.0	60.0	40.0	00.0
Model 2	3	0.0	00.0	66.7	33.3
Model 2-S	2	0.0	00.0	100.0	00.0
Model 3	30	3.4	33.3	63.3	00.0
Model 4	53	1.9	17.0	58.5	22.6
24. How would you rate **Transmission based Precautions** compliance in your place of work?					
Private Hospital	12	0.0	8.3	83.4	8.3
Model 1	5	0.0	60.0	40.0	00.0
Model 2	3	0.0	33.3	33.3	33.4
Model 2-S	2	0.0	00.0	100.0	00.0
Model 3	30	3.3	33.3	53.4	10.0
Model 4	53	3.8	7.5	66.0	22.6

Items scored on a four-point scale - (1) Poor 2) Fair (3) Good (4) Excellent

Table 29. SP and TPs Workplace Compliance

Compliance with Standard & Transmission Precautions	Poor %	Fair %	Good %	Excellent %
23. How would you rate **compliance with Standard Precautions** in your place of work?	2.9	21.9	62.9	12.3
24. How would you rate compliance with **Transmission based Precautions** in your place of work?	2.9	18.1	62.8	16.2

Table 30. Workplace IPC Priority and HAI Inevitability

	Strongly Agree %	Agree %	Undec-ided %	Dis-agree %	Strongly Disagree %
25. In your place of work, IPC activities are given enough priority when compared to other nursing activities	17.3	48.1	14.4	18.3	1.9
26. Healthcare Associated Infections are inevitable in healthcare settings	3.8	35.6	15.4	38.5	6.7

Table 31. IPC Priority and HAI Hospital Comparison

	N	Strongly Agree %	Agree %	Undec-ided %	Dis-agree %	Strongly Disagree %
25. In your workplace, IPC activities are given enough priority compared to other nursing activities						
Private Hospital	12	8.3	66.7	16.7	8.3	0.0
Model 1	5	40.0	60.0	0.0	0.0	0.0
Model 2	3	66.7	0.0	33.3	0.0	0.0
Model 2-S	2	0.0	100.0	0.0	0.0	0.0
Model 3	30	13.3	36.7	16.6	26.7	6.7
Model 4	52	21.2	46.2	13.5	19.2	0.0
26. Healthcare Associated Infections are inevitable in healthcare setting						
Private Hospital	12	0.0	25.0	16.7	50.0	8.3
Model 1	5	0.0	40.0	20.0	0.0	40.0
Model 2	3	0.0	33.3	66.7	0.0	0.0
Model 2-S	2	0.0	50.0	0.0	50.0	0.0
Model 3	30	6.7	33.3	30.0	30.0	0.0
Model 4	52	3.8	38.5	3.8	46.2	7.7

Table 32. Frequency of MNCIPC Items

How **FREQUENTLY** are the following elements of infection control/care **MISSED** (including by you) in your place of work?

		Unsure	Never Missed	Rarely Missed	Occasionally missed	Frequently Missed	Always Missed
21_1.	Hand hygiene is performed before touching a patient	0.0	18.6	31.0	30.1	20.4	0.0
21_2.	Hand hygiene is completed before a procedure is undertaken	0.0	35.4	50.4	10.6	3.5	0.0
21_3.	Hand hygiene is performed after a procedure is completed	0.0	34.5	38.9	23.0	3.5	0.0
21_4.	Hand hygiene is completed after touching a patient	0.0	18.6	37.2	23.9	20.4	0.0
21_5.	Hand hygiene is completed before drug administration	0.9	17.7	23.9	31.9	23.9	1.8
21_6.	Equipment is cleaned before it touches a patient	2.7	19.5	24.8	30.1	21.2	1.8
21_7.	Appropriate PPE (i.e. gloves/gowns are used when providing direct care to patients who have a transmissible disease (e.g. MDRO)	0.0	38.9	43.4	15.9	1.8	0.0
21_8.	Correct order is used when donning PPE: gown first, then gloves to ensure that they are pulled over the gown cuff so no skin is exposed	0.0	27.4	40.7	25.7	6.2	0.0
21_9.	Gloves are changed when staff move from a contaminated/dirty site (e.g. wound to a clean site)	1.8	36.3	42.5	13.3	6.2	0.0
21_10.	Touch contamination avoided. Not scratching nose/adjusting glasses after hands have been in contact with a patient/surface in a room of a patient with a MDRO	5.3	20.4	43.4	22.1	8.8	0.0
21_11.	Gloves are removed before taking off the gown	4.4	29.2	37.2	22.1	4.4	2.7
21_12.	Hand hygiene is undertaken following gown removal	0.0	41.6	37.2	11.5	8.0	1.8
21_13.	Facial equipment is removed before hands are washed	2.7	26.5	40.7	22.1	6.2	1.8
21_14.	Goggles and mask or mask-face shield is always worn when caring for a patient on respiratory/droplet precautions	0.0	38.1	36.3	17.7	7.1	0.9
21_15.	All new admissions are screened for MDROs	7.1	40.7	31.9	12.4	7.1	0.9
21_16.	Appropriate signage displayed informing staff & visitors of the need for transmission-based precautions when managing MDRO patients	1.8	43.4	31.9	13.3	8.8	0.9
21_17.	Patients are invited or assisted to perform hand hygiene following use of a bedpan or urinal in bed	10.6	14.2	30.1	17.7	23.9	3.5
21_18.	Patients are showered pre-operatively	21.2	31.9	24.8	10.6	6.2	5.3
21_19.	Catheter care is performed TDS (8hourly)	14.2	15.9	21.2	26.5	15.9	6.2
21_20.	Oral care/teeth are cleaned at least daily	13.3	30.1	22.1	19.5	14.2	0.9
21_21.	Intravenous cannulas are swabbed with an alcohol based cleansing agent for 15 seconds, allowed to dry for 15 seconds before flushing or administering meds	5.3	32.7	31.9	11.5	16.8	1.8

How **FREQUENTLY** are the following elements of infection control/care **MISSED** (including by you) in your place of work?

		Unsure	Never Missed	Rarely Missed	Occasionally missed	Frequently Missed	Always Missed
21_22.	Gloves are always worn for both preparing and administration of all antibiotics	1.8	33.6	38.9	16.8	7.1	1.8
21_23.	The nurse follows up with medical officer/ senior nurse if patient has indications of infection (temp increase, presence of new swelling or pus)	0.9	60.2	34.5	3.5	0.0	0.9
21_24.	Healthcare organisation documentation specifies the MDRO status (with or without of patients on their admission	6.2	32.7	37.2	12.4	8.0	3.5
21_25.	Documentation about the MDRO status of a patient is completed when patient is discharged	20.4	18.6	31.0	15.0	9.7	5.3
21_26.	Nurses use documentation to report follow-up of pathology test/outcomes (wound swabs, MDRO screens)	7.1	23.9	44.2	16.8	7.1	0.9
21_27.	Nurses handover/communicate information re. patient MDRO infection status at staff handover/change time	1.8	39.8	46.9	9.7	1.8	0.0
21_28.	Nurses handover/communicate patient MDRO/infection status on transfer to new depart (x-ray, theatre or new ward)	2.7	36.3	39.8	15.0	6.2	0.0
21_29.	Cleaning/support staff wear appropriate PPE (personal protective equipment)	2.7	36.3	33.6	15.9	8.8	2.7
21_30.	Cleaning/support staff adhere to signage posted for transmission-based precautions	2.7	34.5	33.6	23.0	4.4	1.8
21_31.	Cleaning/support staff fully clean rooms in between different patients' movement from bed units	3.5	60.2	16.8	9.7	8.0	1.8
21_32.	Cleaning/support staff fully clean rooms following discharge/transfer of an infectious patient	1.8	69.0	20.4	4.4	2.7	1.8
21_33.	The patient's bed table is cleaned before the patient receives food tray	14.2	9.7	15.9	21.2	23.9	15.0
21_34.	Staff decontaminate spills of blood & other body substances (e.g. vomit, urine & spills are correctly contained)	2.7	39.8	38.1	15.0	3.5	0.9
21_35.	Packaged sterile instruments and equipment are stored correctly to ensure sterility prior to patient use	3.5	66.4	25.7	2.7	1.8	0.0
21_36.	Hand hygiene is performed after exposure to body fluids	0.9	78.8	17.7	1.8	0.0	0.9
21_37.	Hand hygiene is completed after drug administration	1.8	19.5	31.9	28.3	15.9	2.7

0) Unsure or N/A; 1) Never Missed; 2) Rarely Missed; 3) Occasionally Missed; 4) Frequently Missed; 5) Always Missed

Independent *t-test* Results on Frequency of MNCIPC

Table 33. Frequency of MNCIPC by Favourable/Unfavourable Work Environment

Frequency of MNCIPC Care by Nurses by Favourable and Unfavourable Work Environments

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's Test
Unfavourable Environment	41	88.07	22.96	1.66	96	.099	.343	.259
Favourable Environment	57	80.65	20.55					

There was ***no statistically significant difference*** in the scores for Unfavourable (*M* = 88.07, *SD* = 22.96) and Favourable (*M* = 80.65, *SD* = 20.55); *t* (96) = 1.66 *p* = .259, two-tailed). The magnitude of the difference in the means (mean difference 2.50, *CI*: -.065 to .750) is low as interpreted by Cohen's d (.343) which measures the effect size by standardising the differences between two groups.

Table 34. Frequency of MNCIPC Comparison between Staff and Other Nurses

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's Test
Staff Nurse Group	61	70.82	18.66	-1.41	111	.161	-.267	.779
All Other Nurses	52	75.94	19.85					

Scores for group expressing 'intention to leave' and the group declaring 'no intention to leave' scores were compared. There was no statistically significant difference between the scores for the 'Staff Nurse Group' (*M* = 70.82 *SD* = 18.66) and 'Other Nurses Group' (*M* = 75.94, *SD* = 19.85); *t* (111) = -1.41 *p* = .161, two-tailed). The magnitude of the difference in the means (mean difference 0.10, *CI*: -0.97 to .29) is small as interpreted by Cohen's d (-.267) which measures the effect size by standardising the differences between two groups.

Table 35. Frequency of MNCIPC by Intention to Leave

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's Test
Intention to Leave	61	2.02	.538	0.99	111	.320	.522	.566
No intention to leave	52	1.92	.502					

Scores for group expressing 'intention to leave' and the group declaring 'no intention to leave' scores were compared. There was ***no*** *statistically significant difference* between the scores for the 'Intention to Leave' Group (*M* = 2.02 *SD* = 0.54) and 'No Intention to Leave' Group (*M* = 1.92, *SD* = 0.50); *t* (111) = 0.99 *p* = .320, two-tailed). The magnitude of the difference in the means (mean difference 0.10, *CI*: -0.97 to .29) is large as interpreted by Cohen's d (.52) which measures the effect size by standardising the differences between two groups.

Table 36. Frequency of MNCIPC Surveillance by Hospital Group t-test result

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's *Test*
Grouped Hospitals	41	16.97	4.57	2.78	96	.007	.569	.542
Model 4 Hospitals	57	14.47	4.26					

There was a statistically significant difference in the scores for Grouped Hospitals (*M* = 16.97, *SD* = 4.57) and Model 4 Hospitals (*M* = 14.47, *SD* = 4.26); *t* (96) = 2.78 *p* = .007, two-tailed). The magnitude of the difference in the means (mean difference 2.50, *CI*: - 0.71 to 4.28) is moderate as interpreted by Cohen's d (.569) which measures the effect size by standardising the differences between two groups.

Table 37. Compliance with SPs and TPs Hospital Group Comparison t-test result

23. How would you rate **compliance** with **Standard Precautions in your place of work**?

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's Test
Grouped Hospitals	40	2.65	.580	-2.72	91	.008	-.570	.509
Model 4 Hospitals	53	3.02	.693					

Scores for Grouped Hospitals (Models 1,2,2-S and Model 3) and Model 4 hospital were compared. There was a statistically significant difference in the scores for Grouped Hospitals (*M* = 2.65, *SD* = 0.58) and Model 4 Hospitals (*M* = 3.02, *SD* = 0.69); *t* (91) = -2.72, *p* = .008, two-tailed). The magnitude of the difference in the means (mean difference -0.37, *CI*: -0.64 to -0.10) is moderate as interpreted by Cohen's d (-.570) which measures the effect size by standardising the differences between two groups.

24. How would you rate **compliance** with **transmission-based precautions in your place of work**?

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's Test
Grouped Hospitals	40	2.70	.687	-2.64	91	.010	-.552	.111
Model 4 Hospitals	53	3.08	.675					

Scores for Grouped Hospitals (Models 1,2,2-S and Model 3) and Model 4 hospital were compared. There was a statistically significant difference in the scores rating compliance with transmission-based precautions in place of work for Grouped Hospitals (*M* = 2.70, *SD* = 0.69) and Model 4 Hospitals (*M* = 3.08, *SD* = 0.67); *t* (91) = -2.64 = *p* .010, two-tailed). The magnitude of the difference in the means (mean difference -0.37, *CI*: -0.66 to -0.92) is moderate as interpreted by Cohen's d (-.552) which measures the effect size by standardising the differences between the two groups.

ANOVA Test Results on Frequency of MNCIPC Items

Table 38. Between Nurse Group 'Gloves removed before gown' ANOVA result

Gloves are removed before taking off the gown

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's *Test*
Staff Nurse	61	1.74	1.12	3.26	109	.024	.082	.144
Clinical Nurse Manager	36	2.36	0.93					
IPC Nurse	9	2.11	0.60					
Specialist Nurse Group	7	2.43	0.98					

There was a statistically significant difference at the $p<.05$ level in the sub-scale scores for the four groups – $F(3, 109) = 3.26$, $p= .024$. The medium effect size at .082, calculated using eta-squared, explains the variance between the groups. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Staff Nurses ($M = 1.74$, $SD = 1.12$) was significantly different from Clinical Nurse Managers ($M = 2.36$, $SD = 0.93$). The Specialist nurse group ($M = 2.43$, $SD = 0.97$) and IPC Nurses ($M = 2.11$, $SD = 0.60$) did not differ significantly from staff nurses or Clinical Nurse Managers.

Table 39. Between Nurse Groups Hand Hygiene after gown removal ANOVA result

Hand hygiene is undertaken following gown removal

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's *Test*
Staff Nurse	61	1.72	0.93	3.02	109	.033	.077	.909
Clinical Nurse Manager	36	2.08	0.99					
IPC Nurse	9	2.67	1.12					
Specialist Nurse Group	7	1.71	1.11					

There was a statistically significant difference at the $p<.05$ level in the variable score for the four groups – $F(3, 109) = 3.02$, $p= .033$. The moderate effect size at .077, calculated using eta-squared, explains the variance between the groups. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Staff Nurses ($M = 1.72$, $SD = 0.93$) was significantly different from IPC Nurses ($M = 2.67$, $SD = 1.12$). Clinical Nurse Managers ($M = 2.08$, $SD = 0.99$) and the Specialist nurse group ($M = 1.71$, $SD = 1.11$) did not differ significantly from either staff or IPC nurses.

Table 40. Between Nurse Groups Handover re MDRO status ANOVA result

Nurses handover/communication information re patient MDRO/infection status at staff handover/change time

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's *Test*
Staff Nurse	61	1.52	0.67	2.92	109	.037	.074	.251
Clinical Nurse Manager	36	1.97	0.74					
IPC Nurse	9	1.78	0.67					
Specialist Nurse Group	7	1.71	1.11					

There was a statistically significant difference at the $p<.05$ level in the sub-scale scores for the four groups – $F(3, 109) = 2.92$, $p= .037$. The moderate effect size at .074 was calculated using eta-squared which explains the variance between the groups. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Clinical Nurse Managers ($M = 1.97$, $SD = 0.74$) was significantly different from Staff Nurses ($M = 1.52$, $SD = 0.67$). IPC Nurses ($M = 1.78$, $SD = 0.67$) and the Specialist nurse group ($M = 1.71$, $SD = 1.11$) did not differ significantly from the staff nurse group or clinical nurse managers.

Table 41. Between Nurse Groups Table is cleaned before food delivery ANOVA Result

The patient's bed table is cleaned before the patient receives the food tray

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's *Test*
Staff Nurse	61	2.77	1.51	4.30	109	.007	.106	.830
Clinical Nurse Manager	36	3.00	1.64					
IPC Nurse	9	1.11	1.36					
Specialist Nurse Group	7	3.57	1.72					

There was a statistically significant difference at the $p<.05$ level in the scores for the four groups – $F(3, 109) = 4.30$, $p= .007$. The high effect size, at .106 was calculated using eta-squared and explains the variance between the groups. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for IPC Nurses ($M = 1.11$, $SD = 1.36$) was significantly different from Staff Nurses ($M = 2.77$, $SD = 1.51$), Clinical Nurse Managers ($M = 3.00$, $SD = 1.64$) and the specialist nurse group ($M = 3.57$, $SD = 1.71$)

Table 42. Reasons for MNCIPC

	REASONS for missed care in your Ward/Unit	Strongly Disagree %	Somewhat Disagree %	Neither Agree or Disagree %	Somewhat Agree %	Strongly Agree %
22_1.	Inadequate no. of nursing staff on ward/unit	11.4	15.2	6.7	30.5	36.2
22_2.	Inadequate skill mix of nursing staff allocated for patient care	7.6	15.2	6.7	42.9	27.6
22_3.	Urgent patient situation (e.g., patient condition worsening)	5.7	5.7	4.8	42.9	41.0
22_4.	Unexpected rise in patient volume and/or acuity on the ward/unit	4.8	14.3	11.4	38.1	31.4
22_5.	Inadequate number of medical staff	9.5	15.2	13.3	37.1	24.8
22_6.	Inadequate number of clerical staff	21.9	17.1	23.8	21.0	16.2
22_7.	Inadequate number of cleaning/support staff	17.1	25.7	13.3	25.7	18.1
22_8.	Unbalanced patient assignment/allocation to nursing staff	7.6	12.4	9.5	43.8	26.7
22_9.	Inadequate handover from previous shift	7.6	21.0	23.8	34.3	13.3
22_10.	Nurses have inadequate education/knowledge of infection control practices	29.5	35.2	14.3	16.2	4.8
22_11.	Nurses have inadequate understanding of transmission-based precautions	29.5	32.4	13.3	21.0	3.8
22_12.	Sterile supplies/equipment not available when needed	31.4	30.5	12.4	18.1	7.6
22_13.	Patient room allocation made without consideration to principles of infection control	24.8	24.8	12.4	27.6	10.5
22_14.	Patient room overcrowded/cluttered with equipment/supplies	13.3	13.3	6.7	48.6	18.1
22_15.	Patients have to share bathrooms	12.4	2.9	14.3	32.4	38.1
22_16.	Inadequate places to store belongings (e.g. blankets, patient personal belongings)	10.5	10.5	7.6	41.0	30.5
22_17.	Ward culture does not support infection control activities	29.5	30.5	15.2	14.3	10.5
22_18.	Lack of nursing control over infection control activities	21.0	27.6	15.2	25.7	10.5
22_19.	Lack of prompts in patient records to check for pyrexia or any other signs of infection	40.0	31.4	14.3	6.7	7.6
22_20.	Lack of support from hospital management for resources to undertake infection control activities	21.0	23.8	16.2	25.7	13.3
22_21.	Lack of support from hospital management for committees governing infection control activities	19.0	21.9	19.0	24.8	15.2
22_22.	Patient room/bays lack sinks for handwashing	34.3	27.6	9.5	12.4	16.2
22_23.	Lack of cleaning schedule for environmental cleaning in clinical areas	31.4	25.7	14.3	12.4	16.2
22_24.	Insufficient plastic puncture-proof containers for sharps/used needles	41.9	27.6	9.5	11.4	9.5

Items scored on a five-point scale (1) Strongly Disagree (2) Somewhat Disagree (3) Neither Agree nor Disagree (4) Somewhat Agree (5) Strongly Agree.

Independent *t-test* Results – Reasons for Missed IPC Care

Table 43. MNCIPC IPC Resource Subscale Hospital Comparison t-test Result

Hospital Groups Comparison on Reasons for MNCIPC Care IPC Resource Subscale

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's Test
Grouped Hospitals	40	28.47	9.73	2.86	91	.005	.600	.910
Model 4 Hospitals	53	22.71	9.50					

Scores for Grouped Hospitals (Models 1,2,2-S and Model 3) and Model 4 hospital scores were compared. There was a statistically significant difference in the scores for Grouped Hospitals (*M* = 28.47, *SD* = 9.73) and Model 4 Hospitals (*M* = 22.71, *SD* = 9.50); *t* (91) = 2.86 *p* = .005, two-tailed). The magnitude of the difference in the means (mean difference 5.75, *CI*: 1.76 to 9.77) is moderate as interpreted by Cohen's d (.600) which measures the effect size by standardising the differences between two groups.

Table 44. MNCIPC Staffing Allocation Subscale Hospital Comparison t-test Result

Hospital Groups Comparison on Reasons for MNCIPC Care Staffing Allocation Subscale

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's Test
Grouped Hospitals	40	30.62	6.65	2.65	91	.009	.555	.910
Model 4 Hospitals	53	26.75	7.20					

Scores for Grouped Hospitals (Models 1,2,2-S and Model 3) and Model 4 hospital scores were compared. There was a statistically significant difference in the scores for Grouped Hospitals (*M* = 30.62, *SD* = 6.65) and Model 4 Hospitals (*M* = 26.75, *SD* = 7.20); *t* (91) = 2.65, *p* = .009, two-tailed). The magnitude of the difference in the means (mean difference 3.87, *CI*: 0.96 to 6.77) is moderate as interpreted by Cohen's d (.555) which measures the effect size by standardising the differences between two groups.

Table 45. Intention to Leave or Not Comparison on Frequency of MNCIPC

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's Test
Intention to Leave	61	2.02	.538	0.99	111	.320	.522	.566
No intention to leave	52	1.92	.502					

Scores for group expressing 'intention to leave' and the group declaring 'no intention to leave' scores were compared. There was ***no*** *statistically significant difference* between the scores for the 'Intention to Leave' Group (*M* = 2.02 *SD* = 0.54) and 'No Intention to Leave' Group (*M* = 1.92, *SD* = 0.50); *t* (111) = 0.99 *p* = .320, two-tailed). The magnitude of the difference in the means (mean difference 0.10, *CI*: -0.97 to .29) is large as interpreted by Cohen's d (.52) which measures the effect size by standardising the differences between two groups.

Table 46. Regression Logistic Analysis on Intention to Leave

Independent Variable	B	SE	Wald	Df	P	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Working between 10 and 20 Years as a RN	1.405	.499	7.920	1	.005	4.076	1.532	10.846
Working up to 10 Years as a RN	1.147	.557	4.233	1	.040	3.148	1.056	9.384

Direct logistic regression was carried out to assess the impact of three independent variables (age, unit of work, and years working as a RN) on intention to leave current hospital due to job dissatisfaction. The full model did not reach statistical significance. However, as a whole the model correctly classified 65.5% of the cases and explained between 16.2% (Cox and Snell R square) and 21.6% (Nagelkerke R squared) of the variance in intention to leave current hospital job. Only one independent variable (working as a RN for between 10 and 20 years) made a unique statistically significant contribution to the model. This group recorded an odds ratio of 4.07 indicating they were over four times more likely to express intention to leave their current hospital job due to dissatisfaction, controlling for all other factors in the model. Although the independent variable (RN group working up to ten years) did not reach statistical significance as a predictor, the odds ratio for this group at 3.15 indicates they were over three times more likely to express an intention to leave their current job due to dissatisfaction, controlling for all other factors in the model.

ANOVA Test Results – Reasons for Missed IPC Control Items

Table 47. Nurse Group Comparison on Lack of Control over IPC activities ANOVA Result

Lack of Nursing Control over Infection Control Activities

Staff Role	*N*	*M*	*SD*	*F*	*df*	*p*	eta-squared	Levene's Test
Staff Nurse	57	3.07	1.22	4.86	101	.003	.126	.118
CNM	34	2.74	1.40					
IPC Nurse	7	1.57	0.79					
Specialist Nurse	7	1.71	1.11					

A one-way between nurse role analysis of variance was conducted to explore the impact of nurse role on the question 'Lack of nursing control over infection control activities'. The respondents were divided into four nurse role groups (Staff Nurse; Clinical Nurse Manager; IPC Nurse; Specialist Nurse). There was a statistically significant difference at the $p<.05$ level in the sub-scale scores for the four groups – $F(3, 101) = 4.86$, $p= .003$. The high effect size at .126, calculated using eta-squared explains the variance between the groups. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Staff Nurses ($M = 3.07$, $SD = 1.22$) was significantly different from IPC Nurses ($M = 1.57$, $SD =0.79$) and Specialist nurse group ($M = 1.71$, $SD = 1.11$). Clinical Nurse Managers ($M = 2.74$, $SD = 1.40$) did not differ significantly from the three other nurse groups.

Table 48. Between Units of Work Comparison on MNCIPC Scale ANOVA Result

Reasons for MNCIPC Scale

Unit of Work	*N*	*M*	*SD*	*F*	*df*	*p*	eta-squared	Levene's Test
Medical Unit	16	71.25	19.07	3.18	98	.007	.163	.496
Surgical Unit	23	70.30	12.40					
Mixed Medical/Surgical	10	66.80	15.55					
Critical Care/ICU	35	59.00	16.16					
Emergency Department	9	78.44	17.12					
IPC Department	9	56.67	16.52					
Other	3	64.33	4.72					

A one-way analysis of variance was conducted to explore whether the unit of work influenced the overall Reasons for MNCIPC Scale. The respondents were divided into seven groups based on the units in which they worked (1=Medical Unit, 2=Surgical Unit, 3=Mixed Medical/Surgical Unit, 4=Critical Care/Intensive Care Unit, 5=Emergency Depart, 6=IPC Depart, 7=Other). There was a statistically significant difference at the $p<.05$ level in the overall scale scores for the seven groups – $F(6, 98) = 3.18$, $p= .007$. The high effect size at .163, was calculated using eta-squared explaining the variance between the groups. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Group 4 ($M = 59.00$, $SD = 16.16$) was significantly different from Group 5 ($M = 78.44$, $SD = 17.12$). Group 1 ($M = 71.25$, $SD = 19.07$), Group 2 ($M = 70.30$, $SD = 12.40$), Group 3 ($M = 66.80$, $SD = 15.55$), Group 6 ($M = 56.67$, $SD = 16.52$) and Group 7 ($M = 64.33$, $SD = 4.72$) did not differ significantly from Group 4 or Group 5.

Table 49. Between Units Comparison on IPC Resource Subscale ANOVA Result

Reasons for MNCIPC IPC Resource Subscale								
Unit of Work	***N***	***M***	***SD***	***F***	***df***	***p***	**eta-squared**	**Levene's Test**
Medical Unit	16	28.19	12.68	2.41	98	.033	.128	.403
Surgical Unit	23	27.87	8.58					
Mixed Medical/Surgical	10	24.90	10.16					
Critical Care/ICU	35	22.17	8.39					
Emergency Department	9	33.11	10.88					
IPC Department	9	21.33	8.70					
Other	3	24.67	2.89					

A one-way analysis of variance was conducted to explore the impact of hospital unit worked in on the IPC Resource Support Scale. The respondents were divided into seven groups based on the units in which they worked (1=Medical Unit, 2=Surgical Unit, 3=Mixed Medical/Surgical Unit, 4=Critical Care/Intensive Care Unit, 5=Emergency Depart, 6=IPC Depart, 7=Other). There was a statistically significant difference at the $p<.05$ level in the overall scale scores for the six groups – $F(6, 98) = 2.41$, $p= .033$. The high effect size at .128 was calculated using eta-squared explaining the variance between the groups. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Group 4 ($M = 22.17$, $SD = 8.39$) was significantly different from Group 5 ($M = 33.11$, $SD = 10.88$). Group 1 ($M = 28.19$, $SD = 12.68$), Group 2 ($M = 27.87$, $SD = 8.58$, Group 3 ($M = 24.90$, $SD = 10.16$), Group 6 ($M = 21.33$, $SD = 8.70$) and Group 7 ($M = 24.67$, $SD = 2.89$) did not differ significantly from Group 4 or Group 5.

Table 50. Associations between factors of MNCIPC Scale

Correlational analysis using Pearson's *r* correlation coefficient showed a significant positive correlation between the 'Hand Hygiene subscale' and 'Surveillance subscale' (r = -.724, n = 105, $p \leq .01$), 'Minimising Hospital Acquired Infections' (r = -.538, n = 105, $p \leq .01$), and 'Minimising Bacterial Colonisation' (r = -.600, n = 105, $p \leq .01$). Similarly, 'Surveillance' is significantly correlated to 'Minimising HAIs' (r = -.602, n = 105, $p \leq .01$), and 'Specific Precautions' (r = -.691, n = 105, $p \leq .01$) and 'Minimising Bacterial Colonisation' (r = -.589, n = -15, $p \leq .01$). Likewise, 'Minimising Hospital Acquired Infections is significantly positively correlated with 'Specific Precautions' (r = -.594, n = 105, $p \leq .01$) and 'Minimising Bacterial Colonisation' (r = -.643, n = -15, $p \leq .01$). There is also a positive correlation between 'Specific Precautions' and 'Minimising Bacterial Colonisation' (r = -.554, n = 105, $p \leq .01$)

Table 51. PES-NWI Responses

	Strongly Agree %	Agree %	Dis-agree %	Strongly disagree %
1. Adequate support services to allow me spend time with my patients	14.6	28.1	34.4	22.0
2. Physicians and nurses have good working relationships	21.9	63.5	11.5	3.1
3. A supervisory staff (clinical & senior management) that is supportive of nurses	17.7	50.0	24.0	8.3
4. Active staff development or continuing education	24.0	46.9	22.9	6.3
5. Career development and/or clinical ladder opportunity	18.8	45.8	28.1	7.3
6. Opportunity for staff nurses to participate in policy decisions	12.5	20.8	47.9	18.8
7. Supervisors use mistakes as learning opportunities and not criticism	14.6	38.5	34.4	12.5
8. Enough time and opportunity to discuss patient care problems with other nurses	10.4	34.4	43.8	11.5
9. Enough RNs to provide quality patient care	9.4	18.8	46.9	25.0
10. A nurse manager who is a good manager and leader	25.0	50.0	17.7	7.3
11. A director of nursing who is highly visible and accessible to staff	6.3	32.3	31.3	30.2
12. Enough staff to get the work done	10.4	20.8	39.6	29.2
13. Praise and recognition for a job well done	7.3	29.2	39.6	24.0
14. High standards of nursing care are expected by the administration	38.5	56.3	1.0	4.2
15. A director of nursing equal in power & authority to other top-level hospital executives	17.7	44.8	20.8	16.7
16.A lot of teamwork between nurses and physicians	18.8	56.3	22.9	2.1
17. Opportunities for advancement	11.5	54.2	27.1	7.3
18. A clear philosophy of nursing that pervades the patient-care environment	19.8	53.1	20.8	6.3
19. Working with nurses who are clinically competent	21.9	55.2	16.7	6.3
20. A nurse manager who backs up the nursing staff in decision-making even if the conflict is with a physician	22.9	54.2	14.6	8.3
21. Senior hospital management listen and respond to employee concerns	10.4	25.0	39.6	25.0
22. An active quality assurance programme	11.5	45.8	31.3	11.5
23. Staff nurses involved in internal governance (practice and policy committees)	6.3	26.0	44.8	22.9
24. Collaboration between nurses and physicians	12.5	56.3	27.1	4.2
25. A preceptor programme for newly hired RNs	16.7	55.2	16.7	11.5
26. Nursing care is based on a nursing rather than medical model	16.7	59.4	20.8	3.1
27. Staff nurses have the opportunity to serve on hospital and nursing committees	8.3	38.5	33.3	19.8
28. Nursing administrators consult with staff on daily problems and procedures	7.3	41.7	33.3	17.7
29. Written, up-to-date nursing care plans for all patients	12.5	59.4	19.8	8.3
30. Patient care assignments that foster continuity of care (same nurse cares for the patient from one day to next)	19.8	47.9	24.0	8.3
31. Use of nursing diagnoses	8.3	37.5	39.6	14.6

Table 52. Career/Job Satisfaction Responses

Career/Job Satisfaction		Very Dissatisfied %	A little Dissatisfied %	Moderately Satisfied %	Very Satisfied %
18.1	How satisfied are you with your choice of Nursing as a career?	(n=9) 8.0	(n=18) 15.9	(n=55) 48.7	(n=31) 27.4
18.2	How satisfied are you with your current job in your hospital?	(n=10) 8.8	(n=22) 19.5	(n=52) 46.0	(n=29) 25.7

Table 53. Intention to Leave (%)

N = 113		Yes %	No %
19.	If possible, would you leave your current hospital job within the next year, as a result of job dissatisfaction?	54	46

Table 54. Hospital Comparison Satisfaction with Nursing as a Career t-test Result

How **satisfied** are you with your **choice of nursing as a career?**

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's Test
Grouped Hospitals	41	2.68	.934	-2.30	73.48	.024	-.490	.042*
Model 4 Hospitals	57	3.09	.739					

Scores for Grouped Hospitals (Models 1,2,2-S and Model 3) and Model 4 hospital scores were compared. The result obtained is based on *Levene's Equal Variance not assumed. There was a statistically significant difference in the scores for Grouped Hospitals (*M* = 2.68, *SD* = 0.93) and Model 4 Hospitals (*M* = 3.09, *SD* = 0.74); *t* (73.48) = -.2.30 *p* = .024, two-tailed). The magnitude of the difference in the means (mean difference -0.40, *CI*: -0.75 to -0.55) is low as interpreted by Cohen's d (-.490) which measures the effect size by standardising the differences between two groups.

Table 55. Nurse Participation in Hospital Affairs Nurse Score

Nurse Participation in Hospital Affairs Subscale Variables	Staff Nurse Mean & Std. Dev N=51	Clinical Nurse Manager Mean & Std. Dev N=33	IPC Nurse Mean & Std. Dev N=6	Specialist Nurse Mean & Std. Dev N=6	All Respondent Mean & Std. Dev N=96
11. A director of nursing who is highly visible and accessible to staff	2.06 ± 0.90	2.12 ± 1.02	2.50 ± 0.55	2.67 ± 0.82	2.15 ± 0.93
23. Staff nurses involved in internal governance e.g. practice and policy committees	2.12 ± 0.82	2.18 ± 0.92	2.33 ± 0.82	2.17 ± 0.98	2.16 ± 0.85
21. Senior hospital management listen and respond to employee concerns	2.12 ± 0.95	2.12 ± 0.89	3.17 ± 0.98	2.50 ± 0.55	2.21 ± 0.94
6. Opportunity for staff nurses to participate in policy decisions	2.06 ± 0.86	2.45 ± 0.94	2.67 ± 0.82	2.67 ± 1.03	2.27 ± 0.91
27. Staff nurses have the opportunity to serve on hospital and nursing committees	2.35 ± 0.82	2.27 ± 1.00	2.67 ± 0.82	2.50 ± 1.05	2.35 ± 0.89
28. Nursing administrators consult with staff on daily problems and procedures	2.35 ± 0.91	2.33 ± 0.77	3.00 ± 0.63	2.33 ± 1.03	2.39 ± 0.86
15. A director of nursing equal in power & authority to other top-level hospital executives	2.69 ± 0.88	2.42 ± 1.06	3.17 ± 1.17	2.83 ± 0.75	2.64 ± 0.96
17. Opportunities for advancement	2.63 ± 0.75	2.73 ± 0.88	2.67 ± 0.52	3.17 ± 0.41	2.70 ± 0.77
5. Career development and/or clinical ladder opportunity	2.65 ± 0.87	2.76 ± 0.83	3.17 ± 0.75	3.33 ± 0.52	2.76 ± 0.84

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

Table 56. Nurse Foundation for Quality of Care Nurse Score

Nurse Foundation for Quality of Care Variables	Staff Nurse Mean & Std. Dev N=51	Clinical Nurse Manager Mean & Std. Dev N=33	IPC Nurse Mean & Std. Dev N=6	Specialist Nurse Mean & Std. Dev N=6	All Respondent Mean & Std. Dev N=96
31. Use of nursing diagnoses	2.35 ± 0.91	2.39 ± 0.83	2.67 ± 0.52	2.50 ± 0.55	2.40 ± 0.84
22. An active quality assurance programme	2.37 ± 0.87	2.73 ± 0.72	3.17 ± 0.98	2.83 ± 0.75	2.57 ± 0.84
29. Written, up-to-date nursing care plans for all patients	2.73 ± 0.83	2.73 ± 0.76	3.17 ± 0.41	2.83 ± 0.75	2.76 ± 0.78
25. A preceptor programme for newly hired RNs	2.63 ± 0.90	2.82 ± 0.85	3.33 ± 0.52	3.17 ± 0.75	2.77 ± 0.86
30. Patient care assignments that foster continuity of care (the same nurse cares for the patient from one day to the next)	2.86 ± 0.80	2.70 ± 1.01	2.83 ± 0.75	2.67 ± 0.52	2.79 ± 0.86
18. A clear philosophy of nursing that pervades the patient-care environment	2.84 ± 0.78	2.79 ± 0.86	3.50 ± 0.55	2.83 ± 0.75	2.86 ± 0.80
4. Active staff development or continuing education	2.88 ± 0.86	2.79 ± 0.89	3.17 ± 0.75	3.17 ± 0.41	2.89 ± 0.84
26. Nursing care is based on a nursing rather than medical model	2.80 ± 0.63	2.91 ± 0.76	3.50 ± 0.55	3.00 ± 0.89	2.90 ± 0.70
19. Working with nurses who are clinically competent	2.86 ± 0.87	2.88 ± 0.74	3.17 ± 0.41	3.50 ± 0.55	2.93 ± 0.80
14. High standards of nursing care are expected by the administration	3.31 ± 0.71	3.30 ± 0.64	3.33 ± 0.52	3.00 ± 1.09	3.29 ± 0.69

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

Table 57. Nurse Manager Ability/Leadership/Support of Nurses Nurse Score

Nurse Manager Ability, Leadership and Support of Nurses Variable	Staff Nurse Mean & Std. Dev N=51	Clinical Nurse Manager Mean & Std. Dev N=33	IPC Nurse Mean & Std. Dev N=6	Specialist Nurse Mean & Std. Dev N=6	All Respondent Mean & Std. Dev N=96
13. Praise and recognition for a job well done	2.04 ± 0.89	2.30 ± 0.92	2.67 ± 0.82	2.50 ± 0.55	2.20 ± 0.89
7. Supervisors use mistakes as learning opportunities and not criticism	2.47 ± 0.95	2.67 ± 0.89	2.67 ± 0.52	2.50 ± 0.84	2.55 ± 0.89
3. A supervisory staff (clinical & senior management) that is supportive of nurses	2.73 ± 0.90	2.82 ± 0.81	3.00 ± 0.63	2.67 ± 0.82	2.77 ± 0.84
20. A nurse manager who backs up the nursing staff in decision-making even if the conflict is with a physician	2.82 ± 0.93	3.03 ± 0.77	2.67 ± 0.52	3.33 ± 0.52	2.92 ± 0.84
10. A nurse manager who is a good manager and leader	2.80 ± 0.96	3.06 ± 0.75	3.00 ± 0.63	3.17 ± 0.41	2.93 ± 0.85

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

Table 58. Staffing and Resource Adequacy Nurse Score

Staffing and Resource Adequacy Variables	Staff Nurse Mean & Std. Dev N=**51**	Clinical Nurse Manager Mean & Std. Dev N=**33**	IPC Nurse Mean & Std. Dev N=**6**	Specialist Nurse Mean & Std. Dev N=**6**	All Respondent Mean & Std. Dev N=**96**
12. Enough staff to get the work done	2.10 ± 0.92	2.09 ± 1.04	2.50 ± 1.05	2.17 ± 0.75	2.13 ± 0.95
9. Enough RNs to provide quality patient care	2.08 ± 0.84	2.18 ± 1.04	2.17 ± 0.75	2.17 ± 0.75	2.13 ± 0.90
1. Adequate support services to allow me spend time with my patients	2.39 ± 1.02	2.21 ± 1.02	2.67 ± 0.82	2.33 ± 0.82	2.34 ± 0.99
8. Enough time and opportunity to discuss patient care problems with other nurses	2.45 ± 0.86	2.33 ± 0.82	3.00 ± 0.63	2.33 ± 0.82	2.44 ± 0.83

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

Table 59. Collegial Nurse-Physician Relations Nurse Score

Collegial Nurse-Physician Relations Subscale Variables	Staff Nurse Mean & Std. Dev N=**51**	Clinical Nurse Manager Mean & Std. Dev N=**33**	IPC Nurse Mean & Std. Dev N=**6**	Specialist Nurse Mean & Std. Dev N=**6**	All Respondent Mean & Std. Dev N=**96**
24. Collaboration between nurses and physicians	2.84 ± 0.78	2.64 ± 0.65	3.00 ± 0.63	2.67 ± 0.52	2.77 ± 0.72
16. A lot of teamwork between nurses and physicians	2.90 ± 0.75	2.97 ± 0.73	2.83 ± 0.41	2.83 ± 0.41	2.92 ± 0.71
2. Physicians and nurses have good working relationships	3.00 ± 0.80	3.03 ± 0.53	3.17 ± 0.41	3.33 ± 0.52	3.04 ± 0.68

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

ANOVA Test Results on PES-NWI Subscales

Table 60. Between Units of Work PES-NWI Staffing & Resource Adequacy

PES-NWI Staffing and Resource Adequacy Subscale								
Groups Test	***N***	***M***	***SD***	***F***	***df***	***p***	**eta-squared**	**Levene's**
Medical Unit	16	11.87	2.63	3.42	89	.004	.187	.788
Surgical Unit	21	11.47	2.99					
Mixed Medical/Surgical	10	13.50	2.55					
Critical Care/ICU	30	9.57	2.95					
Emergency Department	8	11.62	3.74					
IPC Department	8	9.12	2.69					
Other	3	11.33	1.53					

A one-way analysis of variance was conducted to explore the impact of hospital unit worked on the PES-NWI Staffing and Resource Subscale. The respondents were divided into seven groups based on the units in which they worked (1=Medical Unit, 2=Surgical Unit, 3=Mixed Medical/Surgical Unit, 4=Critical Care/Intensive Care Unit, 5=Emergency Depart, 6=IPC Depart, 7=Other). There was a statistically significant difference at the $p<.05$ level in the overall scale scores for the seven groups – $F(6, 89) = 3.42$, $p= .004$. The high effect size at .187, was calculated using eta-squared explaining the variance between the groups. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Group 3 (Mixed Medical/Surgical (M = 13.50, SD = 2.55) was significantly different from Group 4(Critical Care/ICU) (M = 9.57, SD = 2.95) and Group 6 (IPC Dept) (M = 9.12, SD = 2.69). Group 1 (M = 11.87, SD = 2.63), Group 2 (M = 11.47, SD = 2.99, Group 5 (M = 11.62, SD = 3.74) and Group 7(M = 11.33, SD = 1.53) did not differ significantly from Group 3, Group 4 or Group 6.

Table 61. Nurse Participation in Hospital Affairs Age Group Comparison ANOVA Result

ANOVA Test Result on Nurse Participation in Hospital Affairs Subscale (between Ages)

The higher mean score of the 31 to 40 age group indicate greater satisfaction with Nurse Participation in Hospital Affairs with the 41 to 50 age group lower mean score indicates greater dissatisfaction on this scale.

PES-NWI Nurse Participation in Hospital Affairs Subscale

Age Groups	*N*	*M*	*SD*	*F*	*df*	*p*	eta-squared	Levene's Test
Up to 30	27	2.34	0.52	3.34	92	.023	.098	.097
31 to 40	27	2.67	0.70					
41 to 50	22	2.16	0.45					
51 to 65	20	2.38	0.58					

A one-way between age-groups analysis of variance was conducted to explore the impact of age on Nurse Participation in Hospital Affairs subscale (PES-NWI). The respondents were divided into four age groups (Up to 30; 31 to 40; 41 to 50; 51 to 65). There was a statistically significant difference at the $p<.05$ level in the sub-scale scores for the four age groups – $F(3, 92) = 3.34$, $p= .023$. The medium effect size at .098, calculated using eta-squared explains the variance between the groups. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Group 3 ($M = 2.16$, $SD = 0.45$) was significantly different from Group 2 ($M = 2.67$, $SD = 0.70$). Group 1 ($M = 2.34$, $SD = 0.52$) and Group 4 ($M = 2.38$, $SD = 0.58$) did not differ significantly from Group 1 or Group 2.

Table 62. Multiple Linear Regression on PES-NWI and Reasons for MNCIPC

Multiple linear regression was used to test if the five PES-NWI subscales significantly predicted the Reasons for MNCIPC. The overall regression was significant (R^2 = .331, F = 10.40, p≤ .000) meaning it explains 33.1% of the variance in reasons for MNIPC care. Two subscales 'Nursing Foundations for Quality of Care' (β = -.466, p≤ .004) and 'Staffing and Resource Adequacy' (β = -.466, p≤ .000) significantly predicted the reasons for missed IPC care. The remaining three subscales 'Nurse Participation in Hospital Affairs' (β = -.254, p≤ .116), Nurse Manager Ability, Leadership and Support of Nurses' (β = -.005, p≤ .971) and Collegial Nurse Physician Relations (β = -.008, p≤ .943) did not significantly predict the reasons for MNCIPC. Removing the non-significant subscales explains 34.5% of the variance in the reasons for MNCIPC (R^2 = .345, F = 17.71, p≤ .000). The model reaches significance p<.005.

*** Note: adjusted R values are reported to account for small sample size**

Table 63. Hierarchical Multiple Regression on PES-NWI and Reasons for MNCIPC

Hierarchical multiple regression was used to assess the ability of a control measure– subscales of PES-NWI - to predict the reasons for MNCIPC care, after controlling for the influence of hospital group and education level. Hospital Group and Education level were entered in Step 1, explaining 11.9% of the variance in the Reasons for Missed IPC care. After entry of five PES-NWI subscales 'Nurse Manager Ability, Leadership and Support of Nurses', 'Nursing Foundations for Quality of Care', 'Nurse Participation in Hospital Affairs', 'Staffing and Resource Adequacy' and 'Collegial Nurse Physician Relations' at Step 2 the total variance explained by the model as a whole was 41.4%. (7,76) = 9.38, p≤ .001. The control measures explained an additional 32.3% of the variance in the reasons for MNCIPC after controlling for hospital group and education R squared change = .32 *F change (*5,76) = 9.38, p≤ .001. In the final model, both the subscale 'Staffing & Resource Adequacy' (β = -.390, p≤ .001) and education (β = -.203, p≤ .026) were statistically significant. In other words, education level and staffing and resource adequacy are significant predictors of the reasons for missed IPC care in this data set.

- **note adjusted R values are reported to account for small sample size**

Table 64. Nurse involvement in caring for COVID-19 Patients

	N	Yes %	No %	Unsure %
28. 1. Have you personally cared for a patient with suspected or confirmed COVID-19 infection?	96	89.6	9.4	1.0

Table 65. WHO Healthcare Survey Responses

***N*=96** **Healthcare Service Ability to Manage COVID-19**		**Strongly Disagree %**	**Disagree %**	**Neither Agree or Disagree %**	**Agree %**	**Strongly Agree %**
29_1.	The healthcare service where I work can manage current patient demand related to COVID-19	9.4	25.0	13.5	35.4	16.7
29_2.	I am confident that the healthcare service where I work can continue to manage patient demand related to COVID-19 over the next 3 months	13.5	23.0	17.7	30.2	15.6
29_3.	The healthcare service where I work has an effective system for triage of patients with suspected COVID-19	7.3	14.6	24.0	35.4	18.7
***N*=95** **Personal Risk Related to COVID-19**						
30_1.	I am concerned about the risk to myself of becoming ill with COVID-19	9.5	27.4	23.2	21.0	18.9
30_2.	I am concerned about the risk to my family as a result of my job/role	4.2	26.3	16.8	28.4	24.3
30_3.	I am afraid of looking after patients who are ill with COVID-19	27.4	42.1	16.8	10.5	3.2
30_4.	I will try to avoid contact with patients who have COVID-19	31.6	33.7	14.7	13.7	6.3
30_5.	I accept that the risk of getting COVID-19 is part of my job	4.2	17.9	10.5	46.3	21.1
30_6.	I have little control over whether I get infected with COVID-19 or not	22.0	36.8	15.8	14.7	10.5
30_7.	I am looking for another job or thinking about leaving this job because of the risk of COVID-19	40.0	37.9	11.6	5.3	5.2
30_8.	I have received sufficient training in IPC practices specifically for COVID-19	7.4	14.7	10.5	47.4	20.0
30_9.	I am confident in my ability to correctly don and doff PPE to prevent transmission of COVID-19 to others and myself	1.1	3.2	3.1	52.6	40.0
N=95 **Hospital Protocols**						
31_1.	I consider that the implementation of protective measures at work is generally effective to prevent the spread of COVID-19 infection	8.5	8.4	22.1	44.2	16.8
31_2.	Following the IPC recommendations will protect me from getting COVID-19	5.2	5.3	21.1	52.6	15.8
31_3.	Following the recommended IPC procedures related to COVID-19 adds significant strain to my workload	3.2	7.4	15.8	43.1	30.5
31.4.	There are clear policies and protocols in my hospital for everyone to follow related to COVID-19	2.1	13.7	9.5	48.4	26.3
31_5.	I can easily access dedicated isolation facilities for patients with suspected COVID-19	14.7	29.5	13.7	26.3	15.8
31_6.	The hospital management would be honest with its' staff when managing a COVID-19 outbreak	13.7	10.5	12.6	44.3	18.9

Items scored on a five-point scale from 1) Strongly Disagree; 2) Disagree; 3) Neither Agree nor Disagree; 4) Agree; 5) Strongly Agree.

Table 66. Healthcare Service Ability to manage COVID-19 Nurse Responses

Healthcare Service Ability to Manage COVID-19 Variables	Staff Nurse Mean & Std. Dev *n* = 51	Clinical Nurse Manager Mean & Std. Dev *n* = 33	IPC Nurse Mean & Std. Dev *n* = 6	Specialist Nurse Mean & Std. Dev *n* = 6	All Respondent Mean & Std. Dev *n* = 96
29-2 I am confident that the healthcare service where I work can continue to manage patient demand related to COVID-19 over the next 3 months	3.20 ± 1.31	2.67 ± 1.19	4.00 ± 1.09	4.00 ± 1.26	3.11 ± 1.30
29-1 The healthcare service where I work can manage current patient demand related to COVID-19	3.24 ± 1.27	3.06 ± 1.25	4.00 ± 1.09	3.67 ± 1.37	3.25 ± 1.26
29-3 The healthcare service where I work has an effective system for triage of patients with suspected COVID-19	3.31 ± 1.10	3.36 ± 1.27	4.17 ± 0.75	4.17 ± 1.17	3.44 ± 1.17

(1) Strongly Disagree (2) Disagree (3) Neither Agree nor Disagree (4) Agree (5) Strongly Agree

Table 67. COVID-19 Personal Risk Nurse Responses

Personal Risk Related to COVID-19 Variables		Staff Nurse Mean & Std. Dev n = 50	Clinical Nurse Manager Mean & Std. Dev N =33	IPC Nurse Mean & Std. Dev *n* = 6	Specialist Nurse Mean & Std. Dev *n* = 6	All Respondent Mean & Std. Dev *n* = 95
30-2	**Rev I am concerned about the risk to my family related to COVID-19 as a result of my job/role**	**2.38 ± 1.22**	**2.60 ± 1.22**	**4.00 ± 0.89**	**2.66 ± 0.82**	**2.57* ± 1.23**
30-1	Rev I am concerned about the risk to myself of becoming ill with COVID-19	2.76 ± 1.29	2.84 ± 1.28	3.66 ± 1.21	3.16 ± 1.17	2.87 ± 1.27
30-6	Rev I have little control over whether I get infected with COVID-19 or not	3.26 ± 1.44	3.48 ± 1.12	4.00 ± 0.63	4.33 ± 0.52	3.45 ± 1.28
30-8	I have received sufficient training in the infection prevention and control practices specifically for COVID-19	3.42 ± 1.18	3.67 ± 1.22	4.33 ± 1.21	3.67 ± 0.82	3.58 ± 1.18
30-4	Rev I will try to avoid contact with patients who have COVID-19	3.62 ± 1.29	3.60 ± 1.22	4.50 ± 0.84	4.16 ± 0.75	3.70 ± 1.23
30-3	Rev I am afraid of looking after patients who are ill with COVID-19	3.74 ± 1.06	3.66 ± 1.08	4.50 ± 0.84	4.33 ± 0.82	3.80 ± 1.06
30-7	Rev I am looking for another job or thinking about leaving this job because of the risk of COVID-19	3.90 ± 1.20	4.06 ± 1.03	4.66 ± 0.52	4.16 ± 0.98	4.02 ± 1.10
30-9	I am confident in my ability to correctly don & doff PPE to prevent transmission of COVID-19 to others & myself	4.26 ± 0.80	4.21 ± 0.74	4.50 ± 0.84	4.50 ± 0.55	4.27 ± 0.76

* $p \leq .05$ (1) Strongly Disagree (2) Disagree (3) Neither Agree nor Disagree (4) Agree (5) Strongly Agree

Table 68. COVID-19 Hospital Protocols Nurse Responses

Hospital Protocols Related to COVID-19 Variables		Staff Nurse Mean & Std. Dev N=**50**	Clinical Nurse Manager Mean & Std. Dev N=**33**	IPC Nurse Mean & Std. Dev N=**6**	Specialist Nurse Mean & Std. Dev N=**6**	All Respondent Mean & Std. Dev N=**95**
31.3	Rev Following recommended IPC procedures related to COVID-19 adds significant additional strain to my workload	2.06 ± 0.96	2.12 ± 1.05	1.83 ± 0.75	2.50 ± 1.64	2.09 ± 1.02
31-5	I can easily access dedicated isolation facilities for patients with suspected COVID-19	3.06 ± 1.32	2.70 ± 1.31	3.83 ± 1.17	3.17 ± 1.72	2.99 ± 1.34
31-6	The hospital management would be honest with its staff when managing an outbreak of COVID-19	3.24 ± 1.38	3.55 ± 1.17	4.00 ± 1.55	4.00 ± 0.63	3.44 ± 1.30
31-1	I consider that the implementation of protective measures at work is generally effective to prevent the spread of COVID-19 infection in my hospital	3.36 ± 1.02	3.61 ± 1.22	4.50 ± 0.84	3.50 ± 1.38	3.53 ± 1.13
31.2	Following the IPC recommendations will protect me from getting COVID-19	3.58 ± 1.03	3.67 ± 0.96	4.67 ± 0.52	3.67 ± 0.52	3.68 ± 0.98
31-4	There are clear policies and protocols in my hospital for everyone to follow related to COVID-19	3.68 ± 1.04	3.91 ± 1.07	4.67 ± 0.52	3.83 ± 0.98	3.83 ± 1.04

(1) Strongly Disagree (2) Disagree (3) Neither Agree nor Disagree (4) Agree (5) Strongly Agree

Table 69. COVID-19 Personal Risk Subscale Hospital Group Comparison t-test Result

Hospital Groups Comparison on COVID-19 Personal Risk Subscale

Groups	*N*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*	Levene's Test
Grouped Hospitals	37	30.67	5.18	-1.99	81	.049	-.441	.852
Model 4 Hospitals	46	32.96	5.16					

Scores for Grouped Hospitals (Models 1,2,2-S and Model 3) and Model 4 hospital scores were compared. There was a statistically significant difference in the scores for Grouped Hospitals (*M* = 30.67, *SD* = 5.18) and Model 4 Hospitals (*M* = 32.95, *SD* = 5.16); *t* (81) = -1.996, *p* =.049, two-tailed). The magnitude of the difference in the means (mean difference -2.28, *CI*: -4.55 to -000) is low as interpreted by Cohen's d (-.441) which measures the effect size by standardising the differences between two groups.

Table 70. COVID-19 Risk to Family between nurse groups ANOVA Result

I am concerned about the risk to my family related to COVID-19 based on my job/role

Staff Role	*N*	*M*	*SD*	*F*	*df*	*p*	eta-squared	Levene's Test
Staff Nurse	50	2.38	1.23	3.33	91	.023	.099	.118
CNM	33	2.60	1.22					
IPC Nurse	6	4.00	0.89					
Specialist Nurses	6	2.66	0.82					

A one-way between nurse role analysis of variance was conducted to explore the impact of nurse role the question 'I am concerned about the risk to my family related to COVID-19 based on my job/role'. The respondents were divided into four nurse role groups (Staff Nurse; Clinical Nurse Manager; IPC Nurse; Specialist Nurse). There was a statistically significant difference at the $p<.05$ level in the sub-scale scores for the four groups – $F(3, 91) = 3.33$, $p= .023$. The high effect size at .099, calculated using eta-squared explains the variance between the groups. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for IPC Nurses ($M = 4.00$, $SD = 0.89$) was significantly different from Staff Nurses ($M = 2.38$, $SD = 1.23$) and Clinical Nurse Managers ($M = 2.60$, $SD = 1.22$). The Specialist nurse group ($M = 2.66$, $SD = 0.82$) did not differ significantly from staff nurses, Clinical Nurse Managers or IPC nurses.

Table 71. WHO Personal Risk Subscale between nurse groups ANOVA Result

WHO Personal Risk Subscale

Staff Role	*N*	*M*	*SD*	*F*	*df*	*p*	eta-squared	Levene's Test
Staff Nurse	50	3.46	0.62	3.72	91	.014	.109	.229
CNM	33	3.51	0.46					
IPC Nurse	6	4.20	0.55					
Specialist Nurses	6	3.81	0.38					

A one-way between nurse role analysis of variance was conducted to explore the impact of nurse role on WHO Personal Risk Subscale. The respondents were divided into four nurse role groups (Staff Nurse; Clinical Nurse Manager; IPC Nurse; Specialist Nurse). There was a statistically significant difference at the $p<.05$ level in the sub-scale scores for the four groups – $F(3, 91) = 3.72$, $p= .014$. The high effect size at .109, calculated using eta-squared explains the variance between the groups. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for IPC Nurses ($M = 4.20$, $SD = 0.55$) was significantly different from Staff Nurses ($M = 3.46$, $SD = 0.62$) and Clinical Nurse Managers ($M = 3.51$, $SD = 0.46$). The Specialist nurse group ($M = 3.81$, $SD = 0.38$) did not differ significantly from staff nurses or IPC nurses.

CORRELATIONS

Tests of association were carried out on the MNCIPC and PES-NWI in order to make inferences about the strength of relationships between the individual factors within and between scales.

Table 72. Correlations between Reasons for MNCIPC and PES-NWI Subscale

	PA IPC Resource Support	PA Staffing Allocation	PA IPC Education	PA Adequate Storage	PES-NWI Nurse Participation in Hospital Affairs	PES-NWI Nursing Foundations for Quality of Care	PES-NWI Nurse Manager Leadership	PES-NWI Resource Adequacy	PES-NWI Collegial Nurse Physician Relations
MNCIPC IPC Resource Support	1								
MNCIPC Staffing Allocation	.424**	1							
Principal Axis IPC Education Scale	460**	.182	1						
MNCIPC Adequate Storage	**.530****	.391**	.260**	1					
PES-NWI Nurse Participation in Hospital Affairs	-.296**	-.312**	-.093	-.295**	1				
PES-NWI Nursing Foundations for Quality of Care	-.464**	-.347**	-.168	-.408**	**.783****	1			
PES-NWI Nurse Manager Ability Leadership & Support of Nurses	-.266**	-.201*	-.155	-.270**	**.724****	**.646****	1		
PES-NWI Staffing & Resource Adequacy Subscale	-.404**	**-.524****	-.149	-.384**	**.599****	**.564****	.447**	1	
PES-NWI Collegial Nurse Physician Relations	-.333**	-.137	-.231*	-.349**	.447**	**.631****	.447**	.382**	1

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

Table 73. Correlations between Frequency and Reasons for MNCIPC

	Hand Hygiene	Surveillance	Minimising HAIs	Specific Precautions	Minimising Bacterial Colonisation	Staffing Allocation	Nurse IPC Education	Adequate Storage	IPC Resource Support
Hand Hygiene (frequency)	1								
Surveillance (frequency)	.**724****	1							
Minimising Hospital Acquired Infection (frequency)	**.538****	**.602****	1						.
Specific Precautions Blackman (frequency)	.499**	**.691****	**.594****	1					
Minimising Bacterial Colonisation (frequency)	**.600****	**.589****	**.643****	.**554****	1				
Staffing Allocation (reasons)	.212*	.214*	.118	.082	.152	1			
IPC Education Scale (reasons)	.141	.164	.158	.173	.106	.182	1		
Adequate Storage (reasons)	.317**	.278**	.337**	.225**	.364**	.391**	.260**	1	
IPC Resource Support Scale (reasons)	.183	.354**	.210*	.228*	.210*	.424**	.460**	.530**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Highlighted moderate correlation coefficient above .5 mainly within Scales and within PA Subscales.

Table 74 Correlations between PES-NWI Subscales and WHO COVID-19 Subscales

	WHO Healthcare Service Ability to Manage COVID	WHO Personal Risk Subscale with Rev Questions	WHO Hospital Protocols	PES-NWI Nurse Participation in Hospital Affairs Subscale	PES-NWI Nursing Foundations for Quality of Care Subscale	PES-NWI Manager Ability Leadership & Support of Nurses Subscale	PES-NWI Staffing & Resource Adequacy Subscale	PES-NWI Collegial Nurse Physician Relations
WHO Healthcare Service Ability to Manage COVID	1							
WHO Personal Risk	.402**	1						
WHO Hospital Protocols	**.548****	**.502****	1					
PES-NWI Nurse Participation in Hospital Affairs	.151	.021	.484**	1				
PES-NWI Nursing Foundations for Quality of Care	.084	.147	.522**	**.783****	1			
PES-NWI Nurse Manager Ability Leadership & Support of Nurses	.017	.012	.407**	**.724****	**.646****	1		
PES-NWI Staffing & Resource Adequacy	.175	.070	.448**	**.599****	**.564****	.447**	1	
PES-NWI Collegial Nurse Physician Relations	.138	.142	.375**	.447**	**.631****	.447**	.382**	1

**. Correlation is significant at the 0.01 level (2-tailed).

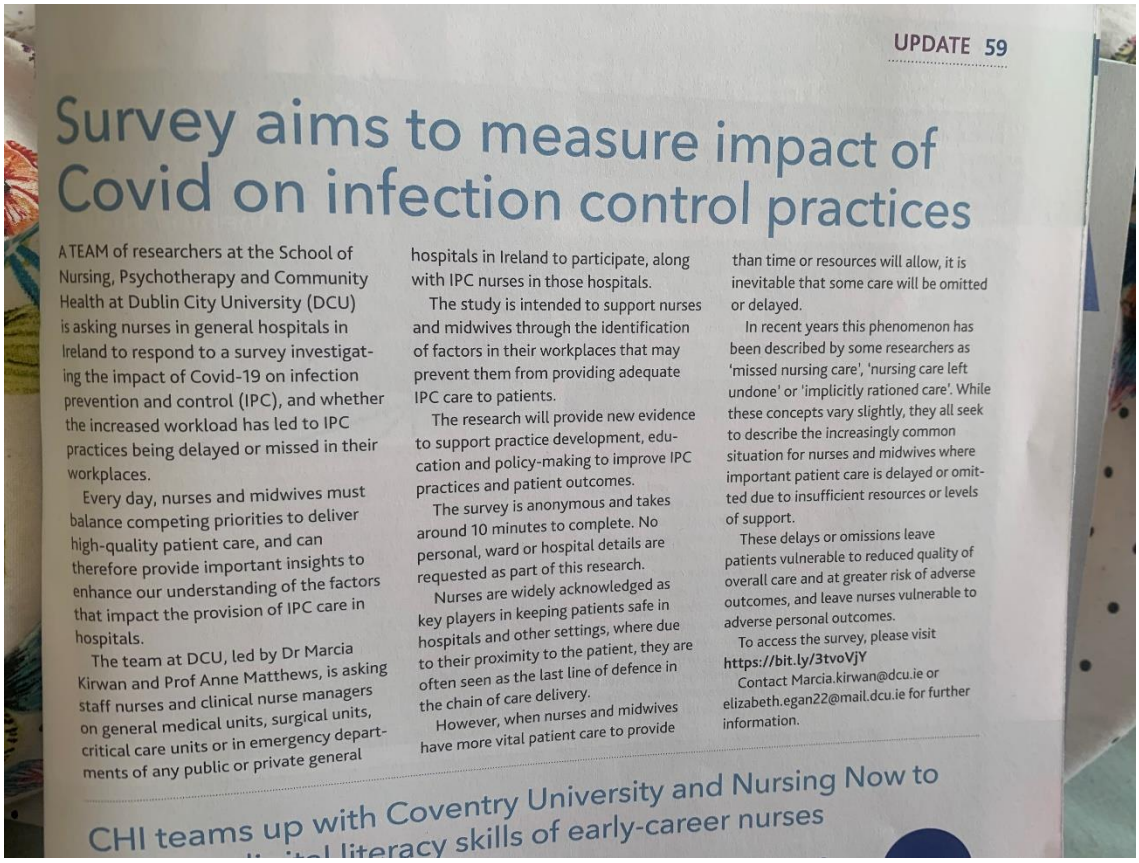
Moderate correlations between the WHO Hospital Protocols and PES-NWI Nurse Participation and Nursing Foundations for Quality of Care

Table 75. Correlations between factors of WHO Healthcare Survey and PES-NWI Scale

	PES-NWI	WHO Healthcare Service Ability to Manage COVID	WHO Personal Risk Subscale Rev Questions	WHO Hospital Protocols
PES-NWI Scale	1			
Healthcare Service Ability to Manage COVID-19	.132	1		
Personal Risk Subscale Rev Questions	.087	.402**	1	
Hospital Protocols	**.552****	**.548****	**.502****	1

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix B: INMO Article in WIN Newsletter



Survey aims to measure impact of Covid on infection control practices

A TEAM of researchers at the School of Nursing, Psychotherapy and Community Health at Dublin City University (DCU) is asking nurses in general hospitals in Ireland to respond to a survey investigating the impact of Covid-19 on infection prevention and control (IPC), and whether the increased workload has led to IPC practices being delayed or missed in their workplaces.

Every day, nurses and midwives must balance competing priorities to deliver high-quality patient care, and can therefore provide important insights to enhance our understanding of the factors that impact the provision of IPC care in hospitals.

The team at DCU, led by Dr Marcia Kirwan and Prof Anne Matthews, is asking staff nurses and clinical nurse managers on general medical units, surgical units, critical care units or in emergency departments of any public or private general hospitals in Ireland to participate, along with IPC nurses in those hospitals.

The study is intended to support nurses and midwives through the identification of factors in their workplaces that may prevent them from providing adequate IPC care to patients.

The research will provide new evidence to support practice development, education and policy-making to improve IPC practices and patient outcomes.

The survey is anonymous and takes around 10 minutes to complete. No personal, ward or hospital details are requested as part of this research.

Nurses are widely acknowledged as key players in keeping patients safe in hospitals and other settings, where due to their proximity to the patient, they are often seen as the last line of defence in the chain of care delivery.

However, when nurses and midwives have more vital patient care to provide than time or resources will allow, it is inevitable that some care will be omitted or delayed.

In recent years this phenomenon has been described by some researchers as 'missed nursing care', 'nursing care left undone' or 'implicitly rationed care'. While these concepts vary slightly, they all seek to describe the increasingly common situation for nurses and midwives where important patient care is delayed or omitted due to insufficient resources or levels of support.

These delays or omissions leave patients vulnerable to reduced quality of overall care and at greater risk of adverse outcomes, and leave nurses vulnerable to adverse personal outcomes.

To access the survey, please visit **https://bit.ly/3tvoVjY**

Contact Marcia.kirwan@dcu.ie or elizabeth.egan22@mail.dcu.ie for further information.

CHI teams up with Coventry University and Nursing Now to

Appendix C: Mayo News Article

Mayo News

NEWS | COMMENT & OPINION | SPORT | LIVING | FEATURES | OBITUARIES | DIGIT

YOU ARE HERE: HOME / NEWS / REGISTERED NURSES ASKED TO TAKE PART IN IPC SURVEY

Registered nurses asked to take part in IPC survey

22 APRIL 2020

NEWS

SHARE THIS

THE Covid-19 pandemic has presented nurses and the Irish healthcare and hospital system with unprecedented and ongoing challenges particularly in the area of infection prevention and control (IPC).

Because nurses are responsible for direct patient care they are tasked every day with managing and limiting the spread of infection while protecting patients in healthcare settings. However, inadequate staffing, time and resources mean that some aspects of patient care may be delayed or omitted.

Researchers at the School of Nursing, Psychotherapy and Community Health at Dublin City University, responding to the Covid-19 19 pandemic, are seeking registered nurses to take part in a survey to help us understand the factors that impact the provision of IPC in their workplaces and to explore nurses' perceptions as to why this might be the case.

Staff Nurses, IPC Nurses and Clinical Nurse Managers on general medical units, surgical units, critical care units or in the emergency department of any public or private general hospital in Ireland are being invited to participate.

This survey is designed to be completely anonymous and completing the questionnaire will take approximately 15 minutes. No personal, ward or hospital details are requested as part of this research.

The survey and further details relating to this research can be accessed at https://dcuacenursehealth.qualtrics.com/jfe/form/SV_9WMUV9W8XpaUwS

Appendix D: Data Security Schedule

Study Purpose

What is the purpose of this Research Study? This study aims to provide a greater understanding of the factors that influence Infection Prevention and Control (IPC) practices that are intended to protect patients, nurses and healthcare workers in hospital settings in the context of COVID-19. The information you give us will help us understand how and why IPC may vary across different hospitals, wards, and groups of nurses. The study is intended to support nurses through the identification of factors in their workplaces that may prevent them from providing adequate IPC care to patients. The research will help to provide new evidence to support practice development, education and policy-making to improve IPC practices and patient outcomes.

Why am I being asked to take part in this study? You are being asked to take part in this study because nurses are key to maintaining patient safety in hospitals through effective IPC practices and your opinion matters.

What does participating in this research involve for me? Participating in this research will involve completing an **anonymous confidential online questionnaire** that will take approximately 10 minutes.

This study is designed to protect your privacy and anonymity. Your name and any personal information provided will not be attached to any data. If you have any questions, comments or concerns relating to this study you can contact Elizabeth Egan at elizabeth.egan24@mail.dcu.ie

Consent - If you wish to take part in this study you will need to indicate your consent. We have included further information about the study in the form of a Plain Language and Informed Consent Statements which include details related to GDPR and Data Protection. This information can be accessed below.

When you have read this information and are happy to provide consent and take part in the study, please press the **Next** button below.

Appendix E: Plain Language Statement

Study Title: Title: Missed Infection Prevention and Control (IPC) practices in public and private general hospitals in Ireland in the context of COVID-19: an online national survey of nurses.

You should clearly understand the risks and benefits of taking part in this study so that you can make a decision that is right for you. This process is known as 'Informed Consent'.

Introduction: You are being invited to take part in a research study that is being conducted as part of a Dublin City University (DCU) funded MSc and is being carried out by Elizabeth Egan, an MSc student, at the School of Nursing, Psychotherapy and Community Health at DCU under the supervision of the Principal Investigator (Dr Marcia Kirwan).

Why is this study important? Nurses are responsible for providing safe, high-quality care in Irish hospitals, however sometimes due to lack of time or resources nurses are unable to provide all necessary care to patients. Important patient care which gets omitted, missed or delayed, often due to inadequate staff numbers or resources, is known as missed nursing care.

Main aims of this research: This study aims to examine if any elements of Infection Prevention and Control care is missed by nurses in general hospitals in Ireland, and if so, what types of care are missed and why this might be happening. This study is intended to support nurses through identification of factors in their workplaces which may prevent them from being able to provide completes IPC care to patients. This data may help inform organizations and policy makers by highlighting areas where nurses need additional support to enable them to provide effective IPC care to patients.

YOUR QUESTIONS ANSWERED

Why am I being asked to take part in this study? You are being asked to take part in this study because nurses are key to maintaining patient safety in hospitals through effective IPC practices. The study aims to provide a greater understanding of IPC practices in Irish hospitals.

Am I eligible to take part in the study? Registered nurses working on general medical units, surgical units, critical care units or in the emergency department of any General hospital are eligible to participate. This includes clinical nurse managers in these departments. IPC nurses working in any hospital department are also eligible to take part.

What does participating in this research involve for me? Participating in this research will involve completing an anonymous confidential online questionnaire that will take you approximately 10 minutes. You will not be asked to provide any personal identifying details. In order to gain access to the online questionnaire you will also have to complete an online consent form agreeing to the conditions of this study. It is important to note that your participation is entirely voluntary.

Are there any benefits to taking part? There are no direct benefits to taking part in this study. However, you may gain insight into the types of research happening in the areas of missed nursing care and IPC in Ireland. As a participant you will also have the opportunity to share your professional perspective on missed care in the workplace.

Are there any potential risks to taking part? Overall, this project is considered to be low-risk, and any potential risks will be managed carefully by the researchers. Given this, you can opt-out of the questionnaire at any point up until you complete the questionnaire. Another potential risk is the protection of participants' responses. This risk will be carefully managed by researchers, in-line with the DCU Data Protection Unit and General Data Protection Regulation (GDPR) guidelines which are outlined below.

Appendix F: Data Protection

How will participant identity and confidentiality be protected? The names of participants and any other personal data will not be recorded at any stage during the questionnaire. Only information required for the purpose of this research will be collected. As these online questionnaires are intended to be anonymous and confidential, no participant will be identifiable from the data they submit. However, in the unlikely event that a participant may become identifiable or inadvertently reveal personal data, steps will be taken to ensure participant confidentiality in accordance with the DCU Data Protection Unit guidelines. For example, data will be deleted or made anonymous. Only processed and analysed anonymous versions of the data collected will be reported on and no individual nurse, hospital or ward will be identifiable in the findings of this project.

Who has access to the data? Only the Principal and other Investigators (Dr Marcia Kirwan, Prof Anne Matthews and MSc student Elizabeth Egan) will have access to and be able to amend the data. DCU have a licensed agreement with Qualtrics, a third-party survey platform who will host and process the online questionnaire data. You have the right to lodge a complaint with the Irish Data Protection Commissioner if you have any concerns relating to the use of your data.

What will happen to the data? Processed, analysed, and anonymous versions of the data collected will be used in the writing and findings of an MSc thesis.

How will the data be stored and how and when will it be disposed of? All electronic questionnaire data will be stored securely on an encrypted, dual password protected DCU laptop and backed-up online to DCU's secure version of Google Drive and Google File Stream. Data collected during this project will be stored for five years after the end of the project, at which point it is expected that all publications using this data will be complete. After this time, electronic data will be disposed of in the appropriate manner using permanent data erasure via data erasure software.

Giving And Withdrawing Consent - Involvement in this research project is voluntary, and you have the right to withdraw your consent. Consent is the legal basis under which your data is being processed in line with Article 6(1) of GDPR 2016. You can choose to opt-out of the questionnaire at any time up until the point you press the final submission button. As the questionnaire data is anonymous it will not be possible for you to access, have a copy or withdraw your data once it has been submitted via the questionnaire because the researchers will have no way of knowing which anonymous questionnaire data belongs to which participant.

You can opt-out of the questionnaire before this point without reason and without this decision affecting you in any way.

What To Do If You Wish to Participate? If you wish to take part in this study, please provide your consent before completing the online questionnaire.

What To Do If You Have Concerns or Problems Related to This Project? If you have any concerns or experience any unexpected or adverse outcome as a result of this research, please contact the Principal Investigator Dr Marcia Kirwan (Phone: +353 1 700 6003) Email: marcia.kirwan@dcu.ie

Otherwise, if you have concerns about this study and wish to contact an independent person, please contact: The Secretary, DCU Research Ethics Committee, c/o Research and Innovation Support, DCU, Dublin 9. Tel 01-700 8000. Email: rec@dcu.ie DCU Data Protection Officer. Martin Ward: Tel: 01-700 7476. Email: data.protection@dcu.ie

Appendix G: Informed Consent Statement

Study Title: Nurse survey of infection prevention and control practices in Irish public and private general hospitals in the context of the COVID-19 Pandemic.

Purpose of the study: I have read the information provided and understand the purpose of the study. I have been offered the opportunity to contact researchers for further information.

Requirements of participation in research: Participation in the research requires completing an **anonymous online questionnaire** which will take approximately 10 minutes.

Participation is voluntary: I understand that participation in this research is voluntary. I freely and voluntarily agree to take part in this study which respects my ethical and legal rights. I understand that I may withdraw at any time right up to the point at which I submit my questionnaire to the research team, without giving reason, and without this decision affecting me in any way.

Please note that as the responses to the online questionnaire are anonymous and confidential, participants cannot be personally identified from their response. As a result, it will not be possible to withdraw your data from this study once you have completed the questionnaire. If you wish to withdraw from the study before completion of the questionnaire, you are free to do so without a reason and without consequence.

Confirmation of data protection arrangements: I understand the efforts being made to protect my confidentiality and anonymity. I understand that the confidentiality of the information I provide is subject to legal limitations. I understand that if any personal data is accidentally revealed during this study this will be protected in accordance with the DCU Data Protection Unit. For example, data will be deleted or made anonymous.

Confirmation of how data will be used: I am aware that processed anonymous versions of my data will be used as part of an MSc thesis.

Confirmation of data retention/disposal arrangements: I understand that my data will be securely stored and retained for five years after the end of this project and that after this period all data will be disposed. I understand that my data will be stored and disposed of in a responsible manner described in the Plain Language Statement.

Appendix H: Consent and Questionnaire

Q1 **Consent:** I have read and understand the Plain Language and Informed Consent Statements. I have been given an opportunity to ask questions and discuss the study and any questions I have asked have been answered satisfactorily. I am currently employed as a Registered Nurse in a Public or Private General Hospital in Ireland and, to the best of my knowledge, am eligible to participate in this Study. I understand that I am giving my consent to participate in this study and that the information I give will be used for the purpose of this research project.

- ○ **By clicking HERE, I understand and agree with each of the above Statements and consent to take part in this Survey.**

Q2 **Do you work in the public or private hospital sector?**

- ○ **Public** (1)
- ○ **Private** (2)

Q3 **If public, what model hospital do you work in?**

- ○ **Model 1 -** Community/District Hospitals
- ○ **Model 2 -** General Hospitals with inpatient and outpatient care to low-risk medical patients
- ○ **Model 2-S -** As for Model 2 above **plus** Intermediate Elective Surgery
- ○ **Model 3 -** General/Teaching Hospitals - Acute Medical, Surgical Patients, ED and ICU
- ○ **Model 4 -** General/Teaching Hospital - as Model 3 above **plus** Tertiary Referral and Higher-Level Intensive Care

Q4 **What is your gender?**

- ○ **Male**
- ○ **Female**
- ○ **Other**
- ○ **Prefer not to say**

Q5 **What is your age? (in years)** _____

Q6 Which of the following best describes your work patterns?

- ○ Full-time
- ○ Part-time

Q7 Did you receive your basic nursing education in the Republic of Ireland?

- ○ Yes
- ○ No

Q8 If no, in what country did you receive your basic nursing education?

_____

Q9 What is your highest nursing qualification?

- ○ Certificate or diploma in Nursing
- ○ Bachelor's Degree Nurse
- ○ Post Graduate Diploma
- ○ Master's in nursing
- ○ PhD/Professional Doctorate
- ○ Other (Please indicate) _____

Q10 Which one of these roles best describes your nursing position?

- ○ Staff Nurse
- ○ Clinical Nurse Manager
- ○ Infection Prevention and Control Nurse
- ○ Other (please state) _____

Q11 How many years AND/OR months have you worked as a registered nurse?

	Length of Time as Registered Nurse	
	YEARS	MONTHS
In your Career	_____	_____
In your current hospital	_____	_____
In your current unit/ward/department	_____	_____

Q12 Which of these best describes the unit in which you work?

- ○ Medical Unit
- ○ Surgical Unit
- ○ Mixed Medical/Surgical Unit
- ○ Critical Care/Intensive Care Unit
- ○ Emergency Department
- ○ Infection Prevention and Control Department
- ○ NONE OF THE ABOVE

Q13 Which of the following unit or units have you worked as a Registered Nurse for 6 months or more? (not including experience gained on student placement)

- ○ Medical Unit
- ○ Surgical Unit
- ○ Critical Care/Intensive Care Unit
- ○ Emergency Department

Q14 Do you have a specific infection prevention and control role in your current job?

- ○ Yes
- ○ No

Q15 If YES, what is the function of your specific Infection Prevention/Control role?

- ○ Infection Prevention and Control Nurse
- ○ Hand Hygiene Auditor
- ○ Other (please specify)

_____

Q16 Please indicate if you have done any of the following training in Infection Prevention and Control since qualifying as a nurse?

- ○ Staff development sessions on IPC (e.g., Standard Precautions Training)
- ○ HSeLanD Training/Certification
- ○ Other IPC Course type (please specify)

_____

Q17 When was the last time you completed any Infection Prevention and Control Training?

- ○ Within the **last 6 months**
- ○ Within the **last year**
- ○ Within the **last 2 years**
- ○ **Over 2 years** ago

Q18 How satisfied are you with the following?

	Very dissatisfied	**A little dissatisfied**	**Moderately satisfied**	**Very satisfied**
Your **choice of nursing** as a career?	○	○	○	○
Your **current job** in this hospital?	○	○	○	○

Q19 If possible, would you leave your current hospital within the next year ***as a result of job dissatisfaction?***

- ○ Yes
- ○ No

Q20 Over the past 3 months, on average how many **hours per week** did you work ***beyond your rostered hours in your place of work?***

_____

Q21 INFECTION PREVENTION AND CONTROL. To the best of your knowledge, **how frequently** are the following **elements of infection control/care MISSED (including by you)** in your place of work?

	Never Missed	Rarely Missed	Occasionally Missed	Frequently Missed	Always Missed	Unsure or N/A
1. Hand hygiene is performed before touching a patient	○	○	○	○	○	○
2. Hand hygiene is completed before a procedure is undertaken (Moment 2 before a clean/aseptic task)	○	○	○	○	○	○
3. Hand hygiene is performed after a procedure is completed	○	○	○	○	○	○
4. Hand hygiene is completed after touching a patient	○	○	○	○	○	○
5. Hand hygiene is completed before drug administration	○	○	○	○	○	○

6. Equipment is cleaned before it touches each patient

7. Appropriate Personal Protective Equipment (PPE) (such as gloves and gowns) are used when providing direct care to patients/residents who have a transmissible disease e.g.: Multi-drug resistant organisms (MDRO)

8. Correct order is used when donning PPE: For example: Putting on gown first and then gloves to ensure that they are pulled over the cuff of the gown so that no skin is exposed

9. Gloves are changed when staff move from a contaminated/dirty site (e.g., wound) to a clean site

10. Touch contamination is avoided, e.g. Not scratching your nose or adjusting your glasses once your hands have been in contact with a patient or surfaces in a room of a patient infected with a MDRO

11. Gloves are removed before taking off the gown

12. Hand hygiene is undertaken following gown removal	○	○	○	○	○	○
13. Facial equipment is removed before hands are washed	○	○	○	○	○	○
14. Goggles and mask or mask-face shield is always worn when caring for a patient on respiratory/droplet precautions	○	○	○	○	○	○
15. All new admissions are screened for MDROs	○	○	○	○	○	○
16. Appropriate signage informing staff and visitors for the need for transmission-based precautions (when managing a patient with a MDRO) is displayed	○	○	○	○	○	○
17. Patients are invited or assisted to perform hand hygiene following use of a bed pan or urinal in bed	○	○	○	○	○	○
18. Patients are showered pre-operatively	○	○	○	○	○	○
19. Catheter care is performed TDS (8 hourly)	○	○	○	○	○	○
20. Oral care/teeth are cleaned at least daily	○	○	○	○	○	○
21. Intravenous cannulas are swabbed with an alcohol based cleansing agent for 15 seconds, allowed to dry for 15 seconds before flushing them or administering medications	○	○	○	○	○	○

22. Gloves are always worn for both preparing and administration of all antibiotics	○	○	○	○	○	○
23. The nurse follows up with medical officer/senior nurse if patient has indications of infection (e.g., Temperature increase, presence of new swelling or pus)	○	○	○	○	○	○
24. Healthcare organisation documentation specifies the MDRO status (with or without) of patients on their admission	○	○	○	○	○	○
25. Documentation about the MDRO status of a patient is completed when the patient is discharged	○	○	○	○	○	○
26. Nurses use documentation to report follow- up of pathology tests/outcomes (e.g.: wound swabs, MDRO screens)	○	○	○	○	○	○
27. Nurses handover/communicate information re patient MDRO/infection status at staff handover/change time	○	○	○	○	○	○
28. Nurses handover/communicate patient MDRO/infection status on transfer to new department i.e., X-ray, theatre, or new ward	○	○	○	○	○	○

29. Cleaning/Support Staff wear appropriate personal protective equipment (PPE)	○	○	○	○	○	○
30. Cleaning/Support staff adhere to signage posted for transmission-based precautions	○	○	○	○	○	○
31. Cleaning/Support Staff fully clean rooms in between different patients' movement from bed units	○	○	○	○	○	○
32. Cleaning/Support staff fully cleaned rooms following discharge/transfer of an infectious patient	○	○	○	○	○	○
33. The patient's bed table is cleaned before the patient receives food tray	○	○	○	○	○	○
34. Staff decontaminate spills of blood and other body substances (e.g., vomit, urine) and spills are correctly contained	○	○	○	○	○	○
35. Packaged sterile instruments and equipment are stored correctly to ensure sterility prior to patient use	○	○	○	○	○	○
36. Hand hygiene is performed after exposure to body fluids	○	○	○	○	○	○
37. Hand hygiene is completed after drug administration	○	○	○	○	○	○

Q22 **REASONS FOR MISSED NURSING CARE/INFECTION CONTROL.** Thinking about the missed infection prevention and control activities in your organisation (as you indicated in the previous section of this survey), please indicate the REASONS infection prevention and control care/practices are missed IN YOUR WARD/UNIT

	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
1. Inadequate number of nursing staff on the ward/unit	○	○	○	○	○
2. Inadequate skill-mix of nursing staff allocated for patient care	○	○	○	○	○
3. Urgent patient situation (e.g.: a patient's condition worsening)	○	○	○	○	○
4. Unexpected rise in patient volume and/or acuity on the ward/unit	○	○	○	○	○
5. Inadequate number of medical staff	○	○	○	○	○
6. Inadequate number of clerical staff	○	○	○	○	○
7. Inadequate number of cleaning/support staff	○	○	○	○	○
8. Unbalanced patient assignment/alloca-tion to nursing staff	○	○	○	○	○

9. Inadequate handover from previous shift, unit, health or aged care facility	○	○	○	○	○
10. Nurses have inadequate education/knowledge of infection control practices	○	○	○	○	○
11. Nurses have inadequate understanding of transmission-based precautions	○	○	○	○	○
12. Sterile supplies/equipment not available when needed	○	○	○	○	○
13. Patient room allocation made without consideration to principles of infection control	○	○	○	○	○
14. Patients' rooms overcrowded/cluttered with equipment/supplies	○	○	○	○	○
15. Patients have to share bathrooms	○	○	○	○	○
16. Inadequate places to store belongings (e.g.: blankets, patient personal belongings)	○	○	○	○	○
17.Ward culture does not support infection control activities	○	○	○	○	○

18. Lack of nursing control over infection control activities	○	○	○	○	○
19. Lack of prompts in patient records to check for pyrexia or any other signs of infection	○	○	○	○	○
20. Lack of support from hospital management for resources to undertake infection control activities	○	○	○	○	○
21. Lack of support from hospital management for committees governing infection control activities	○	○	○	○	○
22. Patient rooms/bays lack sinks for hand washing	○	○	○	○	○
23. Lack of cleaning schedule for environmental cleaning in clinical areas	○	○	○	○	○
24. Insufficient plastic puncture proof containers for sharps/used needles	○	○	○	○	○

Q23 How would you **rate compliance with Standard Precautions** in your place of work?

- ○ Poor
- ○ Fair
- ○ Good
- ○ Excellent

Q24 How would you **rate compliance with Transmission-based Precautions** in your place of work?

- ○ **Poor**
- ○ **Fair**
- ○ **Good**
- ○ **Excellent**

Q25 In your place of work, infection prevention and control activities are **given enough priority**, when compared to other nursing activities?

- ○ Strongly Agree
- ○ Agree
- ○ Undecided
- ○ Disagree
- ○ Strongly Disagree

Q26 Healthcare-Associated Infections are **inevitable** in healthcare settings

- ○ Strongly Agree
- ○ Agree
- ○ Undecided
- ○ Disagree
- ○ Strongly Disagree

Q27 For each item, please indicate the extent to which you agree that the **item is present in your current job**. Indicate your degree of agreement by clicking one answer

	Strongly Agree	Agree	Disagree	Strongly Disagree
1. Adequate support services allow me to spend time with my patients	○	○	○	○
2. Physicians and nurses have good working relationships	○	○	○	○
3. A supervisory staff (clinical & senior management) that is supportive of the nurses	○	○	○	○
4. Active staff development or continuing education programs for nurses	○	○	○	○
5. Career development and/or clinical ladder opportunity	○	○	○	○
6. Opportunity for staff nurses to participate in policy decisions	○	○	○	○
7. Supervisors use mistakes as learning opportunities, not criticism	○	○	○	○
8. Enough time and opportunity to discuss patient care problems with other nurses	○	○	○	○
9. Enough registered nurses to provide quality patient care	○	○	○	○
10. A nurse manager who is a good manager and leader	○	○	○	○
11. A chief nursing officer (Director of Nursing) who is highly visible and accessible to staff	○	○	○	○
12. Enough staff to get the work done	○	○	○	○
13. Praise and recognition for a job well done	○	○	○	○

14. High standards of nursing care are expected by the administration	○	○	○	○
15. A chief nursing officer (Director of Nursing) equal in power and authority to other top-level hospital executives	○	○	○	○
16. A lot of teamwork between nurses and physicians	○	○	○	○
17. Opportunities for advancement	○	○	○	○
18. A clear philosophy of nursing that pervades the patient care environment	○	○	○	○
19. Working with nurses who are clinically competent	○	○	○	○
20. A nurse manager who backs up the nursing staff in decision making, even if the conflict is with a physician	○	○	○	○
21. Administration (senior hospital management) that listen and respond to employee concerns	○	○	○	○
22. An active quality assurance programme	○	○	○	○
23. Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees)	○	○	○	○
24. Collaboration (joint practice) between nurses and physicians	○	○	○	○
25. A preceptor program for newly hired Registered Nurses	○	○	○	○
26. Nursing care is based on a nursing, rather than a medical model	○	○	○	○
27. Staff nurses have the opportunity to serve on hospital and nursing committees	○	○	○	○

28. Nursing administrators consult with staff on daily problems and procedures	○	○	○	○
29. Written, up-to-date nursing care plans for all patients	○	○	○	○
30. Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next	○	○	○	○
31. Use of nursing diagnoses	○	○	○	○

Q28 During the **COVID-19 Pandemic**

	Yes	**No**	**Unsure**
Have you personally cared for a patient with suspected or confirmed COVID-19 infections?	○	○	○

Q29 The **following questions relate to your experience of managing patients** in the healthcare setting where you work. **Please think about your experience over the past week** when responding to these questions

	Strongly Disagree	**Disagree**	**Neither Agree or Disagree**	**Agree**	**Strongly Agree**
1. The healthcare service where I work can manage current patient demand related to COVID-19	○	○	○	○	○
2. I am confident that the healthcare service where I work can continue to manage patient demand related to COVID-19 over the next 3 months	○	○	○	○	○
3. The healthcare service where I work has an effective system for triage of patients with suspected COVID-19	○	○	○	○	○

Q30 The **following questions relate to your experience of managing patients** in the healthcare setting where you work. **Please think about your experience over the past week** when responding to these questions

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
1. I am concerned about the risk to myself of becoming ill with COVID-19	○	○	○	○	○
2. I am concerned about the risk to my family related to COVID-19 as a result of my job/role	○	○	○	○	○
3. I am afraid of looking after patients who are ill with COVID-19	○	○	○	○	○
4. I will try to avoid contact with patients who have COVID-19	○	○	○	○	○
5. I accept that the risk of getting COVID-19 is part of my job	○	○	○	○	○
6. I have little control over whether I get infected with COVID-19 or not	○	○	○	○	○
7. I am looking for another job or thinking about leaving this job because of the risk of COVID-19	○	○	○	○	○
8. I have received sufficient training in the infection prevention and control practices specifically for COVID-19	○	○	○	○	○
9. I am confident in my ability to correctly don and doff personal protective equipment to prevent transmission of COVID-19 to others and myself	○	○	○	○	○
10. The hospital management would be honest with its staff when managing an outbreak of COVID-19	○	○	○	○	○

Q31 The **following questions relate to your experience of managing patients** in the healthcare setting where you work. Please think about your experience over the past week when responding to these questions

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
1. I consider that the implementation of protective measures at work is generally effective to prevent the spread of COVID-19 infection in my hospital	○	○	○	○	○
2. Following the infection prevention and control recommendations will protect me from getting COVID-19	○	○	○	○	○
3. Following recommended infection prevention and control procedures related to COVID-19 adds significant additional strain to my workload	○	○	○	○	○
4. There are clear policies and protocols in my hospital for everyone to follow related to COVID-19	○	○	○	○	○
5. I can easily access dedicated isolation facilities for patients with suspected COVID-19	○	○	○	○	○
6. The hospital management would be honest with its staff when managing an outbreak of COVID-19	○	○	○	○	○