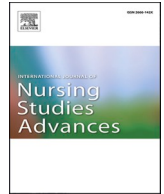


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# The factors contributing to missed care and non-compliance in infection prevention and control practices of nurses: A scoping review

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## ABSTRACT

**Background:** There is growing concern about missed nursing care and its negative impacts on patient care and nursing and organisational outcomes. Research in the area continues to grow, with a greater focus on reliable measurement, evidence-based interventions and sensitive outcomes. The relationship between missed care and adverse patient outcomes is undeniable, including increased mortality levels, and hospital acquired infections. The link between hospital acquired infections and non-compliance with infection prevention and control guidelines is also widely acknowledged. The idea of non-compliance as an element of missed nursing care has not been closely examined and this relationship is explored in this review.

**Objectives:** The aim of this study is to identify the shared factors related to both nurse non-compliance with infection prevention and control practices and the recognised research field of missed nursing care, here in relation to infection prevention and control.

**Methods:** A scoping review methodology was selected to help explore and map the research evidence on non-compliance with infection prevention and control practices, and missed nursing care in relation to infection prevention and control.

**Results:** Five key themes were identified which impact on both missed nursing care and non-compliance in the area of infection prevention and control. These included (1) Organisation of Nursing Staff and Resources; (2) Workplace Environment; (3) Nursing Care Context; (4) Managerial and Inter-Professional Relationships; and (5) Individual Nurse Factors. These shared themes underline the relationship between the concepts and suggest a shared research area.

**Conclusion:** Missed nursing care in the area of infection prevention and control, overlaps significantly with the research area of infection prevention and control non-compliance. This suggests that rather than being approached as separate or distinct entities, these research areas should be acknowledged as related or overlapping, enabling more focused attention to reducing levels of both.

### **Tweetable abstract**

Missed nursing care in the area of infection control, overlaps significantly with the research area of non-compliance with infection prevention and control guidelines.

### **Contribution of the Paper**

**What is already known about the topic?**

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- Missed nursing care has been linked over many years with increased rates of Healthcare Associated Infection rates.
- Healthcare Associated Infections can result in higher rates of morbidity and mortality, but they are largely preventable.
- Infection prevention and control guidelines are designed to protect both patients and healthcare workers from infection in healthcare settings, but non-compliance with these guidelines is an ongoing concern.

**What this paper adds?**

- Factors influencing missed nursing care in general, and specifically missed infection prevention and control care, are similar to factors influencing non-compliance rates with infection prevention and control guidelines.
- The concepts of missed nursing care in infection prevention and control, and non-compliance with infection prevention and control guidelines are essentially the same thing and should be treated as such by nurses, researchers, and healthcare organisations. This would enable a more focused and strategic response to infection prevention and control practices, ultimately helping to reduce preventable healthcare associated infections.

## 1. Background

Over the last 20 years many researchers have focused on the area of missed nursing care, or the linked concepts of implicitly rationed care or care left undone (Kalisch et al. 2006; Schubert et al. 2008; Ausserhofer et al. 2014), and on their antecedents and consequences. This work has firmly established a link between incomplete nursing care and healthcare-associated infections or hospital acquired infections (Kalisch et al., 2014; Mynaříková et al., 2020). The impact of such infections is well-established, as they pose significant threats to patient safety and can result in increased morbidity and mortality levels (Allegranzi et al., 2011; Umscheid et al., 2011; Cassini et al., 2016).

In Europe, more than 2.5 million infections associated with hospital admissions occur every year, resulting in approximately 2.5 million disability-adjusted life years (Cassini et al., 2016) and with significant resultant costs (Umscheid et al., 2011; World Health Organization, 2011; Magill et al., 2014; Bail et al., 2015). These healthcare associated infections are largely preventable consequences of hospitalisation affecting approximately 1 in 20 patients (Cassini et al., 2016). In order to decrease the significant global burden of these infections, and their associated adverse outcomes, we must first understand how they happen. One potential cause of such infections is where infection prevention and control practices by nursing staff are missed, rationed, or remain undone, including non-compliance with basic infection prevention and control guidelines. Although we acknowledge differences in previous conceptualisations of missed, implicitly rationed or undone nursing care, essentially each term describes nursing care that remains incomplete due to lack of resources, including staff and time. For the purposes of this review, we will use the overarching term of missed care to describe all related concepts.

Research suggests that healthcare associated infections are largely preventable through compliance with evidence-based guidelines, practices and precautions (Umscheid et al., 2011; Haque et al., 2018). Core infection-control practices, such as standard precautions, can help prevent infection, save lives, reduce morbidity, and minimize health care costs (Widmer et al., 2007; Revelas, 2012; Haque et al., 2018). Good hand hygiene, for instance, is possibly the most important measure in preventing health-care-associated infection and cross-transmission of antimicrobial-resistant pathogens (Pittet et al., 2006; Revelas, 2012). This scoping review seeks to identify key factors related to both nurse non-compliance with infection prevention and control practices, and missed nursing care in the area of infection control. It aims to establish how these two research areas relate to each other.

Nurses are key players in patient safety and the work nurses do clearly impacts on measurable core patient safety outcomes (Kirwan, Matthews and Scott, 2013). The negative consequences for patients associated with missed care are also well documented (Schubert et al., 2008, 2012; Lucero, Lake and Aiken, 2010; Kalisch et al., 2014; Recio-Saucedo et al., 2018). Effective infection prevention and control practices remain a longstanding tenet of modern nursing practice, and have come under the microscope during the COVID-19 pandemic of 2020/21. Standard precautions and transmission-based precautions are the fundamental tiers of infection prevention and control guidelines, designed to protect both patients and healthcare workers from infection in healthcare settings (Siegel et al., 2007). Compliance with these guidelines by health workers, including nurses, is increasingly important, and where non-compliance occurs, the reasons must be understood and addressed.

In previous studies, nosocomial infections have been associated with missed nursing care (Schubert et al., 2008, 2009; Lucero et al., 2010), and are recognised as some of its most frequent adverse consequences (Papastavrou, Andreou and Efstathiou, 2014). Similarly, missed care is associated with increased bloodstream infections, IV cannula infections, urinary tract infections and pneumonias in patients (Al-Kandari and Thomas, 2009; Ausserhofer et al., 2013; Nelson and Flynn, 2015; Recio-Saucedo et al., 2018; Kalánková et al., 2020; Mynaříková et al., 2020). Notably, missed nursing care and healthcare associated infections seem to share many of the same contributing factors including poor nurse working conditions, low nurse-patient ratio, low nurse staffing levels, high nurse burnout, high nurse workload, high bed occupancy and high patient turnover (Kalisch, 2006; Hugonnet et al., 2007; Stone et al., 2007; Griffiths et al., 2009; Kalisch et al., 2009; Cimiotti et al., 2012; Ausserhofer et al., 2014). Additionally, positive leadership in healthcare settings seems to be a prerequisite for effective infection control activities (Griffiths et al., 2009) and in reducing levels of associated missed care (Kim et al., 2018; McCauley et al., 2020). These similarities and associations solidify missed infection prevention and control as an

important and significant component of missed nursing care in general. To date most studies of missed nursing care take a generic approach to nursing work. They fail to recognise either the distinctly different work that nurses do in different clinical settings, the totality of the nurses work in relation to different aspects of patient care, or conversely one core element of nurses' overall work, like infection prevention and control. One qualitative study reported by [Henderson et al. \(2020\)](#) and [Bail et al. \(2020\)](#) for the first time looked at failure by nurses to perform infection prevention and control activities through the lens of missed nursing care. This scoping review includes and builds on that work as we seek to understand further the reasons why nurses fail to comply with infection prevention and control practices and to explore the issue of non-compliance by nurses within a missed nursing care framework.

Furthermore, this review builds on previous missed nursing care research by placing a focus on the nurse's role in relation to infection prevention and control, while acknowledging that this constitutes only one area of nursing work. Research needs to go beyond the well-established broad approach to missed nursing care, and examine the causes and consequences of specific types of missed care. In this case, given the significant burden of infection worldwide, missed infection prevention and control activities, including noncompliance with guidelines warrants closer examination within the wider context of the missed care literature.

## 2. Methods

A scoping review methodology was selected for this investigation because such reviews are useful in rapidly identifying and mapping the key issues and main available research evidence in a broad research area ([Mays et al., 2001](#); [Arksey and O'Malley, 2005](#)). Additionally they can provide insight into how topics have been studied over time, in order to advance thinking ([Peters et al. 2020](#)), and can help identify factors related to a particular topic ([Munn et al 2018](#)). This review aims to shine a light on the shared and distinct boundaries between the research areas of missed infection prevention and control activities by nurses and nurse compliance with infection prevention and control guidelines, by examining the shared factors contributing to both.

Scoping reviews are useful in examining research areas that are complex, where evidence is heterogeneous, or which have not been examined comprehensively before ([Mays et al., 2001](#); [Arksey and O'Malley, 2005](#); [Munn et al., 2018](#); [Peters et al., 2020](#)). They are of value when aiming to understand emerging knowledge in a particular field, and to examine related concepts ([Peters et al., 2020](#)). As per the remit of the scoping review methodology, this paper will not make judgments on the quality of the research reviewed ([Arksey and O'Malley, 2005](#)). Researchers felt it was important to first summarize and map the available peer-reviewed evidence on this under-researched area, and to examine the relationship between non-compliance by nurses with infection control practices, and the growing research topic of missed nursing care. Following on from this, the authors hope that the findings of this review can be used to inform further research and reviews in this area where such judgements on the quality of the available evidence can be made. No ethical approval was required for this work.

This particular review follows [Arksey and O'Malley's \(2005\)](#) five-stage framework for scoping reviews; 1) identifying the research question, 2) identifying relevant studies, 3) study selection, 4) charting the data, 5) collating, summarizing and reporting the results.

### 2.1. Identifying relevant studies and study selection

#### 2.1.1. Search strategy

As with [Arksey and O'Malley's \(2005\)](#) framework, once the research question had been identified, authors set about identifying relevant studies for this review. Literature for this review was found through electronic database searching of the following databases: Academic Search Complete, CINAHL Complete, MEDLINE, and APA PsychINFO. This literature search was performed in December

**Table 1**

Combination of Search Terms used in EBSCOhost Research Databases Interface

Search 1
<u>Databases searched</u> MEDLINE; APA PsycInfo; Academic Search Complete; CINAHL Complete
<u>Limiters</u> Years Published (1999-2020); Peer-Reviewed; English Language
<u>Search Terms</u> (unfinished care OR unfinished nursing care OR missed care OR missed nursing care OR implicitly rationed care OR implicitly rationed nursing care OR rationed care OR rationed nursing care OR care left undone OR nursing care left undone OR tasks undone OR nursing tasks left undone OR unmet care needs OR unmet nursing care needs) AND (infection OR infection prevention and control OR infection prevention and control nurses OR infection prevention OR infection control OR missed infection control OR missed infection prevention)
Search 2
<u>Databases searched</u> MEDLINE; APA PsycInfo; Academic Search Complete; CINAHL Complete
<u>Limiters</u> Years Published (1999-2020); Peer-Reviewed; English Language
<u>Search Terms</u> (factors impacting compliance OR factors influencing compliance OR suboptimal compliance OR reasons for noncompliance OR noncompliance OR low compliance OR factors impacting adherence OR factors influencing adherence OR suboptimal adherence OR reasons for nonadherence OR nonadherence OR low adherence) AND (standard precautions OR universal precautions OR transmission based precautions OR infection prevention and control OR infection prevention and control guidelines) AND (nurse AND nurses AND nursing)

2020. Key search terms were used, and different combinations were searched both individually and together. The final combination of search terms used can be viewed in Table 1. At this point, potentially relevant papers already known to the authors were added to the search results. In addition to this, reference lists from relevant papers were searched for further potentially relevant studies through processes such as snowballing and cross-referencing. Following this, duplicate studies were removed so that screening could begin.

2.1.2. Inclusion criteria

The papers included provided insight into the factors influencing missed nursing care or registered nurse compliance in the area of infection prevention and control. This included both discussion papers and primary research which looked at standard precautions, or other specified infection prevention and control guidelines. The scoping review methodology allows for inclusion of grey literature and other sources if relevant, however a decision was taken to include only peer reviewed evidence in this case, as the intention was to scope the relationship between two established research areas in the peer-reviewed evidence base. The included papers were peer-

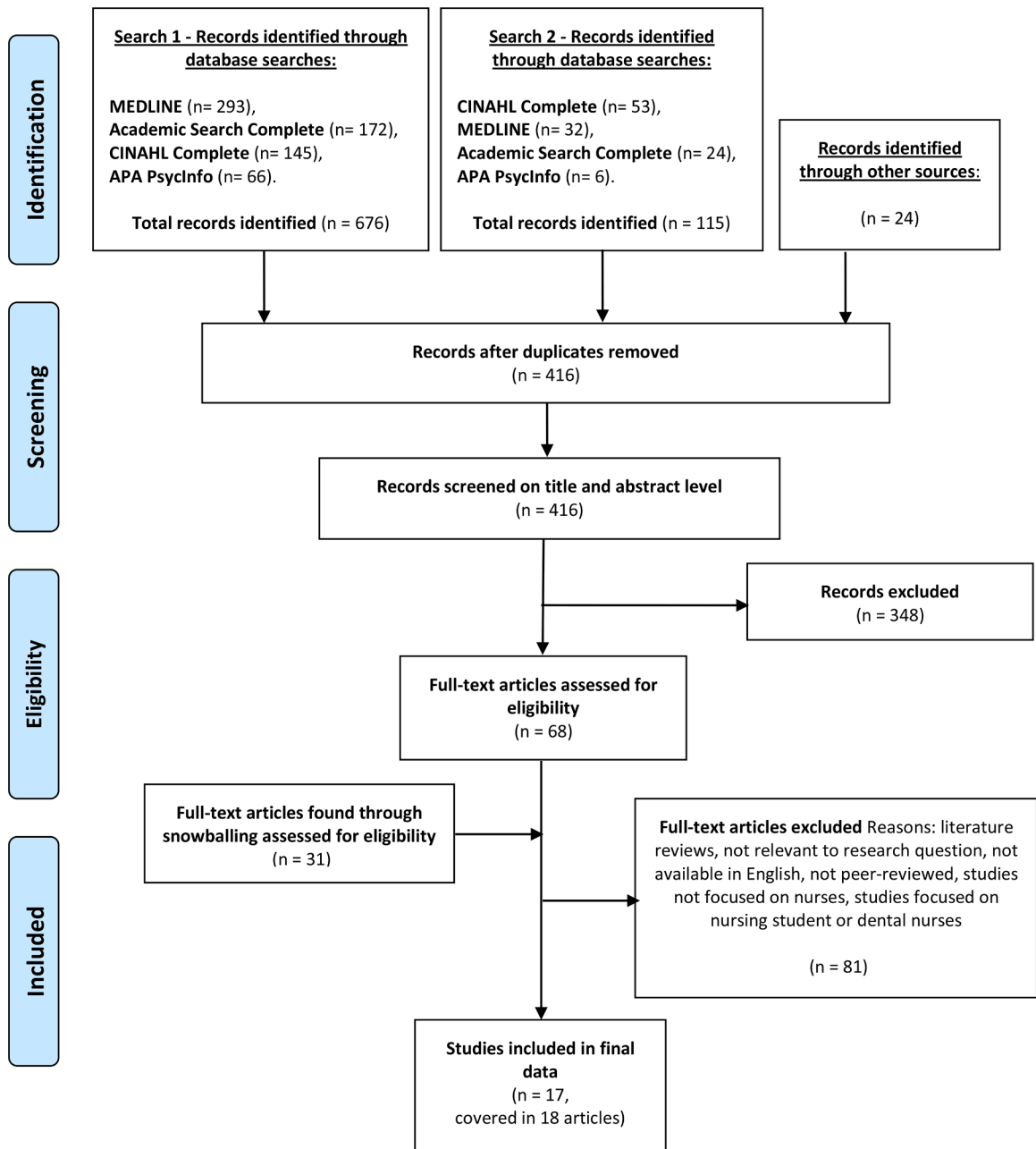


Fig. 1. PRISMA diagram.

**Table 2**

Factors influencing levels missed infection prevention and control activities or non-compliance with infection prevention and control guidelines.

Author(s)	Title & Aim	Location & Sample	Type of Article & Data Collection Tool	Relevant Results
Al-Rawajfah et al. (2013)	Title: Compliance of Jordanian registered nurses with infection control guidelines: A national population-based study Aim: to evaluate compliance of Jordanian staff nurses with infection control guidelines.	Jordan 889 nurses in 22 hospitals	Cross-sectional survey Questionnaire	<ul style="list-style-type: none"> <li>• Nurses who received infection control training in the hospital demonstrated higher compliance than those who never received such training</li> <li>• Nurses who work in university affiliated hospitals demonstrated higher compliance than other types of hospital</li> </ul>
Donati et al. (2019)	Title: Experiences of compliance with SPs during emergencies: A qualitative study of nurses working in intensive care units Aim: To explore factors that influence intensive care nurses' experiences of being compliant with SPs during emergencies.	Italy 19 ICU nurses	Qualitative Study Focus Groups	<p>Findings were presented under 3 themes:</p> <ul style="list-style-type: none"> <li>• Conflict related to protecting the patient and oneself, managing time and having sufficient knowledge.</li> <li>• Competencies related to nurses' knowledge, attitude, skills, training, and (professional and personal) experience.</li> <li>• Context related to the work and organizational conditions during the emergency, including safety climate.</li> </ul>
Efstathiou et al. (2011a)	Title: Compliance of Cypriot nurses with SPs to avoid exposure to pathogens. Aim: to examine Cypriot nurses' compliance with the main aspects of SPs and to explore the possible relationships or associations with the nurses' demographic characteristics	Cyprus 577 nurses in 5 hospitals	Cross-sectional survey Self-completed questionnaire developed by the authors	<ul style="list-style-type: none"> <li>• The results showed inadequate compliance with SPs. Full compliance with all the main aspects of SPs was reported by only 9.1% of the participants.</li> <li>• Nurses who had participated previously in an educational program about SPs reported a higher frequency of implementing them than those who had not participated.</li> <li>• Nurses' age and frequency of the implementation of SPs were found to be significantly and positively correlated.</li> </ul>
Efstathiou et al. (2011b)	Title: Factors influencing nurses' compliance with SPs in order to avoid occupational exposure to microorganisms: A focus group study Aim: to study the factors that influence nurses' compliance with SPs in order to avoid occupational exposure to pathogens, by employing a qualitative research design.	Cyprus 30 nurses in 2 hospitals	Qualitative Study Focus groups	<p>Many factors were revealed to influence nurses' compliance with SPs in order to avoid occupational exposure to microorganisms and most factors could be applied to one of the main domains of the Health Belief Model: benefits, barriers, severity, susceptibility, cues to action, and self-efficacy.</p> <p>The factors which can influence compliance with SPs to differing degrees, and these included: an emergency setting, lack of equipment, PPE hindering care delivery, patient considerations and characteristics, lack of time, embarrassment, poor role models, previous exposure experience, perceived low risk for oneself, a high risk environment, self-efficacy levels and continuous educational need.</p> <p>The most common reasons given for not using precautions included:</p> <ul style="list-style-type: none"> <li>• belief that stopping to use SPs would have put the patient at risk (e.g. during emergency situations);</li> </ul>
Ferguson et al. (2004)	Title: Critical Incidents of Nonadherence with SPs Guidelines Among Community Hospital-based Health Care Workers Aim: To identify, categorize, and	United States 3,223 participants: Registered nurses (67%) physicians (15%), licensed practical nurses (8%), and medical technologists (10%)	Qualitative and quantitative analysis Written, mail-out survey. Analysis for this study based 1,362 respondents	<p>The most common reasons given for not using precautions included:</p> <ul style="list-style-type: none"> <li>• belief that stopping to use SPs would have put the patient at risk (e.g. during emergency situations);</li> </ul>

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Table 2 (continued)

Author(s)	Title & Aim	Location & Sample	Type of Article & Data Collection Tool	Relevant Results
	assess critical incidents of nonadherence to SPs.		who answered a specific question on SP.	<ul style="list-style-type: none"> <li>• using precautions would have interfered with patient care (e.g. difficulties performing venepunctures wearing gloves);</li> <li>• precautions were not warranted in a specific situation (e.g. the belief that recapping needles is safer);</li> <li>• did not anticipate the potential for exposure;</li> <li>• high job demands that had caused respondent to be in a hurry (e.g. not having enough time to change gloves between patients)</li> </ul>
Henderson et al. (2019) Also reported in Bail et al (2020)	Title: Why do nurses miss infection control activities? A qualitative study Aim: To determine the factors that contribute to infection control activities being missed	Australia 11 nurses with infection control expertise	Qualitative Study Semi-structured interviews	<ul style="list-style-type: none"> <li>• Four major factors were identified as contributing to infection control activities being missed. These were: systemic factors, environmental factors, organisational factors and personal factors.</li> <li>• The reasons for failure to perform infection prevention and control activities are complex and involve issues of resourcing, managerial and inter-professional support, ward layout and access to PPE as well as personal motivation and understanding of the rationale for activities.</li> </ul>
Kim and Hwang (2019)	Title: Factors contributing to clinical nurse compliance with infection prevention and control practices: A cross-sectional study. Aim: to evaluate the knowledge, attitudes, perceived safe environment, and compliance of clinical nurses and to identify the factors contributing to compliance with infection prevention and control practices	South Korea 197 nurses	Cross-Sectional Study Self-administrated questionnaire	<ul style="list-style-type: none"> <li>• Nurses demonstrated favourable attitudes toward infection prevention and control and favourable perceptions regarding safe environment. Nurses' attitudes, perceived safe environment, and period of clinical experience had significant positive contributions to compliance. Working in the intensive care unit was associated with higher compliance.</li> <li>• The multiple regression model that included education level, employment department, length of clinical experience, experience in infection prevention and control education, needle injury exposure, blood exposure, knowledge, attitudes, and perceived safe environment significantly predicted compliance with infection prevention and control</li> </ul>
Lee et al. (2018)	Title: Nurses' Views on Infection Control in Long-Term Care Facilities in South Korea: A Focus Group Study Aim: to explore nurses' perspectives on challenging situations and the	South Korea 15 nurses in 5 Long-term care facilities	An Exploratory Descriptive Qualitative Study focus group interview with semi-structured questions	<ul style="list-style-type: none"> <li>• Participants discussed the breadth of challenges interfering with their ability to provide optimal infection care, from practical human resource</li> </ul>

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Table 2 (continued)

Author(s)	Title & Aim	Location & Sample	Type of Article & Data Collection Tool	Relevant Results
	areas of improvement related to their role in infection management			management issues to organizational and environmental barriers, and laid a foundation based on which lacking areas can be improved. <ul style="list-style-type: none"> <li>Analysis produced key themes centred on healthcare personnel-related professionalism, professional role boundaries, daily workflow and management, interdisciplinary collaboration, standards and protocols, and technological infrastructure.</li> </ul>
Luo et al. (2010)	Title: Factors impacting compliance with SPs in nursing, China. Aim: to evaluate registered nurse compliance with SPs and to analyze the factors that affect compliance	China 1,444 nurses	Cross- Sectional Survey Questionnaire	<ul style="list-style-type: none"> <li>Compliance with SPs was found to be low in the surveyed nurses. The factors most affecting compliance were: SPs training and knowledge, followed by hospital grade, presence of sharps disposal box in the department, general self-efficacy, exposure experience, and department in which the nurse worked.</li> <li>Of the nurses surveyed only half had knowledge of all the SPs or had received training. Nurses with SPs training had greater precaution compliance than those without SPs training. Knowledge was found to exert a positive impact on compliance with precautions</li> </ul>
Nofal et al. (2017)	Title: Factors influencing compliance to the infection control precautions among nurses and physicians in Jordan: A cross-sectional study. Aim: To determine nurses and physician's knowledge, attitude and compliance to ICPs and factors associated with reported compliance	Jordan <u>Health care workers (n = 211)</u> : 155 nurses and 56 physicians	Cross-sectional survey 3 instruments were used to assess knowledge, attitudes and compliance to ICPs.	<ul style="list-style-type: none"> <li>Both groups had low knowledge scores for ICP but a high positive attitude. Although both groups had high reported compliance scores, nurses had significantly higher compliance than physicians.</li> <li>Participants from the private hospital had higher knowledge and compliance scores.</li> <li>Length of experience, knowledge and attitude were significant predictors of reported compliance to ICPs.</li> <li>Researchers concluded that clinical training programmes are required to enhance knowledge and understanding of infection prevention and control.</li> </ul>
Oh and Choi (2019)	Title: Factors influencing the adherence of nurses to SPs in South Korea hospital settings Aim: to explore the adherence of nurses to SPs and to identify factors influencing adherence to SPs	South Korea 339 nurses from 9 hospitals	Cross-Sectional Survey Questionnaire	<ul style="list-style-type: none"> <li>A higher, or positive, attitude was the strongest influencing factor in adherence to SPs, followed by administrative support, hospital types, and safety climate, in descending order. These 4 variables accounted for 26.0% of the variance in adherence to SPs</li> <li>The adherence of the participants to SPs was significantly</li> </ul>

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Table 2 (continued)

Author(s)	Title & Aim	Location & Sample	Type of Article & Data Collection Tool	Relevant Results
Powers et al. (2016)	Title: Factors influencing nurse compliance with SPs. Aim: to explore the reasons why nurses fail to adopt behaviours that protect them using the Health Belief Model for the theoretical framework	United States 116 nurses	Descriptive correlational study Cross-Sectional Survey	<p>correlated with their attitude, the safety climate, administrative support, age, and length of clinical experience.</p> <ul style="list-style-type: none"> <li>The attitudes of nurses toward SPs is important for increasing the adherence to SPs best practices. Adherence of nurses to SPs will improve if safe environments are created in different hospital types and if managerial support and administrative efforts are supportive and sustained.</li> <li>A statistically significant relationship was found between compliance and susceptibility to hepatitis C virus (HCV) illness and between compliance and barriers to SP.</li> <li>Fewer than one-fifth of nurses were always compliant with all SP behaviours. 92% reported “always wearing gloves”, and 70% reported always using a face mask.</li> </ul>
Randle and Clarke (2011)	Title: Infection control nurses' perceptions of the code of hygiene. Aim: To understand senior infection prevention and control Nurses' experiences and perceptions of implementing the day to day aspects of the Code of Hygiene.	England 5 senior nurses from 5 infection prevention and control teams	Qualitative Study Qualitative Interviews	<ul style="list-style-type: none"> <li>Two themes emerged from the data: Interventions and Barriers to compliance.</li> <li>Interventions were driven by senior NHS managers and necessitated organizational change. It was senior NHS managers who were considered as being the force for change and who intervened and took responsibility for implementation. Change was achieved by a top-down approach and was driven by senior managers' fear of external censure.</li> <li>Barriers to compliance were identified as: a lack of facilities, specifically a lack of side rooms and isolation facilities, and the non-engagement and non-compliance of medical staff (doctors).</li> </ul>
Sax et al. (2005)	Title: Knowledge of Standard and Isolation Precautions in a Large Teaching Hospital. Aim: To assess the level of knowledge regarding and attitudes toward standard and isolation precautions among healthcare workers in a hospital.	Switzerland <u>Health care workers (n = 1,223):</u> 910 nurses, and 313 physicians	Cross-Sectional Survey Questionnaire	<ul style="list-style-type: none"> <li>The following reasons for non-compliance with guidelines were judged as “very important”: lack of knowledge, lack of time, forgetfulness, and lack of means</li> <li>Lack of means and lack of time were also considered less important for physicians and healthcare workers in a senior staff position.</li> </ul>
Shah et al. (2015)	Title: Towards changing healthcare workers behavior: A qualitative study exploring non-compliance through appraisal s of infection	England <u>Health care workers (n = 39):</u> 18 nurses, 10 doctors, 10	Qualitative Study Semi-structured interviews	<ul style="list-style-type: none"> <li>Three ways in which healthcare workers appraised their behaviour were identified</li> </ul>

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Table 2 (continued)

Author(s)	Title & Aim	Location & Sample	Type of Article & Data Collection Tool	Relevant Results
	prevention and control practices. Aim: To identify behaviours of HCWs that facilitated non-compliance with infection prevention and control practices, focusing on how appraisals of infection prevention and control duties and social and environmental circumstances shaped and influenced non-compliant behaviour.	pharmacists, and 1 midwife in 3 hospitals		through accounts of infection prevention and control policies and practices: (1) attribution of responsibilities, with ambiguity about responsibility for certain infection prevention and control practices; (2) prioritization and risk appraisal, which demonstrated a divergence in values attached to some infection prevention and control policies and practices; and (3) hierarchy of influence highlighted that traditional clinical roles challenged work relationships.
Tait et al. (2000)	Title: Compliance with standard guidelines for the prevention of occupational transmission of blood-borne and airborne pathogens: A survey of post-anesthesia nursing practice Aim: To evaluate post-anesthesia care unit (PACU) nurses' compliance with the guidelines for prevention of exposure to HIV, hepatitis B and C viruses (HBV, HCV), and tuberculosis (TB). To determine compliance with the CDC guidelines for prevention of occupational transmission of blood-borne and airborne pathogens and to identify practices that may place them at risk.	United States 34 adult and paediatric (PACU) nurses at a large, tertiary care medical centre.	Cross-Sectional Survey Questionnaire	<ul style="list-style-type: none"> <li>Reasons for not complying with SPs were listed: (1) No anticipated blood contact, (2) too busy, (3) Patient considered low risk, (4) Protective equipment not readily available, and (5) Forgot.</li> <li>The most commonly cited reasons for noncompliance were no anticipated blood contact or being too busy.</li> <li>Results suggest that, although the PACU nurses surveyed reported knowledge of the standard guidelines, this was not always reflected in their practice. This study identified potential barriers to compliance such as lack of availability of equipment or forgetfulness which may be easily targeted and improved.</li> </ul>
Timen et al. (2010)	Title: Barriers to implementing infection prevention and control guidelines during crises: Experiences of health care professionals Aim: To assess reasons for non-adherence (barriers) among key professionals in outbreak control in crisis situations: consultant microbiologists, infection preventionists, public health physicians, and public health nurses.	The Netherlands <u>Health care workers (n = 212)</u> : 37 public health nurses, 30 microbiologists, 100 infection preventionists, & 45 public health physicians.	Cross-Sectional Survey Questionnaire In-depth interviews used to develop this Questionnaire	<ul style="list-style-type: none"> <li>4 generic barriers to adherence to infection prevention and control guidelines during crises: (1) lack of imperative or precise wording, (2) lack of easily identifiable instructions specific to each profession, (3) lack of concrete performance targets, and (4) lack of timely and adequate guidance on personal protective equipment and other safety measures.</li> <li>Nurse specific barriers to adherence to crisis guidelines is related mostly to practical aspects, such as adequate time to perform control measures and update local protocols on the basis of newly issued guidance for crisis.</li> </ul>

reviewed, published between 1999 and the date of the search in December 2020. These dates are relevant as the patient safety movement was seen to enter a new phase from 1999 onwards, following the publication of *To Err is Human* (Kohn et al. 1999) and related to that there was a focus on missed care evident from 2000 in the nursing literature. Included papers were written in the English language, and available in full-text, electronic format.

### 2.1.3. Exclusion criteria

The authors took a general approach to infection prevention and control in this review by examining papers which looked at compliance with infection prevention and control guidelines as a whole. Therefore, papers that examined only specific elements of infection prevention and control precautions such as compliance with hand hygiene or personal protective equipment, were not included in the findings. This decision was made for the purposes of breadth of coverage and subsequent discussion.

The authors excluded papers which focused on nursing students or dental nurses. Articles which focused exclusively on research in the following settings, which have distinct and particular infection prevention and control requirements or context specific procedures were also excluded: operating theatre settings, community or primary health care, obstetric care, outpatient settings, and psychiatric hospitals. Papers found which were not available in English or not peer-reviewed were also not included in the study.

### 2.1.4. Data screening

During the first phase of data screening, the primary author examined the titles and abstracts of the search results and used eligibility criteria to assess their relevance to this review. Electronic versions of potentially relevant studies were sourced, then read and re-read multiple times by the primary author, who once again applied the inclusion criteria and formulated some exclusion criteria. Inclusion and exclusion decisions were confirmed at all stages by the second author. Again with [Arksey and O'Malley \(2005\)](#), articles were assessed and chosen based on their relevance to the research question rather than methodological rigour. A PRISMA flow diagram giving a detailed account of the strategy used is viewable in [Fig. 1](#).

## 2.1. Charting data and reporting the results

Data were extracted from relevant papers and organized into tables using Microsoft Excel. These included data such as the name(s) of the author(s), the year of publication, the title of the study, the aim of the study, the geographical location, the study design, the data collection tools, available information on the study sample, and finally key results relevant to the research question (see [Table 2](#)). These tables were reviewed and finalised by all authors and were used to inform the writing of this review, including collating, summarizing and reporting the results. The final themes drawn from the papers reviewed can be found in the next section.

## 3. Findings

### 3.1. Overview of selected papers

After the initial screening of results from both searches and the records identified through other sources, 68 potentially relevant papers were identified. Subsequent analysis of these papers and their reference lists produced 31 additional potentially relevant articles through the process of snowballing. Snowballing, or hand searching, refers to the strategy of using reference lists or citations in identified papers to identify additional papers ([Heibl, 2021](#)).

Finally, after full-text analysis and the application of inclusion and exclusion criteria, 17 studies, reported in 18 articles, were deemed relevant to the review. This final sample included six qualitative studies which used either interviews or focus groups, ten quantitative studies which used surveys and one study which used both qualitative and quantitative analysis of data from a written survey. The heterogeneous nature of the included papers is in keeping with the scoping review methodology ([Peters et al., 2020](#)). [Bail et al. \(2020\)](#) reported on the same study as [Henderson et al., 2020](#), and therefore are treated as one study in the findings [Table 2](#). The majority of these papers had participant samples made up exclusively of registered nurses. Some papers focused exclusively on nurses with infection prevention and control expertise ([Randle and Clarke, 2011](#); [Henderson et al., 2020](#)), while others took a more general approach. Notably, five papers included in the final sample also included other healthcare workers such as, midwives, doctors, medical technologists, pharmacists or microbiologists, in addition to nurses ([Tait et al., 2000](#); [Ferguson et al., 2004](#); [Sax et al., 2005](#); [Timen et al., 2010](#); [Shah et al., 2015](#); [Nofal et al., 2017](#)). [Table 2](#) provides further details on the breakdown of participants in the included studies. Most included papers refer to standard precautions (where all body fluids and excretions except sweat should be treated as if they contain transmissible infectious agents), which is consistently understood across these studies. Other papers refer more generally to infection prevention and control precautions, guidelines, or protocols which appear to include the essential elements of standard precautions as outlined by the Centers for Disease Control ([Siegal et al., 2007b](#)) and the World Health Organisation ([World Health Organisation, 2007](#)).

Following an in-depth analysis of extracted data, a number of key themes were identified which impact on both missed nursing care, and on nurse compliance in the area of infection prevention and control. These included (1) Organisation of Nursing Staff and Resources; (2) Workplace Environment; (3) Nursing Care Context; (4) Managerial and Inter-Professional Relationships; and (5) Individual Nurse Factors. The final themes were agreed by all authors.

### 3.2. Organisation of Nursing Staff and Resources

Eight of the included papers refer to factors frequently related to how nursing is configured and resourced, within hospital organisational structures. While [Henderson et al. \(2020\)](#) highlighted systemic issues such as, funding and health policy as contributing factors to missed infection prevention and control activities, other factors identified in this and other papers are fundamentally linked to how nursing is organised and resourced at organisational level. Inadequate staffing levels, often as a result of funding shortages, can impact infection prevention and control activities. It was suggested that poor staffing levels or skill mix, and associated lack of time,

along with lack of availability of appropriate equipment, can lead to infection control activities being missed, or to poor compliance with guidelines (Henderson et al. 2020; Bail et al. 2020; Efstathiou et al., 2011b). These staffing and resource issues were found to reduce the capacity of nurses to carry out core nursing tasks, and also created difficulties in identifying signs of infection (Henderson et al., 2020 and Bail et al., 2020).

Issues around nurse staffing included problems with staffing levels, as well as, staff skill mix and staffing ratios (Efstathiou et al., 2011b; Henderson et al., 2020). Participants in Efstathiou et al. (2011b) believed their increased workloads were often due to staffing issues. Similarly, participants in Lee et al. (2018) argued that adequate staffing and the management of areas such as substitute staffing was essential for smooth workflow and the implantation of infection prevention and control policies.

Time as a resource seems of particular importance in relation to infection prevention and control compliance, related mainly to the time taken to don personal protective equipment (Efstathiou et al., 2011b; Henderson et al., 2020), including glove changes between patients (Ferguson et al., 2004; Tait et al., 2000). In emergency settings nurses reported that they frequently prioritise emergency care above infection prevention and control precautions (Efstathiou et al., 2011b). Healthcare workers, including nurses, in a study by Shah et al. (2015) reported knowingly 'cutting corners' due to competing demands and resources constraints.

Nurses studied by Henderson et al. (2020) flag funding as a factor which contributes to missed infection prevention and control. Funding shortfalls can create barriers in implementing infection control programs and purchasing up to date equipment and technology. This result is echoed in Lee et al. (2018) who noted a lack of technological infrastructure for both managing and monitoring infections. Sax et al. (2005) noted a lack of means as a very important factor contributing to non-compliance.

Finally, inadequate or inappropriate policies, protocols or standards for infection prevention and control, was another significant factor which influenced why nurses don't comply with infection control standards (Lee et al., 2018; Henderson et al., 2020). This issue is particularly evident in the study by Lee et al. (2018), which examined practices in a long-term care facility. Here, participants reported that no specific clinical guidelines existed for infection control long-term care facilities and that application of hospital guidelines in this setting was not appropriate (Lee et al., 2018).

### 3.3. Workplace Environment

Factors related to the immediate environment are important considerations when understanding why nurses miss infection prevention and control activities, and were therefore covered in nine studies. These can include factors such as inappropriate ward layout (Luo et al., 2010; Randle and Clarke, 2011; Henderson et al., 2020); lack of facilities (Randle and Clarke, 2011; Henderson et al., 2020), access to, or availability of equipment (Tait et al., 2000; Ferguson et al., 2004; Luo et al., 2010; Efstathiou et al., 2011b; Lee et al., 2018; Henderson et al., 2020), supply of ineffective or ill-fitting personal protective equipment (Ferguson et al., 2004), and type of department or hospital a nurse works in (Al-Rawajfah et al., 2013; Kim and Hwang, 2020). For example, issues of ward layout such as lack of isolation spaces and side rooms (Randle and Clarke, 2011; Lee et al., 2018), in addition to outdated ward layouts or hospital design (Henderson et al., 2020) were reported as possible barriers to adherence with infection prevention and control activities. Nurses reported that access to personal protective equipment (Efstathiou et al., 2011b; Henderson et al., 2020) and facilities such as sinks, hand basins and sharps disposal boxes can affect their compliance with standard precautions (Luo et al., 2010; Henderson et al., 2020). The location of equipment storage and disposal facilities was also found to be an important environmental factor, as Efstathiou et al. (2011b) noted that inconvenient placement of these facilities made nurse compliance with standard precautions difficult.

University-affiliated hospitals (Al-Rawajfah et al., 2013) and private hospitals (Nofal, Subih and Al-Kalaldehy, 2017) were found to have higher rates of compliance with infection prevention and control precautions. Luo et al. (2010) reported that hospital-grade and size were important factors that could influence compliance with standard precautions. For example, smaller hospitals may have inadequate infrastructure or no specialised infection administration departments (Luo et al., 2010).

### 3.4. Nursing Care Context

The setting and context in which nursing care is carried out can affect compliance with infection prevention and control guidelines. Seven of the included studies covered these factors. For example, the type of department nurses currently work in, and the types of departments in which they have previous experience were found to influence compliance with infection control guidelines (Luo et al., 2010; Kim and Hwang, 2020). Kim and Hwang (2020) reported that nurses working in, or who had experience working in, intensive care units had stronger infection prevention and control compliance rates.

Care context, where time is scarce or workload high, can be very influential around rates of compliance (Efstathiou et al., 2011b) with nurses prioritising other care above infection control precautions. In units such as ICUs, cardiology, or burns units, nurses maintained that rationing infection prevention and control care was necessary in life or death situations (Efstathiou et al., 2011b), and they perceived that taking time to use standard precautions, may in fact have placed patients at higher risk in emergency situations (Ferguson et al., 2004). Donati et al. (2019) reported nurses' conflict in choosing the provision of emergency care, rather than self-protection through the use of personal protective equipment. Sometimes this conflict resulted in use of partial equipment (gloves only, perhaps, where full or extra personal protective equipment is recommended). Overcrowding in emergency situations actively prevented the wearing of appropriate personal protective equipment. Where an emergency situation is seen as chaotic and uncontrolled, compliance is reduced.

Organisation, and planning for emergencies, is critical to supporting nurses' rates of compliances with infection prevention and control measures. A well organised physical environment, effective teamwork with clearly defined roles and division of responsibility, a culture which prioritises infection prevention and control compliances is essential (Donati et al. 2019) along with clear

communication and precise instruction around roles and infection control measures in an emergency situation (Timen et al., 2010).

While Luo et al. (2010) reported that nurses working in medical departments had lower compliance rates than those in surgical departments, this may be partially explained by a finding by Tait et al. (2000) who suggested that compliance is impacted by perceived anticipated contact with blood. Efstathiou et al. (2011b) found that the patient receiving nursing care was also found to influence infection prevention and control compliance. They, along with others (Ferguson et al., 2004), suggest that an influential hierarchy exists by type of patient and perceived risk of infection nurses feel they pose. For example, participants in Efstathiou et al. (2011b) and Ferguson et al. (2004) viewed the provision of nursing care to children to be low-risk, and therefore, the use of preventative measures was considered to be less necessary. Conversely, adult age groups were considered high-risk, and therefore promoted nurse compliance with standard precautions.

### 3.5. Managerial and Inter-professional Relationships

Six of the papers reported relationship factors which can cause nurses to miss infection prevention and control protocols, such as relations with managers and other professional relationships. These included influences such as lack of effective management, managerial support and communication from management (Lee et al., 2018; Henderson et al., 2020). The results of Henderson et al. (2020) suggest that managerial engagement with infection control guidelines is reflected in the overall ward culture. Nurses in this study suggested that effective leadership can improve ward culture and practices around infection prevention and that a lack of managerial support hindered good infection control practice (Henderson et al., 2020). Lee et al. (2018) argue a need for motivational leadership, as participants in their study reported that they did not feel inspired, motivated or energized by their managers towards preventing healthcare-associated infections. Managers lacked leadership in areas such as communication of the organisational culture and that this hindered infection control processes (Lee et al., 2018). Poor management in areas such as daily workflow was also found to have a negative influence on compliance with infection control activities (Lee et al., 2018). On a similar note, Randle and Clarke (2011) argue that compliance with infection control protocols can be achieved through organisational change and intervention by senior management. Lee et al. (2018) argue that the introduction of a legislative code of hygiene drives managers to enforce infection control guidelines due to the prospect of external scrutiny by both agencies and the media. Furthermore, nurses felt that the implementation of a code of hygiene by managers gave them greater authority in improving infection prevention and control practice as they felt enabled to report colleagues who were non-compliant (Lee et al., 2018).

The attitude of the nurse manager is influential in terms of creating a safety climate within the workplace. Oh and Choi (2019) suggest that a positive attitude towards safety was the strongest influencing factor in adherence to standard precautions, followed by administrative support, hospital types, and safety climate. Nurse compliance will improve if managerial support and administrative efforts are supportive and sustained. In contrast, Henderson et al. (2020 p.4) highlight how lack of managerial support can also influence various other systemic and personal factors, including "lack of financial support and educational opportunities for infection control, lack of funding for information technology and research and limited access to infection control expertise".

Another organisational factor found in the papers reviewed was interprofessional relationships and communication (Efstathiou et al., 2011b; Shah et al., 2015; Henderson et al., 2020). In particular, several of the studies reviewed reported that the relationship between nurses and medical staff influenced compliance with infection control guidelines. Participants in Henderson et al. (2020) reported that medical staff may not accept correction of their infection control activities from nurses and that this perceived professional hierarchy can lead to difficulty and uncertainty in challenging poor infection control practices. This is significant because nursing staff fill many of the dedicated infection control and prevention roles. Furthermore, Efstathiou et al. (2011b) reported that nurses might be influenced by non-compliance of other professionals, particularly medical staff, or might be directed towards carrying out protocols incorrectly by senior clinicians.

Shah et al. (2015) noted that prioritization of infection prevention and control activities and views on who is responsible for monitoring infection prevention and control is not consistent between and within different groups of healthcare workers. These differences can fuel tensions which may impact inter-professional communication and overall infection control (Shah et al., 2015).

### 3.6. Individual Nurse Factors

The final key area uncovered in 12 papers in this review, which may explain why nurses miss infection control activities, consisted of a number of specific personal factors which can differ from nurse to nurse. Eight of these papers noted nurses' levels of training (Luo et al., 2010; Al-Rawajfah et al., 2013), nurses' education (Efstathiou et al., 2011a; Kim and Hwang, 2020; Henderson et al., 2020) and nurses' knowledge and understanding of infection control protocols (Sax et al., 2005; Luo et al., 2010; Nofal et al., 2017; Henderson et al., 2020) as key factors. For example, a number of papers reported that nurses who took part in a relevant education or training programme had higher compliance with infection control guidelines (Efstathiou et al., 2011a; Al-Rawajfah et al., 2013). On the other hand, lack of knowledge was considered to be an important factor contributing to non-compliance (Sax et al., 2005; Henderson et al., 2020).

Participants in Efstathiou et al. (2011b) reported that continuous education around infection control guidelines is needed to improve overall compliance with standard precautions. This was mirrored in the results of Sax et al. (2005), Ferguson et al. (2004) and Tait et al. (2000) who commonly highlighted forgetfulness as being a very important factor contributing to non-compliance with standard and transmission-based precautions.

Another factor which can influence nurse adherence to infection control guidelines is a nurse's level of experience (Luo et al., 2010; Efstathiou et al., 2011b; Shah et al., 2015; Kim and Hwang, 2020). This includes not only length of experience (Kim and Hwang, 2020),

but also experience working in particular practice environments and previous exposure to infection (Luo et al., 2010; Efstathiou et al., 2011b; Donati et al., 2019). Kim and Hwang (2020) reported that in addition to the length of clinical experience, experience of working in departments such as the intensive care unit can help improve compliance. Additionally, having previous experience with needle injury, blood exposure or infection exposure in general also strongly influenced nurses' infection prevention and control compliance (Luo et al., 2010; Efstathiou et al., 2011b; Donati et al., 2019). Relevant nurse competencies linked to nurses' knowledge, attitude, skills, training, and experience were seen to be influential (Donati et al., 2019). Furthermore Oh and Choi (2019) noted that adherence to SPs was significantly correlated with age, and length of clinical experience.

Nurse experience could also be related to other personal factors such as self-efficacy and confidence (Luo et al., 2010; Efstathiou et al., 2011b). The results of Luo et al. (2010) revealed a positive correlation between self-efficacy and compliance with precautions. Shah et al. (2015) reported that personal experience is highly valued among healthcare workers. However, they highlighted that because of this; personal experience may often be used as an excuse to override policy and organisational standards. Participants in Shah et al. (2015) stated that sometimes various shortcuts and risk evaluations were used to balance the risk of healthcare associated infection, against other patient needs. This practice can be problematic because as Efstathiou et al. (2011b) highlighted the beliefs and practices of individual nurses can often influence the behaviour of others around them. In particular, junior nurses can be influenced by the behaviour of more senior staff. Furthermore, Efstathiou et al. (2011b) suggested that when standard precautions are followed by colleagues with more knowledge or who hold a senior position, others are also influenced to comply.

A nurse's level and type of experience can influence their specific attitudes and beliefs towards infection prevention and control practices and guidelines (Nofal et al., 2017; Kim and Hwang, 2020), and these, in turn, may influence their levels of compliance. In addition to the belief that personal experience can be used to override infection control guidelines, another personal factor influencing compliance reported by Efstathiou et al. (2011b) is how nurses view their susceptibility to infection. Feelings that one's health is strong and not at risk can reduce compliance with infection control, while fears about susceptibility to infection can lead to the opposite behaviour (Efstathiou et al., 2011b). This is supported by a study conducted by Powers et al. (2016) where a statistically significant relationship was found between compliance and susceptibility to hepatitis C virus illness, and between compliance and barriers to using standard precautions.

Compliance with certain infection control protocols such as wearing of personal protective equipment is also impacted by personal factors such as embarrassment or concern for one's self-image (Efstathiou et al., 2011a). Additionally, some nurses held the belief that such equipment negatively influenced nursing practice by reducing dexterity and causing distress for patients by suggesting the severity of their condition or health status (Efstathiou et al., 2011b; Ferguson et al., 2004).

#### 4. Discussion

This review highlights a range of specific factors influencing missed care and compliance in the area of infection prevention and control. Of the 17 included papers providing data for the review, only one study specifically focused on why nurses miss infection control activities (Henderson et al., 2020; Bail et al. 2020). Twelve of the papers explored factors influencing compliance with standard precautions, transmission-based precautions or infection prevention and control guidelines (Tait et al., 2000; Ferguson et al., 2004; Luo et al., 2010; Efstathiou et al., 2011b, 2011a; Al-Rawajfah et al., 2013; Shah et al., 2015; Powers et al., 2016; Nofal et al., 2017; Donati et al., 2019; Oh and Choi, 2019; Kim and Hwang, 2020). The remaining four articles focused on participants' knowledge, perceptions or views of infection prevention and control (Sax et al., 2005; Timen et al., 2010; Randle and Clarke, 2011; Lee et al., 2018). Despite the different focus in these papers, the authors deemed all these subject areas relevant to answering the research question. The authors included factors influencing compliance with infection prevention and control guidelines in the focus of this review, due to the almost complete lack of literature exploring why nurses miss infection control activities; with the exception of one study (reported by both Henderson et al. (2020) and Bail et al. (2020)).

Kirwan and Schubert (2020, p. 5) suggest that the instrument for measuring missed infection prevention and control care by nurses as developed by Henderson et al. (2020) "advances our thinking around missed or rationed care and suggests that generic instruments for measuring the concepts may not capture the intricacies of specialist nursing practice". The field of missed care research no longer warrants an entirely generic approach, as the antecedents and impacts are widely understood. The work led by Henderson and further reported by Bail et al. (2020) demonstrates how specific elements of nursing work need further exploration. This is particularly important for areas of nursing work which are associated with specific and measurable outcomes such as infection prevention and control. The study reported by Henderson et al. (2020) and Bail et al. (2020) is included in this review and is the first of its kind, as research on missed nursing care in infection prevention and control remains in embryonic stages and requires further attention from researchers.

Missed infection prevention and control care must be examined and understood, as a distinct component within the missed care literature in order for its specific causes and consequences to be effectively addressed. This is important for example, when creating guidelines for reducing healthcare associated infections and infection transmission with healthcare settings. Research suggests that healthcare associated infections can be prevented through good evidence-based practices and precautions (Umscheid et al., 2011; Haque et al., 2018). For instance, compliance with the basics of good hand hygiene can prevent such infections, reduce morbidity, and minimize health care costs (Widmer et al., 2007; Revelas, 2012; Haque et al., 2018). Conducting focused research on missed infection prevention and control activities will enable researchers to understand which specific aspects of this area of nursing care are being missed and why. Notably, research examined in this review suggests a lack of literature focusing on why nurses miss transmission-based precautions. This is particularly relevant in view of the outbreak of SARS-CoV-2 Pandemic.

Overall, literature examined in this review suggested that the issues of non-compliance and missed care in the area of infection

prevention and control could be improved through nurse education (Luo et al., 2010; Nofal, Subih and Al-Kalaldehy, 2017; Henderson et al., 2020; Kim and Hwang, 2020) and changing nursing attitudes and beliefs on infection prevention and control practices (Efstathiou et al., 2011a; Shah et al., 2015; Henderson et al., 2020; Kim and Hwang, 2020). Additionally, improving positive leadership by management (Randle and Clarke, 2011; Lee et al., 2018; Henderson et al., 2020) and leadership of experienced or senior staff and doctors (Efstathiou et al., 2011b; Randle and Clarke, 2011; Shah et al., 2015) also seems to be pivotal to improving overall ward cultures on compliance with infection prevention and control guidelines. These factors can be found in existing missed care literature as contributing factors to levels of missed care. This supports the authors' views that common ground exists between the two well-researched concepts (Ball et al., 2014; Jones et al., 2015; McCauley et al., 2020).

Improving nursing resources such as time, staffing and skill mix (Sax et al., 2005; Henderson et al., 2020), and infection prevention and control resources such as personal protective equipment and disposal facilities (Luo et al., 2010; Henderson et al., 2020) could also reduce missed care and improve compliance in the area of infection prevention and control. Finally, outdated or inappropriate ward layouts, technological infrastructure and infection prevention and control management systems must also be addressed in order to improve infection prevention and control practices and reduce missed care in this area (Randle and Clarke, 2011; Lee et al., 2018; Henderson et al., 2020). The work environment, including the physical environment, are known to influence missed nursing care generally, and now also the more focussed area of missed infection control practice.

In light of the COVID-19 pandemic, it seems imperative to adjust our professional focus towards infection prevention and control practices, and particularly on the factors which may cause nurses to miss or ration this care. By addressing these factors we can support nurses to ensure their infection prevention and control practices are up-to-date and appropriate for the times we live in. Nurses, as a professional group have stepped up during this pandemic, as in others, and it should be recognised that infection prevention and control guidelines offer protection to our healthcare workers as well as our patients. Tait et al. (2000) note that the AIDS epidemic prompted an increase in nurse compliance with infection prevention and control guidelines, the authors of this review suggest COVID-19 may do the same, if nurses are provided with the appropriate supports to enable them to provide safe care. These supports could include enhanced training in decision-making and prioritization, in an effort to support nurses to make the right decision around infection prevention and control irrespective of the environment or care context. It is noteworthy that nurses frequently decide to overlook or partially comply with guidelines when they place greater priority on other types of care (Shah et al., 2015; Efstathiou et al., 2011b). The importance of self protection, particularly in the context of a global pandemic must be emphasised.

Missed nursing care is a current focus within nursing research, with the development of a number of instruments to measure levels and understand contributory factors. Globally nurse researchers are focusing on different areas of clinical practice and endeavouring to address levels of missed care through measurement and interventions (Kirwan and Schubert, 2020). Most recently Henderson et al. (2020) and Bail et al. (2020) examined infection prevention and control practices of nurses through a missed care lens. We advance this thinking further by suggesting that nurse non-compliance with infection prevention and control is a form of missed nursing care. Non-compliance with infection prevention and control measures shares many of the contributing factors and therefore should elicit a similar response from the researcher community and the profession at large.

## 5. Strengths and limitations

### 5.1. Strengths

One strength of this scoping review is that the research reported in the included papers examined cover a variety of research from 1999 to 2020, reflecting the time period during which there has been an increased focus on patient safety and adverse patient outcomes as a result of hospitalisation, alongside which missed nursing care has been under scrutiny by nurse researchers. Furthermore, these articles cover research from a large range of geographical locations, including, Australia, China, Cyprus, England, Italy, Jordan, The Netherlands, South Korea, and Switzerland and The United States. Another potential strength of this paper is that there are no reviews of this nature which attempt to go beyond the general concept of missed care to specifically focus on why nurses miss or ration infection prevention and control care. Furthermore, this review makes clear, for the first time the relationship between missed nursing care and non-compliance with infection prevention and control standards. Thus it proposes that these research areas are related, and can be viewed as such.

### 5.2. Limitations

As with scoping review methodology no judgements were made about the quality of research examined in this review. While this is acceptable with the parameters of this methodology, it may have ultimately weakened results when compared to other methodologies such as systematic reviews. Screening was conducted primarily by one author. However all included and excluded studies were discussed by at least two authors before any decisions were taken. We included only peer-reviewed papers in this review, although the scoping review methodology allows for the inclusion of other sources such as grey literature. We made this decision based on the overall intention of the review – to look at the relationship between two established areas of research. Therefore, peer-reviewed material was both available and could contribute most to meeting the aim of the review.

Another potentially limiting factor in this review is that three of the papers included examined the behaviour and practices of nurses along with other healthcare workers such as doctors. This may have altered the relevance of the results of these studies when examining the behaviour and activities of nurses. Nonetheless, the authors felt it was important to include these papers in this review as many of the described specific behaviour of nurses or how nurse relations with other healthcare workers impact on infection

prevention and control.

The authors set out to take a general approach to infection prevention and control in this review and therefore did not include articles which only examined specific aspects of infection prevention and control precautions (e.g. compliance with hand hygiene or personal protective equipment). This decision was made to allow for breadth of discussion, but may have somewhat limited the scope of this review. That being said, an aim of this review was to provide a starting point to inform further research in the areas of missed nursing care and non-compliance in the area of infection prevention and control. The authors acknowledge that further research is needed into compliance with specific aspects of infection prevention and control guidelines, such as standard or transmission based precautions, in order to understand and improve missed infection prevention and control care overall.

## 6. Conclusions

Research on the concept of missed care and related phenomena must go deeper to address and understand the causes and consequences of specific types of missed care. Given the global burden of healthcare associated infections, missed care in the area infection prevention and control warrants being recognised as a specific concept within the wider context of missed nursing care. This review suggests that research into non-compliance with infection prevention and control guidelines by nurses shares many features with the field of research referred to as missed nursing care. Further research is needed on the reasons nurses miss infection prevention and control activities, in order to illuminate this relationship further. From the evidence reviewed it seems that resources such as staffing, skill mix, and personal protective equipment must be improved for nurses to carry out infection prevention and control activities at an optimal level. Additionally, outdated ward layouts and technology and infrastructure for managing infection prevention and control must also be addressed. Finally, nurse education and nurse beliefs and attitudes towards infection prevention and control warrant further attention from both researchers and policy makers.

## Declaration of Competing Interest

None.

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## Reporting guidelines checklist

PRISMA Extension for Scoping Reviews (PRISMAScR) (Tricco et al., 2018).

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