Environmental hygiene, knowledge and cleaning practice: a phenomenological study of nurses and midwives during COVID-19.

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Abstract

Background

Environmental cleanliness is a fundamental tenet in nursing and midwifery but often overshadowed in practice. This study explored nurses' and midwives' knowledge and experiences of infection prevention and control (IPC) processes and cleaning, and perceptions about workplace risk- management during COVID-19.

Methods

Six registered and enrolled nurses (one with dual midwife qualifications) were recruited. In-depth telephone interviews were analysed using Colaizzi's phenomenological method.

Results

Four major themes were identified: *Striving towards environmental cleanliness; Knowledge and learning feeds good practice; There's always doubt in the back of your mind;* and *COVID has cracked it wide open*. These articulate the nurses' and midwives' experiences and knowledge of IPC, particularly during COVID-19.

Discussion

The findings emphasise the dynamic, interdependent nature of clinical (time, staff knowledge and compliance, work processes, hospital design) and organisational contexts and environmental cleanliness, which must be constantly maintained. COVID-19 opened up critical insights regarding poor past practices and lack of IPC compliance.

Conclusion

COVID-19 has highlighted the criticality of environmental cleanliness within clinical and community settings. Evidence-based, experiential learning is important for nurses and midwives at all career stages, but provides only one solution. Clinician-led hospital design may also reduce the spread of infection; thus promoting better patient care.

Keywords

Infection prevention and control, compliance, shared patient equipment, hospital design, evidence- based learning, organisational contexts.

Introduction

Environmental cleaning is key to preventing infections in healthcare and is cost-effective[1,2]. Workplace factors such as time pressures, staff knowledge, work processes, organisational structures, and the everyday complexity of health care systems can play a key role in how well environmental cleanliness is maintained and healthcare associated infections (HCAIs) prevented[3-6]. This paper builds on previous work from the authors,[7]

which explored nurses' and midwives' knowledge of infection prevention and control (IPC) and cleaning processes. Previous research[7] found that while nurses and midwives broadly understood the importance of cleaning, not all displayed correct knowledge of how to clean correctly nor which disinfectants to use in particular situations. Moreover, despite the majority indicating confidence about their cleaning ability, this confidence did not extend to being placed in a room previously occupied by a patient with a known infection[7]. This study sought to gain deeper insights into this critical disjuncture between infection control knowledge and practice, particularly in light of the COVID-19 pandemic[8], and to further identify additional barriers to cleaning effectiveness.

Methods

Research design

We used a qualitative approach[9] and Colaizzi's[10] method of data analysis to explore nurses' and midwives' lived experiences of cleaning and infection control. Further details are provided in the supplementary material (S1).

Setting and participants

Registered and enrolled nurses (RN, EN) and midwives (RMW) who are currently employed in clinical settings (such as hospitals or GP medical practice) in Australia.

Recruitment

Nurses and midwives were recruited through written and electronic media (emails, social media, Australian Nurses and Midwives Association). Following the completion of an online survey (previously published)[7], survey participants could opt to provide an interview. More information regarding recruitment is detailed in the supplementary material (S1). Participants were offered a
$20 gift card as incentive and reimbursement for their time. The study received Human Research Ethics approval.

Data collection

In-depth telephone interviews ranging between 17 minutes and 57 minutes duration were conducted between June and July 2020, at a time in which the COVID-19 pandemic was present in Australia. Both written and verbal consent were obtained. All interviews were recorded with the permission of participants, transcribed and anonymised prior to analysis. Further details on data collection, including the interview schedule questions, are provided in the supplementary material (S1).

Ethical approval

Ethical approval for the study was provided by the Avondale University College Human Research Ethics Committee (HREC/17/QTHS/198) and The University of Newcastle HREC (H-2020-0160)

Findings

Interviews were conducted with six participants. The participants were all female and worked in a variety of settings (mean years worked =16). One nurse had dual

qualifications as a midwife, but hereafter, is referred to by her first qualification (RN) (see Table 1).

Participant	Qualification	Where employed	State/territory	Years worked (n)
P1	RN	Public hospital (outpatient)	Tasmania	12
P2	EN	Community care	NSW	4
P3	RN; RMW	Public hospital (ER)	NSW	36
P4	RN	Public hospital (ER)	ACT	24
P5	RN	Private practice (GP)	NSW	16
P6	RN	Public hospital (mental health)	NSW	4

Table 1. Participant demographics

Four major themes were identified (see Table 2). These articulate the nurse's experiences and knowledge of infection control and cleaning, particularly during the height of the COVID-19 pandemic, and their perceptions of how well risks of COVID-19 were being managed in the workplace.

Selected quotations are shown for illustrative purposes, with different participant's comments represented by an alphanumeric code (e.g., P1, P2). Quotations are representative of each participant's views and experiences and have not been independently verified.

Major Theme	Subtheme	Quotation
Striving towards environmental cleanliness	*Cleaning is a fundamental cornerstone of nursing*	'I see it *cleaning+ as a cornerstone or a huge pillar.' (P3)
		'It is one of the first things we can do to help prevent the spread of infectious diseases and any other kind of germs that can harm us, it's super important.' (P5).
	There's no excuse for dirtiness	'There's no excuse … It shouldn't be up to the community nurse to be tripping over used incontinence pads because you don't know how to get to the garbage bin.' (P2).
	Cleaning is undervalued	'Getting management to understand why I might need *time for cleaning+ … that's a challenge when they're non-clinical.' (P5)
		'*Cleaning is + highly underrated and extremely vital.' (P3)
	Environmental hygiene is important for patient care	'Our duty of care to our patients is to ensure that they've got the best environment.' (P1)
		'It's all about preventing, doing what you can to prevent any infection to occur to the patient … and you don't want to be working on dirty surfaces because that's E. coli.' (P2)

Knowledge and learning feeds good practice	*Everyone's on board*	'And that's the same for public awareness – especially with this COVID … everyone's now aware that handwashing is really super important'. (P5)
	Embedding cleaning knowledge	'I think it has to start from the beginning, so in the undergraduate, pre-hospital setting. It should really be the platform from which we do any intervention.' (P4).
	Iceberg tips and learning slips	'So we did do a couple of extra sessions … training for intubation because that's a highly aerosolised dangerous procedure or risky procedure, so we did do some of that, but … I think we only touched the tip of the iceberg.' (P3)
	Keeping knowledge fresh	'If you're unsure and you don't feel you've got enough capacity, then you go back online and just refresh yourself on the policies and procedures of what needs to be done'. (P2)
There's always doubt in the back of your mind	*Chasing time*	'Pre-COVID we often didn't wipe down the monitoring equipment or the space that a patient's bed was allocated to … we're pushing people through so quickly'. (P3)
	Taking ownership	'There's this bickering between the cleaners and the nurses because they don't think it's their job, and then it has to be ruled out by the nurse unit manager and the cleaners' managers to work out who cleans what specifically'. (P6).
	The outer end of horridness	'If we swabbed all of that stuff … it would just be a petri dish of horridness'. (P3).
		'We had two or three toilets, one shower that leaked, nowhere for staff to get changed so they had to take over a small space … from an infection control point of view – look at the flow'. (P3).
	A tradesman needs their tools and nurses do too	'Definitely supplies … a tradesman needs their tools, like anything in life … whether you're a cook, a cleaner or a nurse … you need the tools'. (P2)
COVID has cracked it wide open	*We are lucky, safe and in control*	'We have done everything that we needed to keep our patients and our staff safe'. (P1) 'Yes, sparkling clean. Always vacuuming. I just noticed – you can smell the disinfectant, and you can smell the bleach'. (P2)

	Nurses are eating their own	'There's a lot of angst in the Department where people are just saying, "I don't want to work in it *COVID ward+." So I've seen poor practice, I've seen disharmony … breaches of confidentiality … there are very few decent nurse leaders and they're really good at eating their own and you just sit there going, good God, can we not work together?' (P3)
	The COVID ward is hypoxic and hell	'Some people are happy to work in COVID areas, but it's hot, demanding, you don't get a break, you can't have a drink, and we've noticed all since we've put on the masks for work, we're dehydrated, we're cramping up, we're a little bit hypoxic.' (P3)
		'The young nurses didn't want to work in the COVID ward and then they came back to people like me who were over 50 and said, "Well, you've got to work in the COVID ward." And I said, I'm not working in it.' (P3).
	Shifting sands	'*COVID-19+ is an evolving issue … one day we are being told to do one thing and then the next day do something else' (P4).
	You go home scared	'People forget about the impact of the disease and you go home scared … you don't want to bring something home.' (P3)

Table 2. Overview of themes.

Many themes and subthemes were interdependent, for example, issues such as time pressures (*Chasing time*), lack of training (*Iceberg tips and learning slips*) and lack of supplies such as cleaning products and personal protective equipment (PPE) (*A tradesman needs their tools and nurses do too*) impacted nurses' and midwives' ability to achieve a clean working environment *(Striving towards environmental cleanliness)* or to keep themselves safe when caring for patients with COVID-19 (*You go home scared*).

Major theme 1 : Striving towards environmental cleanliness.

This theme aligns with the interview question: 'why is cleaning important?' Cleaning was viewed as a cornerstone or inherent trait and duty associated with being a nurse, as epitomised by Florence Nightingale: 'cleanliness is next to Godliness' (P3). Cleanliness (cleaning) was also tied to patient expectations, but lacked the glamour and excitement of 'cutting people open and CPR and saving lives' (P5). This perception carried through to general practice (GP) settings, hospital staff (nurses, midwives, doctors), and senior management, who failed to grasp the importance of, or time needed to ensure environmental cleanliness (i.e., cleaning is undervalued). This theme highlights the dynamic nature of cleaning and environmental cleanliness within clinical settings; it is not fixed, demanding constant vigilance. Therefore, cleaning and IPC measures have to be consistently, correctly applied to prevent infection. Moreover, environmental cleanliness necessitates a concerted team effort.

Major theme 2 : Knowledge and learning feeds good practice

Having staff who are knowledgeable about environmental cleanliness and who are committed towards preventing infection was critical for the optimal delivery of care, patient safety and a complication-free patient recovery. Team effectiveness was important in terms of mentoring, knowledge sharing and training, making sure that staff were on the 'same page' (P3) and working towards similar goals (i.e., everyone's on board), for ensuring hygiene compliance, and the smooth flow of workplace information. The importance of correctly applying knowledge and learning, in the context of COVID-19, was also underscored. Auditing increased, particularly around use of PPE.

Nurses described much learning and knowledge uptake as occurring at a surface (tip of the iceberg) level only, with in some instances, experiential learning and knowledge sharing being lost (learning slips): 'you're only as good as your weakest link' (P3). Nurses stressed the importance of embedding cleaning knowledge and hygiene (such as handwashing) into practice through early education, post- graduation training and mandatory accreditation. Changes in best practices over time and staff tendencies towards complacency meant that basics required annual review: 'Just like we've got to do cardiopulmonary resuscitation (CPR) … we should all have to do basic hand hygiene' (P5).Moreover, training programs needed to be responsive to nurses' needs (for example, casual shift workers were not on-site when training was conducted), individual learning styles (practical and computer-based education, evidence-based visual learning), and encompass cleaning staff (who when recruited received only minimal instruction): 'You're not just a basic cleaner … they do other tasks than just disinfecting the rooms.' (P2). In this way, cleaning knowledge and hygiene practices became embedded into the organisational fabric holding everything together; there was also less chance for slip-ups to occur.

Nurses were highly reliant on infection prevention and control (IPC) professionals for policy updates and advice. As resourceful and adaptive learners, and perhaps not trusting the limited information they were receiving, three nurses (P5, P2, P4) described going online and seeking out extra training (in addition to mandatory courses) regarding cleaning, PPE use and COVID-19 prevention (i.e., keeping knowledge fresh). At one workplace, policy guidelines had not been revised in over four years; consequently, much information was redundant. Details about how to correctly maintain and sterilise shared patient equipment such as 'things we use to cut people open' (P5) were also missing (not readily found). At another workplace, policy guidelines regarding cleaning did exist, but lacked detailed information to inform work practices. Hence, cleaning was a hit-and-miss affair; open to interpretation: 'people aren't aware that they're the person that's supposed to be cleaning it' (P6).

Major theme 3: There's always doubt in the back of your mind

Workplace and operational factors (time, place, clinical setting, organisational structures, resources and training) played a key role in cleaning effectiveness and IPC compliance. It is notable that, prior to COVID-19, poor cleaning and hygiene practices had been routinely observed, however, the full implications were only now becoming evident. Time was a key influencing factor as to whether or not cleaning was adequately

performed. For one general practice (GP) nurse, economic priorities meant that less than three minutes cleaning and preparation time was allowed between patients: 'they're all time-based appointments. So it's trying to figure out how [cleaning] can be done and not upset the *patient+ booking' (P5). Asked if she considered three minutes to be sufficient cleaning time, the nurse replied:

A: 'I don't think three minutes would be enough because you have to let some surfaces dry for up to 10 minutes, depending on what you've done, to make sure that it's germ-free, basically clean' (P5).

Q: So when it's only three minutes [cleaning] allocated then those disinfectants would not have time to react?

A: No, no.

Q: And so, that surface - you couldn't guarantee it was clean? A: No. Well, you couldn't because you haven't cleaned it' (P5).

Time constraints were also experienced in hospital settings. Two nurses (P3, P4) spoke about working in fast-paced emergency (ED) departments, where rapid patient turnovers and a 'four-hour ED rule' meant that cleaning was 'not done, more typically than not, when it is busy' (P4). The interview comments suggested that 'good' care was equated with speed, rather than practice: 'when *in theatre+ … It was all about speed' (P2). Four nurses reported that cleaning of shared patient equipment (such as blood pressure cuffs) either did not occur or was insufficient. One nurse (P3) suggested more staff training was needed, however training alone cannot overcome time-based barriers. Only one nurse (P1) was confident cleaning processes were adequate, in part because they were responsible for auditing compliance every three to six months, and patients had their own (rather than shared) equipment.

Other factors influencing cleaning compliance included the lack of detailed organisational guidelines regarding recommended cleaning methods and how often cleaning should be performed, lack of management support and role conflicts. IPC was described as a bit of a battleground and the lack of consensus about how things should be done made hygiene more difficult than it needed to be: 'we just need to have consistency and standardisation as best we can with safe practice' (P3). Some nurses hinted at a culture of complicity around 'bad' cleaning practices, for example:

'I have to say this, carefully don't I? … say you've got to do seven beds but at the meantime you've got eight patients going to theatre …

eight patients to do

*observations+ on, and you've got to get these other rooms ready … it's

not *that+ they *management+ don't want to know. They do' (P2).

Cleaning was treated as a 'tick-box' accreditation-focused activity; often disengaged from the care process, i.e., not considered a critical part of patient service delivery.

Moreover, while the COVID-19 pandemic had raised awareness about IPC, this did not necessarily guarantee that cleaning had improved, nor to overcome an endemic, historic lack of hygiene: 'once again, [COVID-19] has exposed an ugly crack, we don't have enough equipment, we never had enough' (P3). One nurse likened this to a tradesman, such as a mechanic, being forced to work without the necessary tools: 'you're begging for things that are meant to be mandatory … it makes life incredibly hard' (P2). Although hospitals tend to be fairly predictable environments, achieving high levels of cleaning and hygiene compliance is challenging. Working from an infectious disease perspective, one nurse (P3) was highly critical about the lack of foresight used in hospital design and planning: 'it's done either by an architect or somebody who's got the cheque book in their hand' (P3). Design factors in the built environment increased COVID-19 risks and hampered IPC compliance.

Major theme 4: COVID has cracked it wide open

This theme relates to nurses' and midwives' experiences of working during the COVID-19 pandemic, and perceptions about how well COVID-19 was being managed in the workplace. Positive perceptions reflected nurses who were fairly confident about the level of overall workplace preparedness, PPE training and information provided: 'No *worries+, not at present. They're very alert where I am' (P2). They also tended to be voiced by those not working in high volume, COVID-19 frontline situations. For example, one nurse (P1) reported little change in cleaning practices due to the low volume of patients seen and already high IPC compliance. In contrast, another nurse (P3) voiced multiple doubts regarding COVID-19 risks in the workplace. For example, poor hygiene practices and the lack of cleaning guidelines meant that shared items and workspaces (hot desks) were inconsistently cleaned. As 'one of the busiest EDs in the state' (P3), the high-patient flow, dirty, broken equipment, and disrupted supplies due to COVID-19, meant that confidence regarding hygiene safety was low: 'yes, we have got increased cleaning … but the Department was filthy before' (P3).

Nurses and midwives working on the frontline of the COVID-19 pandemic described workplaces as toxic, creating conflict between staff, and placing nurses under additional distress. One nurse likened this to 'nurses eating their own' (P3). Finding nurses and midwives willing and able to work in the COVID-19 ward was particularly problematic, causing long delays and tensions; and driven by nurses' first-hand experiences of colleagues who had experienced infection or trauma:

'we saw how our paramedic friend got treated and we also had

[another] nurse die; attacked by a patient at our hospital … we don't

> feel valued and we don't think that they *management+ have got our back' (P3).

Nurses described having to quickly pivot practices in response to emerging evidence about COVID- 19, changes in recommended guidelines and working conditions, and disrupted supplies. Lacking a firm foundation from which to practice, nurses were left negotiating shifting sands: 'one day we are being told to do one thing and then the next day do something else' (P4). There was a sense of frustration that, given the experiences of previous pandemics such as Swine Flu and SARS, health systems were unprepared for the onslaught of COVID-19: 'we're too busy putting out fires. We don't plan, we don't prepare' (P3).

As the pandemic progressed, and numbers in Australia remained relatively small compared to overseas, the heightened awareness and anxiety about COVID-19 seemed to dissipate. There was a perception that Australia had been very lucky, albeit over time, hygiene complacency was on the rise: 'we'll just go back to the sloppiness' (P3). The nurses' and midwives' training meant that they were able to identify when IPC was suboptimal, for example, two nurses commented about poor cleaning practices on public transport. Nonetheless, pre-COVID-19, cleaning was not prioritised.
Hence, it seemed that COVID-19 had finally 'cracked open', brought to light the 'rot' and 'poor infection control practices [already] in existence' (P3) within the healthcare system: 'You look at aged care, you look at EDs, our patient toilets have always been dirty, our staff toilets are dirty, our staff tea rooms are dirty. All COVID's done is just cracked it wide open' (P3). However, COVID-19 had also reinvigorated nurses' and midwives' awareness of basic hygiene and cleaning; an effect which could potentially reap positive change:

> 'I think that it *cleanliness+ is something we could re-focus on, and … COVID-19 has reminded me of those basics, of what are the basis of good healthcare. And so, we can only build from that. If we miss this, then it doesn't matter what else we achieve if a patient ends up with a sepsis that we have created' (P4).

Discussion

Environmental cleanliness is a foundational concept in nursing and midwifery[11], but one that may be undervalued or brushed aside due to time constraints, lack of resources, and other factors[3-5,12,13]. As shown in this study, workplace factors can play a key role in shaping compliance with IPC policies.
Moreover, achieving good compliance demands a concentrated team effort and continual, tailored learning[14]. This finding concurs with Nasiri et al[15] and Welsh's[16] study, which highlighted the need for shared responsibility and collaborative teamwork in

reducing healthcare associated infections (HAIs).

Constant education and reinforcement, and evidence-based practice learning is critical in overcoming active staff resistance[15,16]. Likewise, in our study, evidence-based knowledge and professional development was important for nurses and midwives, as knowledge informed everyday working practices, such as how to prevent infection and the correct use of PPE. Hygiene and cleanliness was perceived as both shared activity and reciprocal, interdependent relationship, existing on multiple (public, private, organisational, clinical) levels[4,11,16,17]. The findings from this study emphasise that, while nurses and midwives broadly understood the importance of environmental cleanliness, many workplaces failed to meet IPC guidelines. Notably, the impact of past poor practices were becoming evident in the context of the COVID-19 pandemic; but this does not guarantee that cleaning will continue to improve over the long-term. Hence, taking ownership of one's own hygiene practices was identified as being important for reducing infections within healthcare and community settings.

This study also emphasised how the lack of cleaning products, PPE supplies and medical equipment, combined with outdated IPC guidelines, impacted on nurses' and midwives' ability to practice optimal hygiene, comply with IPC policies, or work in COVID-19 safe ways[4,18-20]. This variation in process, supplies and equipment with respect to cleaning, has also been identified for other occupations in hospitals[21,22]. Risk therefore became real and very personal; something few nurses had encountered. In drawing parallels between nurses and tradesmen being forced to work without the necessary tools, it was obvious that many nurses and midwives' in this study were not well resourced nor held in high regard. Lacking the full support of management, nurses and midwives were often left without a solid foundation from which to provide care, and at least one nurse was placed at high risk of COVID-19 due to overcrowded staff facilities [19]. The findings stress the importance of hospital and workplace design in either creating or reducing infection in the healthcare environment [3,23,24]. Hospitals and healthcare facilities should factor in sufficient space to allow for safe social distancing between staff, patients and visitors[19,24,25], and be designed with a view to facilitating easier cleaning (for example, avoiding tight corners and rough surfaces where debris can lodge), handwashing[26], and preventing infection (for example, sensor-activated automatic doors and curtains, and copper-infused surfaces for frequent touch-points such as handrails)[23].
Healthcare facilities should also have clear protocols for dealing with infectious outbreaks[4,25,27,28].

The findings from this study highlight that, in most cases, workplace settings were unprepared for managing the COVID-19 pandemic[8]. Moreover, key lessons that might have been learnt from previous infectious outbreaks had not been translated well into organisation policy. Reflecting this deficiency, nurses and midwives in this study called for cleaning and hygiene knowledge and evidence-based practice to be more deeply embedded into organisational cultures and accreditation.

Conclusion

The COVID-19 pandemic has brought home the criticality of environmental cleanliness and hygiene within clinical and community settings. This study has highlighted the importance of evidence-based and experiential learning for nurses and midwives at all stages of their careers, and the need for
better translation of nurses' and midwives' knowledge and experience gained during pandemic outbreaks. Moreover, hygiene and cleanliness should be a shared activity and responsibility, with nurses, midwives, healthcare workers, senior management, patients and the broader community working together to reduce infection.

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