

**ORIGINAL RESEARCH: EMPIRICAL
RESEARCH - QUALITATIVE**

'Doing the best we can': Registered Nurses' experiences and perceptions of patient safety in intensive care during COVID-19

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Abstract

Aims: To explore registered nurses' experiences of patient safety in intensive care during COVID-19.

Design: A qualitative interview study informed by constructivism.

Method: Semi-structured interviews were conducted and audio-recorded with 19 registered nurses who worked in intensive care during COVID-19 between May and July 2021. Interviews were transcribed verbatim and thematically analysed utilizing framework.

Results: Two key themes were identified. '*On a war footing*'—an unprecedented situation which describes the situation nurses faced, and the actions are taken to prepare for the safe delivery of care. '*Doing the best we can*'—*Safe Delivery of Care* which describes the ramifications of the actions taken on short- and long-term patient safety including organization of care, missed and suboptimal care and communication. Both themes were embedded in the landscape of *Staff Well-being and Peer Support*.

Conclusion: Nurses reported an increase in patient safety risks which they attributed to the dilution of skill mix and fragmentation of care. Nurses demonstrated an understanding of the holistic and long-term impacts on patient safety and recovery from critical illness.

Impact: This study explored the perceived impact of COVID-19 on patient safety in intensive care from a nursing perspective. Dilution of skill mix, where specialist critical care registered nurses were diluted with registered nurses with no critical care experience, and the fragmentation of care was perceived to lead to reduced quality of care and increased adverse events and risk of harm which were not consistently formally reported. Furthermore, nurses demonstrated a holistic and long-term appreciation of patient safety. These findings should be considered as part of future nursing workforce modelling and patient safety strategies by intensive care leaders and managers. No public or patient contribution to this study. The study aims and objectives were developed in collaboration with health care professionals.

KEYWORDS

COVID-19, critical care, critical care nursing, patient safety, qualitative interviews

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1 | INTRODUCTION

Coronavirus disease-2019 (COVID-19) is a respiratory tract infection caused by a newly emergent coronavirus, SARS-CoV-2 first identified in Wuhan, China, in December 2019. Prior to the vaccination program, epidemiological reports suggested approximately one in five adults infected with SARS-CoV-2 developed severe diseases requiring hospitalization and oxygen support (Docherty et al., 2020). In severe cases, patients develop complications such as acute respiratory distress syndrome (ARDS), sepsis and multiorgan failure. In the initial surges of COVID-19, approximately 10%–17% of patients with COVID-19 required admission to intensive care (Wang et al., 2021). To this day unvaccinated adults and those with comorbidities remain at high risk of developing severe diseases requiring admission to intensive care (Motos et al., 2022).

The emergence of COVID-19 created a surge in demand for intensive care which far exceeded the availability of beds and staff. In response, health care systems across the globe quickly increased intensive care bed capacity, however, specialist intensive care professionals remained in short supply (Sharma et al., 2021). Tiered staffing strategies where experienced intensive care staff worked with, and supervised, staff from other departments were adopted, to cope with surges in demand. This led to an inevitable dilution of specialist intensive care knowledge and skill at the patient's bedside.

Intensive care nurses faced multiple challenges being tasked with the delivery of safe patient care whilst facing unprecedented increases in workload, changes in the organization and delivery of intensive care, during a global pandemic of a novel disease where effective treatment and management strategies were continually evolving (Hoogendoorn et al., 2021). The impact on the quality and safety of patient care and the strategies employed by nurses that optimize patient safety during surges in demand is unclear. To effectively plan for future intensive care provision, it is essential that the challenges to patient safety and the strategies to mitigate them are known and understood. The aim of this study was to explore registered nurses' experiences and perceptions of patient safety in intensive care during the peak waves of the COVID-19 pandemic.

2 | BACKGROUND

Large numbers of patients are harmed every year because of unsafe healthcare leading to a high burden of death and disability across the globe (World Health Organization, 2021). According to recent estimates, the social cost of patient harm is US\$ 1 trillion to 2 trillion a year (WHO, 2021). Registered nurses have long since been considered central to preventing and detecting patient harm with many nursing metrics directly and indirectly associated with patient adverse events. The seminal work of Aiken et al. (2014) revealed an increase in nurses' workload by just one patient in an acute ward setting, increases the likelihood of an inpatient dying in 30 days of admission by 7% (odds ratio 1.068, 95% CI 1.031–1.106).

Patient safety and adverse events have also been associated with direct nursing care in the acute ward setting. Griffiths et al.'s (2018) systematic review reported that reduced registered nurse staffing and higher workloads often lead to missed nursing care which is associated with reduced patient safety. Ball et al. (2018) reported that a 10% increase in missed nursing care confers a 16% increase in mortality of patients, post-surgery. In a large cross-sectional study in China, Liu et al. (2018) reported the more time nurses spent on direct patient care, the fewer the patient adverse events. In addition, the study results indicated that a better working environment for nurses, including the adequacy of staff and resources, leadership, and support, is directly and indirectly associated with improved patient safety.

In the United Kingdom (UK), prior to the pandemic, nurse-to-patient ratios in critical care were 1:1 or 1:2 depending on patients' level of care (Faculty of Intensive Care Medicine, 2019). However, the ongoing pandemic is having an impact on nurses' work environment, workload, organization and delivery of care, leadership, and support. Given the nature of COVID-19 and associated respiratory failure and the requirement for organ rescue and support, intensive care areas have been a focal point of these challenges. Intensive care nurses have reported that patients suffering from COVID-19 are the sickest they have ever experienced increasing the workload associated with each patient (Bergman et al., 2021). Bruyneel et al. (2021), in an observational survey, confirmed that patients with COVID-19 in intensive care required more nursing time and conferred significantly increased nursing activity scores. In addition, the overall nursing workload has seen unprecedented increases, influenced by the tiered staffing models and significant increases in patient-to-nurse ratios (Bruyneel et al., 2021; Hoogendoorn et al., 2021).

As well as an increase in the volume of work, nurses have also been expected to act outside of their competence and remit. Nurses in intensive care have reported having to work with unfamiliar equipment and technology in unfamiliar environments (Fernández-Castillo et al., 2021). Bergman et al.'s (2021) mixed method survey revealed that due to patient isolation and the resultant isolation of the nurse caring for them, nurses were having to make decisions about patient care priorities and carry out interventions without the support from the senior nursing or medical team.

Intensive care nurses have reported that patient safety and the quality of care have been compromised during the COVID-19 pandemic. Bergman et al. (2021) described how the usual patient safety routines were 'sidestepped'. Nursing care in intensive care during the pandemic has been described as de-humanized (Fernández-Castillo et al., 2021) like an industrial assembly line where the minimum standards for basic intensive care could not be upheld and missed care common (Bergman et al., 2021).

The delivery of sub-standard nursing care has had an impact on nurses' mental health and well-being. Intensive care nurses have reported high levels of moral and ethical distress, anxiety, depression, disturbed sleep, post-traumatic stress disorder and occupational burn-out leaving some nurses wishing to leave intensive care and considering exiting the nursing profession (Ezzat et al., 2021; Sharma et al., 2021).

Maintaining patient safety is at the heart of intensive care, however, with increased nursing workloads, altered staffing models and expansion of roles beyond the level of competence it is not fully understood what impact these factors may have on both the quality of care and patient safety. The rapid changes to intensive care capacity and staffing were an essential response to the pandemic, however, it is essential that we explore nurses' experiences to evaluate strategies employed to maintain patient safety and learn and develop future clinical practice.

3 | THE STUDY

The aim of this study was to explore intensive care and redeployed nurses' experiences and perceptions of patient safety in intensive care during the COVID-19 pandemic. Objectives were to identify patient safety issues encountered, and any factors perceived to optimize, inhibit or improve patient safety.

The research question was 'What are registered nurses' experiences and perceptions of patient safety in intensive care during COVID-19?'

3.1 | Design

This study employed a qualitative interview design informed by constructivism. Constructivism aims to uncover naturally occurring concerns with the goal of understanding individual experiences. Constructivist research is concerned with creating new knowledge in partnership with participants and creating clear and authentic accounts as understood by participants and researchers (Lee, 2012).

3.2 | Sample/participants

Participants were purposively sampled from the population of intensive care registered nurses and registered nurses redeployed to ICU during the peak waves of COVID-19 in the UK. Peak waves of COVID-19 in the UK were in Spring 2020 and Autumn/ Winter 2020/21. We adopted a maximum variation sampling approach based on the numbers of years qualified as a nurse, region of the UK and fair representation from both intensive care specialist nurses and nurses re-deployed to intensive care from other specialities. To ensure participants reflected the population and phenomenon of interest, the following eligibility criteria were applied:

1. All participants were registered with the Nursing and Midwifery Council (NMC)
2. Participants fell into one of the following groups:
 - a. A registered nurse with a minimum of 6 months of experience working in intensive care areas before the onset of COVID-19
 - b. A registered nurse from a different speciality re-deployed to work in an intensive care area during the COVID-19 pandemic

3. Participants provided direct clinical care to patients in intensive care during the COVID-19 pandemic in the UK.

Registered nurses were recruited by an advertisement published on social media channels: Twitter, Facebook and LinkedIn. A research assistant (VC) screened potential participants for eligibility. Participation was voluntary and no payments, incentives or remuneration were offered. Written informed consent was gained by VC. Recruitment to the study continued until data saturation was achieved; that is no new findings or themes were identified. Data saturation occurred at 16 interviews, however, the final number recruited and included in the study was 19 to ensure a maximum variation of the sample.

3.3 | Rigour

The rigour of this research was informed by the trustworthiness, auditability, credibility and transferability (TACT) framework (Daniel, 2019). Trustworthiness is the level of confidence in the quality of the investigation and research outcomes (Daniel, 2019). Trustworthiness was established by utilizing a systematic and transparent approach (Braun & Clarke, 2021) to data analysis. The final themes were independently reviewed by all authors. Discrepancies were discussed until a consensus was achieved. The participants then reviewed preliminary findings to ensure the codes and themes reflected the views of the sample. Auditability refers to the transparency of the procedures for collecting, analysing and interpretation of data. Auditability was achieved by making detailed field notes and keeping a reflexive diary of all decisions made. Credibility refers to the extent to which findings are dependable, relevant, and congruent (Daniel, 2019). The credibility of our findings was ensured by asking participants to verify the final themes and by providing direct participant quotations supporting each theme. A qualitative study is considered transferable if the findings resonate with individuals not involved in the study and readers can associate the results with their own experiences (Daniel, 2019). To ensure transferability, a rich description of the participants provided by the detailed demographics is included. In addition, participants were purposively sampled for maximum variation to ensure they were knowledgeable and had the experience of the phenomenon and to ensure that the study population reflected the wider population of intensive care nurses and nurses re-deployed to intensive care during the COVID-19 pandemic.

This report adheres to the consolidated criteria for reporting qualitative research (COREQ) (Tong et al., 2007).

3.4 | Data collection

Data were collected between May and July 2021, using semi-structured interviews conducted either by telephone ($n = 6$) or by online video meeting platform ($n = 13$) according to the participants'

preference. Interviews were guided by a topic guide (Data S1) developed in consultation with intensive care nurses and re-deployed nurses who had worked clinically during COVID-19. A pilot interview with a registered nurse from the local acute hospital who had ICU nursing experience was conducted utilizing the topic guide; no amendments to the guide were felt necessary. The data from the pilot interview were not included in the analysis. The topic guide asked participants to reflect on patient safety in intensive care during the pandemic, exploring work before, during and after the pandemic. Interviews lasted up to 75 mins. VC, who has extensive qualitative interviewing experience conducted all interviews. VC had no prior connection to the participants. Interviews were digitally recorded and transcribed *verbatim*.

Throughout the research period, the researcher kept a reflexive diary detailing everyday reflexions of preconceptions, the research process and all stages of understanding of the phenomena. Reflexive diary accounts informed the subsequent analysis of the data. During the development of the initial codes, reflexive diary entries were checked to ensure reflections were represented by the codes generated. As part of an iterative research process, the investigators met regularly to discuss the findings in relation to ongoing reflections.

3.5 | Ethical considerations

Approval was gained from the University Research Ethics Committee (approval number 201405). All participants gave written informed consent to participate in the study. All references to the participants in this report will be by their allocated number and gender-neutral pronouns (they/ their).

3.6 | Data analysis

De-identified data were managed utilizing NVivo Version 12 and analysed using the phases of thematic analysis described by Braun and Clarke (2021). After familiarization with the transcripts, initial codes were identified independently by VC, CM and LCS. Codes were compared and discussed as a team until a consensus was reached. Codes were collated into preliminary themes by VC, CM and LCS. Through an iterative process of review and continued analysis, final themes were discussed and confirmed by all authors. Supportive quotes were identified. Participants were given the opportunity to review and comment on the themes. All participants were satisfied that the themes resonated with their own accounts.

4 | FINDINGS

Of the 19 participants interviewed, 11 were ICU nurses and eight were redeployed nurses from other specialities. Participants

worked in ICUs which cared for both Level 2 patients (those with single organ failure requiring detailed monitoring and support) and Level 3 patients (those requiring advanced respiratory support and/ or have multi-organ failure) (Faculty of Intensive Care Medicine, 2019) and varied in bed capacity ranging from 8 to 55 beds.

Participants' demographics are detailed in Table 1. In the UK, registered nurses range from junior nurses (band 5–6) to more experienced senior registered nurses (band 7 and above); the higher the band the more senior the nurse. Eleven of the participants were senior registered nurses with multiple years of experience and with some management responsibilities. The remaining eight participants were more junior nurses who may have intensive care experience but might not have the same background or managerial experience. Only registered nurses from England volunteered to participate in this study.

Participants described their experiences of patient safety in terms of being 'On a war footing'. The unprecedented situation and 'Doing the best we can'—Safe care delivery. Themes are summarized in Figure 1. As expected, themes are complex and interlinked. There appeared to be 'antecedents' (actions taken) which then had consequences for patients' safety. In the paper, intensive care nurses are referred to as ICU, and redeployed nurses as RD.

4.1 | Staff well-being and peer support

A thread that permeated all themes was *Staff Well-being and Peer Support*. Well-being was influenced by the fear of COVID-19, the trepidation of new ways of working, and the moral distress associated with an inability to deliver holistic person-centred care. Participants reported.

'staff were very distressed during and after the shifts, because they were unable to provide sufficient care'

(P5 RD)

However, participants also described the importance and value of teamwork and peer support in supporting their own well-being and their ability to deliver safe patient care.

'we all talked about it ...I realised actually everybody else was feeling the same, so then I didn't feel too weird with it, and it was OK to be not OK, and that enabled me to go to work'

(P16 RD)

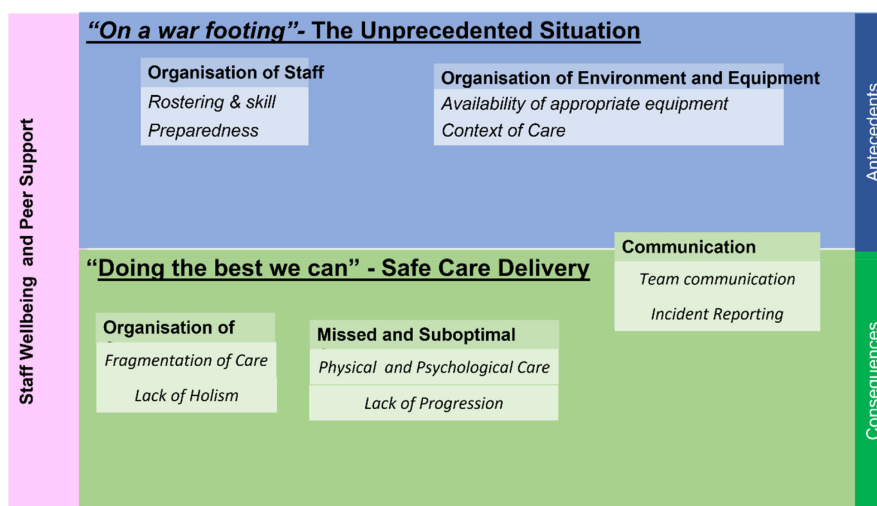
4.2 | On a war footing—The unprecedented situation

This theme describes the perceived situation that nurses faced and actions are taken to prepare for the safe delivery of care. These

TABLE 1 Participants' demographics

Participant number	Registered nurse band (level of seniority)	Years since qualifying as an RN	NHS region	Re-deployed?	Normal job role
1	7 (senior)	16	Southwest		ICU nurse
2	8A (senior)	34	Northwest		ICU nurse
3	7 (senior)	27	Midlands		ICU nurse
4	7 (senior)	26	Northwest	Yes	Nurse Analyst
5	7 (senior)	27	East of England	Yes	Nurse Lecturer
6	6 (junior)	15	London		ICU nurse
7	6 (junior)	24	Southwest		ICU nurse
8	6 (junior)	14	Southeast	Yes	Ward nurse
9	7 (senior)	25	Southwest		ICU nurse
10	7 (senior)	25	East of England	Yes	Children's nurse
11	6 (junior)	31	Northwest	Yes	Nurse educator
12	5 (junior)	6	Southeast		ICU nurse
13	8A (senior)	27	Southeast	Yes	Academic
14	5 (junior)	5	Southeast		ICU nurse
15	6 (junior)	21	Northwest		ICU nurse
16	7 (senior)	16	Southeast	Yes	Research nurse
17	8A (senior)	9	Southeast		ICU nurse
18	8 (senior)	20	South Central	Yes	Resuscitation nurse
19	5 (junior)	6	East of England		ICU nurse

FIGURE 1 Conceptual diagram of themes



measures included the subthemes: organization of the environment and equipment and organization of staff.

impact this had on the ability to deliver safe care was the second element of this subtheme.

4.3 | Organization of environment and equipment

This sub-theme includes the ‘Context of Care’ which relates to the physical environment where intensive care was delivered including areas reconfigured to accommodate additional intensive care beds. Participants described the impact of the physical space on their ability to work safely. ‘Availability of appropriate equipment’ and the

4.3.1 | Context of care

One of the key issues in approaching care during the pandemic was the organization of physical space and the urgent expansion of capacity. Participants reported how additional bed areas were made in existing intensive care areas by squeezing in extra beds between existing bed areas and re-purposing other areas such

as operating theatres, and general wards. Participants often reported that areas were overcrowded, unsuitable, unfamiliar and ultimately unsafe:

'So the safety constraints were one of the geography. We expanded into a whole new ward and in the operating theatres as well. I don't know how many patients in total we had in the last horrendous shift! It was impossible to keep track, impossible to be in charge and know where... they were crammed in everywhere'

(P9 ICU)

Areas with many single occupancy rooms were felt to be particularly unsafe by many ICU nurses. They reported that such orientations made it difficult to oversee multiple patients and support redeployed staff which compromised safety.

Participant 1 (ICU) reported *'...I just couldn't oversee multiple really sick patients, like they were the sickest of the sick and support the staff looking after them. It was impossible'*.

Participants commented that adapted spaces such as operating theatres and ward areas were not organized in the way a normal ICU space would be, which they felt hindered patient care.

Participant 5 (RD) commented, *'When I was in the operating theatre it was just completely the wrong environment to nurse that kind of patient. The patient I had was awake but hallucinating, as often happens, and of course they were waking up seeing themselves in a darkened operating theatre, um, with no, no means of escape, no natural daylight, and they could see operating machinery and lights and everything around them.... It must have been absolutely terrifying'*.

4.3.2 | Availability of appropriate equipment

Participants explained that they faced shortages of key pieces of equipment during the pandemic. The procurement of additional pieces of equipment from elsewhere meant that nurses had to work with unfamiliar items. Many participants expressed anxiety about knowing how to use the equipment.

'That could sometimes be stressful... where are we going to get the kit from... who's going to show me how to use it?'

(P3, ICU)

Participants discussed the availability of the equipment and how safe care was compromised when some equipment was running low. Many participants described how personal protective equipment (PPE) was rationed by avoiding doffing and donning by not taking meal breaks. Nurses acknowledged how the lack of breaks may impact their level of concentration and the influence this may have on safe care.

Participant 6 (ICU) described how they rationed oxygen when they were aware of the oxygen supply being at a critical level *'Ordinarily we would have upped the oxygen without question. But we had to think twice... we had to keep them on the borderline with their sats because you were very aware of the oxygen...we were on red alert'*.

Participant 16 (RD) described how they managed a shortage of haemofilters *'Rather than just giving them three or four days solid filtration to give their kidneys a rest, it was like what's the minimum period of time that we can perhaps get away with, because we've got two patients in acute renal failure that need filtering and we've only got one filter'*.

4.4 | Organization of staff

This subtheme described how staff were rostered according to the skill mix and several staff available. Participants also described the level to which they felt prepared and supported during their practice. Both ICU and RD nurses identified working in new ways in new environments as great sources of stress.

4.4.1 | Rostering and skill mix

One of the biggest challenges during the pandemic was having enough experienced and skilled ICU nurses available to care for the increased several intensive care beds that were needed.

'So just the shift rota, so there weren't enough of them to cover every, every shift on the rota. And so they were kind of having to kind of spread out the staff ...to have some kind of semblance of safety on each shift'. (P18, RD).

Senior ICU nurses reflected on the difficulties of allocating nurses to patients particularly if the only ICU nurses available were junior and lacked expertise and experience in caring for complex patients.

'You know, it might be that you've got three patients that are really really sick, all in multi-organ failure, you know, you're not going to put a junior [ICU] nurse there, because they won't be able to manage, they'll just drown in that'.

(P6 ICU)

The ICU nurses discussed how having the redeployed staff increased the several nurses available, however, highlighted that the skill mix was not what they were used to or what they considered to be safe. As a result, participants were very aware of their own professional accountability and ICU nurses felt a heightened sense of responsibility as they were responsible for the team of re-deployed staff they were leading as well as for the patients they were caring for:

'Our NMC pin [professional registration] states that we should never work beyond our remit of practice.'

You know, if we're not comfortable with doing something you should never be doing it. Yet we're telling these people you have to do it. And we are the ones responsible'

(P1 ICU)

To accommodate the RD nurses' gaps in knowledge and skills ICU nurses would supervise and support several RD nurses:

'we moved to a double-up sort of team nursing approach, so we'd have one ICU nurse and one non ICU nurse working together, which made things easier'

(P12 ICU)

4.4.2 | Preparedness

RD Nurses identified that they received some training before redeployment to intensive care. However, some reported that they felt they had not been prepared adequately. This lack of preparation meant that they felt anxious coming in to care for patients; not due to concerns about their own safety, but that of the patients.

'We had some really difficult shifts, where current ICU nurses weren't available where people were left to look after patients who they weren't really kind of able to look after safely'

(P18 RD)

ICU nurses found having overall responsibility for multiple patients and the RD nurses difficult as it added extra complexity to their working day, and they felt the extra burden:

'I remember thinking well I can't leave them [RD nurses] for too long, because what if they stop the noradrenalin, what if they accidentally, they don't notice something and don't increase the oxygen'

(P16 ICU)

The RD nurses recognized the added extra burden they were putting on their intensive care colleagues. This resulted in mixed feelings, they were there to help, but they were also needing; a lot of support themselves. One RD nurse recognized the added burden that this was having on the intensive care nurses, and commented on how they took this role with professionalism:

'actually, I have to say the ICU team were amazing, and they really did, it must have been a horrible time for them. Because they had all these people come in, who didn't understand their ways, and then they're almost responsible for you as well as the patient'

(P4 RD)

Re-organization of staff, environment and equipment were all necessary and done under extreme pressure. However, this was not without consequences for the safe delivery of care.

4.5 | 'Doing the best we can'—Safe delivery of care

This theme, 'Doing the best we can' describes the consequences of the actions taken in response to the pandemic. Sub-themes include organization of care, missed and suboptimal care and communication.

4.6 | Organization of care

As a result of the re-organization of the context of care and staff, care delivery was also re-organized.

4.6.1 | Fragmentation of care

Care was often organized into fragments both in terms of lists of tasks to be completed and small groups of nurses forming a tag team where one nurse would spend a short period of time (1–3h) at the patient's bedside before swapping with another member of the team.

'What we did do fairly early on was organise teams of people to do specific roles. So things became more task-orientated for example'

(P3 ICU)

'All the patients in a bay were sort of written down on a whiteboard. So like you had to get those tasks done in the two hours that you were in there for, then at the end of that two hours you set a whole new set of tasks for the oncoming shift' (P8 RD)

Participants described how this reorganization ensured that tasks were delegated to appropriately skilled staff and how it assisted re-deployed nurses deliver safe patient care.

'We had sort...of a patient safety pro forma that we did every four hours..., it was just simple things that you do without thinking when you're an ICU nurse, like check the tube, ET tube pressures, that sort of stuff, but for the redeployed nurses it was a very simple checklist...it was a really good way of having a framework for non-ICU nurses to follow'. (P18 ICU).

As participant 16 (ICU), describes, tasks such as moving patients into the prone position were delegated to a 'proning' team which helped ensure the safety of this complex procedure:

'We changed to doing our proning at set times of the day, and they'd start in one end of the hospital and they'd go round and do all the others... And it was the same people, the same teams.... it meant that actually the people coming to do the proning and un-proning, had really gotten to know how to do it safely'.

(P16 RD)

4.6.2 | Lack of holism

All participants lamented the loss of holistic, person-centred care which was a source of great distress and also left nurses feeling professionally vulnerable.

'I think one of the biggest risks I felt for me personally was the risks that we weren't able to provide an adequate level of care for these patients who were so extremely sick and unstable... and holistic care we did the bare minimum but there was no holistic care'. (P4 ICU).

'So I didn't feel unsafe from that point of view [catching COVID], but I felt professionally unsafe because I wasn't giving the level of holistic care that I have been trained to give'.

(P5 ICU)

Participants reported how they felt the care delivered was just enough to keep the patient alive. Participants described this as 'firefighting' (P16 ICU). Another aptly described their experiences as 'battlefield nursing' (P6 ICU).

'We rationalised our care to... In accordance with the staffing that we had...I suppose I personally functioned on an absolutely what needs to get done got done. You know, there were no frills, there was no extras'. (P7 ICU).

Many participants attributed a lack of holism to the fragmentation of care:

'I think when you've got one nurse looking after one patient, and they're very focused on that one patient, it's a lot easier to kind of chase things... When you've got a collective group of nurses looking after a collective group of patients, it's not quite so clear cut, that kind of decision-making, that responsibility is not quite so clear. So things that would ordinarily routinely be followed up wouldn't be'.

(P13 ICU)

4.7 | Missed and suboptimal care

As a result of the fragmentation of care and the lack of holism, participants went on to describe multiple incidents of suboptimal and

missed care which they described as very stressful and distressing. Many incidents related to the physical care of the patients such as medication management, early mobilization and pressure area care. Other reports related to psychological and family care and the lack of proactive nursing care that supports patients' progression and recovery.

4.7.1 | Physical and psychological care

ICU nurses recognized medicines management as a big safety risk and source of concern. They described perceived risks and actual incidents that took place.

'Oh yeah, loads. ...So the drug errors were missed doses. Or incorrect doses. We also had a couple of wrong drug, wrong patient incidents as well. So we had multiple'.

(P18 ICU)

To mitigate these risks participants described how many of the drug infusions were pre-prepared by the pharmacy team. The participants resoundingly appreciated this and felt that it enhanced the safety of their patients and helped RD nurses manage unfamiliar medications.

Other aspects of care commonly reported as being suboptimal included the early mobilization of patients and delivery of pressure area care.

'In terms of giving optimal care and safe care. So ultimately yeah, there were some considerations, like we weren't moving the patients and turning them regularly. You know, so we potentially were sort of subjecting, you know, them to pressure breakdown'.

(P7 RD)

'We couldn't give 10 out of 10 care, and there wasn't enough of us. I'd be looking at my patient and I'd be like they need a turn, they've been in that same position for two, three hours, but ...we'd have to leave them, and you know, they wouldn't get turned for another three or so hours later, and have pressure damage, muscle wastage and all that'.

(P16 ICU)

Participants recognized the risks associated with suboptimal care.

'... when it was busy, patients weren't turned as often as we would do ordinarily. You know, so the risk of pressure area damage was higher, the risk of a chest infection, ventilator-associated pneumonia was probably higher because we weren't moving patients as much as we would do routinely'.

(P13 ICU)

Participants acknowledged the long-term effects this may have on patients' safety in terms of their outcomes. ICU nurses described how they were unable to deliver care interventions such as delirium prevention measures and early mobilization which they recognized would have an impact on patients' longer-term outcomes.

'When you were supporting so many and the patients... so things like the delirium care bundle went out the window. Just even sitting the patient out or standing them. It didn't stand a chance as it was all we could do to do you know the basics. God knows what will become of the patients with all the things they do in follow up, you know the trauma and ... rehaby stuff'

(16 ICU)

Participants recognized the short and long-term impact of no family visiting on the patient, the family, and the nurses' ability to provide holistic care for the patient. Participants described how the lack of consistent psychological care to the patient and their family was detrimental to holistic care delivery and their own sense of well-being as well as potentially having ramifications for the patients' ongoing psychological health.

'But I think just the psychological impact of critically ill patients not being able to have any contact with their family whilst they were in that situation, I think that was a massive difficulty. ...So I think that was a big risk. I can imagine that there's been a massive impact to people's psychological health as a result'. (P18 ICU).

4.7.2 | Lack of progression

Another impact of suboptimal care delivery acknowledged by the ICU nurses was the impact on the patients' progression and recovery. Participants described how they kept patients more heavily sedated than normal and acknowledged the potential impact of this on the duration of mechanical ventilation and the potential for psychological morbidity.

'It also meant people were more heavily sedated than they needed to be, because we couldn't keep them safe any other way'.

(P12 ICU)

In addition, ICU nurses described how they were unable to effectively wean patients from mechanical ventilation due to insufficient staffing. As a result, extubating patients was often delayed.

'But trying to extubate someone obviously takes an ICU nurse and all of their attention for that, And we had a lot

of non-ICU background nurses, and so trying to extubate people next to each other wasn't an option, so it meant people were extuba... Were intubated longer than they had to be, just because we didn't have the staff to keep them safe'. (P1 ICU).

'... you couldn't extubate your other patient because they weren't able to look after that patient enough for an hour or two hours while you extubated this patient' (P12 ICU).

4.8 | Communication

This sub-theme describes the role of communication in patient safety during the pandemic. Methods of communication were adapted to facilitate safe patient care, however, the quality of communication simultaneously had implications for patient safety. Communication was viewed as an antecedent for patient safety with consequences to patient safety.

4.8.1 | Team communication

Participants described the difficulties in communicating in the teams, particularly during patient handover. Some participants attributed these difficulties to the volume of work:

'You weren't always given that opportunity to do that proper handover. So challenges, there was probably quite a lot of potential to miscommunication about what needed to be done for your patient'.

(P13 RD)

Others felt wearing PPE and the physical environment hampered clear communication:

'So, because of space, we then started having a handover in the corridor, in the hospital corridor, with people walking up and down. So there was only so much that could be said, which is not a lot, and so all you had was you're in bed three. No other information...'

(P14 ICU)

Ineffective team handovers led to a lack of situational awareness of the overall coordination of the shift leading to unsafe practices such as lack of preparation for patient admissions

'You weren't ready for them, you didn't have a bed space ready, you didn't have any... You didn't have a nurse....I think as a nurse in charge I should know when a patient's coming my way, You think eh, it's just

not safe to do that to transfer a patient without that knowledge'.

(P1 ICU)

4.8.2 | Incident reporting

Participants described how formal reporting of unsafe care and risks of unsafe care were compromised. Many described a higher threshold for reporting:

'I think this was a big problem, I think people didn't submit incident reports. I think it was almost like rules were rewritten for Covid....the number of patient safety incidents across the hospital kind of dropped, and I think people had a very high threshold for raising a patient safety incident'.

(P7 ICU)

Others described how unsafe care was expected and accepted. Many displayed complacency towards, what in pre-COVID-19 times, would have been a serious incident.

'So it was kind of stuff happened, bad things happened, but it was almost kind of seen as routine, almost as inevitable with Covid because of the circumstances we were working in. So I think patient safety incidents just didn't get raised as frequently during that time...It was kind of almost like a... Felt like a bit of a war footing, where normal rules were off, just doing what you can on a day-to-day basis. You know, so things you would routinely have raised through patient safety incidents just didn't get acknowledged, didn't get flagged, kind of accepted as normal and everyone just carried on'.

(P2 ICU)

5 | DISCUSSION

This study provided a unique opportunity to explore both intensive care and re-deployed registered nurses' perspectives of patient safety in intensive care and the challenges faced in delivering safe care in intensive care areas during COVID-19. It also provided an opportunity to learn from the rapid changes made to the context of care, staffing models and delivery of care.

Many of our findings resonate with earlier work; akin to the theme 'On a war footing- an unprecedented situation', Montgomery et al. (2021) described the ordeal of 'Dislocation' where the environment, equipment and staffing were re-organized to accommodate the increase in demand for intensive care. Montgomery et al. (2021) identified similar challenges associated with these rapid changes such as accessibility and availability of appropriate

equipment, the unfamiliar care context, and unfamiliar tasks/ increased responsibilities.

As a result of organizational changes, registered nurses in our study reported an increase in workload both in the several patients and the workload associated with each individual patient. This resonates with the findings from (Bruyneel et al., 2021; Hoogendoorn et al., 2021) who also reported an increase in the volume of patients and associated workload. Reflecting Griffiths et al. (2018) findings from their systematic review, our participants reported a concurrent increase in risks to patient safety such as missed nursing care, and medication errors.

Consistent with other studies (Bruyneel et al., 2021; Hoogendoorn et al., 2021), participants described how care in ICU was fragmented, lacked holism and reported missed and sub-optimal care. Significantly, Labrague et al. (2022) identified that personal protective equipment adequacy, nurse staffing levels, and patient safety culture were predictors of quality of care during the pandemic. In addition, von Vogelsang et al. (2021) highlighted that where nurse/ patient ratios were maintained, the perceived quality of care and patient safety remained good.

Our study also supports other research that has highlighted the moral distress associated with the inability to deliver holistic person-centred care and the negative impact this has on nurses' well-being (Greenberg et al., 2021; Sharma et al., 2021).

In our data there were some key, unique findings that emerged:

- Registered nurses have a holistic and long-term appreciation of the impact on patient safety as a result of missed and sub-optimal care in intensive care.
- Dilution of skill mix and the fragmentation of care were perceived to lead to a reduction in the quality of care delivered and increased adverse events and risk of harm which were not consistently formally reported.

5.1 | Holistic and long-term appreciation of patient safety

Both intensive care and redeployed nurses in this study described numerous potential and actual adverse events, such as medication errors and pressure injuries, encountered in intensive care during the COVID-19 pandemic. In addition, intensive care nurses described other long-term patient safety risks associated with the lack of holistic care, missed and suboptimal care.

Despite the paradigm shift towards a holistic appreciation of patient safety reflected in the values and recommendations of the Global Patient Safety Action Plan 2021–2030: Towards eliminating avoidable harm in health care (WHO, 2021), on an operational level, a reductionist approach to patient safety still dominates. Patient safety issues are frequently identified and monitored by incident reporting where single events in time in a specific, often localized care context, are documented. However, nurses in our study considered

the ongoing harm that may occur beyond the four walls of the care environment for which they are directly responsible, the full extent of which may not become apparent until months or years after the patient's discharge from the hospital. Intensive care nurses described potential long-term psychological issues and traumatisation due to the context of care, lack of family contact and the lack of holistic care. They also described the physical ramifications that may be experienced by the patient during their rehabilitation due to the lack of early mobilization, higher levels of sedation and prolonged mechanical ventilation.

The limitations of patient safety reporting systems that gather data about adverse events and incidents at the point of care are recognized in the literature. Mitchell et al. (2016) highlight that incident reports only detect a small percentage of relevant patient safety issues as many reports do not contain enough information. The WHO (2021, page 10) also acknowledges that *'too often, great volumes of data are collected and most of the available time and resources are spent storing them. Less time is spent on analysing and sharing data in a way that is usable for learning and can reliably and consistently contribute to improving patient safety'*. Despite this, patient safety initiatives and service improvements are often based on these data.

The WHO (2020) produced the document 'Patient safety incident reporting and learning systems: technical report and guidance'. This guidance recommended using other sources of data to inform patient safety strategies such as malpractice claims, patient-reported experience and outcome measures, clinical care audits, medical record reviews, surveys, significant event audits and safety surveillance data for blood products, medicines, vaccines, and medical devices. Even these recommended data sets do not capture nurses' holistic and long-term view of patients' safety. Our data demonstrate that nurses appreciate the complex contexts of actions, interactions, processes, relationships, communications, human behaviour, organizational culture, rules and policies that WHO (2021) cite as being influential to patient safety, yet there is no rigorous reporting or monitoring mechanism that can adequately capture nurses' concerns. Given registered nurses' unique insight into the patient journey and care delivery, their holistic and long-term perceptions of patient safety risks need to be firmly embedded in all patient safety strategies.

Our study demonstrated that adverse events were not consistently and accurately reported or recorded during the surges of the COVID-19 pandemic. This is evident in other studies (Endacott et al., 2021). As such the true impact of COVID-19 on the risks to patients in intensive care safety will never be fully known. If the Global Safety Action Plan (WHO, 2021) is to be successful, then it is essential that all patient safety risks are identified and incorporate the unique understandings of the nurse at the bedside. Standard 6 of the action plan states: *'Ensure a constant flow of information and knowledge to drive mitigation of risk, a reduction in levels of avoidable harm and improvements in the safety of care'* (WHO, 2021, p. vi). Therefore, the time has come to re-conceptualize the way in which patient safety issues are reported to include nurses' unique understanding and concerns in a way that is timely and meaningful.

5.2 | Dilution of skill mix and fragmentation of care

Both intensive care and redeployed nurses in this study discussed the challenges of poor staffing, and diluting skill mix meaning that registered nurses with critical care nursing experience were diluted with registered nurses with no critical care experience and fragmented care delivery. The experiences of the nurses in this study and others (Bruyneel et al., 2021; Endacott et al., 2021; Hoogendoorn et al., 2021) suggest that the staffing models adopted for COVID-19 were suboptimal in terms of safe care delivery with reductions in the quality of care and an increase in several adverse events reported.

Several patients per nurse in an ICU is related to the patient outcomes (West et al., 2014). Furthermore, Margadant et al. (2020) emphasized the importance of the nursing workload per intensive care nurse and reported that a higher Nursing Activities Score per nurse ratio was associated with higher in-hospital mortality. Hoogendoorn et al. (2021) and Bruyneel et al. (2021), report that patients with COVID-19 confer a greater workload in terms of Nursing Activities Score than other critically ill patients in intensive care. As such maintaining patient safety in ICU during COVID-19 is a battle on all fronts; the global shortfall of intensive care nurses has led to a dilution of skill mix, meaning nurses are caring for a greater number of patients all of whom have more complex needs with a greater associated workload. The negative impact on both the quality of care and patient safety is therefore understandable.

Staffing models in ICU were contentious even before the pandemic. The necessity of one nurse to one patient ratio is often questioned due to the cost and resource implications for this level of nursing care and the lack of a supportive evidence base (Endacott et al., 2021). As health services are recovering from the initial effects of the global pandemic and adapting to meet the continued challenges associated with COVID-19 and resuming normal services, it is essential that nurses' voices are heard and considered when planning ICU staffing models going forward. Considerations of models of staffing must chime with the holistic, person-centred care held as a core value in nursing, that prioritizes thriving over surviving in both patients and the healthcare professionals looking after them.

5.2.1 | Limitations

This study only focussed on nurses' experiences and perceptions of patient safety; the true extent of adverse events remains unknown. Despite this due to the lack of formal incident reporting during the COVID-19 pandemic, this study gives additional insights into patient safety issues and risks.

Data collection for this study ended in July 2021 at a time when there was still uncertainty regarding the ongoing pandemic; participants may now have different views as the pandemic and the vaccine program have evolved. In addition, nurses may have been reflecting on their experiences from the beginning of the pandemic and accounts may be vulnerable to recall bias.

Most of the participants in this study, both RD and ICU nurses, had over 20 years experience of working as a registered nurse; the participants may be comparatively more experienced than the majority of the registered nursing workforce in the UK. Registered nurses with less experience may have different experiences and perceptions of patient safety than those reported.

Despite being open to the whole of the UK, only nurses from England expressed interest in participating and therefore were recruited to the study. The experiences of nurses working in the devolved nations may, therefore, be different to those reported in this study.

It is also acknowledged other health care professionals such as Operating Department Practitioners were re-deployed to intensive care during the pandemic, who may have different perspectives of patient safety. Their views are not represented in this study but would make a useful addition to our understanding in future work.

Due to the unique features of the National Health Service, the transferability of findings to other health care systems may also be limited.

6 | CONCLUSION

This study has reported how, in response to the global COVID-19 pandemic, staff, the environment and equipment were organized to meet the increase in demand for intensive care services. These actions had inevitable repercussions on care delivery, missed and suboptimal care and communication with a perceived overall compromise to patient's safety in intensive care during the COVID-19 pandemic.

Nurses demonstrated a unique holistic and long-term understanding of patients' safety that is not currently wholly reflected in global patient safety strategies and their operational delivery. In particular, the assessment of patient safety risks and their ongoing monitoring does not currently adequately reflect nurses' concerns. The development of a co-produced patient safety risk assessment and monitoring tool that includes nurses' appreciation of holistic and long-term risks would therefore be a useful avenue for future research.

Nurses are the cornerstone of patient safety with staffing and nursing workload influencing the outcomes of patients. However, optimal nurse staffing models in intensive care are unknown and only informed by a relatively meagre evidence base. Further research investigating staffing models in relation to patient safety outcomes would be fruitful. However, it is essential that nurses who care for patients at the bedside actively contribute to policy making. Effective patient safety strategies including the development of staffing models depend on the nurse's unique appreciation of the holistic and complex needs of the critically ill patient.

AUTHOR CONTRIBUTIONS

LCS, CM, SB, SV, VC, AP, KG, NC, HW: Made substantial contributions to conception and design, acquisition of data or analysis and

interpretation of data. Involved in drafting the manuscript or revising it critically for important intellectual content. Given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content. Agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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CONFLICT OF INTEREST

No conflicts of interest are declared by the authors.

DATA AVAILABILITY STATEMENT

The data that supports the findings of this study are available in the supplementary material of this article.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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