Research Article

Factors that influence critical care nurses' management of sedation for ventilated patients in critical care: A qualitative study

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ABSTRACT

Background: Optimising sedation use is key to timely extubation. Whilst sedation protocols may be used to guide critical care nurses' management of sedation, sedation management and decision-making is complex, influenced by multiple factors related to patients' circumstances, intensive care unit design and the workforce.

Aim: To explore (i) critical care nurses' experiences managing sedation in mechanically ventilated patients and (ii) the factors that influence their sedation-related decision-making.

Design: Qualitative descriptive study using semi-structured interviews. Data were analysed using Braun and Clarke's six-step thematic analysis.

Setting and participants: This study was conducted in a 26-bed level 3 accredited ICU, in a private hospital in Melbourne, Australia. The majority of patients are admitted following elective surgery. Critical care nurses, who were permanently employed as a registered nurse, worked at least 16 h per week, and cared for ventilated patients, were invited to participate.

Findings: Thirteen critical care nurses participated. Initially, participants suggested their experiences managing sedation were linked to local unit policy and learning. Further exploration revealed that experiences were synonymous with descriptors of factors influencing sedation decision-making according to three themes: (i) *Learning from past experiences,* (ii) *Situational awareness and* (iii) *Prioritising safety.* Nurses relied on their cumulative knowledge from prior experiences to guide decision-making. Situational awareness about other emergent priorities in the unit, staffing and skill-mix were important factors in guiding sedation decision-making. Safety of patients and staff was essential, at times overriding goals to reduce sedation.

Conclusion: Sedation decision making cannot be considered in isolation. Rather, sedation decision making must take into account outcomes of patient assessment, emergent priorities, unit and staffing factors and safety concerns.

Implications for clinical practice: Opportunities for ongoing education are essential to promote nurses' situational awareness of other emergent unit priorities, staffing and skill-mix, in addition to evidence-based sedation management and decision making.

Introduction

Mechanical ventilation is the most used short-term life support technique worldwide and is commonly used in critical care settings for a diverse spectrum of indications, from scheduled surgical procedures to acute organ failure (Pham et al., 2017). Minimising sedation and mechanical ventilation time is key to minimising complications (Pham et al., 2017). Delayed weaning and prolonged mechanical worsens patient outcomes, increases the risk of death, increases length of stay in ICU and hospital (Epstein & Ciubotaru, 1998; Thille et al., 2013) and is one of the strongest predictors of 1-year functional outcome (Herridge et al., 2016). Critical care nurses have high levels of responsibility for

the management and weaning of mechanical ventilation (Rose et al., 2007), collaborating with a wider multidisciplinary team (Marshall et al., 2017).

Weaning from mechanical ventilation is a critical and time-sensitive milestone in a critically ill patient's recovery (McConville & Kress, 2012). Many of the serious complications associated with mechanical ventilation are attributed to the duration of ventilation (Herridge et al., 2016), and delays to extubation worsens patient outcomes and risk of death (Thille et al., 2013). Changes in patients' level of consciousness and orientation, agitation and sedation induced by the medications given for orientation contribute to extubation delays (Thille et al., 2013). A recent international prospective study identified that sedation use at the time of weaning readiness was strongly associated with delayed extubation (Pham et al., 2023). Thus, optimising sedation use by paying close attention to pathophysiological parameters (Rose et al., 2007), pain assessments (Randen & Bjørk, 2010), sedation scores and weaning eligibility criteria is key to enhancing weaning and timely extubation (Pham et al., 2023).

A multimodal patient-centered approach to optimal sedation, including effective early analgesia is imperative for all ventilated patients (Seo et al., 2022; Shehabi et al., 2018). A range of medications are used for sedation in the ICU which often involves a combination of sedatives and adjunct medications to meet the patients' clinical needs (Devlin et al., 2018; Hetland et al., 2018; Pearson & Patel, 2020) and maintain patient comfort (Wong et al., 2020). Opioids such as morphine and fentanyl (Panahi et al., 2018), benzodiazepines such as midazolam or diazepam (Kotfis et al., 2018), ketamine (Patanwala et al., 2017) and neuromuscular blocking agents (Bailey et al., 2022) are routinely used in combination.

Opioids provide analgesic and sedative effects, improving patients' comfort, reducing pain and distress, however opioids may also result in deeper sedation than intended, delaying weaning from mechanical ventilation (Panahi et al., 2018). Whilst midazolam is one of the most commonly used benzodiazepines in the ICU (Karamchandani et al., 2021), it has been shown to increase the risk of delirium (Rengel et al., 2019). Propofol is arguably the most commonly used sedative agent due to its rapid onset and short duration of action (Hughes et al., 2012). Dexmedetomidine is also commonly used because it has sedative and analgesic effects without causing respiratory depression (Pearson & Patel, 2020), has been shown to increase patient cooperation, improve communication, and reduce the risk of delirium (Wong et al., 2020). Whilst neuromuscular blocking agents do not induce a state of sedation (Bailey et al., 2022), they can assist to control tachypnoea and reduce oxygen requirements (Rowe & Fletcher, 2008).

Importantly, adequately controlling patients' pain is also key to minimising patient distress and sedation requirements (Karamchandani et al., 2021). Opioids were traditionally administered to sedate patients, however ketamine is now widely used as an adjunct to sedation due to its sedative and analgesic effects (Patanwala et al., 2017). Thus, opioids remain a common adjunct to sedation.

In most ICUs, critical care nurses utilise their clinical expertise to guide and manage patient care according to local guidelines and within broad parameters prescribed by a physician (Alastalo et al., 2017), including sedation. Critical care nurses are also responsible for administering sedation to optimise patient comfort and reduce symptom burden associated with mechanical ventilation (Hartog & Benbenishty, 2015; Kotfis et al., 2018; National Health and Medical Research Council, 2018). Yet adherence to practice guidelines and standard unit-based practices is an ongoing issue, attributed to lack of awareness, familiarity and agreement (Majid et al., 2011). Other research exemplifies how knowledge obtained from undergraduate education alone is not enough to guide nurses' practice (Hunter et al., 2023). Rather, critical care nurses learn experientially, developing their own practices according to cultural norms and the dynamics of the environment, constant evaluation and re-evaluation of cues and by role modelling the practices of others (Hunter et al., 2023). Thus, the management of sedation is not

simply about following physician orders or a sedation protocol.

Sedation protocols are associated with improvements in sedation practice. Nurse-led sedation protocols have been shown to result in a lower reintubation rate compared to a physician led sedation-practice (Egerod, 2002). Subsequent research has also demonstrated a reduction in mean ventilation time in response to implementation of a sedation protocol (Frawley et al., 2019). Whilst objective assessment tools such as the electroencephalogram or bispectral Index were considered the gold standard, particularly for evaluating deep sedation (Devlin et al., 2018). Subjective assessment tools, such as the Richmond Agitation Sedation Scale (RASS) (Ely et al., 2003) and the Riker Sedation-Agitation Scale (SAS) (Riker et al., 2001) are commonly used to guide clinical decision making about sedation. However, as subjective measures, the efficacy of RASS and SAS scores in guiding sedation management is contingent on interpretation of the score in context for each patient, their current clinical circumstances, and in accordance with sedation goals.

Hence sedation management, and more specifically de-sedation is often more complex than what can be addressed by a local policy, a sedation assessment tool or sedation protocol. Decision-making is complex, influenced by interprofessional collaboration (or lack thereof) between the wider treating team (Xyrichis & Rose, 2024), the sedation-analgesia balance, the environment, staffing, workload and unit culture (Kalliopi et al., 2019). Other than formal guidance provided by local policies, and goal-directed instructions provided by medical staff, the extent to which human factors contribute to critical care nurses' sedation decision-making practice are less understood (Pham et al., 2023), highlighting a clear research gap, which was the focus of this study.

Aim

The aim of this study was to explore: (i) critical care nurses' experiences managing sedation in mechanically ventilated patients and, (ii) the factors that influence their sedation-related decision-making.

Design

A qualitative descriptive study methodology (Polit & Beck, 2017) was suitable for this study as it focussed on exploring the factors influencing nurse decision-making and subsequent experiences with sedation management.

Setting

This study was conducted at a large not-for-profit private hospital in metropolitan Melbourne, Australia. The hospital had 700 acute care beds and an emergency department and ICU, providing specialist cardiac, neurological, orthopaedic, oncological, ear, nose and throat, general medical and surgical care for more than 29,000 patients annually. The ICU is a 26-bed level 3 accredited ICU, admitting patients requiring critical care or high dependency interventions from multiple specialties except trauma.

The ICU provides care for approximately 2,500 patients each year, of which almost 60 % were planned admissions following surgery, with 45 % requiring mechanical ventilation. Internal data provided by the site research manager demonstrated that in stable postoperative patients with an uncomplicated recovery, weaning from mechanical ventilation usually begins within three hours of admission from the operating room, resulting in a mean ventilation of 11 h (internal unpublished data). In collaboration with the ICU doctors (intensivists and registrars), a critical care nurse is responsible for weaning sedation and ventilation requirements simultaneously to achieve extubation within 24 h of admission from the operating room. At the time the study was conducted, there were 128 critical care nurses employed permanently in the ICU, including those with education, management and outreach roles. The majority (69 %) of critical care nurses worked more than 35 h per

week, and 82 % had a specialty postgraduate critical care qualification. According to Australian critical care workforce standards, ventilated patients and those deemed unstable must be nursed with a 1:1 nurse-to-patient ratio, whilst stable non-ventilated patients may be nurses with a 1:2 ratio (Australian College of Critical Care Nurses, 2016). Critical care nurses manage patient sedation according to a sedation plan prescribed by doctors. Sedation plans, which are a written set of sedation goals and parameters prescribed by ICU doctors, were formally reviewed during the morning and afternoon medical rounds, with the option for further review at any time in response to a patients' changing condition and associated sedation needs. Formal sedation assessment tools including the RASS (Ely et al., 2003) and SAS (Riker et al., 2001) were used at the study site to guide nurses' sedation management and decision-making.

Participants and recruitment

Convenience sampling was used to recruit participants with the requisite knowledge and experience with the phenomena of interest, critical care nurses were invited to participate following self-assessment against the following inclusion criteria:

Permanently employed in the study ICU as a registered nurse, Working at least 16 h per week, for at least three months, and Involved in the care of mechanically ventilated patients.

An email invitation explaining the study, details about participation and participant inclusion criteria was sent to all potential participants by an independent third party, on behalf of the researchers. Flyers containing the same information were also placed in non-clinical areas, such as the staffroom and locker areas, inviting participation. Potential participants were able to register their interest in participating via email to the lead researcher.

Ethical considerations

Ethical approval for this low-risk research has been obtained from the hospital Human Research Ethics Committee (RES-21-0000667L) and the University (2022–052). Local research governance approval was also sought at the hospital prior to commencement. Respect and justice for participants was ensured by providing detailed information about the research and the rights of participants, and by taking measures to minimise the risk of coercion (National Health and Medical Research Council, 2018). Participants were informed that there were no obvious benefits to them from participation, other than the opportunity to talk about their experiences of managing sedation for ventilated patients. Once potential participants were satisfied with the information provided and had no further questions, informed consent was provided. Predetermined strategies were in place to manage participant distress, but these were not necessary. Participants were not paid for their participation, but all received a $5 coffee card for use at the hospital, as a gesture of thanks. Pseudonyms were used in the development of this manuscript, in order to protect the anonymity of participants.

Trustworthiness

Trustworthiness was assured through the shared responsibility of the conduct of this research and through the involvement of all named researchers in all aspects of the research process. The close and active involvement of all researchers in the analysis process ensured credibility in this research. Confirmability was demonstrated by ensuring the data analysis process was conducted objectively, with each researcher considering and discussing the data's relevance and meaning. Whilst these findings are potentially transferrable, with relevance to other settings and contexts, this may be limited by variations in patient profile and unit practice. Authenticity was assured through the unbiased and fair interpretation of the experiences that participants shared, evidenced

through the inclusion of participant quotes that portray the range of participants' perspectives and lived realities. The transferability, or potential for the findings of this study to be applied to other ICUs was ensured by providing a detailed description of the study context and typical patient profile, enabling the reader to interpret the findings and transferability accordingly.

Researcher reflexivity

Consistent with clinical research, positioning of the researcher in the study is key to reflexivity and how it informed interpretation of the research (Creswell, 2013). The lead researcher is a qualified critical care nurse at the study site has undertaken postgraduate education in clinical research (DM). The other members of the research team are also qualified critical care nurses with extensive experience with clinical research and doctoral qualifications (AH, MJB). As a team, the potential impact of the lead researcher (DM) having a pre-existing workplace relationship with the study participants and how this could affect the comfort of study participants and the quality of interviews, was considered. Participants were offered an alternative interviewer if they preferred, but all declined. The researchers acted responsibly to ensure the privacy and confidentiality of both participants and non-participants was upheld. No potentially identifiable information shared in interviews related to either staff or patients was reported. All study data were stored legally and following a de-identification process.

Data collection

Individual semi-structured interviews were used to gather data. This approach was considered most appropriate because it allowed participants to respond to questions, and also provide additional comments or share information they felt was relevant to the topic (Greenhalgh et al., 2017). Interview questions were collaboratively developed by the research team (DM, AH, MJB) according to the extant evidence, and the context of care in the study setting. Additional probing questions were used to encourage further elaboration (Supporting File 1).

All interviews were conducted by the lead author (DM), either online using the Zoom application (Zoom Video Communications Inc, 2021), or face-to-face according to participant preference between March and May 2022. Prior to formal commencement of each interview, the conversation commenced with introductions, an overview of the study, what participation entailed and how participant privacy and confidentiality would be ensured. Potential participants were provided an opportunity to ask questions before verbal consent was sought. Once consent was provided, audio recording of the interview commenced and the participant was asked to reaffirm consent captured in the recording. A semi-structured approach was used to gather data enabling participants to share their experiences and reflections using their own words (Polit & Beck, 2017). Participants were also encouraged to share additional information they deemed important or relevant to the topic. The research team (blinded) met regularly between interviews to enable the lead researcher to reflect on the data collection process and the data, with data collection ceasing at the point of information sufficiency, the point at which no new information was gained from interviews.

Following each interview, audio files were named according to the order in which interviews were conducted. Interviews were transcribed professionally with names replaced with pseudonyms and any identifying features omitted. Interview transcripts were named according to the order in which interviews occurred, such as P1, for participant one. All participants were offered an opportunity to review the transcript of their interview, but none chose to do so.

Data analysis

Braun and Clarke's six-step thematic analysis (2022) was used to analyse the data. This involved two researchers (DM, MJB)

independently reading and re-reading the interview transcripts to familiarise themselves with the content, taking notes and identifying potential patterns, leading to the generation of provisional codes and themes. The two researchers then shared their analysis for comparison, working collaboratively to resolve differences and refine the codes and themes. The third researcher (AH) then reviewed the codes and themes against the raw data to ensure fittingness and reduce threats to the credibility of the research, until the final themes were determined. The study is reported according to COnsolidated criteria for REporting Qualitative research (COREQ) Checklist.

Findings

Thirteen critical care registered nurses participated in this study and their years of nursing experience are shown in Table 1, which was considered to reflect the nursing workforce in this ICU more broadly. In attempting to respond to the first aim of this study, which was to explore critical care nurses' experiences in managing sedation, some linked their experiences to unit policy, or learning, such as:

"everything that I've learned on the job, everything that I learned at university, everything I've learnt from my colleagues and the doctors… [but] no-one really teaches you how" (P2).

But for the majority of participants, their descriptions of their experiences were synonymous with descriptors of the factors that influenced their sedation-related decision-making, presented as three themes: (i) *Learning from past experiences,* (ii) *Situational awareness and* (ii) *Prioritising safety.*

i. Learning from past experiences

Respondents shared how their past experiences with managing sedation of mechanically ventilated patients shaped their sedation decision-making in the present. Even when medical staff may have provided instructions to decrease sedation in preparation for extubation, doing so may not have been in the best interest of the patient, as this participant described:

"You'd turn off the sedation first thing in the morning and still be waiting for the ward round at 11am. And then of course the patient's getting frustrated and agitated and if they've already had confused or agitated periods then they very well are going to lash out again and then you end up re-sedating them and they continue to be mechanically ventilated when arguably it's not necessary" (P1).

For others, an understanding of unit expectations was important to interpreting instructions and make autonomous decisions, particularly if the instructions were not specific:

"Might give a vague term like lightly sedated or keep them comfortable and it's up to us as a nurse to interpret what exact medication amount to give, which can vary really significantly between patients" (P3).

Reflecting on previous practice in managing sedation was integral to guiding their current practice:

"For me it's experience, and when you have situations that stick with you that probably don't go as well as you would want, those are the times that

Table 1
Participant Characteristics.

Experience	n*	Mean (SD)
Total years in nursing	13	11.5 (7.9)
Total years in nursing in ICU	13	8.2 (6.5)
Total years in nursing at the study ICU	11	4.0 (2.1)

*Number of responses is variable as participants could elect not to answer.

I think about when I'm looking to wean and wake patients, or just manage sedation in general" (P8).

Nurse participants similarly reflected that their prior experience with managing and titrating sedation was also helpful in predicting future patients' likely response to changes in sedation, thus guiding their sedation decision making.

"With our longer-term patients who are ventilated and sedated because of complications, you're basing sedation on how tube-intolerant they are. Like if they're not breathing properly because they're biting down on the tube, maybe they need to be more sedated. Or if they look like they're grimacing and like they're in pain, they maybe need a combination of propofol and analgesia" (P11).

Others described how their experiences with some patient characteristics in the past shaped their sedation decision making, such as when it was known a patient used *"recreational drugs"* (P7). Other examples included:

"If they normally take diazepam, or they've been a really heavy smoker or a heavy drinker maybe we can get a nicotine patch or maybe we can start a bit of diazepam, even a low dose before we get them extubated" (P5).
"[If they've] had high alcohol use before coming into hospital and we know they're going to be withdrawing from something" (P1).

Nurse participants also recalled their previous experiences with titrating sedation in a patient who likely has pain or is concurrently prescribed analgesia. An important aspect of holistic patient care was ensuring that sedated patients had effective pain control, because uncontrolled pain could not only cause distress for the patient but also impact on their clinical condition:

"They start to grimace, they look like they have pain, or they become tachycardic, they start to splint. …if you're keeping an eye on intra-abdominal pressures they will start to rise. It effects their ability to deep breath so their ventilation will become quite poor. …their peak inspiratory pressures can rise…pain effects a lot of things, and maybe … could be the reason why they're restless or combative" (P10).

Others similarly reflected on how they had learnt from past experiences to ensure patients have an adjunct analgesic prescribed and available prior to adjusting or ceasing sedation (P8), but to also ensure not to give too much analgesia. Concurrent opioids were of particular concern because they were thought to produce a *"combination analgesic and sedative affect… are they going to have an elevated CO_2?"* (P3), potentially delaying extubation.

ii. Situational awareness

Importantly, participants discussed how broader situational awareness was key to guiding their sedation decision-making. Situational awareness, such as knowing what else may be happening in the unit influenced nurses' management of patient sedation. Participant One described how when there was an emergency situation in the unit, *"you don't want to remove a safe airway by reducing down the sedation and putting them at risk. If they've got a safe one … they're okay"* (P1). This awareness also extended to understanding the whole plan of care for a patient, and determining whether reducing sedation was still appropriate. A nurse participant described a patient scenario to justify the decision to maintain sedation:

"…we're going back on a filter [haemofiltration] or for CT [Computerised Tomography] and so we're going to leave them sedated and ventilated" (P4)

Broader awareness of unit staffing was also an important consideration, such as knowing if there was staff around to provide immediate support if needed. One participant described that when there were not

enough staff on the unit, they would be:

> "…a lot more inclined to bolus or have them on higher doses of propofol… I probably advocate for not doing sedation breaks … or if we were to do them, it is in the middle of the day [when] no-one's on a break, and there's a doctor around" (P12).

Consideration of staffing was however, not just about the number of staff available to provide support, it was also about skill-mix and perceived ability to manage an emergent situation, if a patient were to be extubated. In cases where "*the registrar was very new and unsure*" (P6), or "*when you know the staffing mix isn't right, or people are on breaks*" (P2), any immediate plans to decrease sedation or extubation would be reconsidered. Situational awareness also extended to whether the immediate environment was conducive to reducing sedation. Access and availability of analgesia is one example:

> "So if the analgesia isn't adequate … then you're unlikely to take away the sedation completely until you know they've got adequate analgesia running … it does impact on your assessment of the patient and whether you're going to proceed with removing sedation. So you don't want them to wake up and have nothing" (P1)

Bed location and visibility to others also influenced their thinking about whether the timing was right to start decreasing sedation, and whether staff were likely to be available to provide immediate support if needed:

> "If you haven't got anyone around you for support … are you in an isolated bedspace and you've got no staff around you to sort of help?… You are more likely to leave that patient sedated because you know they're safer" (P4).

When visibility was poor, or staff were not immediately available to provide support after decreasing or ceasing sedation, nurse participants described how the situation could potentially be dire:

> "If that patient is trying to extubate themselves and you haven't got help, you can't do anything else because you're too busy trying to protect the airway" (P4).

When a patient was being managed in an isolation room, participants described not having an awareness of what was occurring in the wider unit, and that getting help was not as straightforward:

> "*Because you'd have to stay in the room, but then it was also just you. So if you did need help, it took a while to get it*" (P12).

> "E*veryone has to don PPE [Personal Protective Equipment] … and the logistics make a big impact*" (P1).

iii. Prioritising safety

Drawing upon past experiences and situational awareness led participants to consistently speak about how sedation management and decision making had to be patient and clinician safety first, irrespective of any desired or agreed timeline for de-sedation and extubation. Keeping patients safe was about "*trying to protect the airway*" (P4) and minimising risks of harm that may arise from inadequate analgesia or reducing sedation:

> "When a patient is distressed, they're uncomfortable and, if they're not ready to be weaned and extubated … it can be hard to keep the patient safe. I mean if you're on your own and you've got a combative patient that hasn't been sedated properly, it's a bit of a safety issue" (P9).

> "…if they've got a lot of pain and they're intubated and sedated, they will often thrash around. So it can be a safety risk. So probably [best] to get on top of the pain with more analgesia before reducing your sedation" (P13).

Assessing patient safety was about considering "*is that patient safe to be left … a little bit sedated but not completely sedated?*" (P4). Decreasing

sedation also necessitated the need for closer observation, which was difficult with competing care tasks, with a participant describing "*we can't dedicate one person to just hold their hand so they don't extubate themselves*" (P4). Equally ensuring clinician safety influenced nurse sedation management and decision making, in order to prevent situations such as this:

> "One patient was trying to self-extubate, trying to pull things out, trying to get out of bed, would throw punches and kick staff. So every half an hour, we had to re-sedate them… trying to bolus but also be on top of the patient at the same time was really unsafe… a few of us ended up getting hit, like punched in the face … from the patient" (P12).

Preventing unplanned extubation was even more important in cases of COVID-19, because of "*the risk of aerosol generating [procedures] – like if a patient accidentally extubated, it was like the worst thing that could happen*" (P3).

Discussion

This study provides novel insights into critical care nurses' experiences with sedation-related decision-making for mechanically ventilated patients and the factors that influence their decision-making. Most notably, managing sedation is not simply about responding to predetermined instructions, goals or timelines for patient extubation (Abdar et al., 2013; Stollings et al., 2022). Rather, previous research has indicated that nurses draw upon their expert knowledge and personal experiences (Wøien & Bjørk, 2013), continuous evaluation and assessment of multiple patient and unit factors to guide their decision making (Hetland et al., 2018). Unit cultural and practice norms also influence nurses' sedation management (Randen & Bjørk, 2010), suggesting that broader consideration of these factors is important to guide understanding.

Thus, whilst the findings in this study demonstrate that sedation management and decision making is largely autonomous, similar to other research which described the importance of finding the balance between patient wakefulness, comfort and safety (Kydonaki et al., 2019; Randen & Bjørk, 2010), knowing when and how is complex, particularly given that doing so likely increased nurse workload as a result of the need for closer observation, increased analgesia needs and psychosocial supports (Hetland et al., 2018; Tingsvik et al., 2013). These challenges are further complicated in patient cohorts with longer ventilation times, such as those with complex respiratory conditions such as Acute Respiratory Distress Syndrome, for whom deep sedation and neuromuscular blocking agents are often used (Chanques et al., 2020). In cases such as these, daily interprofessional discussions are critical to ensuring an individualised approach to optimal sedation management (Stollings et al., 2022).

The value of such autonomous practice should not be understated. Several decades ago, research highlighted how nurses made micro-contributions to decision making through their informal interactions (Porter, 1991), but remained excluded from bigger, often 'pivotal' decisions about patient care (Reeves et al., 2009). Currently, concerns remain that power, team diversity and instability, differing priorities and role confusion (Xyrichis & Rose, 2024) may still impact collaboration in decision-making in critical care. Hence, the decision making that underpins autonomous practice described in this study is a positive step forward. Critical care nurses must be empowered to use their expert assessment skills and understanding of the patient's unique circumstances to guide their decisions in patient care (Zampieri et al., 2019). Autonomous nursing practice in critical care has been linked to decreased length of stay and decreased mortality (Aitken et al., 2018; Bucknall et al., 2008). Whilst there is some obvious role overlap between nurses and physicians, an appreciation for the unique and equally important contribution of nurses to achieving desired patient outcomes is key (Donovan et al., 2018; Hartog & Benbenishty, 2015). For example, a recent systematic review found that implementation of nurse-led

sedation protocols was associated with decreased mechanical ventilation time, ICU length of stay and patient mortality (Qi et al., 2021).

Prioritising safety was a key finding underpinning decision making in this research. Given that sub-optimal sedation can lead to unplanned extubation, aspiration pneumonia, arrhythmia, cardiac arrest and bronchospasm (Chao et al., 2017), striving to continuously improve safety is of fundamental importance, most possible when patient safety, teamwork, improvement reporting and continuous learning are overt priorities (Tlili et al., 2022). A poor safety culture may be an indicator of bigger problems in teamwork, workload and workplace culture (Berggren et al., 2023; Tlili et al., 2022). In relation to COVID-19, previous research has suggested that critical care clinicians experienced an increase in patient safety risks during the pandemic, attributed to an extremely high workload and skill mix, imperative adaptations and reorganisation of care (Berggren et al., 2023). It is therefore a positive finding that even though COVID-19 continued to impact the workforce and staffing to some extent during the time of this study, nurses continued to expect and maintain safety as a priority.

Strengths and Limitations

The primary strength of this research is that it addresses an overlooked area in relation to sedation management. Even with the availability of evidence-based tools, guidelines and protocols to guide sedation practices, this research explicates the human factors that influence critical care nursing practice. Most previous studies exploring sedation management have focused on critical care nurse's role in assessing patient comfort and sedation levels (Guttormson et al., 2019), and their knowledge of pharmacotherapy (Walker & Gillen, 2006). While the contribution of intensivists to patient safety in relation to sedation management has been recently reported (Luz et al., 2022), this is one of the first studies to capture the important contribution of critical care nurses. In recognition of the impact COVID-19 had at the time of planning and conducting this research, providing participants with choice and flexibility about when and how they participated was key to optimising autonomy and participation, and helping to achieve information saturation. Participants' diverse experiences helped ensure rich data meeting the aims of the study. Braun and Clarke's (2022) six step thematic analysis method was used for analysis. Whilst this approach is well known, the method and how it reportedly used has received some criticism, underpinned by an assumption that there is only one way to do thematic analysis (Braun & Clarke, 2021). Rather, as Braun and Clarke report, thematic analysis is meant to provide researchers with flexibility in thematic analysis (Braun & Clarke, 2021). The quality of the thematic analysis process in this research was ensured through the adherence to the six steps, and the close involvement of all members of the research team.

This study also has several limitations. The lead researcher's (blinded) role as a clinician in the same unit must be acknowledged as a limitation, and whilst participants were able to opt for an alternate researcher to conduct their interview, none did so. A sampling matrix, designed to ensure heterogeneity was not used in this study; thus it is possible that the findings may have differed with different participants. Given this research was conducted at a level III accredited ICU in a private hospital in Melbourne, Australia, the patient and clinician profiles, unit practices and workplace culture are likely different other ICUs. Similarly, given the majority of patients cared for in the study ICU have undergone elective surgical procedures, these findings are likely different to other settings with higher rates of unplanned admissions, and those with longer ventilation times. Hence the findings may not be transferrable.

Conclusion

This study highlights that critical care nurse experiences and expertise in comprehensive patient assessment, situational awareness of

unit and staffing factors and emergent complex and dynamic situations contribute to sedation decision making practices where safety is prioritised. Sedation decision making is complex and cannot be considered in isolation. Rather, safe sedation decision making is underpinned by an awareness of the complex interplay between critical care nurses' education and experience, staffing and skill-mix and competing priorities in the unit. In order to support and promote safe and autonomous sedation decision making, ongoing education to ensure decision making is evidence-based, and strong leadership are fundamental. In practice, these findings demonstrate critical care nurses can and do make a meaning contribution to sedation management, helping to ensure safety remains the priority. Whilst there is already evidence to demonstrate nurse autonomy in decision making may improve patient outcomes, further research is needed to examine for relationships between nurse autonomy decision making, patient perceptions of care and care quality. In addition, given that critical care nurses' educational requirements and scope of practice vary widely between units and around the world, further work examining associations between scope of practice and efficacy in decision making is the logical next step to supporting critical care nurses advanced practice.

Ethical statement

This research received ethical approval from the Human Research Ethics Committees of the health service (RES-21-0000667L) and the University (2022-052), and complied with the Australian Code for the Responsible Conduct of Research, from the Australian National Health and Medical Research Council.

CRediT authorship contribution statement

Danielle Macpherson: Writing – review & editing, Writing – original draft, Project administration, Formal analysis, Data curation, Conceptualization. **Anastasia Hutchinson:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Formal analysis, Conceptualization. **Melissa J. Bloomer:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: One author is an Associate Editor for Intensive & Critical Care Nursing and was not involved in the editorial review or the decision to publish this article.

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