Sedation Practices: A Case Study from Australia and the UK

Title

"A little bit of Propofol, a little bit of Fentanyl does wonders for everyone": Understanding the sedation practices of health care professionals when caring for mechanically ventilated intensive care unit (ICU) patients. A qualitative study.

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Title:

"A little bit of Propofol, a little bit of Fentanyl does wonders for everyone": Understanding the sedation practices of health care professionals when caring for mechanically ventilated intensive care unit (ICU) patients. A qualitative study.

Abstract:

Introduction: Sedation is commonly used in intensive care units (ICUs), but there is limited evidence about how staff make sense of their sedation practice or what influences their use of sedation.

Objective: To report qualitative case study findings that compare ICU sedation practice and staff perspectives in Australia and UK, with the aim of informing international practice and policy.

Methods: A qualitative case study approach was applied in one general ICU in Australia and one in the UK. Between November 2021 and February 2023, nurses, doctors, and allied health professionals were recruited. Data were collected through focus groups, participant observation, clinical notes review and semi-structured interviews. Cross-case analysis was completed using reflexive thematic analysis.

Findings: In Australia, forty-three ICU staff participated; in the UK, ninety-one ICU staff participated. Twenty-four patients were observed and their notes reviewed. Two focus groups, eighteen interviews, and over three hundred observation hours were completed. Cross-case analysis identified similarities and differences in sedation practice between the ICUs. Each unit had differences in sedation reduction and contrasting daily routines influencing sedation use. In both units, key drivers of decision-making were similar, namely: the physical layout, perceptions of moral distress, and safety concerns.

Conclusions: This paper presents an in-depth exploration of the sedation practices and perspectives of health care professionals working in an ICU in Australia and a similar ICU in the UK. Through cross-case analysis, we have shown the importance of attending to the physical layout of ICUs and understanding the concerns of staff about safety and the moral dimensions of their practice when aspiring to implement best sedation practice. Further, we have revealed that similar ICUs in different countries take different approaches to sedation reduction, highlighting the need for greater international exchange on this crucial area of ICU practice.

Keywords
Case Study; Critical Care; Health Care Professionals; Intensive Care; Mechanically Ventilated; Qualitative Research; Sedation; Sedative

Main manuscript:

1. Introduction

Sedation enables intensive care unit (ICU) patients to tolerate treatments and is necessary in many clinical situations[1]. Since the 90's, research shows that sedation delivery and depth can affect patients' length of stay, duration of mechanical ventilation, psychological health, and survival[2-9]. In 2018, the USA Society of Critical Care Medicine published widely accepted ICU clinical practice guidelines, focusing on the prevention and management of pain, agitation/sedation, delirium, immobility and sleep for adult patients[10]. The guidelines have an emphasis on light, rather than deep sedation, with validated tools for monitoring sedation and delirium, these were updated in 2025[11]. Despite guidelines, sedation practice remains variable[12]. Optimising sedation is known to be complex, influenced by available resources and the practices of staff[13,14]. A growing body of qualitative literature shows that patient safety, past experiences, reduced staffing, high clinical demands and single rooms all influence sedation practice[15-19]. Building upon this existing evidence, the main author (SV) completed a doctoral study which aimed to compare and contrast factors shaping

sedation practice for mechanically ventilated patients, from the perspective of ICU staff in Australia and the UK[20]. As part of the doctorate, we defined ICU 'sedation practice' by taking inspiration from key guidance and landmark research[10,21-24], as existing definitions focus on procedural/dental sedation[25,26]. 'Sedation Practice' was defined as: 'A continuum of technique which may include administering, withholding or reducing single or multiple sedative, anxiolytic and/or analgesic agents to provide a therapeutic role and/or induce a state that allows a patient to tolerate intensive care practice and procedures based on their clinical need.'[1]

The aim of this paper is to report on qualitative case study findings that compare ICU sedation practice and staff perspectives in Australia and UK, with the aim of informing international practice and policy.

2. Methods

2.1 Design

The doctoral study employed qualitative case study methodology informed by Stake[27], and taking a constructivist ontological position. This means that an understanding and 'thick description' of sedation practice was co-constructed between SV and the case study participants, namely the ICU staff working in the two units included in the doctoral project. This approach enabled a focus on staff perceptions and insights into their sedation practice, while also accounting for vitally important context-dependent factors. Stake emphasises that when selecting a case, there must be an ability to learn, balanced with variety and 'case' accessibility for a successful project[27]. The focus is on particularisations and detailed individual descriptions, rather than on generalisation, as in positivist approaches such as those employed by Yin[28].

[1]This definition was developed for the doctorate in discussion with other named authors and was employed at the outset of the doctoral study. On reflection, we acknowledge that the definition is verbose, but it remains important for the context of this paper.

2.2 Settings

Australia and the UK were chosen as case study locations to provide a comparison of practice in similar health care systems. This is important as it allows us to make visible those issues that are otherwise taken for granted and to reveal what is system or culture specific. Australia and the UK both operate universal healthcare systems with similar patient demographics[29,30]. They both practice closed ICU models with a 1:1 nurse-to-patient ratio for mechanically ventilated patients[31,32].

Two cases were selected and defined as: general ICUs in public hospitals in Australia and the UK, accepting medical and surgical patients[33,34]. The UK site was a hospital in England (1,100 beds) with three general and two specialist ICUs (cardiac and neuro). Only two of the three general ICUs (36 beds total: ICU A, Figure 1; ICU B, Figure 2) were studied. First-line sedation was Propofol and Alfentanil; only alfentanil was controlled (scheduled) medication. The Australian hospital (1013 beds) had two general and two specialist ICUs (cardiac and neuro). Two general ICUs (28 beds total: ICU C, Figure 3; ICU D, Figure 4) were studied. First-line sedation was Propofol and Fentanyl; both were controlled (scheduled) medications.

Both settings aimed for 1:1 nurse-to-patient ratios for sedated, ventilated patients. Daily staffing included at least one consultant (on-call overnight) and resident doctors. The UK had dedicated critical care pharmacy cover. Monitoring included five-lead electrocardiogram, arterial line, continuous saturation monitoring, capnography, hourly observations, and arterial blood gas sampling. Each bed had a monitor, infusion pumps, ventilator and stocked cabinet/trolley. All documentation was electronic.

2.3 Participants

ICU staff were the primary participants, but patients were included during participant observations. Table 1 details the inclusion and exclusion criteria. Eligible staff were invited via several communication channels and were provided an information sheet and a consent form. Optional demographic data was collected. Interviews and focus groups used purposeful sampling aiming to maximise representation from different professions and were scheduled outside daytime clinical hours where possible.

For observations, staff recruitment used convenience and purposeful sampling, based on which sedated and ventilated patients could be observed. Patient recruitment varied by country. In the UK, patients were recruited using convenience sampling with consultee permission, per the UK Mental Capacity Act[35]. Personal consultees were asked for two permissions: (1) verbal permission for bedside observations, and (2) signed permission for accessing demographic, medical and nursing data. Personal consultees could grant permission to either/or and were encouraged to discuss their decision. Surviving patients received letters explaining the study and how they could retract any data collected; none retracted. In Australia, a Waiver of Consent was granted as the research was deemed low risk and we had adequately reviewed the National Statement section 2.3.10[36]. Family members were informed if present and could opt patients out; patients were verbally informed when appropriate. Patients were recruited using purposeful sampling, based on their nurse's consent to observations.

2.4 Data Collection

Data was collected from November 2021 until February 2023.Focus groups, semi-structured interviews and observations alongside notes review were utilised. Focus groups identify subcultural norms[37,38], observations enable direct understanding[27] and interviews reveal social meanings[39]. Triangulation enables rich understanding[40], and enabled us to explore the phenomenon of sedation practice from different angles. For example, through observations we were able to see how staff practised, and then, in

semi-structured interviews, we were able to follow this up in a detailed discussion allowing researcher and the staff participant to develop together an understanding and reflection on the practice, emotions, and decisions made. Each case included one focus group, up to 15 staff interviews, and four to six weeks of observations, along with reviewing the notes. Figure 5 represents the order and time frame of data collection.

SV conducted and recorded the focus groups and interviews via Zoom. Topic guides were developed from the research questions, previous literature, and observations (interviews only) (Supplementary File 1 and 2). Focus group participants were given a gift voucher (£20/$40AUD). SV conducted four to six weeks of in-person observations covering weekdays, weekends, and aimed to cover all hours on a 24-hour clock using an observer-as-participant role[41]. This role provided participants with knowledge about SV's clinical role, the research purpose, and the data collected. If required, SV could intervene to mitigate serious events (e.g. self-extubation), in the light of her nursing registration commitments[42,43]. Field notes were collected at bedsides, handovers, and ward rounds. Observations focused on sedation practice spanning intubation, ongoing management (decision-making, sedation choice, infusion rates, titration, pauses, reduction), up until extubation. This included, but was not limited to, interactions with staff, patients, equipment, and informal discussions with SV, during which some staff provided context and reasons for their decisions. Where there were gaps in observations this period was supported through reviewing patients' records retrospectively, allowing the patient journey and connected decision-making to be captured. In the UK, the bedside nurse facilitated SV's review of medical, nursing, and observation records; in Australia, SV had direct login access. UK field notes were recorded in a Microsoft Word document, with free-form structure. Australia used a structured Microsoft Word document (Supplementary File 3), requested by the ethics committee.

2.5 Data Analysis

SV led data analysis, with guidance from the supervisory team (TR, JS, GM, TM). Braun and Clarke's[44-47] six-step reflexive thematic analysis approach was followed to examine each case individually and preserve context, before cross-case comparisons. Focus groups and 13 interviews were transcribed by SV. A transcription service was used for five UK interviews. Following transcription and anonymisation, the data were imported into Quirkos™, a qualitative data analysis tool[48]. After familiarisation through transcribing and re-reading (step one), data were coded twice by the same author to ensure completeness of code generation (step two), followed by searching (step three), reviewing (step four) and defining the themes (step 6). A report (step six) was produced for each case study before cross-case analysis was completed. Cross-case analysis was conducted through an in-depth exploration of similarities and differences, using visual mind maps to help complete the process[49].

2.6 Rigour and Researcher Reflexivity

Rigour was guided by Lincoln and Guba's Trustworthiness Criteria[50]. Triangulation, thick descriptions, contextual information, prolonged engagement, and reflexivity helped to achieve credibility[51]. Similar patterns of meaning were generated from all three methods and prolonged engagement was achieved through observational work. Thick descriptions and contextual information came from direct quotes and field notes. Finally, reflexivity enabled recognition of biases and assumptions[52]. To mitigate potential researcher bias, SV became a reflexive practitioner through several routes. Initially, SV conducted a reflexive exercise before data collection began, which helped highlight any preconceptions/ideas/assumptions. During data collection, SV used a daily journal to capture any newly formed biases and assumptions, bringing them from the subconscious into the conscious mind where they could be challenged and discussed with colleagues. In addition, many informal conversations were held with participants during the observation periods, which allowed for an exchange of

knowledge about sedation practice that supported reflection. Furthermore, as the primary study was undertaken as part of a doctorate, SV was constantly challenged in supervision about ideas and concepts, ensuring that the findings reflected the data.

All authors brought diverse experiences, some with current (GM, SV) and previous (JS, TM) backgrounds of critical care work. The lead author (SV) is a qualified critical care nurse who worked in both study settings for temporary staffing before the doctoral programme began from which this paper is drawn. SV presented herself as a researcher and not a clinician.

2.7 Ethics

UK ethical approval was granted by the Camden and Kings Cross Research Ethics Committee (288309). Australian approval was granted by the hospital's Human Research Ethics Committee and the local governance office (X21-0174 & 2021/ETH01030). Staff were fully informed, participation was voluntary, ongoing consent was checked, and withdrawal was permitted at any time. Participants had unique identification numbers and data was treated with the strictest confidence. Fully anonymised data was archived permanently in restricted storage provided by The University of Sheffield.

3. Findings

3.1 Participants

Two focus groups took place, one in the UK and one in Australia. Eighteen interviews took place, eleven in the UK and seven in Australia, table 2 provides participant information. Observations totalled 330.61 hours, 142 hours (UK) and 188.61 hours (Australia) (Table 3).

For the UK, eight patients were involved in observations, with permission to include six in a notes review. For Australia, sixteen patients were involved in observations and notes review. Patient demographic data was collected (Supplementary File 4).

3.2 Cross-Case Analysis

This paper draws upon a larger doctoral study and is a presentation of the cross-case analysis from the two case studies (Figure 6). Cross-case analysis generated two themes and five subthemes revealing differences and similarities across cases (Figure 7). Theme one captured key contextual differences unique to each case study. Theme two captured similarities across both case studies which were key drivers of decision-making in sedation practice.

3.3 Theme 1: Key Contextual Differences

Across both cases, there were two key differences in sedation practice which were related to ingrained culture in each case study. Theme 1 reports on i) differing approaches to sedation reduction, and ii) differences in organisational routines and practices.

3.3.1 Differing Approaches to Sedation Reduction

The first difference was the practice of sedation reduction. In the UK, daily sedation holds were practised, and in Australia, a ‘sedation wean’ was practised. A sedation hold is the elective stopping of the sedation until the patient has emerged from deeper sedation, at this point, sedation is either restarted or the patient is extubated from the ventilator[3]. Sedation weaning is the process of reducing a sedation infusion until the patient becomes less sedated and they can be assessed for extubating from the ventilator.

In the UK case study, guidelines created *"standardised sedation holds"* (UK, Doctor ZCK) and nurses were expected to perform a sedation hold for every patient who met the criteria, regardless of extubation suitability. The approach in the Australian case study was described as *'wean and wake'* (Observation Notes, Australia, Patient 858S) and began when the patient was deemed suitable for extubation. There was no prescribed way to reduce sedation, and nurses judged the appropriate reduction in a stepwise approach. Staff in the Australian case study reported they *"definitely don't ever do sedation holds in general intensive care"* (Australia, Nurse 95M2) or *"very rarely"* (Australia, Nurse ZE4Z).

Staff in Australia preferred patients to *"wake up gradually"* (Australia, Nurse UT5Y) and without a *"bang"* (Australia, Nurse XRLD, UT5Y, ZE4Z, GSPM, Y9WA). In addition, and to promote safety, sedation weaning was often combined with the introduction of dexmedetomidine as a sedative *"bridge"* (Australia, Nurse UT5Y). Dexmedetomidine supported extubation via its anxiolytic and analgesic properties, while avoiding respiratory depression[53]. Many staff in the Australian case study thought dexmedetomidine was beneficial because it was *"less sedating, more calming"* (Australia, Nurse 95M2), and allowed *"a lot less Propofol"* (Australia, Nurse UT5Y).

In the UK case study, there was a *"big focus on sedation holds"* (UK, Nurse 2Y3), with an *"agenda to do a sedation hold no matter what"* (UK, Nurse PPC). Despite this focus, some staff perceived low tolerances among bedside nurses for prolonged sedation holds. One pharmacist stated, "*It'll go off [sedation], they'll [patient] like twitch an arm, and it'll [sedation] go back on"* (UK, Pharmacist 9YN). Nurses reported that they found it *'hard when they [doctors] say continue [with the sedation hold]. I've only got so many hands'* (Observation Notes, UK, Nurse LF9). In addition, sedation holds were reported to induce patient distress as explored earlier, resulting in nurses feeling reluctant to '*leave them too long [off sedation]'* (Observation Notes, UK, Nurse DS9). The same

distress was not as obvious in Australia, potentially because dexmedetomidine made patients more *"manageable"* (Australia, Nurse GSPM).

This subtheme explored the different approaches to sedation reduction used in the case studies. In the UK case study staff focused on daily sedation holds, and in the Australian case study staff focused on sedation weaning. These two approaches aimed for the same outcome but created different experiences for staff. The different approaches were also found to be intertwined with other later subthemes, such as safety and moral distress.

3.3.2 Differences in Organisational Routines and Practices

This subtheme explores how daily routines, in particular the daily review and ward round, influenced sedation management. In the UK case study, patients had a one-to-one bedside medical review followed by a multi-disciplinary remote ward round. The ward round was conducted away from the bedside, without the bedside nurse. In the Australian case study, the daily review and ward round were combined after the morning handover. This was delivered by all medical staff at the bedside, with bedside nurse input.

In the Australian case study, the ward round included decisions about sedation practice, but it was reported that doctors don't *"actually say too much about the sedation"* (Australia, Nurse GSPM). Another nurse commented that *"unless you have your Propofol at like 25 [mls per hour]. They're probably not really caring what you're doing, and how much you're bolusing"* (Australia, Nurse 95M2). However, if doctors did comment on sedation, it was described as *"very broad"* (Australia, Nurse XRLD). One nurse commented they *"had a patient who's on Propofol, Fentanyl and Precedex[2],*

[2] Precedex is the brand name for Dexmedetomidine.

and they were getting Quetiapine down their NG [nasogastric tube] as well. Then the only note that was written was just "wean sedation" (Australia, Nurse UT5Y). As the morning review and ward round was combined, doctors quickly moved on as they needed to *"keep rounding"* (Australia, Nurse UT5Y), but due to the broad documentation nurses frequently had to chase *"up the plan with the doctor"* (Australia, Nurse XRLD).

In the UK, decisions about daily sedation holds were made during morning handover, followed by the daily review. At 11:30 am, the multi-disciplinary remote ward round took place. Due to the timing of the remote ward round, nurses felt that medical staff were not available for the *"peak effect of the sedation hold"* (UK, Nurse RUP). Doctors were perceived to *"disappear for hours at a time"* (UK, Nurse TTR), with a view that they asked *"for things [sedation holds] and not really being there to see the outcome"* (UK, Nurse RUP). This impacted sedation practice, especially when combined with safety concerns, with one nurse stating that, *"if you then have to re-sedate that patient for safety, you've missed out on an opportunity there to extubate them because there wasn't a doctor available to review"* (UK, Nurse TE3). Nurses perceived the remote ward round could not be interrupted as it was the doctors' *"protected time"* (UK, Nurse U7B) unless there were "*serious questions"* (UK, Nurse 2Y3). As a result, during this period, nurses described sedation practice as *"freestyle"* (UK, Nurse 2Y3) with increased sedation use and *"just a little bolus to keep them safe"* (UK, Nurse 2Y3).

Both case studies applied different approaches to the daily routine, organisation and structure of the working day. The UK unit had a remote ward round, and Australia had a bedside ward round. Both approaches created unique challenges for sedation management that were equally influenced by other practices, such as sedation holds, sedation weaning, and actions to promote safety.

3.4 Theme 2: Key Drivers of Decision-Making

In both case studies, three shared similarities were highlighted as key drivers of decision-making, influencing how staff assessed, managed and varied their sedation practice: i) the physical layout of the ICU, ii) moral distress experienced by staff, and iii) sedation practice influenced by safety.

3.4.1 Physical Layout

In both case studies, the physical layout created complexities when managing sedation, which had an impact on staff decision-making. Large/obstructing concrete walls, broken window technology/blinds, inconvenient layouts, and single rooms created vision challenges for staff. This increased their reliance on sedation practices involving bolus doses and increasing infusion rates, and at the same time reduced the ready availability of support from other staff.

The layout at both sites was reported to limit effective patient monitoring, with remarks that it was *"difficult to have eyes on all the patients"* (UK, Nurse TTR). One nurse in the UK case study found the switchable privacy windows no longer worked, and stated, *"they're not windows anymore, they're just walls"* (UK, Nurse U7B). Similar perceptions of poor visibility were shared in the Australian case study, where one nurse reported wanting to be *"Around [the] nursing station where everybody can see"* (Australia, Nurse GSPM).

In the UK unit, there were 20 (out of 36) single rooms with a 'U' shaped corridor layout, while the Australian unit had 19 (out of 28) single rooms in a square layout. Both units frequently used single rooms. If allocated to a single room, staff could not *"leave"* (UK, Nurse 43S), despite needing to access medications and equipment outside the room. There was no additional staffing to accommodate the single rooms, which resulted in staff using *"more sedation than they should"* (UK, Nurse TTR) or the delivery of "*a*

bolus before I pop my head out" (UK, Nurse 2Y3). In the Australian unit, staff struggled to carry out daily tasks due to single rooms and the poor *"design of [the] intensive care"* (Australia, Nurse 95M2).

There was a sense that, when allocated to a single room, the nurse became *"tucked away"* (UK, Nurse 2Y3) and *"trapped"* (UK, Nurse TTR). Staff perceived that they and their patients were forgotten about in a single room and had fewer opportunities to *"call for help"* (Australia, Nurse GSPM) and had reduced *"input from the doctors"* (UK, Nurse 2Y3). One area in the Australian unit was termed the *"hallway of isolation"* (Australia, Nurse XRLD), with staff reporting the *"back wall [ICU C] made me want to quit"* (Australia, Nurse 95M2). Single rooms were regarded as areas where *"nobody can hear you. Nobody can see you. It's closed doors."* (Australia, Nurse 95M2). During observations in the Australian case study for example, one nurse struggled to get support and was observed to increase the sedation and deliver a *'2ml Propofol bolus'* (Observation Notes, Australia, Patient 5TR7, Nurse UQKC).

This subtheme has highlighted how the physical layout, especially single rooms, added complexity to sedation practice for staff and impacted decision-making. The main challenges came from reduced patient visibility and physical divisions between health care professionals created by single rooms. In each case study staff reported using sedation to facilitate patient safety.

3.4.2 Moral Distress

Moral distress is defined as "one or more negative self-directed emotions or attitudes that arise in response to one's perceived involvement in a situation that one perceives to be morally undesirable"[54]. For moral distress to occur, there must be an insult to the individual's morals and values. In both case studies, the sedation practices of staff

were shaped by their experience of moral distress; this was especially evident if staff perceived that their patient was in distress.

Moral distress was more evident among nurses who spent most of their time at the bedside and therefore had the greatest exposure to patient distress. In the Australian case study staff perceptions of patient distress were expressed different ways; one nurse said their patient was *"rolling around in bed"* (Australia, Nurse 95M2) and another recalled a patient '*coughing and gagging'* (Observation Notes, Australia, Patient FJUK), or *"scrunching up their face"* (Australia, Nurse UT5Y). Nurses wanted to minimise any distress because they worried the patient would develop *"PTSD when they leave ICU […] and remember being agitated and uncomfortable"* (Australia, Nurse Y9WA).

Staff reported how patient distress led to them experiencing moral distress. One nurse in the Australian case study reported: *"there's nothing worse than when your patient's agitated"* (Australia, Nurse XRLD), and another said that if their patient was *"agitated and […] looking frazzled, then I'm not really comfortable"* (Australia, Nurse ZE4Z). A nurse in the UK case study reported that when patients are distressed, it "*has an impact on us [nurses], […] we want to be able to help them. We know there's something wrong, but we just don't know what it is, […] that's really difficult."* (UK, Nurse U7B). One Australian nurse explained, '*[we find it] Morally distressing when seeing a patient who is perceived to struggle. [and are] Much more likely to give a bolus.'* (Observation Notes, Australia, Nurse JLKB, Patient 6USB). Moral distress led to nurses deciding to use sedation as a tool to control distress in patients and, in turn, the moral distress it created for staff. One nurse reported *"a little bit of Propofol, a little bit of Fentanyl does wonders for everyone"* (Australia, Nurse XRLD).

In the UK case study, and unlike the Australian case study, staff practised daily 'sedation holds' for every patient '*mechanically ventilated and receiving continuous infusion of sedative drugs for greater than 24 hours'* (Documentation review, Guideline, UK) as long as there were no contraindications. A sedation hold was a frequent source of moral distress for nurses that their decision-making was influenced. Nurses felt *'mean'* (Observation Notes, UK, Nurse DS9) when the sedation was turned off and nurses were observed to end sedation holds quickly, making comments like *'I'm not letting [the patient] rag all day.'* (Observation Notes, UK, Nurse DS9). They pondered whether sedation holds were "*ethically […] correct"* (UK, Nurse U7B) and observed that *"it's just distressing for the patient and that just rubs off onto the nurse"* (UK, Nurse PPC). As in the Australian case study, one nurse in the UK study believed that nurses used more sedation to *"manage their sort of moral injuries"* (UK, Nurse TTR).

This subtheme examined how staff experienced moral distress and how it was connected to sedation practice. Nurses were seen to regularly experience moral distress, and often resorted to using sedation to manage and resolve the distress, this resulted in more sedation being used than would otherwise be the case.

3.4.3 Safety and Sedation

The subtheme safety and sedation reports on how concerns about safety had an impact on staff sedation practice and decision-making. Perceptions of safety in both case studies were influenced by airway concerns, environmental factors, the prevalence of 'light' sedation, and staff anxieties. One nurse commented, *"you're always thinking about it, you're always conscious of your sedation, partly for safety"* (Australia, Nurse XRLD). Patient safety was paramount, with staff practising the *"safest thing"* (UK, Doctor 2WN). Sedation was seen as a transient tool that provided a route to safety, as "*deeper sedation tends to be considered safer sedation."* (UK, Pharmacist 9YN).

Airway safety was described as the *"number one, […] main priority"* (UK, Nurse U7B). If patients "*become unsafe […] sedation goes back on"* (UK, Nurse U7B), as they '*don't want the patient to pull it [the endotracheal tube] out'* (Observation Notes, UK, Nurse LF9, Patient ER2). Airway safety became a greater concern during light sedation because of the perceived increased risk of *"self extubation"* (Australia, Nurse XRLD), with some reporting, *"my back never turns on them [lightly sedated patients]"* (Australia, Nurse ZE4Z).

Light sedation raised staff apprehensions in both case studies, and its onset was often preceded by an evaluation of safety in the environment. For example, as already discussed, staff in the UK practised a daily sedation hold, and in relation to this, one nurse commented that they made *'sure that everyone is safe, set up and running in the bay before we start the sedation hold'* (Observation Notes, UK, Nurse DS9). Others found that if the environment was not safe or face additional pressures, this had an impact on sedation practice. Once, the nurse documented that they were *'unable to perform second sedation hold due to emergency admission in the bay'* (Documentation review, UK, Patient 5QT). Although sedation holds were not used in the Australian case study, nurses similarly agreed that patients would *"probably [be] a bit more sedated than what would be considered lightly and it just enables me to do a lot more tasks […] and still have that patient be safe"* (Australia, Nurse UT5Y).

Finally, staff anxieties played a part in sedation and safety. The use of liberal sedation as a tool allowed health care professionals to *"feel safe, 'cos any issues you just control, you have the autonomy to just bolus it if you need to"* (Australia, Nurse Y9WA). Another nurse reported in their *"first couple of months [they] would probably have them on like higher sedation just because [they were] quite scared"* (Australia, Nurse ZE4Z).

However, there was recognition that when you're in that *"safe place"* (UK, Nurse TE3), such higher use was "*probably too much [sedation]"* (UK, Nurse TE3).

Throughout this subtheme, safety plays a large part in decision-making connected to sedation practice. If there were airway concerns or environmental issues, they affected the decisions made by staff. Deep sedation was perceived to be safer, with light sedation being avoided. Often, safety concerns were intertwined and multiple.

4. Discussion

Each case study provided an opportunity to learn, understand and reflect on the sedation practices of health care professionals. Cross-case analysis allowed for exploration of contextual factors influencing sedation practice and contributed to identifying similarities and differences. The discussion focuses on the similarities within the broader context and literature, recognising that the differences have unique and context dependent factors.

Across both case studies sedation practice was influenced by the physical layout and the use of single rooms. Previous research focused on sedation practice also identifies that single rooms increase the reliance on sedation[15,18,19]. Other research shows that when moving from an open ICU to a single room only ICU, there is higher administration of sedation in the first few months[55]. The latter research quantitatively evidenced greater use of sedation to compensate for single rooms and awkward layouts[55] and the study reported in this paper provide context and qualitative insights which are explanatory. Other research shows that single rooms reduce patient visibility, degrade teamwork and patient safety, with limited evidence of any compensatory improvements in infection control[56-60]. Despite this, we have entered an era that readily and prolifically promotes the installation of single only environments in

the ICU and the wider hospital environment[61,62]. In the case studies reported in this paper, there were no adjustments for the complex challenging ICU environment, despite recommendations for additional nurses to accommodate poor layouts and single rooms[63]. If environmental challenges are not appropriately addressed in the ICU, they may result in staff using practices to promote deeper sedation for patients.

Moral distress was pertinent in both case studies, with sedation practice being altered by staff as they questioned the morals and ethics of their practice. The ICU is a complex and ethically challenged environment, with a thin line between life and death[64]. Moral distress was particularly heightened when patient distress was perceived. Research focused on the experiences of ICU nurses caring for agitated patients shows it to be emotionally exhausting, with sedation sometimes used as a tool to care for agitated patients[65]. Moral distress was especially prominent among nurses in this study, echoing with considerable wider evidence that suggests nurses experience greater moral distress than to doctors[66-68]. The literature suggests that acknowledging moral distress can be helpful, and creating “moral communities”, with ethical discussions can unite the workforce and reduce moral distress[66,69]. If moral distress is not addressed it can contribute to burnout, reduced quality of care, and loss of workforce[66,70] and may reduce sedation optimisation for patients.

Finally, safety was another shared similarity across both cases that influenced staff sedation practices. As explored, safety was influenced by staffing, the environment, airway safety and light sedation. These echo findings reported in other qualitative research[15-19]. In each case study reported here, staffing issues had an impact on sedation practice. Internationally, ICUs have experienced a mass exodus of senior nurses partly due to the long-term impact of COVID-19 and has been referred to as the “Great Resignation Era”[71]. The Intensive Care Society[72] have recognised that there continues to be “inadequate staffing levels” in the ICU, which places significant

pressure on the workforce. Across both case studies, workforce pressures resulted in staff not being able to care for sedation and mechanically ventilated patients on a 1:1 nurse-to-patient ratio, a requirement usually adopted in ICU environments. As a result, nurses felt unable to safely carry out safely sedation holds or optimisation of sedation.

This study aimed to explore the sedation practices of health care professionals using a qualitative case study approach and is a report on "one person's encounter with a complex case"[27]. Despite this, wider implications for practice and policy can be noted:

-If an ICU has a challenging layout and is unable to facilitate optimum sedation practices, additional staffing must be integrated into workforce numbers. This would also support safety concerns.

-Moral distress was associated with sedation practice. Each ICU should promote 'moral communities' and have psychological support as per ICU standards and guidance[64].

-Future research should examine the benefits and risks of different approaches to sedation reduction (wean vs hold).

-Future research should examine the effects of patient and staff outcomes of daily routine on sedation practice.

5. Strengths and Limitations

The qualitative case study methodology and cross-case analysis provided unique insights into the sedation practices of staff. Thick descriptions may facilitate the transferability of the findings. However, as Stake's case study methodology focuses

on unique, context-dependent bounded systems, it limits the likelihood of transferring findings beyond the cases[27]. A limitation is that only two cases were studied, however the units selected did allow the impact of the gradual sedation weaning compared to the sedation hold to be assessed. Other limitations centre on one primary researcher collecting, analysing and reporting the data, due to the research being conducted for doctoral degree requirements. However, participant validation occurred during the dissemination of the findings to both case study sites. Sharing the findings affirmed that the data presented reflected participants' experiences. Furthermore, dissemination of findings at national nursing conferences generated wider discussion and allowed the findings to be reviewed at a national level. Despite reflexivity, participant validation, supervisory meetings and feedback through dissemination, there is likely a strong influence from SV's biases and interpretations of the data. SV had worked in both settings and held preconceptions about sedation practice. From prior experience, SV knew that Australia used Dexmedetomidine. For the UK case study, SV recognised the daily practice of sedation holds, which is similar to her daily practice and reflected difficulty in grasping/understanding the practice of sedation reduction. Furthermore, researcher-related influence on participants could lead to temporary changes in their behaviours (the Hawthorne effect), especially during observations. However, as SV became immersed in the social setting, rapport and trust were developed, and the Hawthorne effect may have been diminished[73]. Fewer weeks were spent on the Australian case study, limiting the ability to develop rapport with staff and reducing recruitment opportunities. Due to visa time restrictions in Australia, the observations were conducted before the focus group, which may have been influential. There was limited recruitment to both focus groups, and no medical professionals were recruited to either. Overall, there were limited voices in the study from medical staff in Australia and the UK.

6. Conclusion

This paper has presented a cross-case analysis of sedation practices among staff working in an ICU in Australia and a similar ICU in the UK, highlighting common challenges and differences. Through cross-case analysis, we have shown the importance of attending to the physical layout of ICUs and understanding the concerns of staff about safety and the moral dimensions of their practice when aspiring to implement best sedation practice. Further, we have revealed that similar ICUs in different countries take different approaches to sedation reduction, highlighting the need for greater international exchange on this crucial area of ICU practice. By revealing how the physical layout, concerns about safety and moral distress shape sedation practice, we have provided insights to support international practice and policy in sedation use in the ICU.

Author Contributions (CRediT Statement)

Sarah Varga: Conceptualisation; Data curation; Formal analysis; Investigation; Methodology; Project administration; Writing- original draft.

Tracey Moore: Conceptualisation; Methodology; Supervision; Writing-review & Editing.

Jane Seymour: Conceptualisation; Methodology; Supervision; Writing-review & Editing.

Gary Mills: Methodology; Project administration; Supervision; Writing-review & Editing.

Tony Ryan: Conceptualising; Methodology; Project administration; Supervision; Writing-review & Editing.

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Data availability statement:
The data that support the findings of this study may be available on request from the corresponding author, Sarah Varga. The data are not publicly available due to restrictions on how it can be shared. Sharing of the data is subjected to ethical approval and this would also need to be agreed and approved The University of Sheffield who own the data.

Declaration of competing interests:
Sarah Varga reports a relationship with Somnus Scientific Ltd that includes: board membership and consulting or advisory. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Figures and Tables

Figure 1 Approximate layout of ICU A, UK

Figure 2 Approximate layout of ICU B, UK

Figure 3 Approximate layout of ICU C, Australia

Figure 4 Approximate layout of ICU D, Australia

Table 1 Inclusion and Exclusion Criteria for health care professionals and patients

Figure 5 Order and time frame of data collection

Table 2 Demographic data of health care professionals for each method of data collection

Table 3 The hours and number of days spent at each case study

Figure 6 Similarities and Differences

Figure 7 Cross case analysis themes and subthemes

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