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EDITORIAL

Learning in the pandemic: a reflection

The impact of the COVID-19 pandemic on the health system has been well documented both in Australia and internationally. For nursing students, changes to course delivery, a move to remote learning, as well as the disruption to clinical and simulated learning opportunities have added to the stress experienced by communities affected by lockdowns and the COVID-19 illness. In addition, students feared delayed graduation, managing the academic workload, and greater stress from clinical placement.

In the beginning of the pandemic, the unknown and misinformation linked to COVID-19 heightened students stress and anxiety levels. Questions like; can I access PPE? is my knowledge of infection control adequate? and can I bring home COVID-19 to my family? were common. Clinical placement, in particular, became for students a time of stress and concern, and this undoubtedly affected their learning and their developing confidence. Students, and those who governed clinical placements questioned whether it was appropriate to place them at this time. Clinical providers were unsure how to safely use students during the pandemic and placement cancellations started to rise. This placed stress on education providers who struggled to find appropriate learning experiences. These sentiments have been recognised internationally in wider research.[1]

While on-campus teaching moved towards remote delivery, learning in the clinical environment become haphazard and unpredictable. Clinical staff, who play a critical role in supporting student learning were unavailable because of the increasing complexity and workload of the pandemic. Optimal learning was impacted, students were not exposed to opportunities to engage with and transform their experiences with healthcare staff. The clinical environment was not as welcoming and at times, students did not feel part of the team. Students often felt like a burden and during the pandemic,[2] these feelings may have increased. This might have left some students questioning their role in the profession and ultimately whether nursing was for them.[3] In addition, students may have lacked opportunities to role model from experienced healthcare staff, as the staff themselves were pushed to exhaustion.

Despite the challenges, there were some unintended benefits. After the initial months of the pandemic, students became increasingly flexible and were adept at studying remotely. For some, their resilience grew, and they developed new ways of collaborating online with their colleagues. Opportunities arose for the placement of students; clinical and educational providers began to see the value of having students on placement. Those students who assisted in the pandemic response reported feeling empowered and respected for their contribution. These students demonstrated greater motivation to deliver high-quality care, and this assisted in developing their confidence.[4] Students were keen to play their part in the management of the pandemic. Many volunteered or sought employment in places such as vaccination hubs and this helped ease some of the pressure on front line staff. Industry and educational providers found new ways of working together and it is hoped that the lessons learnt during the pandemic might continue to shine a light on the value of the student contribution to health services.

The stress and anxiety from learning in high-risk environments cannot be underestimated. For the graduating class of 2021, almost two thirds of their degree was impacted. No doubt these graduates who are soon to join our profession, will question their work readiness. Just like other new graduates, the class of 2021 will need support and understanding as they transition and adjust to the work environment. This is especially important, as those who seek to support and assist with transition are themselves stressed and in need of care and compassion. In recent days, we have seen nurses and midwives take to the streets to promote safe working environments and we have heard from a number of experienced staff who are not able to go on. This is an international phenomenon.

There is no greater time for nurse leadership and the development of cultures where respect, flexibility and where we take the time to listen and support others than now.

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RESEARCH ARTICLES

Emergency clinicians' interpretation and application of Anti-D guidelines

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ABSTRACT

Objective: The objective of this study was to audit the use of anti-D immunoglobulin (anti-D) against the current Australian guidelines in one large inner-city referral hospital over three years and critique the practice identified.

Background: Pregnant patients who have a D-negative (RhD negative) blood type are at risk of D alloimmunisation if a potentially sensitising event occurs during pregnancy or birth. The administration of anti-D Ig can prevent complications related to alloimmunisation. Potentially sensitising events commonly present to the emergency department requiring the administration of anti-D Ig in line with current guidelines.

Study Design and Methods: This is a retrospective cohort study of all patients who received anti-D Ig in a large inner-city emergency department (ED) over three years (July 2014 – June 2017). Indications for administration were scrutinised against current guidelines by experienced clinicians.

Results: A total of 228 patients received anti-D Ig, with the majority being less than twelve weeks in gestation (169, 74.1%). Anti-D Ig was administered without support from the guidelines in 81 (35.5%) patients, with a lack of documented sensitising event in 77 (95%) of these cases.

Discussion and Conclusion: There were inconsistencies amongst clinicians who prescribe anti-D Ig in the ED, and a lack of the application of current guidelines. This may stem from a lack of empirical evidence about the need for anti-D Ig in the most common group presenting to EDs, those under twelve weeks in gestation. Current guidelines also fail to take into consideration future need, which could be incorporated in future, ED specific anti-D Ig guidelines.

Implications for research, policy, and practice: This audit identified overuse of anti-D Ig in the ED. This may stem from the absence of evidence for its use in pregnant patients under 12 weeks in gestation. To reduce unsupported use, further data on alloimmunisation rates following potentially sensitising events in early pregnancy would be helpful. Additional guidelines specific to patients under 12 weeks in gestation, and presenting to the emergency department may reduce some unsupported usage.

What is already known about the topic?

- Pregnant patients who have an D-negative blood type are at risk of D alloimmunisation when a sensitising event occurs.

- It is common for patients to present to the emergency department with complications in early pregnancy
- Previous work has shown that there is variation in anti-D Ig administration in the emergency department.

What this paper adds:
- There is significant use of anti-D Ig in the emergency department that is outside of current guidelines.
- The current guidelines may not serve the needs of the majority of presentations in the emergency department.
- Further data on alloimmunisation rates following potentially sensitising events in patients less then twelve weeks of gestation would be useful.

Keywords: anti-D immunoglobulin, Rh(D) alloimmunisation, Pregnancy, Complications of Pregnancy, Emergency Department.

INTRODUCTION

Pregnant patients who have an RhD-negative (D-negative) blood type are at risk of D alloimmunisation if a potentially sensitising event occurs during pregnancy or birth. Alloimmunisation can only occur if the fetus is D positive, and these fetal red cells enter the maternal circulation. This can cause the pregnant patient to develop anti-D which can lead to recurrent miscarriage or the development of hemolytic disease of the fetus and newborn (HDFN) in subsequent pregnancies[1]. Routine administration of anti-D immunoglobulin (anti-D Ig) during pregnancy and postnatally aims to decrease the risk of alloimmunisation.

Acute administration of anti-D Ig is required when potentially sensitising events occur. The emergency department (ED) commonly treats pregnant patients with complications in early pregnancy and, therefore, is required to identify D negative patients and treat those who have experienced a potentially sensitising event. Historically, EDs have been poor at identifying patients at risk of D alloimmunisation and administering anti-D Ig, despite its widespread availability since the 1970s.[2] Evidence-based guidelines exist in almost every jurisdiction on the recommendations for both the routine and acute administration of anti-D Ig, in Australia, these are issued by the Royal Australasian College of Obstetricians and Gynecologists (RANZCOG) and supported by the National Blood Authority.[3]

EDs have been reported as having deficiencies in the assessment of the D type and antibody status (D status) of pregnant people with potentially sensitising events. In the early 1990s, it was reported that most pregnant women presenting to ED's did not have their D status tested or have anti-D Ig administered before discharge.[2] These results have continually been reported since, although by 2012 it was reported that D status was being measured in approximately 70% of pregnant patients and 56 - 62.5% of D negative pregnant patients with potentially sensitising events received anti-D Ig.[4,5] The underutilisation of anti-D Ig in the ED had led to several authors recommending that all D negative pregnant ED patients with potentially sensitising events receive a dose of anti-D Ig.[1,6,7]

The reported lack of application of guidelines in the ED may be representative of the level of evidence for the use of anti-D Ig in the most common group of patients seen in the ED, those under 12 weeks of gestation. There is evidence that 7% of pregnant patients under 12 weeks will have fetal cells in the maternal circulation, and that this can occur as early as five weeks of gestation however, there is no evidence that this causes maternal sensitisation.[8,9] The use of anti-D Ig in patients under 12 weeks of gestation, although recommended in Australia, is not supported by high-quality evidence.[9,10] The RANZCOG guidelines identify that pregnant women under 12 weeks of gestation should be offered 250IU of anti-D Ig if a sensitising event occurs. Sensitising events include miscarriage, termination of pregnancy (either surgical or medical) and ectopic pregnancy. The RANZCOG guidelines state that there is insufficient evidence to recommend administering anti-D Ig to those people with a threatened miscarriage before 12 weeks' gestation.[3]

The lack of high-quality evidence of the possibility of sensitisation in the first trimester has led authors to recommend blanket administration to all D negative pregnant people with a possible sensitising event. This recommendation can lead to some pregnant people receiving anti-D Ig in the ED that is not supported by current guidelines. This study aims to review all administrations of anti-D Ig to pregnant patients in the large inner-city ED of the busiest public maternity hospital in Queensland, Australia over three years, and compare the indications for the administration to the current RANZCOG guidelines to define if the usage of anti-D outside of current guidelines is occurring and to which patient group this may be occurring.

METHODS

This study took the form of a retrospective cohort review/audit of all pregnant patients who had anti-D Ig (Rh(D) immunoglobulin) issued for administration in the ED over three years (July 2014 – June 2017) in a single large inner-

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city hospital. Information on the patients who received anti-D Ig was collected from the pathology information system (blood group antibodies, previous administration of anti-D Ig), electronic medical record of the ED (presenting problems, history and assessment of the patient), and radiology information system (results of ultrasound scan, if attended). Two independent clinicians (JB, MS) reviewed each case. They assessed administration against the RANZCOG guidelines when they disagreed the case was reviewed by a third clinician (AA) to make the final determination. Patients who were administered anti-D Ig are described using descriptive statistics (frequencies and percentages, medians and interquartile range), differences between patients who have anti-D Ig administered within and outside of current are assessed using non-parametric inferential statistics. The inter-rater reliability between the two reviewers is presented as a Cohen's Kappa statistic. To quantify the level of variability of the application of the guidelines, all five authors assessed the same 17 cases before the commencement of the study, and the inter-rater reliability across the five authors was compared using Fleiss' Kappa.

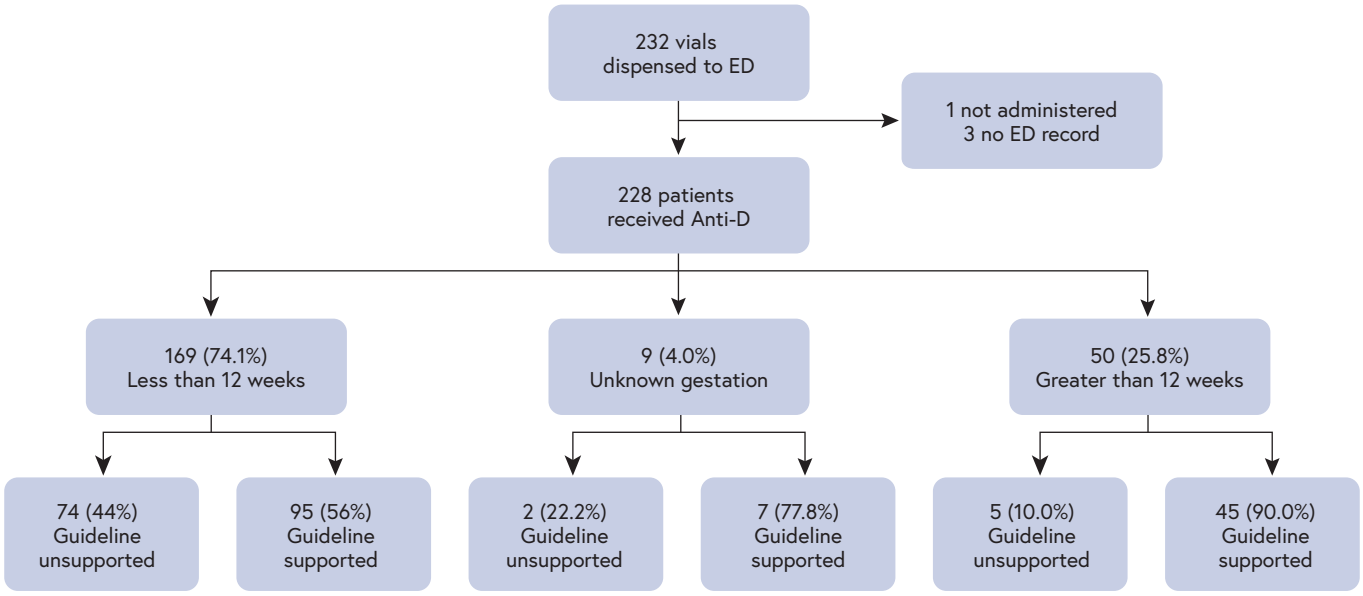
The data abstracter was familiar with the data and databases being interrogated, was blinded to the hypothesis, and was not part of the investigatory team. Data that could be collected from preexisting fields were collected and joined by the ED data manager. Other information was abstracted from free text fields in line with data definitions set out in the study protocol. Missing data were identified and reported on, variables with substantial (>5%) missing data were assessed for randomness via logistic regression. This study was reviewed and approved by the hospital human research ethics committee, and access to patient-level data without consent was approved under the Public Health Act.

RESULTS

There was a total of 228 patients who received anti-D Ig in the ED over these three years. Five variables: previous pregnancies (4, 1.8%); current gestation (9, 4.0%); previous administration of anti-D Ig (1, 0.4%); blood group (3, 1.3%); and antibody screen (7, 3.1%) all had missing data. As none of these met the 5% threshold; therefore, no further analysis was performed, and the missing data remain in the dataset. The majority (169, 74.1%) were under 12 weeks of gestation and were eventually discharged home from the ED or the ED Short Stay Unit (201, 88.2%) (see Table One). Anti-D Ig was administered without support from the RANZCOG guidelines in 81 (35.5%) of all cases over three years. The majority of administrations unsupported by the guidelines were in patients under 12 weeks in gestation ($c^2$19.954 (2), p<0.001). The most common reason for administration unsupported by the guidelines was the lack of an identified sensitising event (77, 95.0%).

Almost all of the patients reviewed in this study received an ultrasound scan (USS) (188, 82.5%) a further 23 (10.1%) arrived in the ED with a recently completed USS leaving only 17 (7.4%) not receiving a USS. Blood group and antibody screen was completed in the ED or privately before arrival in 223 (97.8%) of all cases. Further details on the patients and treatment provided are summarised in Table One below.

There was significant variation in the application of the RANZCOG guidelines among clinician authors of this work. All five authors reviewed the same 17 patients who had anti-D Ig administered in the ED before the commencement of data collection. There was only moderate agreement amongst raters (κ0.596, z=8.04, p<0.001). There was better cohesion between the two raters that reviewed all cases (κ0.876, z=13.5, p<0.001); however, discrepancies still occurred in 13 (5.7%) of all cases.



ED = emergency department

FIGURE ONE: THE BREAKDOWN OF THE POPULATION INCLUDED IN THE STUDY

TABLE ONE: CHARACTERISTICS OF THE POPULATION RECEIVING ANTI-D IN THE EMERGENCY DEPARTMENT.

	Total	Guideline Supported	Guideline Unsupported
Age (median, IQR) years	32 (28–37)	33 (28–38)	30 (27–36)
Discharge Location			
Discharged Home	98 (43.0%)	58 (39.5%)	40 (49.4%)
ED Short Stay Unit	103 (45.2%)	63 (42.9%)	40 (49.4%)
Admitted to hospital	18 (7.9%)	18 (12.2%)	0 (0.0%)
Obstetric Review Centre	8 (3.5%)	8 (5.4%)	0 (0.0%)
LAMA	1 (0.4%)	0 (0.0%)	1 (1.2%)
Referral			
General Practitioner	147 (64.5%)	89 (60.5%)	58 (71.6%)
Obstetrician	39 (17.1%)	38 (25.9%)	1 (1.2%)
Nil	42 (18.4%)	20 (13.6%)	22 (27.2%)
Diagnosis			
Miscarriage – Threatened	113 (49.6%)	55 (37.4%)	58 (71.6%)
Miscarriage – Inevitable	47 (20.6%)	44 (29.9%)	3 (3.7%)
Miscarriage – Complete	13 (5.7%)	11 (7.5%)	2 (2.5%)
Abnormal Vaginal Bleeding	9 (3.9%)	4 (2.7%)	5 (6.2%)
Pregnancy	9 (3.9%)	1 (0.7%)	8 (9.9%)
Ectopic Pregnancy	5 (2.2%)	5 (3.4%)	0 (0.0%)
Other	32 (14.0%)	27 (18.4%)	5 (6.2%)
Gestation[+]			
Less than 12 weeks	169 (74.1%)	95 (64.6%)	74 (91.4%)
Greater then 12 Weeks	50 (21.9%)	45(30.6%)	5 (6.2%)
Antibodies			
Anti-D	1 (0.5%)	1 (0.7%)	0 (0.0%)
Passive Anti-D	13 (5.9%)	10 (7.0%)	3 (3.8%)
Anti-M	1 (0.5%)	1 (0.7%)	0 (0.0%)
Nil	206 (93.2%)	131 (91.6%)	75 (96.2%)
Prescriber			
Medical Officer	211 (92.5%)	135 (91.8%)	76 (93.8%)
Nurse Practitioner	17 (7.5%)	12 (8.2%)	5 (6.2%)
Documented Consent			
Yes	33 (14.5%)	25 (17.0%)	8 (9.9%)
No	195 (85.5%)	122 (83.0%)	73 (90.1%)

ED = emergency department
LAMA = left against medical advice
IQR = Interquartile range
Nine patients had an unknown gestation

DISCUSSION

Anti-D Ig administration is occurring in the department that is not guideline supported in up to 35.5% of all patients. The majority of use that is not guideline supported is in patients under 12 weeks in gestation, without an identified potential sensitising event. The current guidelines present a poor level of evidence for the most common presentation (threatened miscarriage, 49.6%) in the most common gestation (less than 12 weeks, 74.1%) to the ED. Therefore, clinicians may be hesitant to not administer anti-D Ig given the perceived safety (adverse event rate of less than 1:80000[1]) and limited availability outside of the hospital environment. Both British and Australian guidelines identify that there is insufficient evidence to administer anti-D Ig in threatened miscarriages less than 12 weeks of gestation[1,3] and recommend by consensus[3] or by grade 2C evidence[1] that anti-D Ig should only be administered in Chorionic villus sampling, miscarriage, termination of pregnancy or ectopic pregnancy in patients of gestation less than 12 weeks. There is no accommodation in the guidelines for future need; therefore ED clinicians may also administer anti-D Ig to patients who may require it and are referred back to a general practitioner for further care as general practitioners have limited access to anti-D Ig. Antibody screening and USS were completed in almost all cases studied, a significant improvement from previous work,[4] however there was some evidence that anti-D Ig was administered before USS in many cases; therefore consideration of identification of sensitising event was not given, and this should be explored further in future work. Although the Australian guidelines do not discuss the urgency of anti-D Ig administration after the potential sensitising event, other guidelines do discuss that ideal administration is within 72 hours but can be given up to 10 days post-event, in almost all cases this would allow sufficient time to obtain a USS (generally available two-three hours after presentation).[1] Documentation of consent for administration was low, and any intervention that aims to improve anti-D Ig use should include improving the rates of consent for administration.

In the absence of further empirical evidence of the potential for sensitisation in early pregnancy (less than 12 weeks), specific application of current knowledge and guidelines to the ED cohort may reduce administration that is not needed. Guidelines that incorporate pathways, including the timing of administration, required investigations, the potential for future need, consent and risks stratification are likely to improve the use of this therapy. Appropriate use of this therapy is desirable; despite a low adverse event rate, there are significant supply constraints. The Australian anti-D Ig supply coming from only a few donors and supplies, at times of high demand, needing to be sourced from overseas to maintain supplies.

LIMITATIONS

The findings of this audit are limited in that they reviewed cases from only one metropolitan ED. The audit was retrospective and in some cases there may have been further information available that influenced the clinical decision to give anti D Ig that was not documented in the clinical record. This audit did not examine cases where people who required a dose of anti D Ig, did not receive it in the ED. Future work should review all patients who present to the emergency department with miscarriage, not just those receiving anti-D Ig.

CONCLUSION

This audit has highlighted the inconsistencies amongst clinicians in the ED to follow guidelines when prescribing anti-D Ig to pregnant patients. Accentuating this issue and improved signposting to the national guidance for ED staff would potentially improve practice. The creation of ED specific guidelines, or a subsection of existing guidance focusing on first-trimester pregnancy with reference to the ED, may further assist ED clinicians in their decision making. These guidelines would consider where the person has to follow up treatment and their access to anti D Ig and specific ultrasound findings. They may also include the consideration of new technology being increasingly accessed in assessing the fetal D type in early pregnancy. Further improvement into good clinical practice would include gaining signed consent for the administration of anti-D Ig. Further research into the risk of first-trimester D alloimmunisation would be optimal; however, the authors acknowledge that this recommendation has been made consistently for several decades and has yet to occur in view of the difficulty designing and performing sufficiently powered studies.

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Conflicts of Interest: The authors have no conflicts of interest to declare.

Author Contributions: MS and JB conceived the study. MS supervised data collection with assistance from JH. JH obtained ethics and governance approval for the conduct of the study. All authors contributed to the application of the guidelines. JH provided statistical assistance. The manuscript was prepared by JH, MS and JB with significant specialist input from KL and AA.

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RESEARCH ARTICLES

Intensive care nurses' perceptions on barriers impeding the provision of end of life care in the intensive care setting: a quantitative analysis

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ABSTRACT

Background: Intensive care nurses look after the most critically ill patient population with the highest mortality rate on a daily basis. Whilst research to date has highlighted and provided some insights into the current provision of end of life care, further research is much needed to improve the efficacy of nurses existing practice.

Objective: To investigate the specific barriers and contextual characteristics that nurses experience within the Intensive Care Unit environment.

Study Methods: The National Questionnaire of Critical Care Nurses Regarding End of Life Care was used to collect quantitative and qualitative data to answer the research questions. This study was conducted in a major intensive care unit located in a tertiary public hospital in metropolitan Western Australia.

Results: The respondent rate was 67.31%. Obstacles with the highest perceived intensity score (PIS) reported by participants involved issues around the communication and practice of end of life care including family interaction. The ranges of mean scores for supportive behaviours were much higher than the ranges for obstacles. These supportive behaviours included allowing family members to have adequate time alone with the patient after death, and families being taught how to engage with the dying patient.

Conclusion: The findings reflect that the most intense and frequently occurring obstacles are consistent with past research. A perceived negative end of life care experience by the nurse was found to negatively impact the nurse's psychological and physiological health. The research demonstrates the need for a stronger multidisciplinary patient centred approach. It is envisaged that the findings will support the review and development of appropriate guidelines to support nurses caring for intensive care patients in the initial and progressive phases of end of life care.

What is already known about this topic?

- ICU patients have the highest incidence of mortality in the acute care setting with one in four patients dying in an ICU, accounting for 15% of all hospital deaths annually.
- This patient population presents nurses with a set of unique, yet significant challenges related to increased rate of mortality.

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- There is a significant amount of existing literature that has explored moral distress amongst nurses, particularly in relation to end of life care.

What this paper adds:

- This research suggests that there continues to be obstacles that impede critical care nurse's ability to facilitate EOLC in the ICU setting.
- The participants of this study highlighted the need for stronger emphasis being placed on decision making processes, communication, and standardised practice.
- The most supportive behaviours reported were associated with practice that could be initiated by the nurse such as, allowing family members adequate time with their loved one pre and post death, and teaching family members how to act and engage with their loved ones during this time.

Keywords: Barriers; obstacles; intensive care nurse; end of life care; supportive behaviours; intensive care unit; The National Questionnaire of Critical Care Nurses Regarding End of Life Care

1. BACKGROUND

The cohort of patients admitted to Australian intensive care units (ICU) are a critically ill and vulnerable patient population in the acute care setting. Due to the advancement in medicine and technology, ICUs have the capacity to treat patients who would have previously not been expected to survive.[1] The ICU setting is unique, in most cases the patients have been admitted in emergency circumstances with a life-threatening condition, where the primary goal is to save the patient's life,[2] and where there is often a smaller time frame for the physicians to deliberate on the patient's trajectory. This adds to the difficulty of the End of Life Care (EOLC) decision making process. The Australian Institute of Health and Welfare (AIHW) reported that between 2014 to 2015, 63% (n=39,543) of patients admitted into a public hospital had received acute care prior to their death in hospital.[4] Of those, patients aged 65 years and over accounted for nearly two thirds (63% n=6,148) of deaths in hospital that involved a stay in an ICU.[4] ICU patients have the highest incidence of mortality in the acute care setting with one in four patients dying in an ICU, which accounts for 15% of all acute care deaths annually.[4,5] This aligns with the 2014 Australian and New Zealand Intensive Care Society (ANZICS) report, that found of all intensive care admissions, approximately 10% (n=12,000) die annually in ICU.[6] The AIHW reported the number of deaths occurring in the hospital settings increased by almost 8% (n=5,409) comparatively, between the years of 2005 and 2014.[4]

EOLC in the ICU setting has significant considerations. These include the medical decision to limit treatments that are or could be provided that may not be beneficial to the patient's quality of life, and may directly contribute to worsening patient outcomes.[7] The decision to limit medical intervention, would result in the patient dying from their underlying disease process, however, the withdrawing or withholding of treatment may not be the direct cause of the patient's death.[8] According to Latour et al.,[2] EOLC in the ICU is defined as the care and support services provided to the patient and his/her family after the decision has been made to withdraw or withhold treatments. For the purpose of this research, the researcher used the definition of EOLC by Latour et al.[2]

Research indicates that ICU nurses have a higher exposure rate to dying patients than nurses practicing in other specialty areas of the hospital.[4,5,9,10] EOLC is therefore an inherited part of intensive care nursing practice. However, 60% of nurses at any one-time associate death and EOLC practice with a perceived sense of failure and abandonment.[11,12] While physicians are burdened with the responsibility of making the decision, nurses regularly implement it and must live with the decisions made by somebody else. The nurses' position in the hierarchy of the healthcare system can render them unable to influence EOLC decision making, despite their explicit knowledge and involvement with patients and families.[13,14,15] Furthermore, nurses can often feel their voice is disregarded and this is reported to be a key source of moral distress with 25% of ICU nurses feeling psychologically burnt out at any one time.[12,14] One study found nurses had internal turmoil and expressed feelings of compassion fatigue and burnout, believing they did not provide their patient with a good death.[16] EOLC is emerging as a significant speciality in the ICU setting, which should have the same level of knowledge and competence as other specialities yet remains one of the most poorly understood specialties in ICU at present.[17]

This study investigated the specific barriers and contextual characteristics that nurses experience within the ICU environment concerning a patient's EOLC. A descriptive survey research design was considered appropriate to understand the nurse's perceptions of the specific care of their patients following the decision to withdraw or withhold treatment.

2. STUDY METHOD

This study explores the experiences of ICU nurses caring for patients following the decision to withdraw or withhold treatment. The study was conducted in a level three tertiary ICU setting which has 23 funded beds and provides comprehensive critical care to cardiothoracic, neurology, surgical, and general medical patients. The convenience sample was employed permanent ICU registered nurses (n=175) who had cared for patients in the acute end of life phase. Nurses with less than one year of experience in the ICU, on leave, or who had not been exposed to caring for at least one patient in the end of life phase in ICU were excluded from the study.

The National Questionnaire of Critical Care Nurses Regarding End of Life Care developed and created by Kirchoff and Beckstrand,[9] was deemed the most appropriate tool to meet the intentions of this study. This tool has a Cronbach α score of 0.89 which indicates a highly reliable tool.[9] This validated tool has been used in several international studies.[9,18,19] The National Questionnaire of Critical Care Nurses Regarding End of Life Care was used with permission granted from the authors with one additional obstacle question added to the existing validated tool.[9] The additional question on standardised practice was considered to be relevant, and related to the Western Australian (WA), State-Wide Framework for the Provision of Comprehensive, Coordinated Care at End of Life which had been developed along with the WA End of Life and Palliative Care Strategy 2018-2028.[20] The questionnaire provided the researcher with a statistical trend on the attitudes and beliefs of the nursing population in the ICU about EOLC. The questions used a Likert scale where participants rated the intensity of the listed obstacles from 0= not an obstacle to 5= extremely large obstacle, the intensity of the listed supportive behaviours from 0= not a help to 5= an extremely large help. The frequency of occurrence for both the obstacles and supportive behaviours where 0= never occurs to 5= always occurs. Information on the release dates and the purpose of the questionnaire was provided to ICU nurses through posters in the ICU environment. Verbal and written information was provided to participants prior to the study commencing. This study used the informed consent approach, where returning the anonymous questionnaire was considered consent. The data collection period went for one month in which hard copy questionnaires were placed in individual nurses' mailboxes in the ICU and completed questionnaires collected in a secure box situated in a secure central location in the ICU.

Participant's questionnaires were analysed using IBM SPSS version 25.0. P-values <0.05 were considered statistically significant. The accuracy of data entry was checked by two independent researchers for all the returned questionnaires. The researcher determined which obstacles and supportive behaviours were perceived as both being the most intense and the most frequently occurring. Descriptive summaries of demographic data consisted of frequency distributions (n= %) for categorical data and mean and standard deviations or median, interquartile range and range for continuous data, depending on normality. Grouped comparisons of the outcome data between categorical variables seen in Table 1 was conducted using the Chi-square test. The Chi-square test was used to determine whether there was an association between categorical variables. There were no identified associations between variables. The questionnaire outcome data (size and frequency of obstacles and supportive behaviours) were summarised using frequency distributions per category in the Likert scales. Frequencies, measures of central tendency and dispersion and reliability statics were calculated for all obstacle and supportive behaviour items.

A perceived intensity score (PIS) was then determined by calculating mean average of the intensity and frequency of the obstacle. The Perceived Supportive Behaviour Score (PSBS) was calculated by the mean average of the intensity and frequency of the supportive behaviour. The PIS and the PSBS scores were considered by the researchers to be the most important and sensitive indicator and finding to be examined when looking at this research topic results.

Ethical approval and permission to conduct the study was obtained from the Western Australia Department of Health Research Governance Service (SCGOPHCG RGS0000003227) and the University Human Research Ethics Committee (019053F).

3. RESULTS

Of the 175 potential respondents, n=15 (8.57%) were ineligible due to not being present in the unit to receive their internal mail due to sick leave, maternity leave, long service leave, change of position or annual leave. A further n=4 (2.29%) nurses were excluded from the results as they did not meet the inclusion criteria. The usable response rate was 67% (n=105) from the eligible sample pool of ICU nurses (n=156). The variables, as described in Table 1, show that most participants surveyed were female (89%), of the participants surveyed (78%) held a post graduate qualification, with more than two thirds (68%) of participants having worked as a nurse in an intensive care setting for over 10 years.

On further analysis nearly half of the 105 participants (43%) reported having received no education on EOLC care during their time as ICU nurses. Furthermore, only 19 participants (18%) reported having the opportunity to receive over 10 hours of education on EOLC care in ICU. Over 45% of participants reported having cared for a patient requiring EOLC and subsequently dying on their shift within the last one to six months prior to this survey being conducted. A further 20% of participants having cared for a patient in the last week to one month and 10% having cared for a patient receiving EOLC in the last week or less before the survey was conducted. As over 75% of participants had provided EOLC

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in the last six months, and over one third of participants (39%) reported having cared for over 20 patients during the EOLC phase in the ICU setting it was hoped that the recency in practice and exposure would render the findings and data to be more meaningful and richer in quality. The completed demographic information is reported in Table 1.

TABLE 1: DEMOGRAPHIC DATA OF PARTICIPANTS

Demographic Information	N (%)
Gender n=105	
Female	93 (88.6)
Male	12 (11.4)
Years of ICU Experience	
<10	33 (31.4)
10-15	38 (36.2)
>15	34 (32.4)
Highest Degree	
Diploma/Bachelor of Nursing	22 (21.0)
Postgraduate Qualifications (Postgraduate Certificate, Diploma or Master)	82 (78.1)
Hours of EOLC education	
Nil	45 (42.9)
<10	39 (37.1)
>10	19 (18.1)
Recency of the provision of EOLC and patient death on shift	
<=1 week	11 (10.5)
1 week to 1 month	21 (20.0)
1 to 6 months	47 (44.8)
6-12 months	12 (11.4)
> 1 year	14 (13.3)

3.1 OBSTACLES

Perceived Intensity Score

To determine which obstacles the participants reported as being the most significant both in intensity and frequency, the PIS score was deemed to be a sensitive indicator when it came to understanding the perceptions of the participants. PIS scores ranged from 0.75 to 12.75 (Table 2). The obstacle item receiving the highest score was having multiple physicians involved with one patient, who differ in opinion about the direction care should go (12.75). The second and third highest PIS scores reported were the lack of standardised practice in how to manage dying patients in ICU (12.08) and families not accepting the poor patient prognosis (11.85).

Of the remaining top 10 high scoring PIS obstacles, issues around interpersonal communication and current practice surrounding EOLC in ICU were recognised by participants. These included: Having family and friends who continually call the nurse for updates rather than designated contact person (11.81), the nurse's inability to communicate with the patient to learn of his/her wishes regarding treatment due to sedation or depressed neurological status (11.21), a poorly designed unit which does not allow for privacy for the dying patient and grieving family (11.20), the family not understanding the term 'lifesaving measures' and its implications (10.66) and, physicians who would not allow the patient die from the disease process (10.40).

The lowest scoring PIS obstacles identified were in relation to ICU visiting hours protocols and the funding and management of ICU patients care for organisational financial benefit. With family visiting hours that are too restrictive (0.75) being the lowest reported PIS obstacle and continuing to provide advance treatments to dying patients because of financial benefits to the hospital (1.17) identified as the second lowest PIS obstacle. The completed break down of each obstacle item surveyed, along with each item ranking for intensity, frequency, and PIS has been reported in Table 2.

3.2 SUPPORTIVE BEHAVIOURS

Perceived Supportive Behaviour Score

To determine which supportive behaviours the participants reported as being the most supportive and the most frequently occurring, the PSBS was deemed to be a sensitive indicator when it came to understanding the perceptions of the participants. PSBS scores ranged from 4.09 to 15.90 (Table 3). The top three items which received the highest PSBS scores were allowing family members to have adequate time to be alone with the patient after he or she has died (15.90), family members having a peaceful dignified bedside scene (14.33) and having family members accept that the patient is dying (14.32).

The subsequent highest scoring behaviours were related to the nurse-family interactions, family members being taught how to act around the dying patient (13.57), family members showing gratitude to nurse for care provided to patient who has died (12.77) and having physicians involved agree about the direction of care (12.53).

The lowest PSBS included letting the social worker/religious leader taking primary care of the grieving family (4.09), talking with the patient about his/her feelings and thoughts about dying (4.66), and nurses scheduled so that the patient receives continuity of care (4.93). The completed break down of each supportive behaviour item surveyed along with each item ranking for intensity, frequency and PSBS has been reported in Table 3.

TABLE 2: OBSTACLES INTENSITY, FREQUENCY AND PIS IN THE PROVISION OF END OF LIFE CARE

Obstacles	Intensity*		Frequency+		PIS‡
	Mean	Rank	Mean	Rank	
Multiple physicians, involved with one patient, who differ in opinion about the direction care should go.	4.21	1	3.03	5	12.75
There is a lack of standardised practice in how to manage dying patient in ICU.	3.70	7	3.26	2	12.08
Families not accepting what the physician is telling them about the patient's poor prognosis.	3.99	2	2.97	7	11.85
Family and friends who continually call the nurse wanting an update on the patient's condition rather than calling the designated family member for information.	3.72	6	3.17	3	11.81
The nurse not knowing the patient's wishes regarding continuing with treatments and tests because of the inability to communicate due to a depressed neurological status or due to pharmacologic sedation.	3.55	11	3.16	4	11.21
Poor design of units which do not allow for privacy of dying patients or grieving family members.	3.73	5	3.00	6	11.20
Family members not understanding what "life-saving measures" really means, i.e., multiple needle sticks causing pain and bruising, ribs may be broken during chest compressions.	3.60	10	2.96	8	10.66
Physicians who won't allow the patient to die from the disease process.	3.85	3	2.70	10	10.40
Not enough time to provide quality end of life care because the nurse is consumed with activities that are trying to save the patient's life.	3.42	14	2.64	11	9.02
The nurse having to deal with angry family members.	3.61	9	2.43	12	8.76
The nurse having to deal with distraught family members while still providing care for the patient.	3.01	20	2.86	9	8.62
Intra-family fighting about whether to continue or stop life support.	3.65	8	2.27	16	8.28
Continuing treatments for a dying patient even though the treatments cause the patient pain or discomfort.	3.51	12	2.26	17	7.96
When the nurses' opinion about the direction patient care should go is not requested, not valued, or not considered.	3.33	15	2.37	14	7.91
Employing life sustaining measures at the families' request even though the patient had signed advanced directives requesting no such treatment.	3.80	4	2.04	19	7.74
Lack of nursing education and training regarding family grieving and quality end of life care.	3.19	17	2.40	13	7.64
Physicians who are overly optimistic to the family about the patient surviving.	3.14	18	2.28	15	7.16
The nurse knowing about the patient's poor prognosis before family is told the prognosis.	1.99	27	3.49	1	6.94
Physicians who are evasive and avoid having conversations with family members.	3.48	13	1.99	20	6.93
Being called away from the patient and family because of the need to help with a new admit or to help another nurse care for his/her patient.	2.66	24	2.15	18	5.71
Continuing intensive care for a patient with a poor prognosis because of the real or imagined threat of future legal action by the patient's family.	3.29	16	1.68	24	5.53
The family, for whatever reason, is not with the patient when he or she is dying.	2.68	23	1.94	22	5.21
The unavailability of an ethics board or committee to review difficult patient cases.	3.07	19	1.67	25	5.12
Dealing with the cultural differences that families employ in grieving for their dying family member	2.57	26	1.97	21	5.07
The patient having pain that is difficult to control or alleviate.	2.96	21	1.60	26	4.73
No available support person for the family such as a social worker or religious leader.	2.63	25	1.79	23	4.72
Pressure to limit family grieving after the patient's death to accommodate a new admission to that room.	2.69	22	1.42	27	3.82
Unit visiting hours that are too liberal.	1.38	29	1.24	28	1.72
Continuing to provide advance treatments to dying patients because of financial benefits to the hospital.	1.97	28	0.59	30	1.17
Unit visiting hours that are too restrictive.	0.99	30	0.76	29	0.75

* Ranging from 0, not an obstacle to 5, extremely large obstacle.

+ Ranging from 0, never occurs, to 5, always occurs.

‡ Perceived Intensity Score (mean for intensity multiplied by mean frequency)

TABLE 3: SUPPORTIVE BEHAVIOURS INTENSITY, FREQUENCY AND PSBS IN THE PROVISION OF END OF LIFE CARE

	Intensity*		Frequency+		PSBS‡
Supportive	**Mean**	**Rank**	**Mean**	**Rank**	
Allowing family members adequate time to be alone with the patient after he or she has died.	4.27	5	3.73	1	15.90
Providing a peaceful, dignified bedside scene for family members once the patient has died.	4.42	3	3.24	3	14.33
Having family members accept that the patient is dying.	4.65	1	3.08	6	14.32
Teaching families how to act around the dying patient such as saying to them, "she can still hear… it is ok to talk to her."	3.91	10	3.47	2	13.57
Having family members thankyou or in some other way show appreciation for your care of the patient who has died.	4.09	8	3.13	5	12.77
Having the physicians involved in the patient's care agree about the direction care should go.	4.56	2	2.75	8	12.53
Having enough time to prepare the family for the expected death of the patient.	4.17	7	2.75	8	11.46
Having one family member to be designated contact person for all other family members regarding patient information.	4.40	4	2.59	11	11.40
Having a fellow nurse tell you that "You did all you could for that patient," or some other words of support.	3.64	12	3.08	6	11.22
Allowing family's unlimited access to the dying patient even if it conflicts with nursing care at times.	3.54	13	3.16	4	11.19
Having a fellow nurse put his or her arm around you, hug you, pat you on the back or give some other kind of brief physical support after the death of your patient.	3.37	16	2.72	10	9.16
Having fellow nurses take care of your other patient(s) while you get away from the unit for a few moments after the death of your patient.	3.44	14	2.51	12	8.63
Having a support person outside of the work setting who will listen to you after the death of your patient.	3.40	15	2.47	13	8.41
Having the physician meet in person with the family after the patient's death to offer support and validate that all possible care was done.	4.04	9	1.87	15	7.57
The nurse drawing on his/her own previous experience with the critical illness or death of a family member.	3.10	18	2.34	14	7.25
A unit designed so that the family has a place to go to grieve in private.	4.24	6	1.61	16	6.81
Having the family physically help care for the dying patient.	3.09	20	1.60	17	4.94
Having a unit schedule that allows for continuity of care for the dying patient by the same nurses.	3.34	17	1.48	18	4.93
Talking with the patient about his or her feelings and thoughts about dying.	3.65	11	1.27	20	4.66
Letting the social worker or religious leader take primary care of the grieving family.	3.09	19	1.32	19	4.09

* Ranging from 0, not a help to 5, extremely large help.

+ Ranging from 0, never occurs, to 5, always occurs.

‡ Perceived Supportive Behaviour Score (mean for intensity multiplied by mean frequency)

4. DISCUSSION

The purpose of this research was to investigate the specific barriers and contextual characteristics that nurses experience within the ICU environment concerning a patient's EOLC. The research applied a descriptive approach to devise a greater understanding of what is most important from the perspective of the primary care givers, the critical care nurses. Several obstacles and supportive behaviours in the facilitation of EOLC practice that were identified in this research were consistent with past research.[9,19,22-26]

The greatest concerns for the nurses in this single site study, as in the original Beckstrand and Kirchoff study, suggests that nurses find difficulty with obstacles that ultimately hinder the quality of care provided to the dying patient as seen in Table 4.[9] The results from this study suggest that there are still concerns surrounding the standard of care and management of ICU patients post withdrawal or withholding of treatment.

TABLE 4: COMPARISON OF DATA TO THE ORIGINAL RESEARCH

Hynes, Coventry & Russell Identified Highest PIS Obstacles	Beckstrand & Kirchoff (2005)
1. Multiple physicians, involved with one patient, who differ in opinion about the direction care should go.	Listed as the third highest identified PIS Obstacle.
2. There is a lack of standardised practice in how to manage dying patient in ICU.	This obstacle was not in the original questionnaire by Beckstrand and Kirchoff.
3. Families not accepting what the physician is telling them about the patient's poor prognosis.	Listed as the sixth highest identified PIS Obstacle.
4. Family and friends who continually call the nurse wanting an update on the patient's condition rather than calling the designated family member for information.	Listed as the highest identified PIS Obstacle.

The highest-ranking obstacle identified in this study was nurses' perceptions that physicians involved in care often had differing opinions about the direction of care. Bloomer et al.,[16] identified that disparities between individual physicians regarding the goals of care and prognosis (curative verses supportive) was reported as being seen to cause the most conflict amongst physicians and nurses.[27] Furthermore, the authors reported that 40% of family members in retrospect perceived conflict had occurred between physicians and nurses.[16] Nurses reported taking a stoic approach, limiting their communications with the families in fear of voicing their moral conflict with treatment, which increases the risk of both the nurses and family feeling isolated.[16] A key compounding factor that causes delay in EOLC discussions is the significant reporting of communication breakdown between physicians and nurses regarding goals of care and rationale of interventions requested.[12] The fast turnover of critical care staff, both nurses and physicians, subsequently results in an increased number of staff caring for a singular patient. This creates several challenges in care of the dying patient as the potential for discontinuity of care and conflicting goals of care among the healthcare professionals is substantially higher.[28,29] The result is families receiving a multitude of differing and inconsistent information and views about the patients' health status, both in a formal and informal setting from numerous healthcare professionals, producing further confusion and creating obstacles for providing positive EOLC experiences.[9] Therefore, increasing the likelihood of both the nurse and family perceiving a negative EOLC. The achievement of cohesion between physicians and nurses is crucial to ensure the family are presented with a transparent plan of care for the patient.

The second most significant obstacle identified was the lack of standardised practice in how to manage dying patients in ICU. It can be noted that the acute hospital setting is intended to provide short term episodic care, where the default practice is to continue to intensely treat and manage the symptoms.[30] Furthermore, the recognition of dying is frequently inadequate, resulting in missed opportunities to consider appropriate referrals to palliative care.[3] In Australia, all states and territories have different approaches to developing and delivering policies, strategies, and programs about different aspects of EOLC.[31] Various aspects of EOLC are funded by different governing bodies across Australia.[31] This results in fragmentation of services with healthcare professionals finding it challenging to navigate the system. Thus adding another level of complexity as there is no overall sole standard of care and practice in Australia. Internationally, Australia's EOLC system is highly ranked.[32] However, it should be noted that Australia's EOLC has less emphasis on holistic practises compared to Europe, Canada, the United Kingdom and New Zealand.[33,34]

In WA, the Palliative Care Network Advisory Committee oversees a range of activities aimed at developing an integrated model of palliative care across the state. The WA state-wide framework for the provision of a coordinated framework for EOLC was developed to recognise the need for a standardised approach to ensure all clinicians received adequate training and support to deliver EOLC.[30] However, there is no detailed strategy on how to manage patients who have had an unexpected catastrophic event leading to a rapid, life-threatening acute deterioration.[21,30] An informal analysis of current EOLC practices within WA hospitals indicates a lack of formal guidelines on how to manage a patient during the initial and progressive phases of EOLC after withdrawal or withholding of treatment in a tertiary ICU setting despite a number of frameworks being available. EOLC and palliative care is at the forefront of the national health agenda, with government policy driving change through policies and guidelines such as the National Safety and Quality in Health Care Standard 5, Comprehensive Care: At the end of life and the National Palliative Care Strategy 2010: Supporting Australians to Live Well at End of Life.[21,30] Localised ICU standardised care pathways or guidelines as seen in the ward setting or community, would ensure a standardised approach is taken to managing the dying patient. These care pathways could consider the management of pain, dyspnoea, secretions, and agitation. By having a standardised care pathway for EOLC in ICU, nurses potentially will feel more empowered in the EOLC process.[35]

The third most significant obstacle identified was the nurse's perception that the families were not accepting of poor patient prognosis. A possible explanation for this obstacle relates to the highest scoring obstacle which was that physicians often differ in opinion about the direction of patient's care. As patients present acutely with severe life-threatening illnesses, often requiring multiple treatment considerations, indecision and ambiguity are commonly seen in the ICU.[11] The findings of this study suggest that after the decision to withdraw treatment has been made, uncertainty remains. This is further compounded by the

short timeframe in which the decision to withdraw treatment is made. The concept of timing related to withdrawal of treatment has been highlighted in many other studies.[11,36,37] Research has uncovered some clear factors that affect a family's readiness to withdraw treatment.[11,36,37] These included the way communication is conducted, the uncertainty around the patient prognosis, and the potential impending loss of their loved one.[11,36,37] Critical care nurses are highly skilled professionals who work in a fast paced environment in which their skills and expertise are of an advanced level, with 82% of participants in this study holding a postgraduate qualification. Subsequently their understanding, knowledge, and decision-making abilities may be considered as greater to that of the patients' family members. Communication with family members experiencing an acute crisis in EOL situations is challenging as they may experience difficulties in processing and understanding the information given.

A significant factor in determining family satisfaction, both in the initial and progressive phases of initiating EOLC is 'good communication', with current literature reporting that providing information on the patients' status is directly linked with greater family satisfaction.[25,28,38,39] The ability to empathise and emotionally interact with family members is the key determinant to building a strong foundation, in which frank communications regarding prognosis can be had allowing for further opportunities to openly discuss EOLC.[27] It is clear that families appreciate honest and complete information being provided rather than vague information, which is associated with a greater incidence of traumatic stress, apprehension and depressive symptoms.[40,41] However, the challenge lies in the ability to ensure the families receive real time updates without compromising the care provided to the patient.[25,28] The literature recommends that families receive education on admission about the importance of creating one primary contact who can relay and communicate information with other family members and friends.[25,28] By doing so, more of the nurses' time can then be spent on caring for the patient.[25,28] Providing families with a clear understanding of the channel of communication may reduce the stress of many requests for information to the nurse providing care, and ultimately reduce misinterpretation and miscommunications occurring between family members. However, having a nominated family representative may be challenging in some situations such as interfamily disharmony.

Providing family members adequate support and preparation for withdrawal of treatment may help to increase the family's readiness and reduce the intensity of this perceived obstacle. In addition, an understanding of the family's health literacy level can allow the nurse to tailor information, ensuring there are no gaps in the family's understanding on the patient's prognosis and potential trajectory. Furthermore, there is a clear need for early, honest, open, and transparent communication with a discussion on all potential eventualities. The outcome of effective communication is timely decisions in the provision of comfort care and a reduction in the time of prolonged futile treatments.[28,40,42-44]

The ranges of supportive behaviours PSBS were higher than the obstacles PIS, as the higher scoring behaviours were typically ones that the nurse could control, and therefore perceived as being very supportive. The supportive behaviours that related to the pre and post EOLC that nurses could offer to the patient were; providing adequate time alone with patient pre/post death, facilitating a peaceful dignified bedside scene, having family members accept that the patient is dying and providing instruction on how to act around the dying patient. These findings aligned with the original studies top supportive behaviour PSBS findings.[9] Nurses perceived the PSBS controlled by clinicians other than nurses as lower primarily because these specific behaviours occurred at a less frequent rate than the supportive behaviours initiated and controlled by nurses.

5. RECOMMENDATIONS

The importance of evidence-based practice guidelines and policies have been highlighted in research to date. The intention of evidence-based guidelines is to assist clinicians in providing high-quality EOLC by having a standardised practice that supports the management of principles related to legal, moralistic, ethical and medical considerations and the implications that arise normally during withdrawal of life-sustaining measures.[14,6,45,46,47] In this study, the participants acknowledged the lack of current guidelines as impacting on their EOLC practice. The findings from this study support the need to have local guidelines and policies around EOLC in the ICU. Further research would consolidate the findings and increase the reliability, validity, and generalisability of the study. Additional research is required to understand if a guideline, once in place, will impact positively on nurses' and family's wellbeing by increasing nurses' professional job satisfaction and their psychological wellbeing. This would also help to determine whether the barriers recognised currently by participants change or improve, for example seeing an increase or decrease in the intensity and/or frequency of occurrence. Additionally, whether the change in practice and policy results in nurses perceiving more positive EOLC experiences.

6. STUDY LIMITATION

The study was a single site survey with a small sample size at only one tertiary adult ICU in Western Australia, the transferability of this study may be limited as participants at other sites may rate the obstacles and supportive behaviours differently. Although this is a single site study from one ICU unit the aim of this research was to gain insight into this area of practice. For a comprehensive understanding to occur,

it is recommended that further research on the same topic be conducted in auxiliary ICUs and consider other contexts such as paediatric ICUs and the private sector. A potential perceived bias by the participants could be considered as the main researcher is employed by the organisation in which the research was conducted and although the participants completed the survey anonymously and through self-nomination this could be considered a limitation. The researchers have no sources of funding to declare.

7. CONCLUSION

EOLC is emerging as one of the most significant specialties in the ICU setting. However, EOLC still remains one of the most poorly understood and undereducated specialties in ICU at present. The research to date highlights that ICU nurses have the highest exposure rate to dying patients in the acute care setting. Although EOLC is an inherited part of intensive care nursing practice, this study demonstrates that there continues to be obstacles that impede the nurse's ability to perceive and facilitate a positive EOLC for the patient and their family. The results of this study confirm that nurses continue to struggle with many of the same barriers identified 15 years ago by the original researchers. Furthermore, the study demonstrates the need for a stronger multidisciplinary patient centred approach. It is envisaged that the findings will support the review and development of appropriate guidelines to assist nurses caring for ICU patients in the initial and progressive phases of EOLC.

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RESEARCH ARTICLES

Healthcare workers' experiences of transitioning natalizumab infusions from hospital services to an in-home setting: a qualitative study

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ABSTRACT

Objective: This study explored healthcare workers' experiences of transitioning infusions of natalizumab from hospital to a patient-centred model of home care.

Background: Hospital in the home is one of the fastest growing healthcare delivery models. In Australia, intravenous infusions are rarely available at home for chronic disease patients, such as those with multiple sclerosis. A recent trial of natalizumab infusions at home for patients with multiple sclerosis required both the hospital and hospital in the home staff to consider the logistics of how this transition could be achieved safely.

Study design and methods: This was a qualitative study using an exploratory-descriptive approach. Twelve participants from two main groups of healthcare workers participated in delivering natalizumab infusions during the six-month trial period and were subsequently interviewed about their experience. Participants were recruited from a hospital ambulatory care day unit and a Home Infusion Team from a private provider of home nursing care located in South Australia. The data was analysed thematically.

Results: Three main themes were identified from the interviews: 'preparing for change', 'focussing on the patient', and 'enhancing professional support and relationships'. These findings demonstrated the importance of understanding healthcare workers' experiences of transitioning to a patient-centred model of care, from hospital to home infusion of natalizumab.

Discussion: Flexibility and good management of logistics is necessary to maintain the standards of the health services, which highlights the need for training and professional support to facilitate quality home care. This may enhance workers' sense of professional confidence and trust and reduce stress when delivering the home model of care.

Conclusion: Healthcare workers and patients worked to support one another, not only therapeutically but also logistically within collegial relationship and interdependent communications. Being flexible, communicating clearly and being willing to work together within the team, especially between the hospital in the home staff and the hospital staff, was demonstrated to be an important factor for the safe delivery of infusions at home. Managing the logistics

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of delivering a flexible and safe home therapy service was an important part of this model of care.

Implications for research, policy, and practice: The results of this study will be used to inform healthcare teams about the key logistical components that are important for healthcare services, when considering transitioning to a home-based model of care for treating people with relapsing-remitting multiple sclerosis.

What is already known about the topic?

- Although outpatient infusion programs are often hospital based, they may be run by regional health authorities or private organisations, such as a hospital in the home service.
- Healthcare workers delivering a hospital in the home service require advanced knowledge and skill in order to deliver quality care.

What this paper adds:

- The development of a comprehensive logistical process, which has the patient at the centre of the model of care, enabled natalizumab to be delivered safely in the community by healthcare workers.
- Being flexible, communicating clearly and being willing to work together within the team, especially between the hospital in the home staff and the hospital staff, was demonstrated to be an important factor for the safe delivery of infusions at home

Keywords: Model of care, healthcare worker, home infusion, multiple sclerosis, natalizumab.

INTRODUCTION

Over 25,000 people in Australia have multiple sclerosis (MS), an inflammatory disorder of the central nervous system that may result in neurological symptoms and increasing disability.[1,2] Multiple sclerosis is a chronic neurological disease that develops in young adults.[1] About three quarters of people with MS are female and the majority are diagnosed between the ages of 20 to 40 years.[2] Most people with MS start out with relapsing-remitting MS (RRMS), which is characterised by relapses or exacerbations when symptoms flare up, followed by a variable period of time when no symptoms are present, called 'remission'.[3] Currently, the US Food and Drug Administration, together with the European Medicines Agency, have approved 13 drugs for use as RRMS disease-modifying therapies, which help to control the disease and improve quality of life.[3] Gajofatto and Benedetti emphasised that these therapies modulate or suppress the different mechanisms of the autoimmune process that underlies the disease, thereby minimising the occurrence of relapse or preventing disease progression.[4] Natalizumab was one of the first disease-modifying therapies approved for the treatment of adults with RRMS in a hospital setting.[5,6]

Hospital outpatient intravenous therapy services, also known as hospital-based infusion centres, are gaining recognition as a beneficial model of care for both health services and patients.[7] Patients diagnosed with RRMS may require natalizumab infusion treatments on an ongoing basis for at least a one-hour infusion every 28 days.[8,9] Natalizumab infusions can be delivered to people with RRMS as an outpatient rather than requiring admission to the hospital as an inpatient. While this outpatient appointment is a relatively short hospital visit, patients still have to allocate sufficient time to travel to and attend the hospital for the treatment and may miss work, study and other activities on that day. This is time consuming and inconvenient, not only for the patients but also for their family members.[10,11] Although outpatient infusion programs are often hospital based, they may be run by regional health authorities or private organisations. Several studies have recently supported the concept of delivering patient care, especially intravenous infusions, away from a hospital and in the patients' home or community environment. This places the patient at the centre of the delivery of the care rather than the hospital.[11,12]

BACKGROUND: 'HOSPITAL IN THE HOME' MODEL

Delivering healthcare for people with chronic health conditions at home is commonly known as 'hospital in the home services'.[2] 'Hospital in the home' involving infusion therapy has been an effective mode of management of some illnesses since the 1980s.[13] The use of home infusion therapy services has grown not only due to the development of advances in medical technology for infusion devices but also due to the development of new medicines. The development of home infusion treatment programs has been influenced by the need to stem the increasing demand for access to acute care hospital beds, to decrease the chance of infections and to reduce hospital costs.[14] Additionally, during the COVID-19 pandemic, the preference for people such as those receiving natalizumab for RRMS to avoid the hospital environment and self-isolate has increased the need for health managers to rapidly consider safer options for delivering ongoing medical treatment.

Disease-modifying therapies are part of a growing group of agents, which includes monoclonal antibodies, with the aim of offering more effective, suitable treatment for patients with chronic disease.[4] In some countries, such as Canada, certain disease-modifying therapies are provided to people in their own homes.[15] For example, infliximab therapy, a monoclonal antibody agent used for Crohn's disease patients has a safety profile approved for administration in the home setting. Three studies have reported that infliximab therapy for Crohn's disease is safe to administer in the home.[15,16] In the United Kingdom (UK), a recent pilot study by Brex et al. on natalizumab home infusion reported significantly higher levels of satisfaction (94 to 100%) after delivering 253 home infusions on 10 highly active MS patients.[8] Recent studies have piloted home infusions of natalizumab for people with RRMS.[9, 17] Despite the possibility of adverse events due to natalizumab infusion, these studies stated that the participants' safety was maintained and that participants reported a high level of satisfaction. While these three studies documented important findings about the patients' experience of home care, clinicians' experiences of transitioning to and supporting a different model of care have not been studied. Given that healthcare professionals are potentially operating in a new environment, and working with a new model of care, it is important to understand their perspectives, how they may inform practice and the process of managing change. A search of the literature has identified only one study conducted in the UK that used a qualitative methodology to investigate the experiences of district nurses caring for patients with home chemotherapy.[18] The authors concluded that the experiences of nurses with home chemotherapy highlighted the importance of shared care with patients and learning from colleagues.

This article presents the findings from research which aimed to understand healthcare workers' (HCWs) experience of transitioning to a patient-centred model of care, from in-hospital to at-home, for patients with MS requiring monthly infusions of natalizumab. Moreover, this study may inform the key logistics of the delivery of home infusion services.

METHOD

The study was conducted using a qualitative methodology. The study question was: 'What are HCWs' experiences of delivering natalizumab infusions in a home environment?' An exploratory descriptive study design is common among qualitative methodologies, also known as 'naturalistic inquiry'.[19(p479)] There were advantages to using this design for this research question. Firstly, it is an ideal design to gather individual experiences during the period of study. Secondly, the researchers sought to gain a deeper understanding of the HCWs' experiences of the model of care used in the home environment. The research was approved by the relevant health service Hospital Ethics Committee (HREC/16/RAH/192) and all participants provided written informed consent before commencing.

SETTING AND PARTICIPANTS

This study is the qualitative part of a larger study that examined the safety, clinical effectiveness, acceptability and cost effectiveness of home infusions of natalizumab for people with MS.[9] Twelve participants from the two main groups of HCWs delivering natalizumab infusions during the six-month study period were interviewed: four from the Home Infusion Team (HIT) (a private provider of home nursing care located in South Australia) and eight from a tertiary hospital ambulatory care day unit. There was no relationship between the researchers and participants.

DATA COLLECTION/ANALYSIS

A total of 110 natalizumab infusions were provided to 36 RRMS patients during the six-month period April to September 2017, of which 55 infusions were delivered at patients' homes and another 55 at the ambulatory care day unit.[9,20] Semi-structured interviews were conducted with the HCWs after the completion of the period of delivering natalizumab home infusions. The participants were given a choice between participating in a telephone or a face-to-face interview, either individually or as a group. This combination of interview approaches was considered to be suitable because the questions were very specific (Table 1) and related to implementing the project's process. The interviews took between 30 and 60 minutes and were digitally recorded. The recordings were transcribed and participants were given the option to check the transcripts. None of the participants requested to review their transcript.

The transcripts were analysed using Braun and Clarke's method.[21] In this analysis, the researchers focussed on the content of the transcripts, then identified common themes. This approach involved grouping concepts, supported by quotations from the participants' interviews.

TABLE 1: HEALTHCARE WORKERS INTERVIEW QUESTIONS

1.	Could you please share how you started working on the Home Infusion project?
2.	What training did you receive in preparation for this project?
3.	How prepared did you feel for this project?
4.	What was your perception of the patients' preferences in receiving home infusion?
5.	Were there any family members present and if present, what sorts of interaction did they have (Home infusion team only)?
6.	In relation to the process of delivering home infusions what worked well and what did not work well?
7.	Were there any specific supports you required in the preparation or delivery of home infusions and if so what were they?
8.	What was your experience of any adverse events and the process of responding and reporting these (Home infusion team only)?
9.	How would you describe the experience working on the Home Infusion project?

ISSUES OF RELIABILITY AND VALIDITY

Reliability and validity are important components in conducting research. In qualitative research, validity and reliability are maintained by establishing trustworthiness. Trustworthiness can be demonstrated through the process of gathering data.[25] For this study the same semi-structured questions were used for all participants and two researchers independently analysed the transcribed recordings and then came together to discuss the findings. In addition, the research team met monthly throughout the data collection period. Finally, the researchers maintained an audit trail of the study, keeping a record of the materials used, and the process of data collection and analysis.

RESULTS

The framework that guided the analysis of the data was dictated by the study question. Three main themes were identified from the interviews: 'preparing for change', 'focussing on the patient', and 'professional support'. These are presented in Table 2. In the descriptions of each theme, participants are referred to by a letter and a number, such as H2, at the end of each comment. The HIT HCWs (nurses and courier) are identified with the letter H. The ambulatory care day unit HCWs (consultant neurologist, neurology nurse consultant, nurse unit managers and nurses) are identified with the letter R if they were individually interviewed or the letter F if they were interviewed in groups.

TABLE 2: OUTLINE OF THEMES AND SUBTHEMES FROM HCWS' EXPERIENCES

Theme	Subtheme
Preparing for change	Comprehensive process of preparation for change
	Extra work in facilitating the change
	Ensuring the cold chain is maintained
Focussing on the patient	Convenience for the patient
Enhancing professional support and relationships	Training
	Positive collegial relationships
	Nurse–patient relationships

THEME ONE: PREPARING FOR CHANGE

The importance of establishing a clear process that ensured safe patient care was a pervasive theme among the HCWs. This theme has three subthemes: 'comprehensive process of preparation for change', 'extra work in facilitating the change' and 'ensuring the cold chain is maintained'.

Subtheme one: Comprehensive process of preparation for change

It was clear from the participants' experiences, across both the hospital and home care staff, that there was a lot of consideration during the planning and intervention phase of the project, which aimed for accurate documentation and patient safety. Participants mentioned that the process was well documented and comprehensive:

> *I think for the purpose of the trial, there was a lot more … tracking, and you could audit all of that. It was very comprehensive. Probably more comprehensive than we would normally do. (F3)*

With regards to the patient recruitment process, participants mentioned a key safety factor that only patients who had had more than 12 months of natalizumab treatment were recruited:

> *So the two safety issues we got around is, one was allergic reaction. That's why we said patients had to have a minimum number of doses before they went on the [home] treatment, because then that risk of allergic reactions were a lot, lot less. (R2)*

The main concern about transitioning treatment to the home was the management of an anaphylactic reaction in a home setting, as the following participant mentioned:

> *The only concern I had is that if a patient had a major anaphylactic reaction, what was the process that was involved? How was that going to be attended? That was my probably single most concern with the home infusions. (R1)*

The smoothness of the process of providing natalizumab treatment at home was an important part of the experiences of the HIT. The HIT clearly prioritised the patients' perspective, especially the benefits for them of well-organised care. Participants stated that they felt more confident and organised as the process developed smoothly:

> *But I think from the second time I sort [of] became a little bit more – I would get there a little bit early, I felt that my preparation was – making them feel comfortable and not being rushed or on a set timeline. I think I just became a little bit more organised and relaxed in the process. After that I think everything became quite – everything was very smooth sailing. (H1)*

> *As a nurse operating with what we, I have put in place, not any issues at all. It was … smooth … So I just thought no, it was good. (H3)*

Subtheme two: Extra work in facilitating the change

Workload management is an approach that is used to ensure a team functions efficiently and equitably. Some of the participants emphasised a concern that they had at the beginning of the trial process that the transition would generate extra work and may have a negative impact on the unit. However, this did not eventuate:

> *We had the paperwork … so we knew that those patients had come from home and now they were doing the hospital part. (F1)*

> *I was concerned about it because of the extra workload that it might have – you know, the impact that it might have had on our unit. (F2)*

All of the participants were required to do extra work and planning to ensure that the drugs were ordered, ready to be collected and arrived at the correct day and time in the patient's home:

> *I think from my point of view, for ordering and things like that, it was a lot of work from our side of things, to make sure that the drug was available at the times [required]. (F3)*

> *I was quite clear about when the couriers were coming. We knew when they were coming. We had the drug prepared. They came with containers that were temperature monitored. We signed for – we checked the patients, the dosage, the temperatures, all of that. It was really quite thoroughly done; it was very comprehensive. (F3)*

Subtheme three: Ensuring the cold chain is maintained

All of the HIT participants voiced the importance of maintaining the cold-chain process, mainly when handling the natalizumab between the hospital (where it was dispensed) and the home. The use of a 'cool pack' was critical (particularly in the Australian summer when the environment is very hot) in maintaining the appropriate temperature while the natalizumab was in transit:

> *Sometimes we did, now it may be that the nurse had scheduled an infusion for 7:00 in the morning, in which case the courier would pick up the drug from the hospital the afternoon before that, put it in the cold-chain data log and deliver it to the nurse's home [for appropriate ongoing storage]. (H4)*

> *I really liked the flexibility of it and the fact that I guess the cool pack maintained that process. There were a couple of times when the cool pack would be delivered to my house, so I would actually have the infusion maybe hours in advance, but again I knew that we could still check the temperature control and it was still within its manufacturing guidelines so I was happy to do that. (H1)*

Monitoring the temperature within the cool pack provided confidence that the cold chain had not been broken:

> *What did work really well was the cold-chain hardware and we were able to prove that by monitoring not only the in-chain stuff but also the longevity of the efficacy, of the cold-chain equipment, which worked really well even over two to three days in some cases. (H4)*

During the six-month home infusion trial, a participant reported that only one drug dosage was returned to the hospital, because of the patient's need to change an appointment for another week:

> *But if it was going to be like a reschedule of a week or more with once [only] I think we returned the drug to the hospital. So the beauty of that system is that we understood, if you like, the medication issues and the cold-chain physics well enough to make those decisions appropriately. (H4)*

This analysis highlights participants' high level of awareness of a key logistical part of the process, namely maintaining the cold chain when delivering this service in the community. This demonstrates that there can be flexibility while maintaining the relevant standard to ensure that the 'cold chain' is maintained for the medication.

THEME TWO: FOCUSSING ON THE PATIENT

The focus on delivering a flexible, smooth process to achieve optimum patient-centred care was a pervasive theme amongst the participants. A focus on patient-centred care was the key philosophy that was adhered to by all of the participants. This theme has a sub-theme: 'convenience for the patient'.

Subtheme one: Convenience for the patient

Participants discussed how having natalizumab infusions at home provided convenience for the patients:

> *All of them want to know when it's going to happen permanently. I can't think of one person who didn't take part in the trial who would prefer to come into hospital. It is just so much more convenient for them. They all sort of said, look, I think this was fantastic. (R2)*

> *Everybody really liked it. I think the bulk of the people appreciated the opportunity to have it at home, certainly if you've got young children, all that sort of thing. (F3)*

In some case infusions at home improved patients' treatment compliance:

> *I could see the benefits, no problems at all. Having the infusion at home, I could see there would be better compliance. (R1)*

The participants emphasised that having natalizumab home infusions would free up spaces for other patients currently waiting for treatment in the hospital unit:

> *We would free up a lot of chairs that – when we try and get patients in, it can be very difficult. So you have temporarily given some capacity in the bookings. (R1)*

> *So, we're growing. We grow about 6% a year, is what I worked out some years ago. So, we're not going to get quieter. if there is a small population that we can move to community, and it's a move that's happening nationally as well as internationally. (F3)*

On the other hand, some participants noted that for some patients it was more convenient to have the infusion at the hospital:

> *The negatives tended to be that if that person worked in town, then it might be more convenient for them just to drop into the hospital than to have it in their work, or to go back home. (R1)*

All of the HIT interviewees described their approach as 'very flexible' in providing natalizumab treatment at the patient's home, as these participants highlighted:

> *Yeah, look, I was very flexible. I guess it was always about the – client centred and the fact that we had post-op care in the home, that we had the ability to really deliver the infusions on a much more flexible basis … I delivered infusions on public holidays, weekends, I did some infusions as late as seven o'clock, seven or eight o'clock at night. (H1)*

Flexible delivery of the nursing service was driven by the importance participants placed on their patients' ability to maintain their lifestyle while living with a chronic illness:

> *Just that it fits into their lifestyle and their – because people have busy lives these days so it's giving them that opportunity to have it done at night if they want to … So it was just – it just made it a lot less complicated for the patient. (H2)*

THEME THREE: ENHANCING PROFESSIONAL SUPPORT AND RELATIONSHIPS

The enhancing professional support and relationships theme included all participants' experiences across both the hospital and the HIT working together throughout the project. Professional support included training, establishing clear protocols, ensuring the availability of 'back-up' if needed and support from all colleagues. Three subthemes emerged: training, positive collegial relationships and nurse–patient relationships.

Subtheme one: Training

The HIT nurses were required to attend training to ensure that they had the knowledge and skill to carry out the treatment competently in a home setting. This included considering the context in which they would practise, as one participant stated:

> *I think at the initial orientation with … I think she talked a lot about risk assessment. She has done a lot of work with hospital at home and infusions in people's homes. I really asked a lot of questions and picked her brains on safety because I guess that is one of the things, we do have to be safe in a home when delivering care, another person's safety has to be paramount. (H1)*

The participants also appreciated the importance of observing how the nursing staff delivered the treatment in the hospital's outpatient department, which was a requirement for HIT nurses and helped to replicate hospital care in the home environment:

> *What you do here is done there. It's that reassurance. (F1)*

> *We had TAPP [Tysabri® Australasian Prescribing Program] training. So we were fully aware … to sort of see how the infusion went and what you could do when you're actually meeting the patients. So part of that meet and greet was also looking at how … to do the infusions. (H3)*

Subtheme two: Positive collegial relationships

For the HIT participants to deliver optimal care and maximise the advantages of home infusions, it was important for a collaborative relationship to be developed and maintained across both services. The participants appreciated the professional support from others, such as team members being flexible and working together:

> *That was all negotiable and because we were keen to get the process or the protocols working smoothly, we were always pleased to renegotiate timing and what have you. (H4)*

> *You just needed to be flexible and work with each other. Which we all did as nurses. (H3)*

Some participants mentioned having a 'back-up' if they were not able to meet the scheduled appointment time with the patient:

> *I wanted compliance to treatment to be seen as not driven by the nurse. More driven by the patient. Therefore, if there was a patient that needed cannulating and be given an infusion, because the other nurse couldn't get there, I stepped in. (H3)*

Senior hospital staff were also part of the collegial team and they were approached for support and advice, as this participant mentioned:

> *But yeah, so I would use … staff in [hospital] senior staff. We would talk things out. If there was some issues there, we would talk it out and we would get a resolution. (H3)*

An HIT participant acknowledged their responsibility as part of the team to ensure that the system worked:

> *From that schedule I would make it my duty, if you like, to collect the drug at an appropriate time so it could be delivered directly to the nurse in the field at the appropriate time. (H4)*

The ability to deliver a good outcome for the patient was at the heart of the willingness of all the participants to be flexible in when, where and how care was provided. As a team they worked together to ensure that the patients' needs were central to the service being delivered. The patients were also part of the team so the participants delivering care in the home were also adaptable to the varying home environments while ensuring that standards of care were maintained.

Subtheme three: Nurse–patient relationships

Some participants emphasised that establishing a therapeutic relationship with the patient is necessary not only to resolve any difficulties during the treatment but also to make the patients feel comfortable and safe in the care of

the visiting nurse. Meeting patients in the hospital setting before they transitioned to home care was important to promote this relationship:

> *It was really good to develop those personal therapeutic relationships. I think it was great for them because, they'd met me before, but then they'd also continue that follow-up care, so they felt quite safe as well. (H1)*

Participants identified that family support was particularly important, not only in their presence but also as a part of the patient's wellbeing, and it contributed to the therapeutic relationship:

> *Also a few of them had their families around while we were doing the infusion, so I'd include them in conversations. That I think helped the patients relax a bit more, knowing that we weren't sort of dismissive of the family. It was a very inclusive kind of process because the family are a big support to the patient, so they need to be, the family need the support as well. (H2)*

DISCUSSION

This exploratory descriptive study recognised the importance of understanding HCWs' experiences of transitioning to a patient-centred model of care, from hospital to home infusions of natalizumab. This included HCWs' perspectives on the logistics of the process and their need for training and support to ensure patient safety. A previous article explored the patients' perspective using the patient-centred model of care for home infusions of natalizumab.[20]

MANAGING THE LOGISTICS TO ENSURE A FLEXIBLE, SMOOTH PROCESS

The findings indicated that providing care at the patients' own home supported the principle of patient-centred care due to the flexibility and the convenience provided to patients. Offering infusion therapy within a non-hospital environment is common practice.[22] Organising and managing home infusions requires not only skill in delivering the treatment but also in the logistics of maintaining the cold chain, particularly when the outside environment may be very hot.[23] In this study, managing the logistics appropriately was critical to the success of the home-based infusion therapy and the administration of the medication. The importance of maintaining the safety of the medication and getting it to the patient at the right time and place was emphasised by all the participants during the interviews. This required everyone to step-up and be accountable for their part in the process and to communicate well with each other.

TRAINING AND PROFESSIONAL SUPPORT

Transitioning from hospital to home services requires highly skilled home care clinicians. The participants in this study recognised that training and professional support are essential when delivering infusions outside a hospital setting. The quality of the training and professional support of the HIT affected participants' experiences of delivering infusions in the home setting. In addition, this study revealed that the training and education allowed them to fulfil their role safely, efficiently and with confidence. Depledge and Gracie emphasised that skill-based training with continuing education is important to ensure safe treatment is delivered in a non-hospital setting such as a home infusion service.[24] Consistent with findings from their semi-structured study, interviews with nurses delivering home infusions in the United Kingdom found that most participants benefitted from the training and education provided, indicating that they felt confident and valued the professional support.[18]

Moving care from the hospital setting to the home setting requires consistent support, including enabling the HIT to access the required training and to receive ongoing advice from the hospital staff who have the experience and know the patients well. However, an international report argued that there is limited professional support for clinicians delivering home infusions due to a lack of resources.[22] Alexander et al. stressed the importance of professional support in ensuring quality of care when delivering a home-based model of care.[7] Throughout this study, professional and inter-organisation support were available to the HIT. This involvement provided very valuable support to the HIT and enhanced the sense of trust and confidence amongst the HIT team and between the HIT and hospital teams.

Managing the change from hospital to home care required good collaboration between the team. This effective collaboration was vital so that the team could determine the logistics of the process of transferring patients who were medically stable to home care, how information was communicated across both teams ensuring an audit trail of documentation, and then the process of delivering the medication to the patient at the time and venue that the patient requested. Even though there was some anxiety at the start of the transition, by working together through the concerns raised, all participants felt that the patients' safety was ensured, as much as possible. The participants recognised the value of the new service delivery model; though it was potentially disruptive to the daily routine in the hospital, it would provide a better quality of life for their patients with a long-term chronic disease. It was this central value, articulated by all participants that ensured the new model was about the patient and not about the hospital routine. If this value had not been shared across all service teams then there would have been many opportunities for the process to be sabotaged and the pilot project to fail. The results support the home model of care because of

the benefits to the patients, including convenience, and importantly improving patient compliance with their treatment.[11] In addition, the hospital was able to reduce the waiting list for those needing to commence treatment and to provide a more targeted service to those who were more acutely ill.

LIMITATIONS

One of the limitations of this study was the relatively small size of the HIT, which comprised only three nurses and two couriers. Another is that some of the participants were members of the main study's organising team. Although there is a positive perception of home infusions from this six-month study, a longer study period, such as a year of home infusions may present issues of sustainability, which indicates that further longitudinal studies are warranted.

CONCLUSION

This study provides an example of how two teams of health workers can come together to work through some difficult logistics of service delivery to establish a better way of delivering care that truly puts the patient at the centre. The new model focussed on more than the discharge of patients from one service to another, rather reflecting a model of care where patients with a chronic illness transition between home and hospital services depending on their wellbeing and the level of medical care required. Although HCWs had to accommodate extra work, especially with planning, patient assessment, nursing handovers, checking of natalizumab and documentation, they felt reassured that people with RRMS will receive a safe natalizumab infusion in an in-home setting.

IMPLICATIONS FOR RESEARCH, POLICY, AND PRACTICE

This study can inform healthcare teams about the key logistical components that are important for healthcare services, when considering transitioning to a home-based model of care for treating people with relapsing-remitting multiple sclerosis.

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RESEARCH ARTICLES

It's just not that easy! Challenges faced by nurses and midwives in the work environment in adhering to social distancing during COVID-19

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ABSTRACT

Aim: The aim of this study was to understand the challenges that nurses and midwives face when seeking to practice social distancing within the various clinical settings in a hospital work environment during COVID-19.

Background: COVID-19 has had a significant impact on nurses and midwives internationally. With the ease of transmission of COVID-19 and the limitations in pharmaceutical interventions, other measures had to be implemented across communities and in healthcare settings. These public health measures were enacted in various ways throughout the world. A key measure employed globally was social distancing. Australia was no different, initiating community wide interventions to apply social distancing principles and action, in an effort to reduce transmission. Whilst at their places of work, nurses and midwives were also encouraged to practice social distancing.

Design and methods: Using convenience sampling, 579 nurses and midwives employed within one local health district in NSW, Australia completed an online questionnaire during the COVID-19 pandemic. Subsequently, a thematic analysis was undertaken as a way of categorising data from the 216 (37%) qualitative responses with regards to social distancing. This study adhered to The Standards for Reporting Qualitative Research (SRQR) guidelines.[1]

Results: Overwhelmingly, responses indicated that participants found it challenging to practice social distancing in their workplaces across various clinical settings within the hospital. The two major themes identified were: 1) challenges relating to social distancing with patients and 2) challenges related to social distancing with colleagues. Several sub themes were also identified.

Conclusion: The COVID-19 pandemic has highlighted a number of challenges for healthcare professionals, social distancing being a key challenge. Social distancing is argued to be almost impossible in various clinical settings within a hospital where patient contact and provision of care in a team environment occurs.

What is already known about the topic?
- Social distancing has been demonstrated as an effective public health intervention to prevent the spread of infectious diseases, such as MERS, SARS and Ebola.

What this paper adds:
- During COVID-19, social distancing practices in acute healthcare environments have been enforced. However, this creates difficulties for health professionals such as nurses and midwives when providing quality care.
- The results showed that social distancing has been more difficult than anticipated to adhere to in the work environment.
- The built environment of hospitals (physical layout) and working in multidisciplinary teams made social distancing particularly challenging for nurses and midwives.

Keywords: Nursing, Midwifery, Acute care, Nurse-patient relationship, COVID-19, Social Distancing.

INTRODUCTION

The World Health Organization (WHO) designated 2020 as the "Year of the Nurse and Midwife" and what a year it has been with an incomparable and extraordinary public health emergency SARS-CoV-2, known as COVID-19.[2] Worldwide, nurses and midwives have met the unparalleled challenges associated with being at the forefront of healthcare during this respiratory pandemic.[3] Nurses and midwives found themselves deployed in unfamiliar clinical settings, undertaking many different and varied tasks spanning from mass screening and health education, to providing care for people with COVID-19.[4] Additionally, nurse led research teams are building a future evidence base of what was effective and what was not, with regard to the pandemic. Significantly, during the chaos of the initial pandemic period, nurses and midwives have continued to provide care for people who were hospitalised for health reasons other than COVID-19. Nursing and midwifery care simply did not stop, and every patient continued to receive care from a professional cohort committed to better health outcomes.

BACKGROUND

Given the ease of transmission of COVID-19, numerous public health measures including social distancing were enacted by various governments around the world. Greenstone and Nigam state that the core aim of social distancing is to keep people apart to reduce the mixing of susceptible and infectious people through early discovery of cases or through the reduction of contact that each person makes.[5-7] The effectiveness of social distancing was demonstrated during the H1N1 influenza pandemic in 2009 where implementation contributed to considerable decline in transmission rate in workplaces.[8] Therefore, in March 2020, with the COVID-19 pandemic straining healthcare resources worldwide,[9] the Australian Government implemented community wide social distancing with encouragement to work at home where possible and a discontinuation of non-essential gatherings (including gyms, licenced clubs, cinemas, restaurants, places of workshop, weddings and funerals.[10] In April 2020, restrictions were increased, and schools were closed.[11]

All hospitals in New South Wales (NSW) were also required to adhere to the containment measures. As per the NSW Health guidelines, the containment measures implemented by hospitals included (1) closure of the multiple entrances and having a single-entry point to the hospital, (2) screening, (3) droplets and contact precautions and (4) social distancing. Screening involved the use of Quick Response (QR) codes and temperature checking using infra-red thermometers at hospital entrances for all staff. Out-patient medical visits where possible were conducted using telehealth and only emergency surgery and procedures were carried out. In the wards, visitation was restricted to one person only and families were encouraged to use video and audio methods to communicate with patients.

Droplet and contact precautions included strict hand hygiene where staff were provided with education about the importance of hand hygiene and hand sanitisers were placed at convenient locations and on mobile workstations to improve compliance. Mandatory education was also provided to staff regarding donning and doffing and masks

were required to be worn when attending patient care. Guidelines for the use of personal protective equipment (PPE), including facemasks and gloves, were also provided to all staff. However, limited availability of PPE early in the pandemic meant that social distancing was a key measure to reduce transmission of COVID-19. Social distancing was mandated therefore seating and tables were removed from the hospital cafeterias and the occupancy of staff tea rooms was restricted. Notices were placed on break out rooms that indicated number of people allowed in the rooms. All staff were advised to maintain 1.5 metres between individuals hence ward-based meetings involving multiple staff were conducted using the cloud-based video conferencing service Zoom. At the time of this study each hospital participating in the study had directives in place for all public health measures including social distancing. The hospital directives including those relating to social distancing were reinforced during live updates provided by the General Managers of the individual hospitals as well as the Chief Executive of the Local Health District (LHD).

Given the myriad of clinical interactions that occur in the hospital environment, adherence to social distancing can prove challenging for healthcare professionals.[12] These measures are particularly challenging for nurses and midwives who continue to provide front line care during a public health crisis.[4] In the hospital setting, nurses and midwives have significant close contact in their daily interactions with patients who may potentially be infectious. Consequently, the reality of social distancing practice in acute healthcare environments requiring nurses and midwives to care for people alongside colleagues creates enormous challenge. Therefore, it is vital to understand the experiences of nurses and midwives when seeking to practice social distancing within their places of employment. Specifically, the first voice is privileged as nurses and midwives identified what they perceived as the challenges from the lived experience of delivering nursing and midwifery care.

AIM

The aim of this study was to explore the challenges that nurses and midwives faced when seeking to practice social distancing in the various clinical settings within the hospitals in one LHD during the COVID-19 pandemic.

METHODS

DESIGN

This was an analysis of the responses to an open-ended question that was included within a larger cross-sectional study. The larger study sought to explore the impact of COVID-19 on nurses and midwives wellbeing in a LHD in NSW Australia. This paper reports on the qualitative data collected about the participants' experiences of social distancing in the workplace. Data about other aspects of the survey is reported elsewhere.[13,14] This paper is reported according to the Standards for reporting qualitative research guidelines,[1] thus improving the transparency of all aspects of the research.

PARTICIPANTS

The study participants were a convenience sample of 579 nurses and midwives from approximately 3,000 employed within one LHD in NSW, Australia during the COVID-19 pandemic.

DATA COLLECTION

Data were collected using a self-administered online survey that was distributed to participants via email. The email contained a SurveyMonkey link and was distributed via a hospital wide email to all nurses and midwives by the Director of Nursing and Midwifery at each participating hospital. The survey commenced with a participant information sheet detailing the aims of the study and how the data will be used. The survey was conducted between May and June 2020, which was during the period the Australian government had affected restrictions on non-essential movement (social distancing and quarantine) of the Australian population. Reminder emails were sent by the Director of Nursing to improve response rates.

This paper reports on an open-ended survey item that asked participants to comment on their experience with practicing social distancing within an acute care hospital. The question was "When it is not a matter of patient safety, do you think that it is difficult to practice social distancing in a hospital environment?" which asked participants to rate the question as very easy, easy, neutral, difficult and very difficult. The follow-up question for the qualitative response was "If difficult, can you please explain why it is difficult to practice social distancing?".

DATA ANALYSIS

Data were managed within a Microsoft Excel spreadsheet. A thematic analysis, using the approach described by Braun and Clark was undertaken as a way of categorising data from the 216 responses received.[15] The data underwent multiple readings to identify important patterns with each researcher undertaking this individually. This process generated open codes which were then grouped together and given a brief description to aid in identifying the preliminary themes. The coded extracts were consistently discussed within the research team until consensus was reached on the final themes and appropriate nomenclature. Data analysis culminated in two overarching themes. These were consequently named and defined according to their distinct and distinguishing features.

ETHICS

Ethics approval was gained for the study from the LHD Human Research Ethics Committee (2020/ETH01075). Completion and submission of the survey was considered as implied consent. Participants were informed that the survey was anonymous and that responses they provided will be used in any future publications.

RESULTS

A total of 579 nurses and midwives from approximately 3,000 employed across the LHD completed the survey for the larger study. However, only 452 nurses and midwives rated their difficultly in practicing social distancing within the hospital environment. Of these, 216 nurses and midwives provided qualitative comments relating to the question about social distancing. The majority of the nurses were females (n= 182; 84.2%), with a mean age of 43 years (SD 12.21) and the length of time they worked as a nurse or midwife was 18.1 years (SD 12.5). Nurses and midwives worked across a diverse range of clinical units including medical and surgical wards, intensive care, aged care, outpatient settings and maternity units. (Table 1).

Data analysis revealed a total of 331 of the 452 nurses and midwives (73%) indicated that it was difficult or very difficult to practice social distancing within the hospital environment. Two key themes emerged from the 216 nurses and midwives in relation to the challenges they faced when seeking to practice social distancing in the various clinical settings within a hospital environment. Both themes were informed by subthemes. The first theme, 'Challenges relating to social distancing with patients' has two sub-themes, '*patient care*' and '*the nature of nursing*'. The sub-theme 'patient care' was informed by procedures, tasks and nursing interventions, while subtheme 'the nature of nursing' was informed by close physical contact. The second theme to emerge from the data was 'challenges relating to social distancing with colleagues' and has three sub-themes, '*the built environment*' referring to the physical space, '*people*' which has been informed by too many people, and adherence and '*equipment*' referring to use and access. These themes are represented in Figure 1.

THEME 1: CHALLENGES RELATED TO SOCIAL DISTANCING WITH PATIENTS

Nursing and midwifery are inherently hands-on professions and patient care requires nurses and midwives to be in close contact with the people for whom they provide care. This creates significant challenges when nurses and midwives seek to socially distance from their patients.

TABLE 1: DEMOGRAPHICS (N= 216)

Demographic variables	Frequency	Percentage %
Gender*		
Female	182	84.2
Male	22	10.2
Professional Designation*		
Registered Nurse/Midwife	89	41.2
Clinical Nurse/Midwife specialist	30	13.9
Clinical Nurse/Midwife consultant	24	11.1
Clinical Nurse/Midwife educator	21	9.7
Nurse/Midwife Unit Manager	16	7.4
Nurse/Midwife Manager	12	5.6
Others: Enrolled Nurse; Assistant in Nursing; Nurse Practitioner	2	0.01
Department/ Unit worked*		
Surgical Ward	25	11.6
Intensive Care Unit	23	10.6
Medical Ward	17	7.9
Outpatient Department	13	6.0
Oncology	10	4.6
Antenatal/Birthing/Postnatal	10	4.6
Aged care	7	3.2
Other: mental health; paediatrics; operating theatre etc	81	37.5
	Mean (years)	**SD (years)**
Age	43	12.21
Years working as nurse or midwife	18.1	12.5

* Some respondents did not complete all fields in the survey.

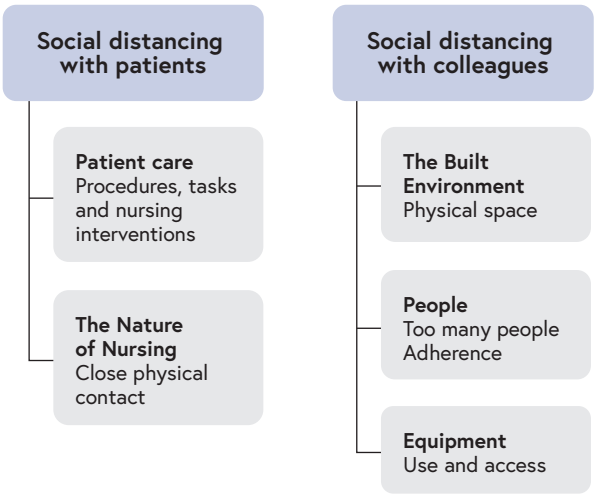

FIGURE 1: OVERVIEW OF MAIN THEMES

Sub-theme 1.1: Patient care

The provision of patient care and the procedures, tasks and nursing interventions that is required for patient care could not occur if nurses and midwives had to remain 1.5m apart from their patients. Comments regarding how impossible this was included, "*Certain patient procedures require close contact e.g. line insertions, log rolls, doing ETT tapes, collar care just to name a few*" (participant 27) and "*You cannot treat them if you are 1.5 metres away from them e.g. Showering, dressings etc.*" (participant 206). Another participant described how social distancing in multiple situations such as, "*During resuscitation, during dispensing of recordable drugs from Dangerous Drugs (DD) cupboard, administration and checking of medications which requires a two person check, and check at the bedside, handover at the bed side (trying not to share handover to other patients*)" (participant 49), simply could not occur. Participants also responded to the question with their own rhetorical questions and statements such as: "*How can you do any personal patient care from 1.5 metres*?" (participant 58) and "*It's very hard to deliver a baby from 1.5 metres away*!" (participant 61).

Sub-theme 1.2: The Nature of Caring

The nature of caring sub-theme fundamentally encapsulates close physical contact. Participants expressed that "*As nurses we need to be up close and personal with patients during some of their care"* (participant 9) and that, *"Showing empathy to patients and relations, requires physical touch"* (participant 146). The "*Nature of the job and workplace - our job requires you to get close to patients in order to fulfil your role*" (participant 172). One participant summed this ethos up well when they said "*Many interactions are physical, negating social distancing. The importance of touch is embedded in our practice of healing, making social distancing an anathema to our cultural practices*" (participant 98). Yet another participant commented that "*Care, comfort and empathy are difficult to achieve without touching*" (participant 34).

THEME 2: CHALLENGES RELATED TO SOCIAL DISTANCING WITH COLLEAGUES

Just as patient care requires nurses and midwives to be in close contact with the people whom they provide care. Nursing and midwifery are often practiced in close contact and proximity to other nurses and midwives, other health professionals and ancillary staff. Participants described the challenges related to social distancing in the workplace as related to both the built environment and the nature of the work and interaction between people in the clinical setting.

Sub-theme 2.1: The Built Environment

Social distancing with colleagues was described by nurses and midwives as very challenging. The built environment was identified as an influencing factor. Nurses and midwives remarked that hospitals were not designed with physical distancing in mind. There was, quite simply "*Not enough physical space to keep apart*" (participant 38). Descriptions of the environment included observations such as "*Narrow corridors, confined and shared workspaces*" (participant 133), "*Our unit is in a small cramped space*" (participant 127), "*Staff rooms, nurses station and wards are too small*" (participant 160), and "*A small area with a narrow corridor. The consultation rooms are also small, making social distancing difficult*" (participant 171). Furthermore, as one participant explained, there was "*Limited space at nursing stations. Limited computers. Ward meetings do not have the option for virtual meetings. Medication Room is a small space. Not all tearooms have enough space to safely practice social distancing*" (participant 92). With the closure of the hospital cafeteria "*it is difficult to find an area to sit at mealtimes and observe social distancing*" (participant 53).

Sub-theme 2.2: People

In addition to the built environment, participants identified that people themselves made it challenging to adhere to social distancing. At times there were too many people in the clinical setting, who often did not or were unable to adhere to social distancing conventions. At times participants said the wards were quite crowded, with one saying "*My ward has all the surgical specialities which means all the (specialist) teams end up on the ward at the same time with medical students. We also have nursing students and physio students*" (participant 106). Another participant reported, "*in ICU individual handover of patients occurs at each shift at one desk with four nurses present at a time*" (participant 75). Another nurse spoke of the intensity of some critical clinical situations requiring many people to be present when they said, "*I work in an ED. We cannot do our job while social distancing. A trauma patient may have 25+ people in the room working on them*" (participant 69). Many participants felt that there was a lack of adherence to social distancing with one stating that "*Some healthcare workers seem to ignore the advice and stand very close to each other*" (participant 148). Others suggested that "*Not everyone adheres to it*" (participant 15), with "*Some staff members not taking social distancing seriously and continue to enter rooms for chats and congregate for breaks*" (participant 66). Two participants appeared to offer a rationale for the lack of social distancing between colleagues when they said: "*We are by habit social creatures that are naturally drawn into each other's personal space*" (participant 192) and "*With such a low incidence rate, the general behaviour is business as usual*" (participant 208).

Sub-theme 2.3: Equipment

Use of and access to equipment was also identified as an issue that impacted nurses and midwives ability to socially distance. The participants described how there was not enough equipment and that it often had to be shared. One nurse said that the "*Biggest issue is shared equipment and surfaces, e.g. computers, desk surfaces, physical patient notes, blood pressure devices etc.*" (participant 132). The availability of computers to use to access electronic medical records was also identified as posing a challenge because they were often only located in the nurse's station. One participant described how because of COVID-19, "*In-service sessions (occurred) around a computer*" (participant 151). This meant that nurse's stations were further crowded, for example, at the "*Nurse's station we all sit close as computers are placed close together, and the offices are small*" (participant 118). Another participant aptly illustrated this by saying "*The area around the nurses station gets crowded, it's where all the phones and computers are. There's not enough space to implement social distancing*" (participant 170).

DISCUSSION

In response to the COVID-19 pandemic, numerous public health measures, including social distancing, were implemented by healthcare facilities globally. This study was undertaken to provide insight into the experiences of nurses and midwives when seeking to practice social distancing in the various clinical settings within hospitals during COVID-19. The results of this study demonstrate the major challenges in implementing and maintaining social distancing in the various clinical settings within hospitals, and still engaging in patient care.

Social (physical) distancing in the various clinical settings within hospitals is critical to ensure the health and wellbeing of the health professional workforce during the pandemic.[12] Protecting nurses and midwives, so that they can continue to care for patients, within an already stressed healthcare system, and without the fear of transmitting the virus, is crucial.[8] As COVID-19 continues to spread rapidly across the globe, public health measures including social distancing are still required within hospitals. Hospital administration and policy makers need to urgently implement and provide employees with guidelines and strategies to address the challenges in social distancing within the workplace. Indeed, a study conducted by Courtemanche et al.[16] demonstrated that the adoption of social distancing measures reduced the daily growth rate of confirmed COVID-19 cases in the US by 5.4% after one to five days, 6.8% after six to 10 days, 8.2% after 11 to 15 days, and 9.1% after 16 to 20 days. While social distancing has been demonstrated to be effective within the community, in various clinical settings within a hospital this has been challenging for nurses and midwives during their daily roles. Adoption of new protocols during the height of the COVID-19 pandemic is vital in safeguarding nurses and midwives. To attain this, new behavioural expectations must be developed and reinforced surrounding social distancing including limiting traffic around the hospital and rearranging staff meal rooms.

While administrative meetings and education sessions have transitioned to online meeting platforms, patient care is unable to be performed in any way other than physical contact. Our study highlights that maintaining social distancing when providing patient care and having to share equipment is challenging, even impossible. Nurses and midwives reported that social distancing was impossible if effective care was to be provided. Touching and being close to patients to provide care is essential and part of developing and maintaining interpersonal relationships with patients and clients. The nature of clinical settings and hospital environments, including the physical layout of the workplace creates major barriers to practicing social distancing. Despite marked areas on floors for staff to stand during handover, and signage placed around workspaces stating how many staff could be present at any one time, providing care and adhering to social distancing was found to not be possible by participants in this study. This highlights the importance of access to appropriate PPE in the workplace when social distancing cannot be maintained.

STRENGTHS AND LIMITATIONS

This large study across three metropolitan hospitals offers a wealth of information on the challenges that nurses and midwives experience regarding social distancing measures in the various clinical settings. To our knowledge, at the time of writing, this is the first study to explore the impact of implementing public health measures such as social distancing on nurses and midwives within clinical settings in Australia. A limitation of this study is that the sample was drawn from a single local health district in NSW. However, this geographic region, which covers seven local government areas, has a complex mix of highly urbanised and industrialised areas and low-density suburbs and has a population of over 950,000 people.[17] That said, a broader range of participants across other clinical settings would establish a more generalisable result. In addition, the data were drawn from a single qualitative item within a larger survey. More in-depth focus on social distancing may have elicited more detail. Additionally, the convenience sampling methodology used in this study could create bias, by under or over sampling the population. Further exploration of how social distancing can and does occur in clinical settings would be of benefit. Despite these limitations, the study was undertaken during the COVID-19 pandemic, providing real experiences of the impact of social distancing in practice for nurses and midwives.

CONCLUSION

There are not many unseen benefits from the COVID-19 pandemic but nurses and midwives have demonstrated leadership and provided care not only to people affected by COVID-19, but also to other people who also require nursing treatment. Physical distancing is an important public health measure employed to slowing transmission of COVID-19. Clinical settings have not been immune to the need to adopt this concept. However, social distancing is not easy to adopt in the various clinical settings within a hospital environment. This study has identified challenges around the built environment, shared equipment and the presence of people that could be addressed to enhance nurses and midwives ability to practice social distancing. It is imperative for managers and policy makers to consider how these issues can be addressed to promote the safety of the workplace for staff and patients.

IMPLICATIONS FOR RESEARCH, POLICY, AND PRACTICE

The results of this study acknowledge the importance of social distancing as a preventative measure to limit transmission of COVID-19, however this study also reveals that social distancing in the various clinical settings within a hospital environment is difficult. This is especially if nurses and midwives are to continue to safely and adequately care for their patients. Further exploration of how social distancing can occur in clinical settings within hospital environments is needed for future pandemic planning and preparedness. Further research on how to optimise patient care while still adhering to social distancing measures, such as modification of handovers, and nursing and medical rounds is required.

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RESEARCH ARTICLES

Coronavirus disease 2019 Critical Care Essentials course for nurses: development and implementation of an education program for healthcare professionals

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ABSTRACT

Objective: To describe development, implementation, and evaluation of an evidence-based online critical care nursing education program to upskill a registered nurse workforce in response to Coronavirus disease 2019 (COVID-19) pandemic.

Background: As Australian federal, and state governments prepared for the possible influx of critically ill patients associated with COVID-19, initiatives were sought to assist frontline healthcare workers meet the complex care requirements of these patients.

Study design and methods: A team of experienced acute and critical care nursing, medical practitioners, and education specialists, online and mobile learning specialists, and front-line workers were assembled. This team developed 10 online educational modules for rapid delivery and upskilling of registered nurses in Victoria, Australia. Nurses undertaking these modules were invited to complete a satisfaction survey. Survey questions were answered in Likert style or free text. Quantitative data were summarised descriptively, whilst freeform answers were explored for themes.

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Results: An online Critical Care Essentials course was launched in May 2020. In its first month 2,875 students had accessed this course. Course evaluation (*n* = 395 students) found over 92% responded favourably (Strongly Agree or Agree) to all 14 Likert style questions. Qualitative course feedback revealed four core themes: applicability, accessibility, engagement, and endorsement.

Discussion: This innovative project demonstrated how a university department of nursing collaborated with government and industry partners to rapidly respond to develop and implement an online educational program. This program was immediately responsive to local, national, and international urgency. Obtained student feedback was overwhelmingly positive. However, future areas for development and evaluation are presented.

Conclusion: An inter-professional and inter-organisational model is proposed for the development and implementation of future online programs. This focused online flexible learning, specific to care of critically unwell people with COVID-19, provides an approach to rapid upskilling of registered nurses. This approach appears favourably to its intended target audience. Furthermore, this program could be adapted for a national or international community.

What is already known about the topic?

- Globally, Coronavirus disease 2019 quickly overran advanced healthcare systems with vast numbers of critically ill patients requiring specialist care.
- To address surging critical care numbers, healthcare staff require increased knowledge to care for higher acuity patients.
- Online educational packages can be one element of fulfilling healthcare staff training needs.

What this paper adds:

- Description of development, implementation, and evaluation of a novel evidence-based online critical care nursing education program.
- Evidence of how an online education can be made accessible to frontline healthcare workers to support the demand for a scalable resource that is responsive to emergent global health pandemic.
- Using a tripartite model for knowledge translation is one potential approach for the future responses to urgent educative program development.

Keywords: COVID-19, Critical Care, Education, Nursing, Practical, Intensive Care Units.

OBJECTIVE

To describe development, implementation, and evaluation of an evidence-based online critical care nursing education program to upskill a registered nurse (RN) workforce in response to a Coronavirus disease 2019 (COVID-19) pandemic.

BACKGROUND

As COVID-19 began to devastate healthcare systems globally, Australia was preparing to battle this unprecedented pandemic.[1] Responding to the need for urgent critical and complex care upskilling from healthcare organisations and healthcare workers was a high priority. To aid with this a specialty education team was formed at an Australian University's Department of Nursing. The core objective was to develop and implement an evidence-based program of core critical care education for non-critical care nurses. This course was to be aligned,and referenced to specific issues surrounding managing patients with acute respiratory distress secondary to COVID-19. The course specifically aimed to support rapid upskilling and knowledge for RN in acute healthcare settings to promote safe and effective care.

IMPACT OF COVID-19

On 31 December 2019 the World Health Organization (WHO)'s China Country Office was informed of 44 case-patients with pneumonia of unknown aetiology detected in Wuhan City, Hubei Province, China.[2] Subsequently, case numbers exploded to pandemic proportions. Cases, hospital admissions, and in some cases deaths continue to place crippling impacts on global healthcare.[3] This has led to strict social restrictions and state and national border closures internationally. This caused both social and economic turmoil.

COVID-19[4] is a coronavirus that can cause (usually respiratory) illness in both animals or humans. Older people and those with underlying chronic diseases, such as hypertension or diabetes, are seen to be more susceptible to developing serious COVID-19 impacts.[5] Prior to vaccine development, it was estimated that COVID-19 has a fatality rate of 3%. Approximately 40% of cases will have a mild form of the disease, 55% will experience moderate to severe symptoms requiring medical intervention and 5% of cases will have critical disease.[6] Of the latter 5% of these will require critical care specialist treatment including mechanical ventilation.

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RESPONSE TO COVID-19: CLINICAL GUIDELINES

In response to experience gained in treating people with severe cases of COVID-19 in China and globally, guidelines for treatment of patients were rapidly developed.[7,8] These were released by leading health agencies including but not limited to the WHO,[9] Centers for Disease Control and Prevention (CDC),[10] National Institute for Health and Care Excellence (NICE),[11] Australian and New Zealand Intensive Care Society (ANZICS).[12] There have also been consortium of experts publishing rapid guidelines in leading international journals.[13] Guideline recommendations are relatively consistent but also evolving. One constant theme throughout all guidelines was a requirement for critical care treatment for COVID-19 patients who developed severe acute respiratory failure.[11,12]

LOCAL INTENSIVE CARE PROVISION

A 2020 estimate reported that Australia had 2,378 existing intensive care beds.[14] Employing surge capacity measures this could be increased to 4,258 physical intensive care beds.[14] An increase in critical care beds would require a simultaneous increase in number, and capability of RNs able to care for critically ill patients in ICUs. This would be required across Australia and locally within the state of Victoria. To fill this skill shortage one option would be to recruit suitably trained overseas nurses. However, due to national, and international border closures this was not possible. In addition, global demand for suitably trained nurses was high. Thus, a Critical Care Essentials COVID-19 course was designed to meet some of these pandemic training needs of local healthcare providers.

With the threat of COVID-19 overwhelming the Australian healthcare system looming, the federal and state governments sought numerous practical initiatives. Within the state of Victoria, Safer Care Victoria, a branch of the Department of Health and Human Services, the state authority charged to oversee, and support health services was investigating ways to tackle this problem.[15] The local University's department of nursing had commenced development of the "Critical Care Essentials COVID-19" program, which Safer Care Victoria proceeded to sponsor.

METHOD

The University's department of nursing model is directed towards postgraduate and specialist focused clinical education. It has a vision to lead the development of nursing practice knowledge through the quality contributions of research, learning, and teaching. The department's experience in online teaching, and cadre of academics with specialist knowledge, was ideally situated to promptly respond to a need to develop an online short course for frontline nurses. Safer Care Victoria's brief, and this course's aim, was to provide widespread access to foundational knowledge required for RNs to safely assess, plan, and provide supportive care to patients with acute respiratory failure due to COVID-19.

PEDAGOGY

Critical Care Essentials COVID-19 program was developed in alignment with local University's specialty programs. Learning encompasses a combination of flexible and enriched virtual learning[16] with a work integrated approach.[17] The enriched virtual model enables learners to complete their theoretical knowledge development through active and transformative interpreting experiences. This approach encourages critical self-reflection across a variety of learner-centred online and clinical forums. Clinical practice and practice-based research are deemed integral to the educational preparation of all the post-graduate learners, at all levels of professional practice. The tripartite knowledge translation model underpinning the course development had its foundations in both the Promoting Action on Research Implementation in Health Services (PARIHS) framework and Graham's Knowledge to Action framework,[18-20] see Figure 1.

Key components of this model include the focus towards embracing opportunity and innovation in co-creating change. Examples of our application of this model throughout the course development included: 1) drawing from international, national and local healthcare experiences (identify opportunity); 2) leveraging from existing resources including organisational partnerships, programs and knowledge (adapt knowledge to embrace opportunity); applying contextual knowledge and seeking early feedback to support the co-creation of a highly relevant program (tailor intervention for context); employing key stakeholders and local champions in implementation and ongoing evaluation (implement and evaluate); and focusing towards enabling innovations rather than structural barriers (innovate towards enablers).

Adopting an integrated flexible model was a key element for this short course. Learners were to develop knowledge through activities aligned with COVID-19's very specific requirements. To customise the learning in this short course, the work integrated approach was adapted to the use of case studies and simulation. This supported interpretation of learning through evaluation of simulated COVID-19 scenarios and the application of theoretical knowledge to case studies. Throughout these experiences, the course developers were available to respond to learners' feedback on an as-needed basis as learners work through course curriculum. This approach supported learners to develop and maintain a high degree of control over their learning experience,[21] within a nursing model of healthcare that is grounded in person-centredness.[22]

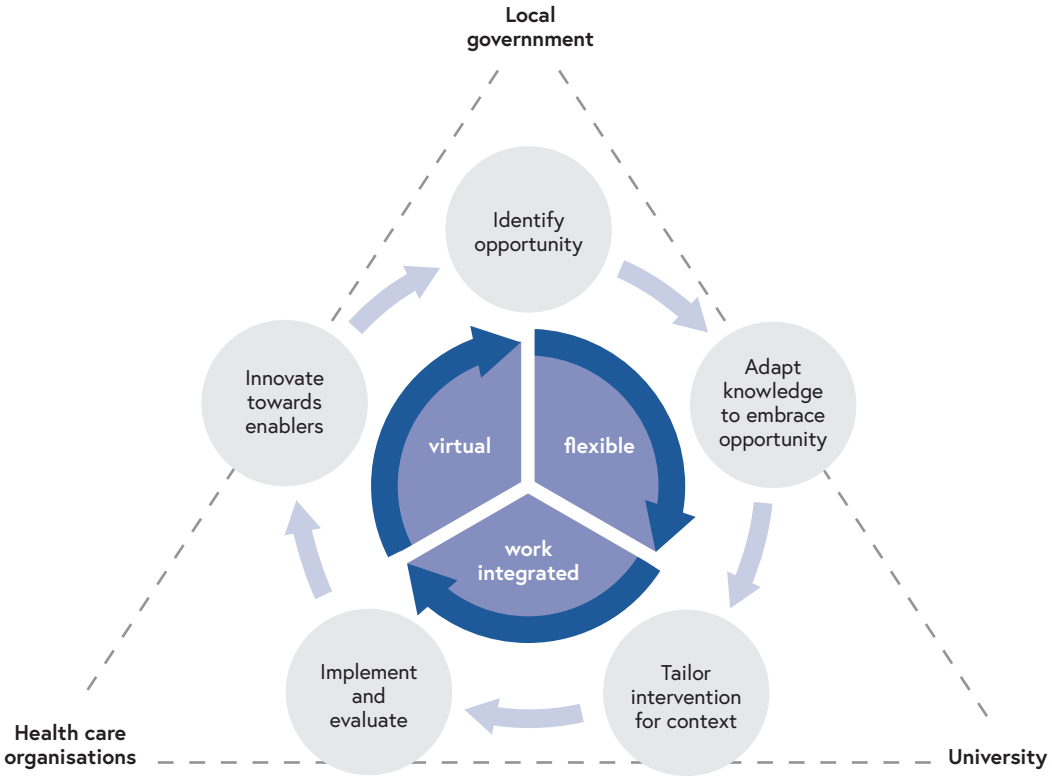

FIGURE 1: TRIPARTITE MODEL FOR KNOWLEDGE TRANSLATION

CRITICAL CARE ESSENTIALS COVID-19 PROGRAM DEVELOPMENT

Key academics from the local University were specifically identified for their acute and critical care practice and academic experience. In addition, they required strengths in management, development and delivery of flexible online programs of study. This specialist team comprised of acute and critical care nurses, educators, medical practitioners, learning designers from both clinical and non-clinical environments and the University's mobile learning team.

Emerging COVID-19 relevant publications along with national and international guidelines such as ANZICS,[12] WHO,[9] CDC,[10] NICE,[11] and Australian College of Emergency Medicine[23] were used to support the design of the program structure and build module content and learning activities. Comprehensive reviews of the literature were undertaken, inclusive of published research and guidelines, by teams allocated to each module. These literature reviews were topical and context dependent. Evidence was synthesised and modules were developed then peer reviewed by both academic and clinical specialists.

Ultimately, it was decided that such a program should be flexible and self-paced, delivered over approximately 10 hours (10 modules). The learning activities were developed to include case studies which needed to be interactive and included filmed simulations to demonstrate key safety aspects related to the assessment and interventions associated with caring for the person with COVID-19 in acute respiratory failure. Simulation was filmed, and case studies were developed across our contributing organisations including clinicians from Austin Health, Epworth Health, Northern Health, Peninsula Health, Royal Melbourne Hospital and Western Health.

A mobile enabled digital learning environment was chosen to facilitate streamlined delivery. This would in turn allow the learner to apply evidence-informed guidelines relevant to the clinical management of patients with COVID-19. The objective, by the end of 10 learning modules, was for the nurses to be able to apply evidence to the nursing assessment, interventions, and evaluation of care for patients with acute respiratory failure and a systemic inflammatory response as a result of COVID-19 infection. Additionally, these nurses would be prepared to identify core risks and control measures to then implement these to safely care for critically ill patients.

There were three central tenets for this Critical Care Essentials COVID-19 program. Firstly, healthcare organisations and frontline workers of Victoria, Australia would receive this course free of charge and receive Continuing Professional Development credit. Secondly, every module was to be underpinned by current evidence and aligned with key guidelines. Thirdly, but most importantly, the course would support the development of safer care for Victorian people.

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COURSE SYLLABUS

Each of the 10 modules encompass one hour of learning focused on specific learning outcomes that inform the care of the critically ill person with COVID-19. Practice and safety alerts are drawn from key current guidelines to support learning. Ten online modules drawn from case studies to move through the critical care patient journey from their presentation with acute respiratory and/or haemodynamic deterioration. An overview of the modules is presented in Table 1.

Modules begin with a focus on severe acute respiratory infection assessment, escalation of care, and initial respiratory focused interventions up to patient intubation. Focus then shifts to assessment, and interventions associated with caring for a sedated and ventilated patient with COVID-19. Then fundamentals of invasive positive pressure ventilation and key nursing considerations are introduced. Next, haemodynamic monitoring and interventions are explored, with a particular focus on the interpretation of assessment findings. These modules lead to a focused investigation of the care of the patient with sepsis

TABLE 1: OVERVIEW OF CRITICAL CARE ESSENTIALS MODULES AND LEARNING OUTCOMES

Module	Learning outcomes
Module 1: Core principles in assessing severe acute respiratory infection	• Explain fundamental nursing assessments of the patient with a severe acute respiratory infection • Describe the key findings that are important in determining the severity of an acute respiratory infection • Explore the triggers and strategies for escalation of care for the patient with a severe acute respiratory infection through clinical case study analysis.
Module 2: Management of hypoxic respiratory failure	• Explain the indications for high flow oxygen therapy and non-invasive positive pressure ventilation • Describe the common modes, settings, terminology, risks and benefits of high flow oxygen therapy and non-invasive positive pressure ventilation • Explore the nursing considerations for the critically ill patient receiving non-invasive ventilation through clinical case study analysis
Module 3: Arterial blood gas analysis and sampling	• Describe a structured approach to blood gas sampling and analysis • Explain the significance of the findings in the analysis of a blood gas • Explore key nursing considerations across a range of blood gas analyses from clinical case studies
Module 4: Airway management	• Describe rapid sequence intubation and recognise indications for its use • Explain communication priorities and personnel involved when planning and preparing for RSI • Describe the commonly used drugs and equipment and the RSI procedure, from pre-oxygenation to extubation • Explain the general, non-COVID-related risks associated with the RSI procedure and know how to mitigate them
Module 5: Invasive ventilation principles	• Describe the most common invasive positive pressure ventilation modes, settings and terminology • Explain ventilator-induced lung injury and dyssynchrony • Explore key nursing considerations for the critically ill patient receiving invasive positive pressure ventilation through clinical case study analysis
Module 6: Invasive ventilation management	• Explain the common alarm parameters, modifications and nursing actions taken to minimise harmful effects and risks of mechanical ventilation on the critically ill patient • Describe the monitoring and evaluation requirements for the patient receiving mechanical ventilation • Explore, through clinical case study analysis, risk mitigation and management strategies in the mechanically ventilated patient with acute respiratory distress syndrome
Module 7: Haemodynamic monitoring	• Explain the function, positioning and risks of invasive haemodynamic monitoring and blood sampling • Describe the key nursing considerations required to mitigate risk when managing the patient with an arterial line and/or central venous access device • Explore key nursing considerations for the critically ill patient with arterial and central venous access devices and pressure monitoring through clinical case study analysis
Module 8: Haemodynamic support	• Explain the most common intravenous fluid management strategies, vasopressors and inotropes used in the care of the critically ill patient • Describe the risks and benefits of the use of intravenous fluids, vasopressors and inotropes in the critically ill patient • Explore key nursing considerations for the critically ill patient receiving intravenous fluid, vasopressor and/or inotropic support through clinical case study analysis
Module 9: Care of the sedated and ventilated patient	• Explain the fundamental nursing interventions for health promotion in the critically ill paralysed, sedated, ventilated patient • Describe the relationship between the fundamental nursing interventions and the risks associated with critical illness and admission to critical care • Explore fundamental nursing considerations and risk assessment for the paralysed, sedated, ventilated patient through clinical case study analysis
Module 10: Specific guidelines for the management of sepsis in COVID-19	• Describe the key assessment criteria for sepsis • Explain the standard nursing considerations for the patient admitted to critical care with COVID-19 • Explore the major changes with respect to the management of sudden deterioration or cardiac arrest in the COVID-19 patient through clinical case study analysis

secondary to COVID-19. Throughout these modules there is a focus on health promotion for a sedated and ventilated patient, culminating in a specific module focused on the fundamentals of the holistic care of the critically unwell person. All assessments and interventions are addressed within the context of COVID-19, safety precautions including escalation of care, current evidence, and are linked to applied pathophysiology.

Responding to COVID-19 necessitated a rapid time frame for implementing this program. However, focused and detailed review remained a requirement. Content review was performed by academics and representatives from our clinical partners. These included representatives from Austin Health, Eastern Health, Royal Children's Hospital, and Royal Melbourne Hospital. All were asked to review content, consider applicability for their local context, and determine its appropriateness for general nursing education. This was done to ensure material was covered in such a way that could be easily understood without specialist prior knowledge.

ASSESSMENT

Self-assessment through brief tests based on case studies were used to provide immediate formative feedback to nurses. This empowerment of a student's own learning, through self-assessment, conforms to a Sound Standard model of developing understanding.[24] The course required participants to successfully complete all 10 modules and achieve 80% correct answers for a range of questions across all modules as a summative assessment. On completion of the program the RNs were credited with continuing professional development points.

Learning platform

Drawing on department of nursing's expertise, and experience in nursing education was one element to developing this program. In addition, effective online delivery of this content required specialised technical support. This is where ongoing partnership with the University's mobile learning team was invaluable in supporting the development and ongoing learner experience. The Mobile Learning Unit was established by the local University to connect academics and researchers with health professionals through online courses.[25] The platform can be accessed anytime, anywhere, and on nearly any device. The final program can be accessed via https://www.tfaforms.com/4822557.[26]

STUDENT EVALUATION

Several in-built learning management system strategies were utilised to collect evaluative feedback. This included collecting student accessing data and an end of course survey. Fourteen Likert style questions (Strongly Agree, Agree, Disagree, Strongly Disagree or Not Applicable) were asked on course completion. These questions related to various course aspects including appropriateness of content and online delivery method. Students were also invited to provide freeform feedback regarding course delivery and course administration.

Collecting student evaluations is an inherent aspect of this learning management system. Results from this satisfaction survey enables modifications to be made if required. Given this was a satisfaction survey ethical approval was not sought. However, internal governance approval was sought, and obtained for publication of de-identified data.

Comments were examined for themes. We adopted a structured stepwise approach to the thematic analysis, aligned with that recommended by Braun and Clark (2006).[27] First, we (RJ & NB) explored the respondent's feedback to become familiar with the data. We then determined initial content-related key threads within data. Next, we explored and identified patterns across these key threads within feedback, and finally reported key threads as themes.

RESULTS

COVID-19 Critical Care Essentials course was launched online in May 2020. In one month, 2,875 students had accessed our Critical Care Essentials course. Of these 678 (23.6%) students had completed all modules. Feedback was obtained from 395 respondents.

As shown in Figure 2, over 92% of respondents Strongly Agreed or Agreed to all 14 Likert style questions.

Qualitative feedback of the course revealed four core themes: applicability, accessibility engagement, and endorsement.

APPLICABILITY

Most students who completed this course found the content useful and that it would be relevant to practice.

> *"I currently have an allied health role in ED, but the course and knowledge helped me gain a better understanding into patients health". Participant 5vEIEAY*

> *"Fantastic course that beat my expectations. Useful and very relevant. Well done". Participant 5xfbEAA*

> *"Felt the course helped ease the stress of upskilling for ICU in PACU if required with COVID19". Participant 506sEAA*

> *"Amazing course to upskill the ICU modules and gave good preparation to attend COVID 19 patients surge if it occurs". Participant 5rgFEAQ*

> *"This was a great course. Very relatable to clinical practice". Participant 5vXtEAI*

> *"Excellent course content with interactive videos- phenomenal". Participant 500LEAQ*

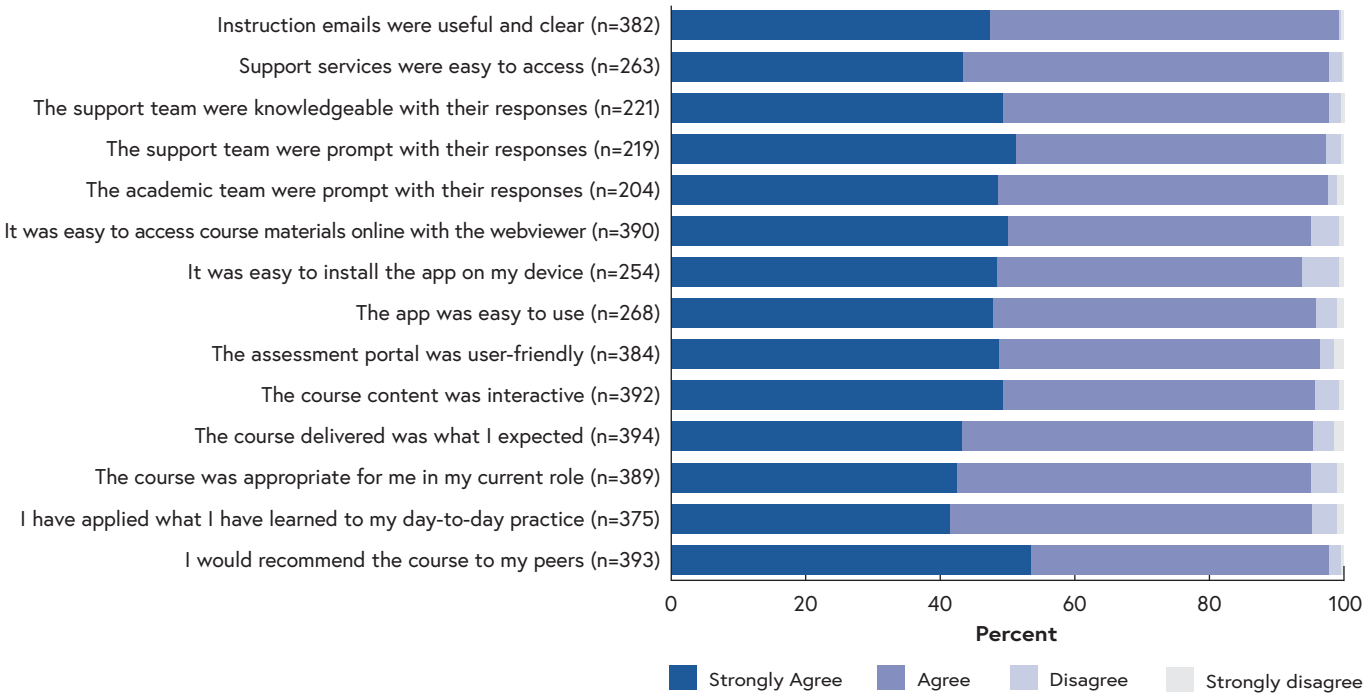

FIGURE 2 STACKED BAR CHART OF LIKERT RESPONSES (WHERE RESPONSE WAS 'NOT APPLICABLE' THIS HAS BEEN REMOVED)

Students with some prior experience of critical care utilised this course as a valuable refresher.

> *"Extremely relevant course for anyone with ICU experience. Well done to the course team". Participant 65CsEAI*

> *"Good information and learning activities which complemented hospital ICU upskill training". Participant 5norEAA*

> *"This course was absolutely fantastic. It summarised my post grad done seven years ago brilliantly. I hope this kind of course is available to anyone to refresh their knowledge in future. I couldn't recommend this more". Participant 5unOEAQ*

Though, for a few, content was new and offered some challenges to learning.

> *"The part about ventilation was pretty difficult to comprehend. Perhaps give us clinical scenarios of where each mode or settings can be used, explain it more simpler ways". Participant 5zDxEAI*

ACCESSIBILITY

Most students found this course easy to access on various devices.

> *"Great to be able to access this online, the material was well presented". Participant 5sYkEAI*

> *"I think the virtual classroom worked very well-the learning tasks were brilliant". Participant 650NEAQ*

> *"Easy to work through course content on both a laptop and a phone which is very useful". Participant 61n2EAA*

However, some content did not appear compatible with all devices.

> *"Overall I really enjoyed the course. I accessed the course via my iPad and I was not able to access all the video links, particularly in the case studies and scenarios. Otherwise I got a lot out of the course". Participant 6EoxEAE*

ENGAGEMENT

Student respondents reported that content, and its presentation, kept them engaged.

> *"To be honest I think this was the best nursing course I ever attended-the method of presenting highly integrated, complex, and broad areas of study were presented in a very succinct manner. Each line, each video clip was rich in meaning. The opportunity of improving your learning through formative and summative assessment reviews was also excellent-a great way to hone your learning". Participant 650NEAQ*

A particular element that appealed was this course's interactive design:

> *"The interactive parts of the course were useful. I particularly found the case studies helpful". Participant 5vXtEAI*

> *"I really enjoyed the interactive content, i.e. breath sound assessments!! and working through scenarios like the blood gas analysis to name a couple". Participant 5uamEAA*

> *"Really good course, very interactive". Participant 5vPQEAY*

ENDORSEMENT

Many who completed this course stated they would recommend this course to their colleagues:

> *"I have already recommended this course to my peers". Participant 5ugAEAQ_*
>
> *"I recommend this course to my colleagues. Very useful and interesting". Participant 509BEAQ_*
>
> *"One of the best courses I have completed. Would love to complete another course and would love one on PA catheters. Thanks". Participant 5sveEAA*

DISCUSSION

This paper reports development, implementation, and evaluation of an evidence-based online critical care nursing education program to upskill a registered nurse workforce in response to the COVID-19 pandemic. In a local context this online program, with collaboration of a local department of nursing and partners is unique. The focused online flexible learning specific to care of critically unwell people with COVID-19 provides a strong evidence-based approach to rapid upskilling of RNs. Furthermore, this program could easily be adapted to the broader community, whether national or international.

Responses to COVID-19 pandemic have given weight to the adage 'Necessity is the mother of invention'.[1] Thus, numerous agencies, local and internationally, have developed online COVID-19 resources. Of note is WHO's Clinical Care Severe Acute Respiratory Infection course. These courses are freely available to all healthcare professionals and in multiple languages. Courses were developed for clinicians in intensive care units from low and middle-income countries managing patients with severe forms of acute respiratory infection, including COVID-19.[28] This is a great resource, however some program content is not directly applicable to high income countries.

Australian specific online COVID-19 information has been developed. The Australian government in conjunction with Aspen Medical launched a COVID-19 infection control training program aimed at health professionals.[29] This program consists of slides and an end of program quiz. Although effective, this training program is targeted at all healthcare professionals and covers only general knowledge of COVID-19. It does not assist in the development of RNs skills to care for specific issues related to COVID-19. The Australian College of Nursing[30] and the Australian Nursing and Midwifery Federation[31] also have COVID-19 resources. These resources are in the form of brief information, links to other resources, or with modules predominantly only available to their members and relate to a general focus on infection control not critical care provision.

At the time of our courses' development there were limited options to develop nursing critical care skills for managing COVID-19 patients via an online format. To address COVID-19 critical care knowledge deficits, other courses have become available.[32-34] Many of these have occurred since our Critical Care Essentials course was initiated and launched. However, many of these courses lacked a nursing or Australian focus.

An upskilling for COVID-19 critical care course was developed in Australia. This was a Medcast Pty Ltd and Australian College of Nursing's collaboration.[35] Funded by the Australian government, this project aimed to deliver online training to eligible RN's. This intended to build an RN's capability to respond to COVID-19. However, a component of this course was 11 Zoom sessions. These Zoom sessions were scheduled at different times to support Australia's time zone variations.[36,37] However, this still required senior critical care educator or facilitator coordination.[36,37] In addition, for this course's duration, discussion forums were facilitator monitored.[36,37] Our Critical Care Essentials course employed a self-directed learning, and assessment, focus. This enabled students to complete at their own pace and at a time that suited individual students.

Another benefit of not having a direct facilitator requirement is that a course can be ongoing. Medcast's SURGE Critical Care education project was delivered between April and August 2020.[36,37] Whilst they do offer an Ongoing Access Bundle,[38] this is only available for students who have completed their course. Our Critical Care Essentials course has no facilitator monitoring.

STRENGTHS AND LIMITATIONS

At the outset it appears our Critical Care Essentials course fills a gap and offers valuable, and flexible, learning for RNs. Utilising a Mobile Learning Unit platform permits flexibility that enables learners access to materials "anytime and anywhere". When learning can occur on a choice of devices such as a mobile, tablet or desktop, this can offer greater convenience for a nursing and healthcare worker student.

Whilst feedback was promising there are some notable limitations that should be considered. Course feedback was only obtained from those who completed our Critical Care Essentials course. Thus, comparisons between completer, and non-completer students were not able to be made. Obtaining these data could have elicited vital feedback regarding course functionality and content. Thus, eliciting further insights into barriers and enablers to uptake and inform future programs.

Another consideration is that of clinical applicability. From freeform feedback some students, with previous critical care experience, indicated that this course was of value. However, how all students used information gathered from this course in practice remains unknown. A requirement for a rapid course launch necessitated a pragmatic approach to

course evaluation. Thus, whilst potentially of interest, it was not feasible to evaluate in-practice competence for course participants. Whilst full course evaluation was not possible, we believe that this work demonstrates practical guidance to delivering a pandemic educational response. Future exploration of our tripartite model for knowledge translation could include participatory action research with groups of potential users of future generations of this program. This might reveal data and insights from the potentially synergistic interaction of participants.

CONCLUSION

COVID-19 has been an impetus for educators to think outside the "box" when developing learning programs. Critical Care Essentials is a program that draws from existing knowledge of nursing the critically ill person and applies this specifically to the context of the person with COVID-19. This online program is evidence based, timely and relevant, and demonstrates how a collaboration of academics, clinicians, government and industry partners can make a difference in the provision of safer care.

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