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Expedited upskilling of intermediate care nurses to provide critical care during the COVID-19 pandemic

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Abstract

Aim: Describe the strategy, efficacy and preferred mechanisms of training used to rapidly upskill intermediate care nursing staff to provide critical care during the COVID-19 pandemic.

Design: Descriptive study.

Methods: The strategy used from March through December 2020 to upskill nurses in an intermediate care unit to administer critical care upon rapid conversion of the intermediate care unit to an intensive care unit for coronavirus disease 2019 is described. Training and education included paired staffing models, interdisciplinary education, skills days and self-directed learning. Nurses engaged in this upskilling process were surveyed to evaluate their confidence in new critical care competencies and educational preferences.

Results: Of 38 intermediate care nurses, 35 completed training and began independent intensive care practice. Nursing confidence in critical care competencies increased steadily. Nurses demonstrated the greatest preference for peer education models, particularly those incorporating the hospital's pre-existing medical intensive care nurses.

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KEYWORDS
COVID-19, critical care, intermediate care, nurse education, pandemic, skill enhancement

1 | INTRODUCTION

As of February 2022, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) had infected more than 87 million people in the United States and caused more than 894,000 deaths (*COVID Data Tracker*, 2021). Of those hospitalized with coronavirus disease 2019 (COVID-19), approximately 25% require intensive care (Murthy et al., 2020; Wang et al., 2020). In order to accommodate this acute increase in volume of critically ill patients, hospitals have supplemented medical critical care beds by repurposing surgical intensive

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care unit (ICU) beds (Douin et al., 2021). Many institutions have also needed to rapidly commission new critical care beds (Douin et al., 2021). While this rapid expansion of clinical services has been essential to manage critically ill patients with COVID-19, an equally important challenge that has received less attention is increasing the pool of nurses capable of providing critical care. The failure to do this not only jeopardizes the welfare of patients, but makes nurses more vulnerable to burn out (Wynne et al., 2021). In this descriptive study, we report the upskilling of nurses from an intermediate care unit (IMCU) to provide critical care.

2 | BACKGROUND

Prior to the pandemic, this academic hospital had 121 fully staffed ICU beds, of which 24 were in the medical ICU. In March 2020, the hospital identified the medical IMCU as a location for critically ill patients with COVID-19. While IMCUs are present in approximately 60% of United States hospitals (Sakr et al., 2015; Sjoding et al., 2016), they are not intended to administer critical care. Rather, they are designed for patients with care and monitoring needs that surpass what is feasible on general medical or surgical acute care floors, but do not require the human and technical resources of typical ICU patients (Prin & Wunsch, 2014). Converting the IMCU into a COVID-19 ICU created an additional 21 beds for critically ill patients with COVID-19 but also staffing challenges. Initially, IMCU nurses were supported by nurse colleagues with critical care experience who rotated into the unit from cardiac or surgical ICUs (elective surgeries had been curtailed significantly). However, as the first surge abated and elective surgeries resumed, this support was less available and a mechanism to "upskill" IMCU nurses to provide critical care was needed. While a variety of strategies, including "team-based" and "tiered" approaches to upskilling have been using in the United States, the efficacy of these strategies is not known (Bennett & Cunningham, 2020; Castellucci, 2020; Schneider & Schneider, 2020).

Due to the pressing challenges and dynamic features of the pandemic, we adopted educational and training interventions based on established models of nursing education (Tariga, 2021). This descriptive study provides an account of our approach to upskilling nursing staff to meet the acute increase in demand for critical care nursing during the COVID-19 pandemic.

3 | THE STUDY

3.1 | Aim and objectives

The aim and objective of this study was to describe the strategy, efficacy and preferred mechanisms of training used to rapidly upskill the nurses of an IMCU in an urban academic medical centre to provide critical care during the COVID-19 pandemic.

4 | METHODS

4.1 | Design

This descriptive study details the iterative skill building process that occurred over the course of 10 months (May–December 2020) in the IMCU. The process was based on structural, procedural and educational interventions designed by the unit's nursing leadership and nurse educator. Further, the process was modelled to allow nurses to develop core critical care competencies that were identified by medical ICU and IMCU nurse educators, the IMCU clinical nurse specialist (CNS) (a former MICU nurse) and the medical ICU clinical resource nurse (Appendix S1). Educational resources and training via supervised patient care models were evaluated over time, with periodic adjustment based on staff feedback collected via a survey administered in April, May, July and December 2020 (see Section 4.4 below).

4.2 | Setting and participants

4.2.1 | Setting

The work was conducted in an academic university hospital with 1,000 beds, 262 of which are managed by the Department of Medicine. These include a 24-bed Medical ICU and a 12-bed Cardiac ICU, both staffed by residents with faculty supervision. The remaining beds include a 21-bed medical IMCU (the unit of focus in this study), a 12-bed Cardiac IMCU and 193 floor beds staffed by resident/faculty teams or hospitalists directly.

A detailed description of the medical IMCU before the pandemic has been reported previously (Simpson et al., 2017). Briefly, the IMCU was a 21-bed unit where all patients received continuous pulse-oximetry and telemetry and provider staffing was via an open model that allowed up to 10 different medical teams to admit and manage patients. The primary provider for all patients was a medical resident supervised by faculty. Continuity was only disrupted if ICU transfer were to occur. Upon transitioning to a dedicated COVID-19 unit with critical care capacity, the unit switched to a closed provider staffing model.

Before the pandemic, nursing shifts were staffed by a charge nurse and resource/"mentor" nurse without primary patient care responsibilities, one to four clinical technicians, a unit associate, a unit clerk and a nurse: patient ratio of 1:3. Shifts were 12-hr with staff changes at 7 a.m. and 7 p.m. This staffing model was achieved with 58 full-time nurse positions. To work independently, each nurse completed an 11-week IMCU orientation program of classroom teaching, self-education, supervised bedside learning and assessments covering specific pharmacology, arrhythmia detection and general knowledge. A critical care nursing credential was not required to work in the unit. Clinical operations were overseen by a full-time nurse manager, an assistant manager, a CNS, two lead clinical nurses and a physician medical director. Notably, most of the

leadership team had significant experience working in critical care before joining the IMCU staff.

4.2.2 | Participants

The training experience and data presented in this descriptive study are only reflective of nursing staff already working on the IMCU who did not have previous critical care experience (i.e. travelling nurses not included). Additionally, the critical care competency was limited to those that (1) had at least 6 months of nursing experience, (2) chose to participate (the program was not mandatory) and (3) were not ineligible due to medical conditions or pregnancy, which at the time were felt to be contraindications to the direct care of patients with COVID-19. However, all nurses on the unit had access to training as they were helping care for critically ill patients.

4.3 | Critical care skill building resources and process

In March of 2020, IMCU leadership initiated the development and use of interventions and resources to upskill unit-based nursing staff (Figure 1). These included unique staffing models, the development and dissemination of educational resources and in-person skills days.

4.3.1 | Self-directed learning resources

A bibliography of web-based resources was assembled by the IMCU Nurse Educator and Clinical Nurse Specialist and included, (1) Web-based materials endorsed by the American Association of Critical Care Nurses (AACN) with emphasis on the care of critically ill patient with COVID-19 (*Coronavirus (COVID-19) Resources*, 2021), (2) videos demonstrating core procedures (i.e. proning, managing continuous renal replacement therapy [CRRT]) and (3) just-In-Time training for hospital endorsed practice guidelines specific to COVID-19 care, including management and titration of sedation, use of vasopressors and paralytics and troubleshooting ventilator alarms and endotracheal tubes.

4.3.2 | Interdisciplinary education

Joint Nurse-Physician Rounds: Prior to the pandemic, the open provider staffing model prohibited consistent multidisciplinary work rounds. However, upon transitioning to a dedicated COVID-19 unit, a close provider staffing model was adopted and nurses played an integral part in rounds each day.

Faculty Lecture Series: Critical care faculty provided formal lectures via video conference on key topics such as basics of mechanical ventilation, weaning and sepsis. Lectures were recorded and available for review on a unit-based education site.

4.3.3 | In-person ICU skills days (May–June 2020)

In response to April and May survey findings, the IMCU Nurse Educator and IMCU Clinical Nurse Specialist developed an 8-hr skills day targeting competencies in which staff reported low confidence (i.e. proning, management of paralytics and train of four testing, management of CRRT and logistics of intubation and extubation). The first 4 hr of the skills days were completed independently and included review of existing hospital protocols and procedures and watching hospital-produced videos addressing the areas of focus. The second 4 hr were in-person instruction with hands-on practice, case study discussions and an expert panel presentation. The day concluded with an interactive group quiz via a web-based platform. This skills day was offered at five different times in May and June.

4.3.4 | Supervised patient care models

Phase 1 (March–May): A "2:2" model with one IMCU nurse and one visiting credentialed ICU nurse or Certified Registered Nurse Anaesthetists (CRNA) was used to staff two critically ill patients. ICU nurses were sourced from an institutional pool created to support ICU care in non-traditional locations and included permanent and agency nurses from cardiac, neurological, surgical and medical ICUs and CRNAs. The objective of these pairings was for IMCU nurses to learn by doing with the benefit of direct interaction with a nurse colleague trained in critical care nursing.

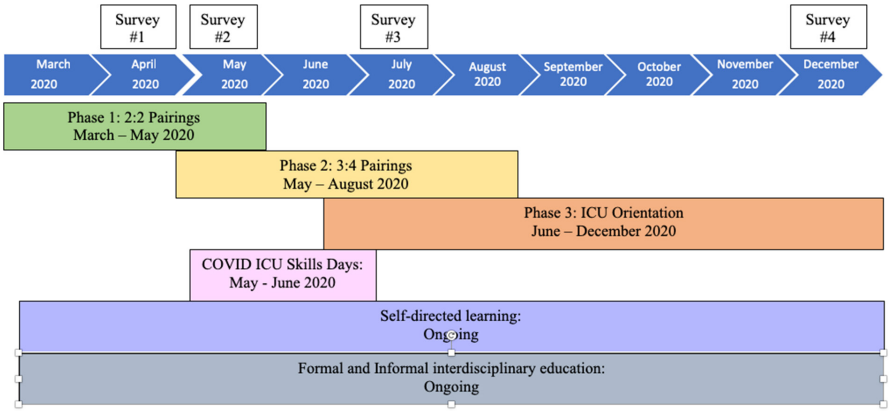

FIGURE 1 The timeline of different phases of upskilling, elements of education and timeline of survey assessments are shown

Phase 2 (May–August 2020): Staffing occurred via a "3:4" model in which three nurses (i.e. 2 IMCU nurses supervised by 1 critical care nurse) cared for four ICU patients.

Phase 3 (June–December 2020): In May of 2020, it became clear that critical care nursing support from other units would be less available over time as elective procedures had resumed. In response, a formal pathway for critical care orientation was developed. To set clear expectations, the previously described core competencies were presented to IMCU nurses at the beginning of ICU orientation in a checklist format and preceptors were responsible for documenting successful demonstration of these competencies (Appendix S1). This formal orientation occurred in the IMCU or medic ICU with each orientee assigned to the direct care of two critically ill patients, but directly supervised by a medical ICU nurse preceptor. Efforts were made to limit the number of preceptors each IMCU nurse worked with so there would be continuity in the orientation process. The number of orientation shifts was dependent on the needs and comfort level of each IMCU nurse, their ability to demonstrate core critical care nursing competencies and any progress concerns from the preceptor, but could not be <9. This minimum number was based on the observation that the first set of nurses to go through the ICU orientation process demonstrated competency in 6–9 shifts. After orientees completed dedicated orientation shifts and had successfully demonstrated competency, they were supervised 1:1 by a dedicated mentor without other responsibilities for 1–4 additional shifts, depending on the orientee's comfort level.

Lastly, the IMCU CNS verified completion of the competency checklist and discussed independent practice with the orientee and preceptor before the orientee could begin ICU care independently. If there were any items missed during orientation, they were reviewed by the CNS with the orientee as would normally be done at the end of orientation to be sure an orientee is familiar with all items prior to independent practice. Comfort of the orientee in moving to independent ICU care was paramount and none were scheduled in this role without their explicit endorsement. Nurses who successfully completed Phase 3 were able to care for critically ill patients independently.

4.4 | Data sources/collection

Basic demographics including age, tenure as an IMCU nurse, and gender of nurse participants were recorded from unit administrative files for nurses pursuing critical care credentialing. Trainee experience was captured via a survey tool (Qualtrics XM) administered in April, May, July and December of 2020. The survey had three domains developed by unit leadership assessed (1) confidence in 13 different critical care nursing competencies, (2) which forms of education were of greatest perceived value and (3) a free text section to identify other educational resources orientees used and education gaps they perceived. The survey was distributed to all nursing staff by email though responses were anonymous. Note that domains 2 and 3 were only included beginning with the May survey.

4.5 | Data analysis

Continuous variables are reported as means with standard deviations (SDs) or medians with interquartile ranges (IQRs) and categorical variables as counts and proportions. Comparisons between survey results are made using a two-sample test of proportions. A p-value ≤.05 was deemed to be statistically significant. All statistical analyses were conducted using STATA 16.1 (Stata Corp). Responses to free text questions included in the surveys were grouped by theme.

4.6 | Ethical considerations

The study was approved by the by the university's Institutional Review Board.

5 | RESULTS

Of the 38 IMCU nurses eligible for critical care credentials, 35 completed ICU orientation and began independent practice as ICU nurses during the 10 months of this study. They had a median age of 25 years (IQR: 24–38), 33 (89%) were women and had worked on the IMCU a median of 1 year (IQR: 1–3). The median time to independence following start of formal ICU orientation was 38 days (IQR: 26–51).

5.1 | Survey findings

Survey response rates were 48% in April (pre), 72% in May, 41% in July and 52% in December (post).

5.1.1 | Domain 1 – Nursing confidence

Orientee confidence generally increased between April–December 2020 for most critical care nursing competencies (Table 1, Figure 2, Table S1). In April, the majority of respondents identified as "not confident" or only "somewhat confident" in most competencies including vasopressors (71.5%), prone positioning (8.75%), paralytic use including train of four interpretations (96.4%), troubleshooting ventilator alarms (67.9%), ventilator settings (78.6%), intubation and extubation (96.4%), CRRT (96.4%) and hemodynamic instability (85.7%). Conversely, at baseline most identified as "confident" in the use of high flow nasal oxygen (HFNO) (85.7%), checking bedside emergency equipment (71.4%), blood gas interpretation (67.9%) and use of arterial lines (67.9%). By December, significant increases in confidence were noted in nine competencies, with trends toward increased confidence using HFNO and in checking emergency equipment. There were no changes in confidence when interpreting blood gasses or in understanding ventilator settings.

TABLE 1 Nursing confidence in critical care competencies

Competency	April (n = 28)			May (n = 42)			July (n = 24)			December (n = 25)		
	NC	SC	C	NC	SC	C	NC	SC	C	NC	SC	C
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Sedation drips/boluses	6 (21.4)	15 (53.6)	7 (25.0)	7 (16.7)	20 (47.6)	15 (35.7)	1 (4.2)	8 (33.0)	15 (62.5)	1 (4.0)	1 (4.0)	23 (92.0)
Vasopressor use	5 (17.9)	15 (53.6)	8 (28.6)	4 (9.5)	12 (28.6)	26 (61.9)	1 (4.2)	5 (20.8)	18 (75.0)	1 (4.0)	1 (4.0)	23 (92.0)
Prone positioning	15 (53.6)	9 (32.1)	4 (14.3)	7 (16.7)	21 (50.0)	14 (33.3)	1 (4.2)	11 (45.8)	12 (50.0)	0 (0)	2 (8.3)	22 (91.7)
Paralytic use/train of four monitor	18 (64.3)	9 (32.1)	1 (3.6)	15 (35.7)	17 (40.5)	10 (23.8)	3 (12.5)	9 (37.5)	12 (50.0)	1 (4.0)	6 (24.0)	18 (72.0)
Ventilator management	7 (25.0)	12 (42.9)	9 (32.1)	15 (35.7)	20 (47.6)	7 (16.7)	2 (8.3)	14 (58.3)	8 (33.3)	1 (4.0)	10 (40.0)	14 (56.0)
CRRT	21 (75.0)	6 (21.4)	1 (3.6)	22 (52.4)	18 (42.9)	2 (4.8)	10 (41.7)	12 (50.0)	2 (8.33)	4 (16.0)	14 (56.0)	7 (28.0)
HFNO	0 (0)	4 (14.3)	24 (85.7)	0 (0)	3 (7.3)	38 (92.7)	0 (0)	1 (4.2)	23 (95.8)	0 (0)	0 (0)	25 (100.0)
Intubation and extubation	14 (50.0)	13 (46.4)	1 (3.6)	12 (28.6)	22 (52.4)	8 (19.1)	3 (12.5)	16 (66.7)	5 (20.8)	1 (4.0)	10 (40.0)	14 (56.0)
Managing hemodynamic instability	3 (10.7)	21 (75.0)	4 (14.3)	2 (4.8)	33 (78.6)	7 (16.7)	0 (0)	13 (54.2)	11 (45.8)	0 (0)	9 (36.0)	16 (64.0)
Checking emergency equipment	1 (3.6)	7 (25.0)	20 (71.4)	1 (2.4)	11 (26.2)	30 (71.4)	0 (0)	1 (4.2)	23 (95.8)	0 (0)	2 (8.0)	23 (92.0)
Interpreting ABGs	1 (3.6)	8 (28.6)	19 (67.9)	3 (7.3)	21 (51.2)	17 (41.5)	0 (0)	6 (26.1)	17 (73.9)	0 (0)	10 (40.0)	15 (60.0)
Understand ventilator settings	5 (17.9)	17 (60.7)	6 (21.4)	11 (26.2)	22 (52.4)	9 (21.4)	3 (12.5)	18 (75.0)	3 (12.5)	2 (8.0)	18 (72.0)	5 (20.0)
Use of arterial lines	0 (0)	9 (32.1)	19 (67.9)	4 (9.5)	18 (42.9)	20 (47.6)	0 (0)	4 (16.7)	20 (83.3)	0 (0)	2 (8.3)	22 (91.7)

Abbreviations: ABG, arterial blood gas; C, confident; CRRT, continuous renal replacement therapy; HFNO, high flow nasal oxygen; NC, not confident; SC, somewhat confident.

5.1.2 | Domain 2 – Preferred learning strategies

While greater than a third of respondents to each administration of the survey felt all interventions were "somewhat helpful", what was "most helpful" changed over time (Table 2, Table S2). In May (Figure S1), the majority of nurses reported that education from a "paired" ICU RN during their shift was the most helpful form of education (65.9%), followed by education from a "float" ICU RN during their shift and then use of institutional online policies (28.6%). Conversely, nurses reported that journal articles were the not helpful (54.6%).

In July (Figure S2), this domain was expanded to include the COVID ICU Skills Days and the formal ICU orientation. Formal ICU orientation was identified as most helpful (75.0%), followed by being "paired" with an ICU RN during a shift (62.5%) and the ICU Skills Day (33.0%). Again, the majority of respondents felt journal articles were not helpful (58.3%).

In December (Figure S3), the majority of nurses continued to rate the formal ICU orientation as most helpful (88%), but education via physician providers during rounds and shifts increased (52%). The majority of respondents now identified journal articles as being somewhat helpful (60%).

5.1.3 | Domain 3 – Free text comments

The May, July and December surveys included two free text questions. Orientees identified several additional educational resources. These included watching web-based YouTube videos and websites such as American Association of Critical Care Nurses (AACN) and DKBMed (*Coronavirus (COVID-19) Resources*, 2021; "COVID-19 Keeping Up with a Moving Target,", 2021). Several nurses also reported that working with ICU-trained nurses, including former ICU nurses working in unit leadership positions, was particularly helpful. This was especially true if the ICU-trained nurses were from the hospitals own medical ICU who were knowledgeable about medical critical care at the institution and intuitional critical care policies, protocols and procedures.

Key gaps in education reflected competencies for which nurses felt less confident even at the end of training. These included management of CRRT, understanding ventilator settings and ventilator strategies and approaches to ventilator weaning.

6 | DISCUSSION

In this descriptive study, we describe the process of upskilling 35 IMCU nurses to deliver critical care in the context of a rapidly evolving pandemic. Using traditional models of nursing education, including preceptor models, competency-based training, videos and access to hospital-based policies, orientees demonstrated consistent increases in confidence in all but two critical care competencies (i.e. ventilator settings and blood gas interpretation)

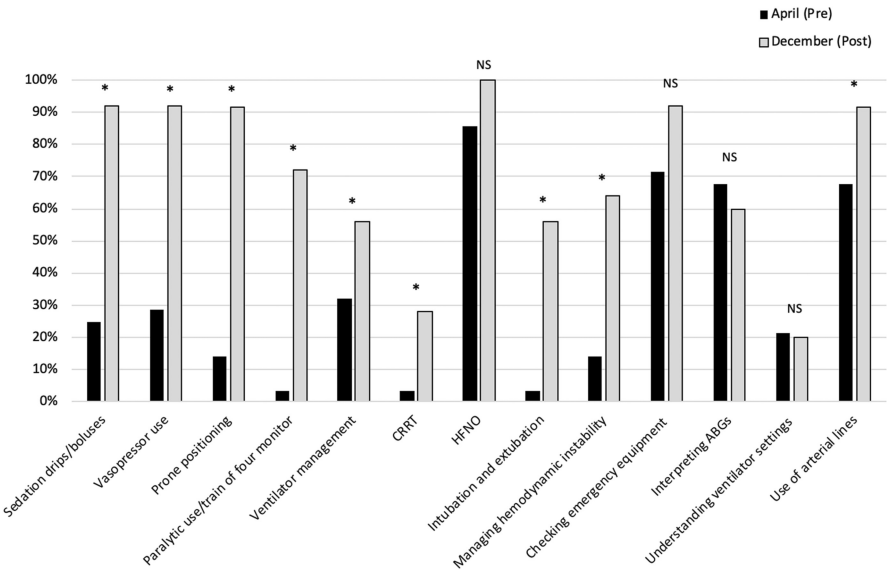

FIGURE 2 The percent of nurse trainees expressing confidence in each of 13 elements of delivering critical care in April and December of 2020. NS, not significant. *A statistically significant difference ($p < .05$)

during the period of observation. While understanding and comfort in the use of HFNO was minimally changed, there had been a high level of comfort in managing this therapy at baseline. The most highly valued element of the educational over time was being "paired" with a trained ICU nurse, especially if the ICU nurse was from the institutions own medical ICU and formal ICU orientation. Journal articles were generally felt to be a less helpful resource, which suggested active rather than passive learning was preferred. Over time, education from the provider team was valued more and by December it was the second most valued source of education.

The greatest gains in confidence occurred in critical care competencies unknown to nurses prior to COVID-19, such as the management of paralytics and sedation. This may be a function of most patients admitted to the unit being dependent on these therapies. This necessitated repeated practice of these skills and motor retention, a key component of learning (Breslow et al., 2004).

In contrast to the use of sedation and paralytics, confidence in interpretation of blood gasses and understanding ventilator settings changed little during the period of observation. This was despite frequent engagement with these topics. In fact, in Domain 3 of the survey, respondents identified their understanding of different ventilation strategies as an educational gap. Perhaps as exposure to mechanically ventilated patients increased, awareness of the nuances in managing ventilators grew. This may be true of blood gas interpretation as well. It is possible nurses may not have appreciated the complexity of these two skills, but as they learned more, their appreciation of the complexities grew (and thus their confidence declined). For mechanical ventilation, it is also possible that confidence was affected by observing inconsistent management strategies by different providers. Indeed, while some argued for the use of standard of care ventilatory approaches for the COVID-19 population, others supported different strategies that were untested at the time, but intuitively appealing (Gattinoni & Marini, 2021; Rose et al., 2020).

Confidence in CRRT remained low during the period of observation and was also one of the most commonly cited educational gaps in Domain 3 of the survey. Prior to the COVID-19 pandemic, the institution did not have a formal CRRT training program for RNs. Thus, even "experienced" ICU nurses had varied levels of comfort and ability with this modality. Therefore, peer-to-peer training was not of great value for this skill.

Peer education from ICU nurses was rated as one of the "most helpful" forms of education across all administrations of the survey. The value of peer-learning in nursing is well established, as peers are uniquely positioned to identify learning needs and are viewed as non-threatening and non-judgmental.(Ringerman et al., 2006) Notably, medical ICU nurses, who may have been viewed as "near-peers", were felt to be most helpful. Near-pears are better able to meet the learning needs of trainees as they are demographically and psychosocially similar to learners (Ten Cate & Durning, 2007). Peer-learning as a social learning approach is also best suited when the learner identifies with the trainer or role model (Burke & Mancuso, 2012). Indeed, as a function of working in the same department with overlapping workflows, procedures and protocols before the pandemic, it is not surprising IMCU nurses (learners) identified more medical ICU nurses (trainers). By contrast, visiting CRNAs or surgical ICU nurses, who normally work in settings with vastly different workflows, ways of doing things and culture, may not have had the opportunity to be as effective. For these reasons, formal ICU orientation (Phase 3) relied on mentorship by medical ICU nurses.

It is notable that in May of 2020, 87.8% of trainees rated provider interactions as only somewhat helpful or not helpful and by December, 52% rated these interactions as most helpful. This finding was likely predictable and explained by the transition to a closed provider staffing model upon conversion of the IMCU to an ICU in March of 2020. Closed provider staffing models have previously been demonstrated to significantly facilitate communication between providers and nursing colleagues,

TABLE 2 Most useful learning strategies

	May			July			December		
	(*n* = 42)			(*n* = 24)			(*n* = 25)		
	NH	SH	MH	NH	SH	MH	NH	SH	MH
Resource	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Paired ICU RN	0 (0)	14 (34.2)	27 (65.9)	1 (4.2)	8 (33.3)	15 (62.5)	3 (12.0)	11 (44.0)	11 (44.0)
ICU Float RN	8 (19.5)	16 (39.0)	17 (41.5)	4 (16.7)	13 (54.2)	7 (29.2)	4 (16.0)	15 (60.0)	6 (24.0)
MD interactions	11 (26.8)	25 (61.0)	5 (12.2)	2 (8.3)	16 (66.7)	6 (25.0)	0 (0)	12 (48.0)	13 (52.0)
Videos	9 (21.4)	25 (59.5)	8 (19.1)	8 (33.3)	13 (54.2)	3 (12.5)	3 (12.0)	20 (80.0)	2 (8.0)
Articles	23 (54.8)	17 (40.5)	2 (4.8)	14 (58.3)	10 (41.7)	0 (0)	9 (36.0)	15 (60.0)	1 (4.0)
Policies	9 (21.4)	21 (50.0)	12 (28.6)	2 (8.3)	15 (62.5)	7 (29.2)	0 (0)	13 (52.0)	12 (48.0)
ICU skills day	N/A	N/A	N/A	4 (16.7)	12 (50.0)	8 (33.3)	4 (16.0)	10 (40.0)	11 (44.0)
Formal ICU orientation	N/A	N/A	N/A	0 (0)	6 (25.0)	18 (75.0)	0 (0)	3 (12.0)	22 (88.0)

Abbreviations: MH, most helpful; N/A, not applicable (not available prior to this assessment); NH, not helpful; SH, somewhat helpful.

nurse confidence in providers and opportunities for nurse education during multidisciplinary rounds (Hager et al., 2022; Haut et al., 2006).

There are important limitations to this study. First, the findings represent the experience of one nursing unit responding to the priorities of a single academic medical centre. Further, our data collection systems were created de novo and have not been validated in other settings. As such, our strategy and experience may not be generalizable to other centres. Second, the competency checklist and training reported here were tailored to the management of patients that were critically ill due to COVID-19. We do not know if our accelerated approach to upskilling would be successful or appropriate to other types of critically ill patients. Third, while formal orientation occurred rapidly beginning in June, many participants had exposure to critical care as a function of being IMCU nurses at baseline and having worked on the unit with supervision beginning in mid-March. The truncated timeline for orientation may not be appropriate for nurses with less baseline experience or outside the context of a pandemic.

In spite of these limitations, this descriptive report strongly supports the feasibility of rapidly upskilling nurses in the care of critically ill patients. As we strive to prepare our health system against future assaults, including pandemics, these lessons and methods for rapid adaptation will be very valuable. The pandemic has exacerbated workforce shortages that are also likely to be experienced in the future and will require flexible and iterative training models that are responsive to changing circumstances (Endacott et al., 2022). Emerging data underscores the need for supporting nurses in the context of the pandemic (Guttormson et al., 2022). This descriptive report provides an exemplar for a rapid, responsive model to address learning needs.

7 | CONCLUSION

By modifying established models of nursing education and the capacity to tailor these based on trainee feedback, we rapidly upskilled IMCU nurses to independently care for critically ill patients with COVID-19. Participating nurses experienced significant increases in confidence in nearly all elements of competency except understanding mechanical ventilator settings and the interpretation of blood gases. The most highly valued elements of training were formal ICU orientation and being paired with an ICU nurse, especially if that nurse was a medical ICU nurse.

AUTHOR CONTRIBUTIONS

RH, CEO, LS, SM and DNH made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; RH, CEO, LS, SM, BK, PMD and DNH involved in drafting the manuscript or revising it critically for important intellectual content; given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content; agreed

to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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None.

CONFLICT OF INTEREST

No authors have a conflict of interest.

DATA AVAILABILITY STATEMENT

Data available on request from the authors.

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SUPPORTING INFORMATION

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

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