

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-19⁴ 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 learning¹⁶ 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

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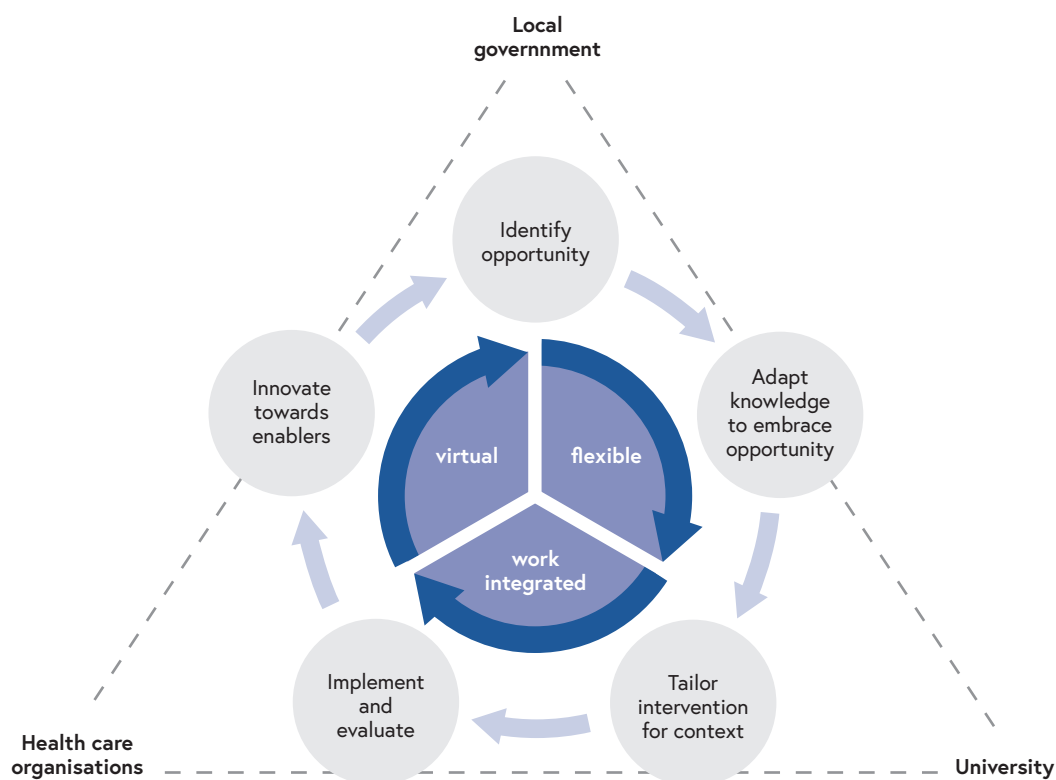


FIGURE 1: TRIPARTITE MODEL FOR KNOWLEDGE TRANSLATION

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 Medicine²³ 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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

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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 5xfBEEA

"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

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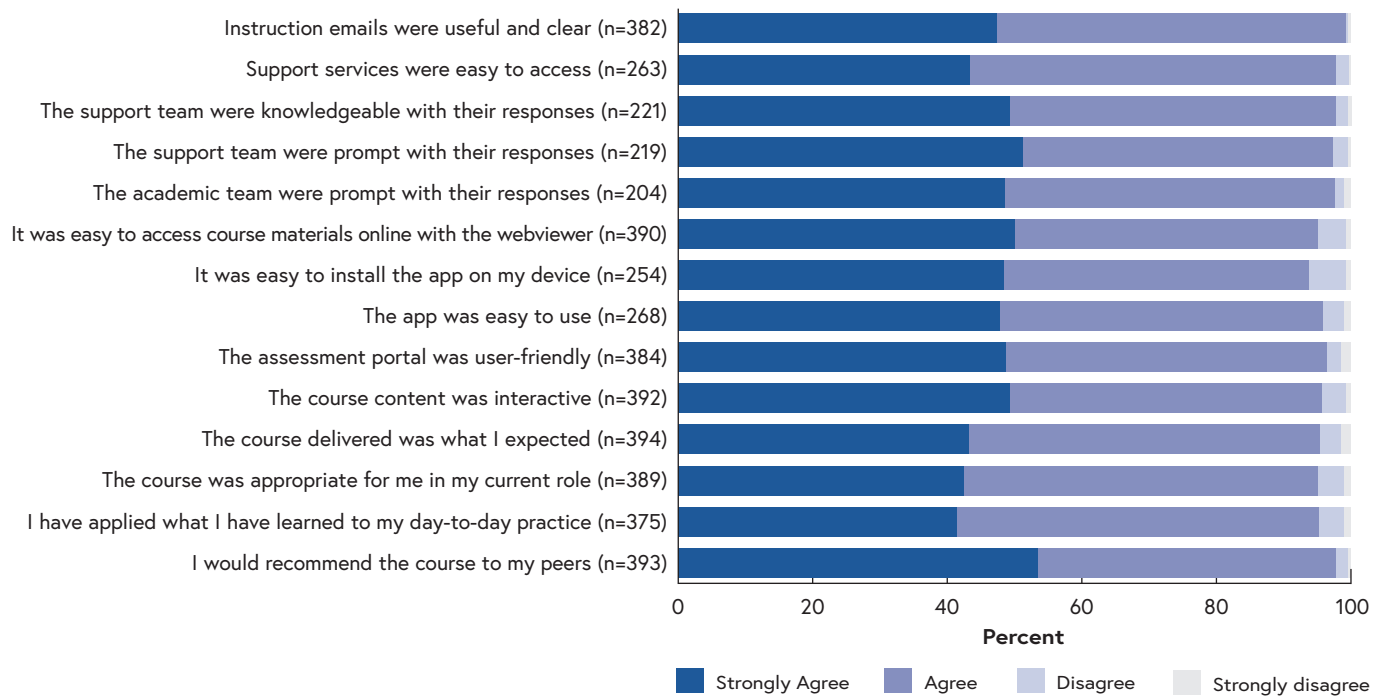


FIGURE 2 STACKED BAR CHART OF LIKERT RESPONSES (WHERE RESPONSE WAS 'NOT APPLICABLE' THIS HAS BEEN REMOVED)

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 65oNEAQ

“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 65oNEAQ

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

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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 Nursing³⁰ and the Australian Nursing and Midwifery Federation³¹ 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

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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.

Competing interests: The authors declare that they have no competing interests.

Funding: Safer Care Victoria, a branch of the Department of Health and Human Services supported this course’s development and implementation. Initial funding enabled 2,000 Victorian nurses to access this course without charge.

REFERENCES

- Blecher GE, Blashki GA, Judkins S. Crisis as opportunity: how COVID-19 can reshape the Australian health system. *Med J Aust.* 2020;213(5):196-8.
- World Health Organization. Novel Coronavirus (2019-nCoV) situation report – 1. World Health Organization. 2020. [cited 2021 Feb 15] Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200121-sitrep-1-2019-ncov.pdf?sfvrsn=20a99c10_4
- World Health Organization. Novel Coronavirus (2019-nCoV) Situation Report - 111. World Health Organization. 2020. [cited 2021 Feb 15] Available from: <https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200510-covid-19-sitrep-111.pdf?sfvrsn=1896976f>
- World Health Organization. Novel Coronavirus (2019-nCoV) Situation Report - 22. World Health Organization. 2020. [cited 2021 Feb 15] Available from: <https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200211-sitrep-22-ncov.pdf>
- Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet.* 2020;395(10229):1054-62.
- World Health Organization. COVID-19 strategy update - 14 April 2020. World Health Organization. 2020. [cited 2021 Feb 15] Available from: <https://www.who.int/publications/i/item/covid-19-strategy-update---14-april-2020>
- Cook TM, El-Boghdady K, McGuire B, McNarry AF, Patel A, Higgs A. Consensus guidelines for managing the airway in patients with COVID-19. *Anaesthesia.* 2020;75(6):785-99.
- Poston JT, Patel BK, Davis AM. Management of Critically Ill Adults With COVID-19. *JAMA.* 2020;323(18):1839-41
- World Health Organization. Clinical management of severe acute respiratory infection (SARI) when COVID-19 disease is suspected. World Health Organization. 2020. [cited 2021 Feb 15] Available from: https://www.who.int/docs/default-source/coronaviruse/clinical-management-of-novel-cov.pdf?sfvrsn=bc7da517_10&download=true
- National Center for Immunization and Respiratory Diseases Division of Viral Diseases. Interim clinical guidance for management of patients with confirmed coronavirus disease (COVID-19). Centers for Disease Control and Prevention. 2020. [cited 2021 Feb 15] Available from: <https://stacks.cdc.gov/view/cdc/89980>
- National Institute for Health and Care Excellence. COVID-19 rapid guideline: critical care in adults - NICE guideline [NG159]. National Institute for Health and Care Excellence. 2020. [cited 2021 Feb 15] Available from: <https://www.nice.org.uk/guidance/ng159>
- Australian and New Zealand Intensive Care Society. COVID-19 Guidelines. Australian and New Zealand Intensive Care Society. 2020. cited [2021 Feb 15] Available from: <https://www.anzics.com.au/wp-content/uploads/2020/03/ANZICS-COVID-19-Guidelines-Version-1.pdf>.
- Alhazzani W, Møller MH, Arabi YM, Loeb M, Gong MN, Fan E, et al. Surviving sepsis campaign: guidelines on the management of critically ill adults with coronavirus disease 2019 (COVID-19). *Crit Care Med.* 2020;48(6):e440-e469.
- Litton E, Bucci T, Chavan S, Ho YY, Holley A, Howard G, et al. Surge capacity of intensive care units in case of acute increase in demand caused by COVID-19 in Australia. *Med J Aust.* 2020;212(10):463-7.
- Department of Health and Human Services. About us. State Government of Victoria, Australia. 2020. [cited 2021 Feb 15] Available from: <https://www.dhhs.vic.gov.au/safer-care-victoria>.
- Blieck Y, Ooghe I, Zhu C, Depryck K, Struyven K, Pynoo B, et al. Consensus among stakeholders about success factors and indicators for quality of online and blended learning in adult education: a delphi study. *Studies in Cont Edu.* 2019;41(1):36-60.
- Nilson LB. Creating self-regulated learners: strategies to strengthen students' self-awareness and learning skills. Stylus Publishing; 2013.
- Harvey G, Kitson A. PARIHS revisited: from heuristic to integrated framework for the successful implementation of knowledge into practice. *Implement Sci Commun.* 2016;11(1):33.
- Kitson AL, Rycroft-Malone J, Harvey G, McCormack B, Seers K, Titchen A. Evaluating the successful implementation of evidence into practice using the PARIHS framework: theoretical and practical challenges. *Implement Sci Commun.* 2008;3(1):1.
- Graham ID, Logan J, Harrison MB, Straus SE, Tetroe J, Caswell W, et al. Lost in knowledge translation: time for a map? *J Contin Educ Health Prof.* 2006;26(1):13-24.
- Littlejohn A, Hood N, Milligan C, Mustain P. Learning in MOOCs: motivations and self-regulated learning in MOOCs. *Internet High Educ.* 2016;29:40-8.
- McCormack B, McCance T, editors. Person-centred practice in nursing and health care: theory and practice. 2nd ed. Wiley Blackwell; 2017.

RESEARCH ARTICLES

23. Australian College of Emergency Medicine. COVID-19 related ACEM resources. Australian College of Emergency Medicine. 2021 [cited 2021 Feb 15]. Available from: <https://acem.org.au/Content-Sources/Advancing-Emergency-Medicine/COVID-19/Resources/ACEM-Resources>.
24. Taras M. Situating power potentials and dynamics of learners and tutors within self-assessment models. *J Furth High Educ*. 2016;40(6):846-63.
25. Mobile Learning Unit. Melbourne school of Professional and Continuing Education. University of Melbourne. 2020 [cited 2021 Feb 15]. Available from: <https://staff.unimelb.edu.au/mspace/home>.
26. Bridge N, Jarden R, Scanlon A, Turner R, Prescott, H, Thompson J, et al. Critical Care Essentials for Nurses. Safer Care Victoria. 2020 [cited 2021 Feb 15]. Available from: <https://www.tfaforms.com/4822557>.
27. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol*. 2006;3(2):77-101.
28. World Health Organization. Clinical care severe acute respiratory infection. World Health Organization. 2020 [cited 2021 Feb 15]. Available from: <https://openwho.org/courses/severe-acute-respiratory-infection>.
29. Department of Health. COVID-19 infection control training. Commonwealth of Australia. 2020. [cited 2021 02 15]. Available from: <https://www.health.gov.au/resources/apps-and-tools/covid-19-infection-control-training>.
30. Australian College of Nursing. COVID-19 resources. Australian College of Nursing. 2020 [cited 2021 02 15]. Available from: <https://www.acn.edu.au/covid-19-resources>.
31. Australian Nursing and Midwifery Federation. Coronavirus (COVID-19) Information for Members. Australian College of Nursing. 2020. [cited 2021 02 15]. Available from: <http://anmf.org.au/campaign/entry/coronavirus-covid-19-information-for-members>.
32. The University of Edinburgh. COVID-19 critical care: understanding and application. Future Learn. 2021 [cited 2021 Feb 15]. Available from: <https://www.futurelearn.com/courses/covid-19-critical-care-education-resource>.
33. Camilleri M, Zhang X, Norris M, Monkhouse A, Harvey A, Wiseman A, et al. Covid-19 ICU remote-learning course (CIRLC): rapid ICU remote training for frontline health professionals during the COVID-19 pandemic in the UK. *J Intensive Care Soc*. 2020;0(0):1-8
34. Critical Care Education Pandemic Preparedness Team. Quick ICU training for COVID-19. 2021 [cited 2021 Feb 15] Available from: <https://www.quickicutraining.com/>.
35. Critical Care Education Services. Rapid upskilling in high dependency & critical care for registered nurses. Medcast. 2020. [cited 2021 Feb 15] Available from: <https://medcast.com.au/surge-critical-care>.
36. Australian College of Nursing. Online refresher program for registered nurses report. Department of Health. 2020 [cited 2021 Feb 15] Available from: https://www.health.gov.au/sites/default/files/documents/2020/12/evaluation-of-online-nurse-training-to-build-capability-during-covid-19-acn-final-evaluation-report-refresher-nurse-training_0.pdf.
37. Medcast. Medcast final evaluation report critical and high dependency care nurse training. Department of Health. 2020 [cited 2021 02 15] Available from: https://www.health.gov.au/sites/default/files/documents/2020/12/evaluation-of-online-nurse-training-to-build-capability-during-covid-19-medcast-final-evaluation-report-critical-and-high-dependency-care-nurse-training_0.pdf.
38. Medcast. SURGE ongoing access bundle (Invitational). Medcast. 2021. [cited 2021 02 15] Available from: <https://medcast.com.au/courses/376>.