Simulation-based education programme for upskilling non-critical care nurses for COVID-19 deployment

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► Supplemental material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/bmjstel-2020-000711).

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Received 25 June 2020
Revised 27 August 2020
Accepted 12 October 2020
Published Online First 21 October 2020

ABSTRACT

Background The coronavirus disease 2019 (COVID-19) crisis created pressure on healthcare institutions to be prepared with maximum workforce and bed capacity. Clinical education during COVID-19 has high risk of disease transmission to learners due to contamination of equipment, supplies and surfaces, in addition to increased clinical-related stress and fear. Simulation-based education (SBE) has potential to help manage the pandemic by rapidly upskilling nurses' clinical responsibilities.

Methods Upskilling of 445 non-critical care nurses was conducted using SBE between 14th March and 30 May 2020. Training consisted of completing a mandatory online critical care awareness module, followed by 3 hours of critical care simulation-based scenarios using demonstration and return-demonstration approach.

Results All 445 non-critical care nurses completed required modules and simulation experiences. The critical care simulation-based upskilling programme was evaluated as an effective way to learn how to manage critically ill patients. The majority of evaluation items were rated over 95% for effectiveness of the education; four items were less than 95% (88–94%). Lower rated items considered training and practice time, improved competency and commitment to apply learning.

Conclusion Rapidly developed and implemented upskilling of critical care nurses was effectively accomplished with SBE. However, learners noted the need for longer learning times and increased practice opportunity to improve competency. Lack of intent to apply the patient care techniques requires further study. SBE has potential as an effective educational method for rapid preparedness in future crisis.

INTRODUCTION

During a pandemic crisis, there is significant burden on physical and personnel resources required for patient care. Given the rapid onset of coronavirus disease 2019 (COVID-19), healthcare institutions were pressured to prepare a maximum workforce and bed capacity[1]; however, not all employed nurses had the training or skills to manage COVID-19 patients, especially those with critical disease progression. Even in time-pressured situations, it is important to assess key clinical skills and scope of service considering that in critical care units the case acuity and complexity levels are higher than any other healthcare units, presenting the need for highly specialised and subspecialised nurses.[2]

Simulation-based education (SBE) has potential to help manage quick, focused upskilling training, which helps to improve patient care and safety by decreasing practice errors and risk of contamination.[3] During pandemic crisis, it is important to have focused education that is prioritised based on the needs of the patient and organisation.[4] Clinical education during COVID-19 must be planned in a way that lowers the risk of disease transmission, particularly in small group training, while also acknowledging clinical-related stress and fears.[5] Learners and educators must be careful not to become complacent in protecting themselves from the virus when outside the clinical arena.

Hamad Medical Corporation's (HMC) Nurse and Midwifery Education Department (NMED), executive nursing lead for critical care service and corporate nursing workforce, in collaboration with Itqan Clinical Simulation and Innovation Centre of HMC, adopted the SBE approach to upskill non-critical care nurses to be deployed in critical care areas as an urgent response to service expansion related to COVID-19. HMC is the largest tertiary healthcare governmental institution in Qatar under the Ministry of Public Health. In March, the Supreme Committee for Crisis Management announced work in progress to increase bed capacity by 18 000 beds as a proactive measure.[6] HMC took the lead by designating COVID-19 and non-COVID-19 facilities and establishing field and quarantine hospitals to quickly expand the bed capacity. The expansion process placed clinical leaders under significant staffing and resource management challenges. The critical care service needed to expand quickly to accommodate the COVID-19 critical care cases.

This article reports on the preparation of non-critical care nurses to work in the critical care environment and to assess their readiness for COVID-19 critical care practices.

METHODS

Simulation-based upskilling trainings were conducted between 14th March and 30 May 2020 by eight NMED critical care nurse educators certified by the American Nurse Credentialing Centre (ANCC). Three simulation locations were established at Itqan Clinical Simulation and Innovation Centre, Hazem Mabreek General Hospital (HMGH) and The Cuban Hospital (TCH). The hospitals were designated as main tertiary COVID-19 centres in Qatar. SBE

To cite: Almomani E, Sullivan J, Hajjieh M, *et al*. *BMJ Simul Technol Enhanc Learn* 2021;**7**:319–322.

training has become commonplace due to the availability of specialised simulation educators, staff and equipment located in a dedicated training facility. The team provided upskilling training for 445 non-critical care nurses from post anaesthesia care unit, non-emergent unit of emergency department, and Paediatric specialities to work in critical care areas of HMC during the COVID-19 crisis. This project has been accepted as a quality improvement project by the Nursing Continuing Professional Development Committee of HMC and therefore is exempt from Institutional Review Board (IRB) approval.

Due to COVID-19 infection control restrictions and to avoid clustering of learners in physical classrooms, the simulation upskilling programme started with a prerequisite online learning module that included an introduction to COVID-19, the critical care environment, critical care scope of service, COVID-19 pathophysiology and COVID-19 infection control prevention strategies. This online module covered the knowledge and the theoretical parts of the training and was mandated as a prerequisite to attending the in-person SBE. The anticipated completion time for the online module was 2 hours.

To consolidate the skills and to enhance the learning process, the SBE was followed by hand-on bedside practice with senior critical care nurses' supervision. The consolidation process was established through clinical exposure and competency assessment facilitated and assessed by the critical care clinical educators in the critical care setting. The first week of deployment included unit orientation facilitated by preceptors but no patient assignment. During the second week, nurses were assigned to low acuity level patients with senior nurse supervision and backup support. After 2 weeks, the nurses were expected to work independently with critically ill, but lower acuity patients such as those requiring oxygen support >50% but not ventilated. However, gradually with continuous support and assessment, they started to handle ventilated patients in the presence of a senior backup support nurse.

To begin the training, each learner accessed HMC's online educational portal, which was created by NMED in collaboration with the communication department. The content was developed by subject-matter experts. The infection control section was developed by an infection control practitioner, the critical care scope of service was developed by the critical care clinical leader, and the disease pathophysiology was developed by an expert critical care educator. Each learner was mandated to review the material and to sign an electronic completion statement. Pre-test and post-test were not administered. The online module coordinator tracked the completion status and prepared the list of learners who were ready to attend the SBE.

Based on previous simulation workshop experiences, the HMC scientific planning committee, comprised of educational and clinical experts, decided that learners should attend 3 hours of SBE with four simulation skill stations:

1. Care of patient on mechanical ventilation;
   a. Airway, breathing, circulation, disability and exposure (ABCDE) assessment and oxygen therapy;
2. Care of patient with invasive lines and chest tube; and
3. Care of mouth, eyes, nasogastric tubes (NGT), and urinary catheters. There were numerous supplies required for the four stations, which are outlined in table 1.

Each station was 45 min duration and consisted of orientation (table 2), 20 min of demonstration by the simulation educator within the context of a simulation scenario, followed by 25 min of learners' individual return-demonstration (scenario details in online supplemental material). Each learner individually demonstrated their ability to perform the skills over a 10 min time period. Each scenario centred on a COVID-19 positive patient and was designed to allow participants to meet the learning objectives. The nurses were randomly placed in groups of 12 learners and further divided into groups of three for participating in each simulation station, which they rotated through. Feedback was provided to individuals and small groups during the return-demonstration as well as to the larger group following completion of all stations. Educator developed evaluations were completed by all participants following the SBE.

Table 1 Supply list

System	Required supplies
Respiratory	▶ Various sizes of ETT and TT ▶ Various sizes of oropharyngeal and nasopharyngeal airways ▶ Oxygen devices: nasal cannula, masks (simple face rebreathing, non-rebreathing, venturi) ▶ Tracheostomy care kit ▶ Chest tube, drainage chamber
Cardiovascular	▶ Disposable stethoscope ▶ Central line, arterial line, pressure monitor tubing and transducer, pressure cable, pressure module ▶ Anti-microbial dressing for arterial and central lines ▶ DVT prevention kit
Genitourinary	▶ Urinary catheter, urometer catheter holder
Gastrointestinal	▶ NGT and holder
Neurological	▶ BIS monitoring kit
Patient Care	▶ Oral care kit ▶ Eye care kit

BIS, bi spectral Index; DVT, deep vein thrombosis; ETT, endo tracheal tube; NGT, naso gastric tube; TT, tracheostomy tube.

Table 2 Orientation

Category	Topics
Equipment	▶ Gaumard HAL3201 model high-fidelity simulator ▶ Hamilton S1 mechanical ventilator (MV) ▶ Cardiac monitor ▶ Intravenous pumps
Environment	▶ Simulation centre building ▶ Examination and feedback rooms ▶ Fire and emergency exits ▶ Equipment and supply locations

RESULTS

A total of 445 non-critical nurses completed the prerequisite online module and attended the critical care upskilling simulation skill stations. Post-course evaluations were collected from the 445 learners and the results are presented in table 3. The evaluation process was anonymous. The evaluation form was completed immediately after attending the SBE sessions. The evaluation forms were collected in a sealed box, and later reviewed by the lead planner. Ninety-eight per cent of the learners reported that they successfully achieved the learning objectives of the training, and 98% reported that the SBE to upskill noncritical care nurses was an efficient short track educational method in pandemic crisis. However, 88% of the learners reported that more clinical practice is needed to consolidate the skills and to be highly competent.

The simulation-upskilling programme for non-critical care nurses was evaluated overall as being an effective way to quickly learn how to manage critically ill patients, with all but one evaluation item rated over 90% agreement. Only four of the 18 items were less than 95% effective (88–94%). Those four items

Table 3 Summary of post-course evaluation

Element	Percentage
The facilitators are confident and knowledgeable	99
The facilitator(s) used appropriate teaching strategies to achieve objectives	98
Questions and clarifications were addressed satisfactorily	95
Time allocated for the training was enough	92
The overall purpose of the activity was clearly communicated to me	95
I was able to achieve the overall intended objectives and outcomes of the activity	97
I was told what was expected from me to successfully complete the activity	100
I was actively engaged throughout the overall activity	95
The facilitator(s) offered balanced information and content based on the best evidence	97
The physical environment was conducive for learning	100
The high-fidelity simulation is an effective method for critical care upskilling for non-critical care nurses	98
The simulation-based training approach is an efficient short track to upskill non-critical care nurses	95
The high-fidelity simulation-based training improved my critical care competency level	94
I am going to recommend this activity to my colleagues	98
This activity will positively impact on my practice in terms of competence or performance	95
I am committed and motivated to apply what I have learnt in everyday practice	90
I am confident to apply what I have learnt in practice	95
I need more clinical practice to consolidate my competency level	88

considered allocated training time, improved competency, identified need for more practice, and long-term commitment to the application of training.

DISCUSSION

The first three findings are not surprising given the condensed time for the training to take place. Forty-five minutes is a very short period of time to learn how to manage critically ill patients in a critical care environment. The format of demonstration with return-demonstration does not allow for deliberate practice or repetition of learning skills, both of which are critical to mastery,[7 8] which may explain why learners did not feel highly competent upon completion of the programme. To combat this, the ongoing clinical mentorship plan was enacted.

Of concern is the finding that only 90% of learners reported that they were committed and motivated to apply what they had learnt. This result requires further exploration; however, it is possible that the newly upskilled nurses had not yet realised the potential long-term impact of COVID-19 on patient care, seeing their redeployment as a short-term response to what has since been identified as a longer-term problem. In addition, the learners were not asked to participate in this programme but were identified for inclusion at the corporate nursing level. This may have been perceived negatively by some learners who were not interested in caring for critically ill patients, preferring to remain in the area where they felt competent.

Critical care bed capacity expanded from 250 beds to 770 beds over 2 months period, bringing a significant critical care staff shortage to accommodate this expansion. The recruitment process was very challenging and lengthy during COVID-19 crisis due to travel restrictions, resulting in the need to upskill nurses from departments not as heavily impacted by COVID-19 such as the outpatient departments. The HMC corporate workforce committee decided to use the SBE to upskill the non-ICU nurses and to train them to become temporary team members of the COVID-19 critical care workforce. In the planning phase, it was challenging to decide on the simulation content, duration, and the training topics due to the short amount of time available to increase the workforce. Training needed to be planned and finished quickly to adjust to the dramatic, massive critical care service expansion.

To overcome the challenges, our SBE design had three focal points: educational, systems and personal. The educational focus was on the urgent need for training, requiring a quick needs assessment to produce a shortened version of focused critical care educational curriculum. A scientific planning committee was formed with members from nurse education department, and critical care clinical leaders to determine the training design structure best suited to address the needs assessment.

From a system perspective, consideration was given to the HMC system capacity to release staff from duty to attend the training and to follow the infection control recommendations. The physical safety of educators, staff and learners was a priority, and to achieve that numerous efforts were enacted based on recommendations of HMC Infection Control, the European Centres for Disease Control,[9] the WHO,[10] and consensus of simulation centre directors worldwide (K. Leighton, personal communication, 11 March 2020). At the time of this training, the following guidelines were in place:

- Screening for temperature and symptoms upon building entry;
- Group size based on ability to maintain 2-m distance within the area of the simulation rooms;
- Removal of all non-essential items from the rooms including curtains;
- All participants required to wear masks, non-surgical gowns and gloves following hand hygiene;
- Circular movements of participants between simulation stations to avoid passing in narrow hallways;
- Only required items placed in room; linens removed except for SBE teaching proning technique;
- And disinfecting all equipment, supplies and surfaces with approved products between groups.

Finally, moving to the personal focus we considered the cognitive and psychological burdens on learners. Fear of working in COVID-19 clinical areas while experiencing a novel pandemic experience could affect nurses' engagement and acceptance of training. Assurance and psychological enhancement were provided by all facilitators to the learners at the beginning and during the simulation skill station; for instance, the facilitators discussed the importance of nurses during COVID-19 to protect the community and their families until the disease is better controlled.

Limitations and strengths

The project was limited by time, as the criticality of the need for nurses in patient care superseded the educational need for repetitive practice towards mastery learning and competence. In addition, the attendees did not choose to alter the trajectory of their nursing practice, which may have explained some of the lack of motivation to apply what they learnt. This was compensated for by the creation of a mentoring relationship between the non-critical care graduates of this course and seasoned critical care nurses. While the attendees highly rated all aspects of the course,

this project has not yet considered the long-term outcomes of confidence and competence.

This project was a starting point. The educators plan to further explore the non-critical care nurses' perceptions of their readiness and confidence, as well as their perceived competence to practice what they learnt through SBE when caring for critically ill patients. Assessing readiness for critical care practices without being in the real critical care environment may be difficult for a learner to gauge. A follow-up study at the 2-month mark has received IRB approval, at which time confidence and perceived competence in caring for the critically ill patient will be evaluated.

CONCLUSION

In summary, it is possible to take rapid measures to create, conduct and evaluate trainings in a pandemic environment. In a crisis, the educational approaches should be adjusted to meet the demands of the healthcare system. COVID-19 brought a need for highly effective and efficient educational methods to upskill non-critical care nurses for critical care acuity level within a very short period of time. The online learning module and SBE approach is one effective method to upskill non-critical care nurses. Good planning, communication and collaborative interactions are key factors to develop successful education during the crisis. While it is unlikely we will experience a pandemic again in our lifetime, it behoves educators to have a plan for rapid deployment of education and training for large numbers of employees should a crisis of magnitude occur in the future.

What is already known on this subject

- SBE is an appropriate educational method during pandemic crisis preparedness such as COVID-19.
- In pandemic crisis, critical care services need to expand rapidly to meet the demands of patient acuity and flow.
- During COVID-19 and pandemic crisis, the critical care acuity level becomes high, and patient safety is a concern to healthcare workers.

What this study adds

- SBE is a recommended educational method to upskill non-critical care nurses and to assess their readiness for practice during the COVID-19 pandemic.
- SBE can be used to prepare a skilled taskforce to manage critical care patient acuity level and to maintain patient safety during COVID-19.

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Conception and design of the study: KL, JS; revising the manuscript critically for important intellectual content: KL, MH; acquisition of data: EA; analysis and/or interpretation of data: EA, KL; drafting the manuscript: EA, MH; approval of the version of manuscript to be published: KL, MH, JS.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests No competing or conflict of interest. All authors declare all relevant competing interests in the competing interests field on ScholarOne.

Ethics approval The reporting of this data has been accepted as a Quality Improvement project by the Nursing Continuing Professional Development Committee of Hamad Medical Corporation and therefore is exempt from IRB approval.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon request. This article is made freely available for use in accordance with BMJ's website terms and conditions for the duration of the COVID-19 pandemic or until otherwise determined by BMJ. You may use, download and print the article for any lawful, non-commercial purpose (including text and data mining) provided that all copyright notices and trademarks are retained.

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