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Simulation as a substitute for clinical practice in the COVID-19 pandemic

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I. BACKGROUND

The coronavirus disease 2019 (COVID-19) has been declared as a pandemic. On 7 February 2020, the Ministry of Health (MOH), announced the suspension of all clinical postings. All healthcare students were ordered to withdraw from hospitals within hours after the announcement. Graduating year nursing students from the National University of Singapore (NUS) were into their final phases of clinical postings. The suspension of clinical postings greatly disrupted the students' preparations in developing clinical competencies critical to their future nursing professions.

Across the world, healthcare policymakers and institutions have responded to nursing students' clinical education in a variety of ways. One compelling argument for continuing the clinical education of graduating nursing students is to treat them as part of the healthcare teams and leverage their clinical skills to boost the capacity of care teams. However, as our nursing students were at an earlier stage of their final year clinical practicum and have yet to acquire the knowledge, skills and clinical experience of a qualified nurse, it may be argued that their involvement in patient care delivery would have primarily been for educational purposes. Thus, the potential of compromising patient safety due to lack of supervision by the overwhelmed trained staff, the risks of contracting the contagion and giving rise to psychological concerns might not overweigh their educational benefits.

In Singapore, healthcare policymakers and institutions face the challenge of balancing education, healthcare service and potential risks for students in the healthcare settings. The main reasons for the suspension of clinical postings were the unknown risk of COVID-19 at that timepoint and the need for hospitals to manage their resources to transform their facilities and manpower to care for infectious patients. The suspension of clinical postings affected the nursing students' abilities to fulfil the required number of clinical hours set out by the Singapore Nursing Board (SNB) to be registered as a registered nurse. Academic nurses at the NUS had to react quickly by employing simulation strategies to replace clinical hours. This gave rise to a debate around evidence-based practice versus practicalities in designing simulation as a substitute for clinical practice in nursing clinical education.

II. SIMULATION TO REPLACE CLINICAL PRACTICE HOURS

In light of the suspension of clinical placements, the SNB has permitted the substitution of 160 out of 400 clinical hours (40%) of the final year students' clinical practicums with simulation. This can be supported by existing evidences on the use of simulation as a substitute for clinical placement in prelicensure nursing programmes (Curl et al., 2016). In our plan to replace 160 clinical hours, we initially assumed a ratio of one hour of simulation to one hour of clinical time. However, we recognised the challenges to implement this 1:1 ratio for the training of 300 nursing students using the existing simulation facilities, along with the need to adhere to the

safe distancing measures initiated by the university. We had to plan a class size of not more than ten persons in a simulation laboratory, including a facilitator and a simulated patient, in order to keep everyone at a safe distance of at least two metres apart. Given these resource implications, we equated a ratio of one hour of simulation to two hours of clinical practice.

There is no clear evidence on the substitution ratio for simulation hours to clinical placement hours. A study by Curl et al., (2016) evaluated the use of simulation experiences to replace 50% of clinical experiences by employing a ratio of a substitute of one hour of simulation to two hours of clinical experience. Bogossian et al. (2019) postulated that as a simulation can be both controlled and time-compressed, it should draw more than parity in clinical practice hours, which is an aspect worth future investigation.

III. TYPES OF SIMULATION MODALITIES

We had to work out different types of simulation modalities to meet the 80 hours of simulation learning as well as to achieve the learning outcomes based on the SNB's competency domains for registered nurses. The 80 hours also included the simulation-based assessment on clinical performance and post simulation activities on reflective writing to provide evidence to SNB on the achievement of learning outcomes. Earlier studies focused mainly on the use of high-fidelity simulations to replace clinical practices (Bogossian et al., 2019; Curl et al., 2016). The adequacy of existing simulation facilities and their accesses were constraints that led us to explore a variety of simulation modalities, including simulated clinical immersion using high-fidelity simulations, procedural simulations and computer-based simulations.

We adopted and expanded our earlier developed evidence-based simulation program, known as SIMulated Professional Learning Environment (SIMPLE) to create simulated clinical immersion learning and assessments in the NUS Centre for Healthcare Simulation. The availability of the SIMPLE guide, which included learning objectives, details of scenarios, debriefing guides and scripts for simulated patient, prompted our quick planning and implementation of the facilitators' briefing and simulation learning. A total of six simulation sessions were implemented based on themes related to common ward nursing practices. In each simulation session, we incorporated two patients (one high-fidelity simulator and one simulated patient) in a simulated general ward setting. Our earlier study provided evidence on the benefits of the SIMPLE programme in promoting nursing students' transition-to-practice experiences (Liaw et al., 2015). We also put in place a contingency plan on the use of video-based simulations in case we could not conduct face-to-face simulations. The video-based simulations were conducted via video conferencing for a small group of students who were unable to attend face-to-face simulations.

In the simulated clinical immersion scenarios, the students were required to perform a set of clinical procedures related to patient care. Thus, we incorporated procedural simulations to provide opportunities for the students to revise the procedures and practise the technical skills that they had acquired in years one and two. As a result of a lack of simulation facilities and faculty resources, the self-direct practice approach was adopted for procedure simulation learning. The students were given case scenarios and a set of requisites, including a wound dressing set, an intravenous priming set and an indwelling catheterization set, to practise the clinical procedures innovatively at home. They were also instructed to develop and submit video recordings of their best ten performed procedures, selected from a list of core skills for registered nurses, to provide evidence of their time (e.g. 20 hours) in engaging self-directed learning as well as for instructor feedback. Apart from procedural simulation learning, we managed to implement procedural simulation assessments on donning and doffing personal protection equipment (PPE) at remote locations by leveraging telecommunication resources using Zoom's video conference calls. This approach enabled direct observations of performance and feedback between a student and an assessor.

Earlier, we developed two computer-based simulations, e-RAPIDS (Rescuing A Patient In Deteriorating Situation) and CREATIVE (Create Real-time Experience And Teamwork In Virtual Environment), to allow the students to participate in experiential learning. These were considered valuable resources for students' off-site learning for the development of non-technical skills. Using experiential learning approach, the e-RAPIDS provided a self-directed learning resource for students to develop clinical reasoning skills through the application of knowledge to problem solve deteriorating virtual patients with feedback from multiple scenarios. The CREATIVE provided nursing students opportunities to undertake simulation-based interprofessional education with medical students on nurse-doctor communication skills training. We evaluated the effectiveness of these computer-based screen simulations on students' learning outcomes performance by comparing with high-fidelity simulation in the previous studies (Liaw et al., 2014, 2020). The non-inferiority outcomes of these simulations to high-fidelity

simulations may justify the use of these computer-based screen simulations to replace some clinical hours.

IV. CONCLUSION

The COVID-19 outbreak posed a unique challenge to nursing clinical education. The cessation of clinical placements led to immediate concerns on nursing students' clinical competencies, which necessitated the adoption of various simulation resources as an alternative means of delivering clinical education. The inadequacy of existing simulation resources and their limited accessibilities posed challenges in the replacement of clinical hours. Nonetheless, this COVID-19 pandemic has prompted us to embrace more innovative simulation initiatives, including video-based simulations and tele-simulations. These innovations inevitably gave rise to a debate around evidence-based practice versus practicalities for designing simulation as a replacement for nursing clinical practice. More evidence is warranted to justify the use of different types of simulation modalities to replace clinical practices in terms of learning outcomes and cost-effectiveness. Such evidence can inform future implementations and policy development on the regulation of using simulations to replace clinical practices to ensure student competency for the nursing workforce. We look forward to seeing more simulation innovations along with evaluation research for simulation technology amid the COVID-19 pandemic.

Notes on Contributors

Sok Ying Liaw designed and implemented the simulation and took the lead in writing the manuscript.

Siew Tiang Lau contributed to the planning of the simulation and aided the development of the manuscript.

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Declaration of Interest

The authors have no conflict of interests to declare.

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