

## Hybrid-virtual simulations for Canadian medical students during the COVID-19 pandemic

### Simulation hybride virtuelle pour les étudiants en médecine au Canada pendant la pandémie de la COVID-19

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Published ahead of issue: April 20, 2021; published: September 14, 2021. CMEJ 2021, 12(4). Available at <http://www.cmej.ca>

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### Implication Statement

Given the efficacy of simulations as a medical education tool, the inability to provide them during the COVID-19 pandemic may be detrimental to pre-clinical medical student learning. We developed hybrid simulations, where remote learner participants could direct an in-person assistant. This offered a learning opportunity that was more realistic than fully virtual simulations and abided by public health guidelines. Hybrid simulations provided an opportunity for medical students to practice real-time clinical decision making in a remote, high-fidelity, simulated environment. This approach could be adapted for rural healthcare students and professionals to participate in simulations without a local simulation centre.

### Énoncé des implications de la recherche

Background: Compte tenu de l'efficacité des simulations en tant qu'outil d'éducation médicale, l'impossibilité d'en proposer pendant la pandémie de la COVID-19 pourrait nuire à l'apprentissage préclinique des étudiants en médecine. Nous avons conçu des simulations hybrides, où les apprenants peuvent diriger à distance un assistant qui intervient en personne. Ces simulations permettent un apprentissage plus réaliste que celles qui sont entièrement virtuelles tout en respectant les directives en matière de santé publique. Les simulations hybrides ont permis aux étudiants en médecine de s'exercer à distance à la prise de décision clinique en temps réel dans un environnement simulé de haute fidélité. Cette approche pourrait être adaptée pour permettre aux étudiants et aux professionnels de la santé en milieu rural, qui ne disposent pas d'un centre de simulation local, de néanmoins participer à des simulations.

### Introduction

In response to public health guidelines for physical distancing during the COVID-19 pandemic, in-person learning transitioned to virtual formats.<sup>1</sup> This resulted in the cancellation of an existing in-person simulation program for University of British Columbia medical students.<sup>2</sup> Early in the pandemic we offered fully virtual simulations. However, these lacked the fidelity of real clinical environments using mannequins, monitors, and medical equipment.<sup>3,4</sup> We began offering a novel form of hybrid simulation. Hybrid simulation is defined as two or more simulation modalities used simultaneously with the

intention of creating a more realistic experience.<sup>5</sup> In this case we combined virtual and in-person simulation modalities. This allowed participants to join simulations via video conference and direct an in-person assistant (as shown in this video: [https://youtu.be/xM8LIPWC\\_OM](https://youtu.be/xM8LIPWC_OM)). To our knowledge, this is the first program offering this novel form of hybrid simulation to Canadian pre-clinical medical students.<sup>1,6,7</sup>

This was a quality improvement initiative per TCPS2 Article 2.5 and was exempt from review by the UBC Ethics Review Board.

## Innovation

Using Zoom™ (Zoom Video Communications Inc, USA), medical students attended simulations held in the Centre for Interprofessional Clinical Simulation Learning in Victoria, BC. The centre has high-fidelity mannequins, cardiac monitors, medical equipment, and multiple camera angles which were crucial for participants to visualize all simulation details (Figure 1).

Two in-person simulation assistants ran the sessions. One assistant controlled the mannequin and cardiac monitors using the Laerdal Learning Application (Laerdal Medical, Canada) and communicated information requested by participants; the other assistant performed physical examinations and interventions on the mannequin as directed by participants. A medical resident attended virtually to facilitate and lead debrief discussions. The cases were written by medical students, reviewed by medical residents, and based on UBC's MD Undergraduate Program curriculum.<sup>2</sup>

During the simulations, pre-clinical students discussed differential diagnoses, ordered appropriate investigations, and initiated medical management. This offered an opportunity to practice clinical reasoning in a remote, high-fidelity environment. The Zoom™ chat function was used to record case details, which supported effective communication and limited multiple participants speaking simultaneously.



Figure 1. Hybrid simulation setup. The camera angles include four views: (A) full room, (B) cardiac monitor, (C) overhead view. Investigations are displayed in Panel B when requested. Panel D is used for audio from the 'patient' and a close-up view when needed

## Outcomes

Medical resident facilitator feedback indicated that hybrid simulations offered an "excellent education modality" for students to engage in simulations during the COVID-19 pandemic. Facilitators did not need to control the

mannequin and, therefore, were able to pay closer attention to students' clinical reasoning during hybrid simulations, which enabled them to lead more comprehensive debrief discussions. Hybrid simulation required participants to demonstrate advanced verbal communication to clearly direct the in-person assistant. Limitations of hybrid simulation included the lack of hands-on skills acquisition for participants, the time required for setup, and access to a simulation centre with integrated audio-visual equipment. Facilitators suggested this simulation method could be adapted for rural healthcare workers.

## Next steps

Hybrid simulations combine virtual and in-person simulations, allowing students to practice history-taking, physical examinations, and procedures, while also abiding by public health guidelines for physical distancing during the COVID-19 pandemic. This model could be expanded to train allied health professionals from multiple geographic locations. Future steps include offering hybrid simulations to interdisciplinary healthcare learners, including rural healthcare professionals, and obtaining ethics approval to assess participant learning outcomes.

**Conflicts of Interest:** The authors do not have any conflicts of interest to declare.

**Funding:** The authors received no financial support for this project.

**Acknowledgements:** We would like to thank the Centre for Interprofessional Clinical Simulation Learning for providing their expertise, simulation centre, and audiovisual equipment. We would also like to thank Nick Slater, Erin Chahley, Lisa Hackett, Anthony Hinde, and Robin Stone for their participation in the Hybrid Simulation video. As well, we want to thank Sarah Douglas, the founder of the Island Medical Program Simulation Team.

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