

Telesimulation-based education during COVID-19

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Abstract

Simulation is a valuable, immersive educational tool for both health professional trainees and experienced clinicians. By promoting a realistic, collaborative, safe, hands-on, learning environment, simulation allows interprofessional teams to come together and practise both routine and high stakes, low-frequency events. The COVID-19 pandemic and the need for social distancing have shifted traditional simulation-based medical education towards a virtual platform: telesimulation. Telesimulation is an evolving field and the speed at which clinical educators need to adapt to use this platform is unprecedented. Educators must quickly navigate and leverage the differences between traditional simulation and telesimulation to create robust remote educational experiences. Telesimulation has unique goals and objectives, technology needs, and participant roles that need to be understood and properly operationalized to maximize opportunities for learning. This article reviews the authors' recommendations for developing and delivering successful telesimulations.

KEYWORDS

COVID-19, education, simulation, telesimulation

1 | Background

The Coronavirus Disease 2019 (COVID-19) has created many obstacles in clinical education.^{1,2,3,4} To foster social distancing, educators must now provide quality distance learning.⁵ This can be particularly challenging when attempting to deliver simulation-based education (SBE). SBE immerses learners in patient care scenarios set in safe learning environments. This hands-on experience exposes participants to various technical, cognitive and behavioural skills that aim to improve performance during both routine and high stakes, low-frequency clinical encounters.^{6,7} Educators must now alter their approach and turn this hands-on SBE into a high-level distance experience. This type of simulation, known as telesimulation, utilizes video technology to interactively link remote participants with their instructors. This Toolbox discusses recommendations for developing and delivering successful telesimulations, which reflect the authors' own experiences, available evidence-based practice, and comparisons with traditional SBE.

2 | Telesimulation recommendations

2.1 | Needs assessments

Needs assessments guide training design⁸ and thus serve as a foundation for the development and delivery of SBE. Unlike traditional SBE, telesimulation needs assessments must take into account technology available to participants. Internet speed, institutional firewalls, video and audio capabilities and interfaces may determine participant involvement. If the same level of technology is not accessible to all participants, then educators need to design curricula and scenarios that foster equal participation. For example, if not all participants are able to use the same audio function during the telesimulation, educators may alter scenarios so that participants type in responses and recommendations rather than speak them out loud. Additionally, institutions may block access to certain sites, chat rooms or video conferencing platforms. Educators must therefore choose a medium that is available to all participants. Modifications

may need to be considered to provide participants with adequate access to the SBE experience so that they may reap the benefits of the learning opportunity.

2.2 | Learning Outcomes

Technical, hands-on skills training is limited in telesimulation. Participants may not have the opportunity to gain active tactile or haptic deliberate practice. However, they will have the opportunity to observe technical skills. Telesimulation learning outcomes should therefore focus more on why certain actions are performed (cognitive skill) and how participants would inform their team and the patient/patient's family about the need for action (behavioural skill) rather than the mechanics of the action itself (technical skill). For example, learning outcomes for a respiratory failure telesimulation scenario may include the cognitive skills of recognizing respiratory distress and reviewing airway management options. Behavioural skills focused learning outcomes may emphasize the value and impact of utilizing closed-loop communication.⁹ The actual technical skills of airway management could be discussed and demonstrated by the facilitator; however, they may not be physically practised by participants during the telesimulation.

2.3 | Equipment

The types of simulators and equipment needed depend on the learning outcomes, available resources and the location in which the simulation will be broadcast. Simulation centres may heighten the fidelity of their broadcasts by utilizing a wide array of resources, moulage (mock injuries), equipment and supplies. Remote non-simulation centre broadcasts may be limited by what is easily accessible and portable. For example, remote sites may not be able to show-case seizures in a 5-year-old child if the only available easily portable mannequin is infant sized. Opportunities to highlight the same learning outcomes via the smaller mannequin should therefore be considered. Likewise, educators should balance mannequin needs with the learning outcomes of the scenario. For example, educators may not need a \$50,000.00 USD high-fidelity mannequin to underscore the ideal cognitive and communication skills needed in scenarios that focus on accurate nursing documentation. It is possible to teach these skills by utilizing a low-fidelity mannequin that costs under \$200.00 USD and sharing screen shots of pre-programmed changes in vital signs.

2.4 | Practice

Facilitators and simulation educators should practise their telesimulations ahead of time and fine-tune technical aspects such as ideal mannequin and monitor positioning as well as lighting. The mannequin and vital signs monitor should be positioned with optimum

lighting so that they are both clearly projected on the video platform whether the simulation is projected from a remote setting or simulation centre (Figures 1 and 2, respectively). This will allow the participants to visualize real-time actions performed and changes in vital signs. Participants should be able to see physical examination details such as retractions or pupillary size changes. Likewise, they should be able to adequately see interventions such as administration of fluids or placement of an airway adjunct. This will enhance realism and fidelity of the scenario thus leading to a more robust debrief and meaningful learning experience.

Facilitators and educators should also practise troubleshooting any potential broadcast or video issues prior to the actual simulation so that they may effectively resolve issues as needed during the live broadcast. Additionally, timing actual scenario elements such as how long they should allow for drawing up and administering medications or acquiring and applying airway adjuncts will give facilitators a better sense of the duration needed for the entire telesimulation as well as time ratios between the pre-brief, actual scenario and debrief.

2.5 | Pre-brief

As in traditional simulations, the telesimulation pre-brief sets the stage for the entire learning encounter.¹⁰ Participants should be oriented to the objectives and flow of the session as well as capabilities of the mannequin. Psychological safety of learners should still be emphasized.¹¹

However, telesimulation pre-briefs should spend more time emphasizing suspension of disbelief and expectations of the simulation. This will help participants believe that the scenario is unfolding in a traditional manner. Assigning roles ahead of time and clarifying which participants will speak during the scenario will help foster coordinated active participation. For example, assign a participant as the team lead responsible for choreographing the overall direction of patient care. Assign a participant to verbalize all of the airway-related tasks and actions that an airway clinician would perform. Likewise, a different participant could be responsible for directing all of the actions that the bedside nurse would perform. Depending on the size of the group, other participants could be assigned to utilize the chat function of the video platform to offer real-time collaboration and suggestions to the team lead.

2.6 | Facilitating the simulation

During the telesimulation, the facilitator's responsibilities depend on available resources. If the facilitator is the only resource in a remote setting, then he/she will need to run the mannequin, act as all confederates and conduct the debrief. In these situations, this person should be a highly experienced simulation educator and debriefer given the significant amount of multi-tasking needed. If other resources are available, the facilitator may be able to share roles. For example, one staff member can run the mannequin from an adjacent room to allow

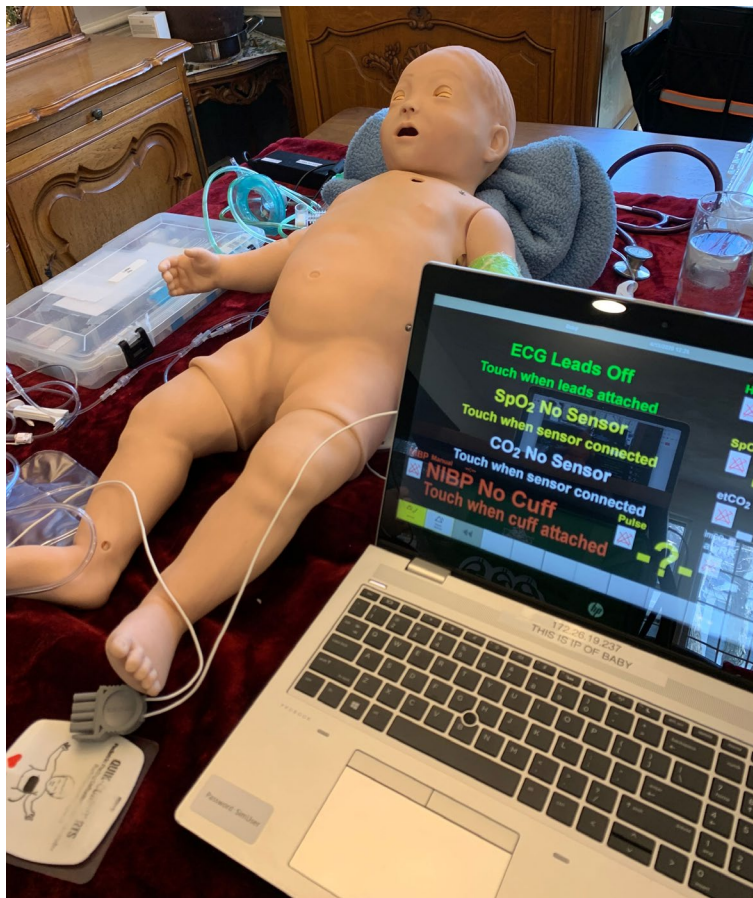


FIGURE 1 In a remote, non-simulation centre setting, the mannequin and vital signs monitor are positioned so that both may be captured in one video angle.

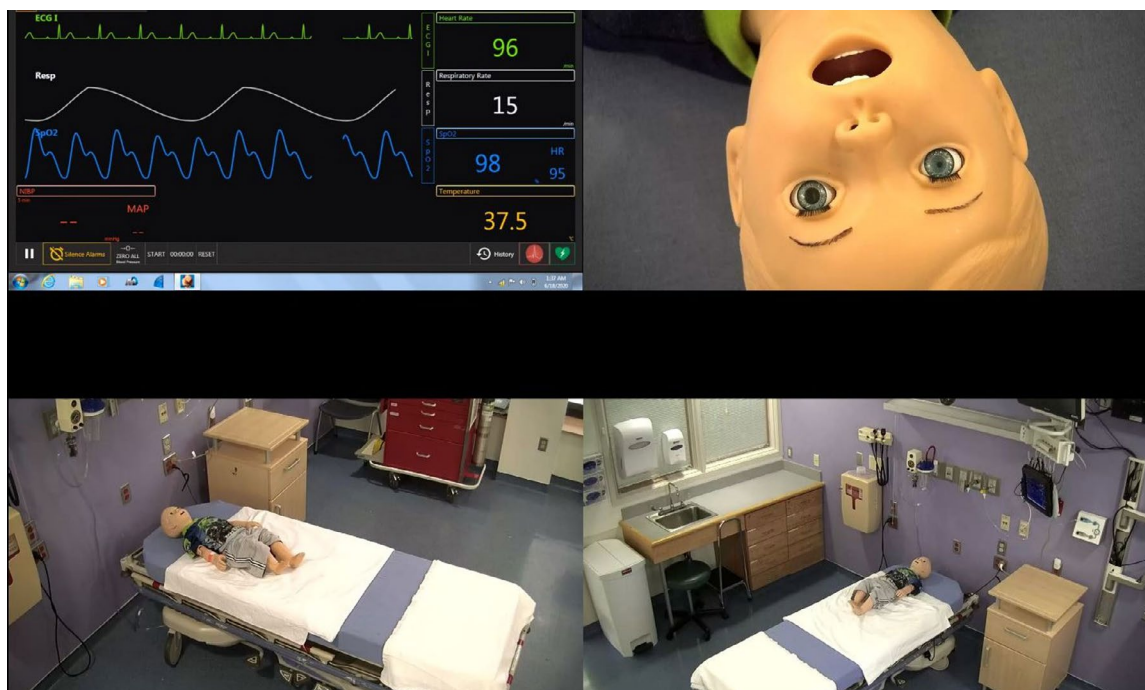


FIGURE 2 Participant view of tele-simulation broadcast from a simulation centre. Participants are able to see three views of the mannequin plus the vitals sign monitor. Note the close-up view of the mannequin showing unequal pupils.

for social distancing. If hands-on confederates are available, it is possible to position them throughout the simulation room to maintain social distancing with one at the patient's airway, one at the code cart/equipment away from the patient and one at or near the foot of the patient.

2.7 | Debriefing

Debriefing is one of the most critical components of SBE.¹² Each participant should be seen on video during the debrief to more effectively and actively involve them in the learning and guided reflection process. Visualization of participant faces can clue the facilitator into participant comprehension or confusion, lack of clarity or understanding, etc. This will help guide the discussion. Also, participants should take turns asking questions to foster a more interactive and inclusive conversation. If available, encourage learners to use the 'raise their hand' function in the video platform.

2.8 | Participant feedback

Participants should be asked to provide immediate feedback about the telesimulation either verbally or electronically. This feedback should include their insight about technical issues such as ability to see and hear essential components and interventions as well as their perspectives about this forum as an educational modality – were the objectives met, what practice changes will they make, etc. And participants should also share opportunities for improvement: how did this telesimulation compare to traditional simulation and what could be done to make the experience better? These evaluations will inform how future telesimulation offerings may be enhanced.

3 | Discussion

COVID-19 and the need for social distancing have forced educators to alter their traditional teaching methods. Telesimulation has emerged as an innovative tool for virtual distance learning and continues to be an evolving and advancing educational methodology.^{13,14,15} As summarized in Table 1, unique factors that must be considered include telesimulation specific needs assessments, learning outcomes, and equipment, as well as logistics of set up, internet access, troubleshooting malfunctions and timing of the sessions. Participant role designation with an emphasis on the meaning of the roles allows learners to participate more effectively in telesimulations. Additionally, behavioural skills and closed-loop communication must be emphasized as participants are not able to rely on team members' body language as means of communication in this type of distance learning. They must verbally close the loop with each other to ensure situational awareness and shared mental models. This platform encourages participants to actively listen, work together as a team and develop crisis resource management skills as they are forced to focus

TABLE 1 Telesimulation Recommendations

Aspect of Simulation	Summary of Recommendation
Needs assessment	Needs assessments should consider participants' access to technology
Learning outcomes	Learning outcomes should include more cognitive and behavioural skills than technical skills
Equipment	Determine equipment needed based on the objectives and location in which the simulation will be broadcast
Practice	Facilitators should practice the telesimulation ahead of time and set up the broadcast so that participants are able to see the mannequin, vital signs monitor and interventions performed
Pre-brief	The pre-brief must emphasize the suspension of disbelief and expectations of the simulation
Facilitating the simulation	Real-time roles and responsibilities of the telesimulation facilitator depend on availability of additional staff and confederates
Debriefing	Encourage active participation by making sure each participant is seen on video during the debrief
Feedback	Use participant feedback and evaluations as a means for rapid, continuous improvement of the telesimulation

on teamwork, leadership, followership and effective utilization of resources.¹⁶ As is seen with traditional SBE, this multidisciplinary educational approach fosters interprofessional collaboration, communication, and understanding of roles and responsibilities.¹⁷ Telesimulation also provides ample opportunity to engender a more in-depth examination of participants' cognitive skills through discussions about recognition of illness, analysis of management decisions and potential patient outcomes.

Telesimulation has some limitations as it is dependent on a functional video communication platform. Educators and facilitators must understand the nuances between this and traditional SBE prior to delivering telesimulation-based clinical education. In addition, this educational modality requires practice, as educators need to effectively troubleshoot technology so that the participants are able to focus on learning rather than technical mishaps.

4 | Conclusion

Telesimulation as an educational platform is in evolution. This manuscript provides the authors' perspectives about ways to develop and deliver SBE and training to learners during the COVID-19 pandemic. The feedback from our own telesimulations has been overwhelmingly positive with participants indicating that this is an interactive, thought-provoking way to learn as we navigate the pandemic. We have seen this success both with telesimulations run by a single

facilitator in a remote setting and with telesimulations run in a simulation centre with ample resources. As we continue to move into the virtual world, we have the opportunity to further refine and evolve telesimulation into a robust adjunct in clinical education. And with this new approach to learning, we have the potential to further expand this type of distance education to a wide array of healthcare trainees and professionals across developing and low-resource areas.

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CONFLICT OF INTEREST

The authors certify that to the best of our knowledge, no conflict of interest, financial or other, exists.

AUTHORS' CONTRIBUTIONS

Conception and design of work: MD and BW. Drafting the work or revising it critically for important intellectual content: MD and BW. Final approval of the version to be published: MD and BW. Agreement 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: MD and BW. Give final approval to the submitted paper: MD and BW.

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REFERENCES

- Rose S. Medical student education in the time of COVID-19 [published online ahead of print March 31, 2020]. *JAMA*. <https://doi.org/10.1001/jama.2020.5227>
- Ferrel MN, Ryan JJ. The impact of COVID-19 on medical education. *Cureus* 2020;12(3):e7492.
- Important guidance for medical students on clinical rotations during the coronavirus (COVID-19) outbreak. Press release. Association of American Medical Colleges. Published March 17, 2020. Available at <https://www.aamc.org/news-insights/press-releases/important-guidance-medical-students-clinical-rotations-during-coronavirus-covid-19-outbreak> Accessed on 31 May 2020
- COVID-19 updates and resources. Liaison Committee on Medical Education. Updated March 25, 2020. Available at <https://lcme.org/covid-19/>. Accessed on 31 May 2020
- Newman NA, Lattouf OM. Coalition for medical education—A call to action: A proposition to adapt clinical medical education to meet the needs of students and other healthcare learners during COVID-19. *J Card Surg*. 2020. <https://doi.org/10.1111/jocs.14590>. Online ahead of print
- Lopreiato JO, Sawyer T. Simulation-based medical education in pediatrics. *Acad Pediatr*. 2015;15(2):134–42. <https://doi.org/10.1016/j.acap.2014.10.010>
- Okuda Y, Bryson EO, DeMaria S, Jacobson L, Quinones J, Shen B, et al. The utility of simulation in medical education: what is the evidence? *Mt Sinai J Med*. 2009;76(4):330–43.
- Wilson R, Hagler D, et al. Assessing Learning Needs, In Palaganas JC, Maxworthy JC ed. *Defining Excellence in Simulation Programs*. Wolters Kluwer; 2015. 488–495.
- Diaz M, Dawson K. Impact of simulation-based closed-loop communication training on medical errors in a pediatric emergency department. *Am J Med Quality*. 2020. <https://doi.org/10.1177/1062860620912480>. [Epub ahead of print]
- Rudolph JW, Raemer DB, Simon R. Establishing a safe container for learning in simulation: the role of the presimulation briefing. *Simul Healthc*. 2014;9(6):339–49.
- Henricksen JW, Altenburg C, Reeder RW. Operationalizing healthcare simulation psychological safety: a descriptive analysis of an intervention. *Simul Healthc*. 2017;12(5):289–97.
- Sawyer T, Eppich W, Brett-Fleegler M, Grant V, Cheng A. More Than one way to debrief: a critical review of healthcare simulation debriefing methods. *Simul Healthc*. 2016;11(3):209–17.
- Hayden EM, Khatri A, Kelly HR, Yager PH, Salazar GM. Mannequin-based telesimulation: increasing access to simulation-based education. *Acad Emerg Med*. 2018;25(2):144–7.
- Papanagnou D. Telesimulation: a paradigm shift for simulation education. *AEM Educ Train*. 2017;1(2):137–9.
- McCoy CE, Sayegh J, Alrabah R, Yarris LM. Telesimulation: an innovative tool for health professions education. *AEM Educ Train*. 2017;1(2):132–6.
- Fung L, Boet S, Bould MD, Qosa H, Perrier L, Tricco A, et al. Impact of crisis resource management simulation-based training for interprofessional and interdisciplinary teams: a systematic review. *J Interprof Care*. 2015;29(5):433–44.
- Cunningham S, Foote L, Sowder M, Cunningham C. Interprofessional education and collaboration: A simulation-based learning experience focused on common and complementary skills in an acute care environment. *J Interprof Care*. 2018;32(3):395–8.

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