

UC San Diego

UC San Diego Previously Published Works

Title

COVID-19 educational innovation: Hybrid in-person and virtual simulation for emergency medicine trainees.

Permalink

<https://escholarship.org/uc/item/93r7p61m>

Journal

AEM Education and Training, 5(2)

Authors

Austin, Andrea
Rudolf, Frances
Fernandez, Jorge
et al.

Publication Date

2021-04-01




DOI

10.1002/aet2.10593

Peer reviewed

ORIGINAL CONTRIBUTION

COVID-19 educational innovation: Hybrid in-person and virtual simulation for emergency medicine trainees

Andrea Austin MD¹  | Frances Rudolf MD¹  | Jorge Fernandez MD¹ |
Paul Ishimine MD^{1,2}  | Matthew Murray MD^{1,2} | Preetham Suresh MD^{1,3} |
Michele McDaniel MD^{1,2} | Kirill Shishlov MD¹ | Leslie Oyama MD¹

¹Department of Emergency Medicine, University of California San Diego, San Diego, California, USA

²Department of Pediatric Emergency Medicine, Rady Children's Hospital, San Diego, California, USA

³Simulation Training Center, School of Medicine University of California, San Diego, California, USA

Correspondence

Austin Andrea, Department of Emergency Medicine, University of California San Diego, 200 W Arbor Drive, San Diego, CA 92103, USA.

Email: andreaaustinmd@gmail.com

Handling Editor: Jason Wagner

Abstract

The COVID-19 pandemic has dramatically affected medical education. Emergency medicine (EM) requires excellence in multiple core competencies, including leadership, teamwork, and communication skills as well as procedural experience. To meet these objectives, we developed a hybrid simulation model that accommodated a reduced number of learners in our simulation center to allow for physical distancing, seamlessly integrated with an online integrated experience for remote learners. All learners participated or watched one adult and one pediatric simulation case. Fourteen residents participated in live simulation, while six residents and six medical students comprised the remote group. At the end of each case, the live feed was ended, and separate debriefings were conducted by different EM faculty, in person and online (via Zoom). An electronic survey was then sent to participants to rate the effectiveness of the intervention; 23 survey responses were collected: 52.2% (12) from the live session and 47.2% (11) from the virtual session. Survey results demonstrated that the online simulation observation and debriefing had the same, if not better, satisfaction than in-person simulation sessions and debriefings. Due to its success, this new method of hybrid simulation will be our plan for the foreseeable future, at least until COVID-19 abates.

BACKGROUND

Simulation has become a cornerstone of emergency medicine (EM) residency education. When COVID-19 struck the United States, virtually all medical simulation programs were halted and there was a shift to virtual learning.^{1,2} In response, our institution's simulation center developed a COVID-19 protocol to allow for limited in-person simulation activities. Changes included universal masks and gloves, frequent hand hygiene, and a maximum of six people per simulation room. While online learning has been a critical component to continuing education during the era of COVID-19, our simulation center and EM residency program recognized the importance of resuming in-person training, because EM requires the integration of

leadership development, teamwork and communication skills, and procedural competency. The residency program leadership felt that it was not possible to meet all these learning objectives through a purely online program. Thus, our faculty developed a hybrid model that accommodated a reduced number of learners physically present in the simulation center, integrated with an online experience for remote learners outside the simulation center.

OBJECTIVES OF INNOVATION

The primary objectives of this innovation were to: 1) allow for a limited number of learners to be at the simulation center to experience

in-person simulation sessions and debriefings; 2) project the simulated sessions to an on-line audience unable to attend in-person because of the reduced capacity of the simulation center; and 3) provide an online debriefing for the off-site and online audience, facilitated by experienced EM faculty.

DEVELOPMENT PROCESS

Adult simulations used the SimMan 3G (Laerdal Medical, Stavanger, Norway) high-fidelity manikin with vital signs displayed in the simulation room on an in-room display. Pediatric simulations utilized the Pediatric HAL (Gaumard Scientific, Miami, FL) with vital signs displayed on an in-room monitor. Three in room pan-tilt-zoom (PTZ) cameras were used to capture video and were streamed along with the vital signs feed using the SimCapture (B-Line Medical, Washington, DC) video streaming and recording system. The SimCapture interface was running on the instructor's desktop computer, which allowed for sharing of the video and audio with the remote learners, allowing them to see and hear the entire simulation (see Figure 1). Once the simulation scenario was completed, the screen share of SimCapture was transitioned to share presentation slides utilized for the postsimulation debriefings.

IMPLEMENTATION

Learners self-selected in-person or virtual simulation. Those groups were then divided in half and performed pediatric then adult or adult then pediatric simulations. The in-person training groups performed in-person debriefing, led by the adult or pediatric simulation instructors, with their cohort following their simulation session. The virtual groups performed the Zoom-based debriefing with faculty that were also observing the simulation sessions remotely. An anonymous survey was administered to all participants following the session.

OUTCOMES

We piloted this hybrid in-person and virtual simulation experience on July 21, 2020. Fourteen residents participated in the live simulation session and were divided into four groups of differing levels of training (PGY-1 to -4). The group of 12 remote participants included six residents and six fourth-year medical students. Remote participants were sent an electronic survey and asked to rate the overall virtual simulation experience compared to a live, in-person simulation (three-point Likert scale, better to worse). Ten of 12 surveys for the adult session and 11 of 12 surveys for the pediatric session were collected with an overall survey response rate of >80%. For the adult simulation, 100% of respondents felt that the virtual experience was either better ($n = 6$) or neutral ($n = 4$) to a traditional live simulation. For the pediatric simulation, 92% of respondents felt that the virtual experience was either better ($n = 2$) or neutral ($n = 9$).

Feedback from this pilot session was almost universally positive. Qualitative comments included that "participating by Zoom was just as valuable as in person." Multiple respondents appreciated the separate virtual debriefing, noting that "the Zoom debrief was outstanding. I think it allowed for more engagement of participants."

DISCUSSION

The ACGME guidance related to educational activities is that education should continue with Web conferencing and other innovations when feasible.³ Months into the COVID-19 pandemic, the risks of transmitting and contracting COVID-19 from close contact were persistent, but the suspension of all in-person training events was suboptimal. While the risk of contracting COVID-19 is not zero in a simulation center, the procedures outlined in this paper mitigate the risk substantially. Furthermore, our experience has shown that residents desire in-person training and relish the opportunity for hands-on learning. Therefore, we have been able to ensure that a certain

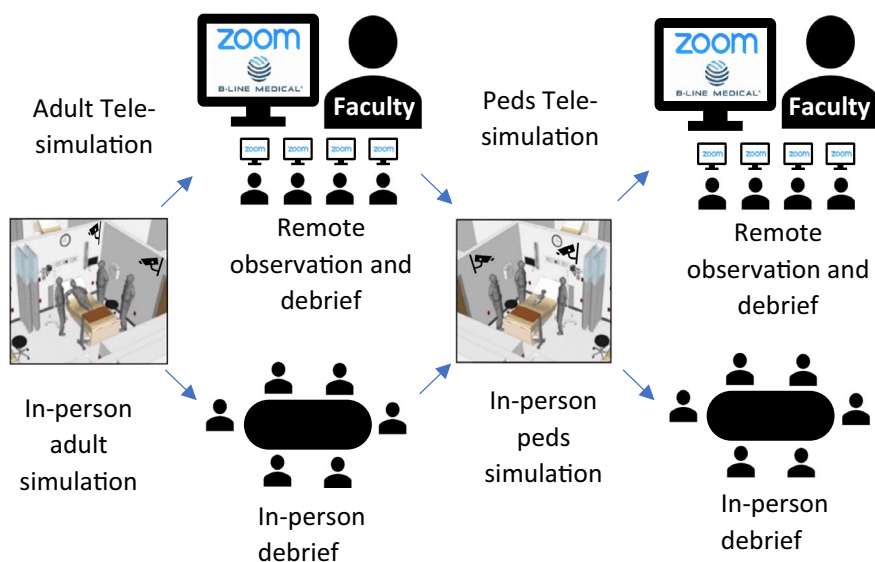


FIGURE 1 Overview of hybrid in-person and virtual simulation event

number of learners are present for in-person training, while also allowing learners with concerns about in-person training to have the option of choosing a virtual option only.

There are several nuances related to the technological set-up that are critical to the success of future similar educational undertakings. First, the audio-visual quality must be very high to promote a successful online experience. Our center has several high-quality microphones strategically placed in each simulation room; these microphones were crucial to amplifying masked speakers' voices sufficiently to clearly project to the online audience. Additionally, as with all new innovations, practice and troubleshooting were crucial. We conducted two practice sessions with all participating EM simulation faculty and simulation center personnel. From those practice sessions, we realized the importance of coaching our participants to speak clearly and slightly louder than their normal speaking volume just prior to the cases. We also learned how to best position the cameras, manikin, and equipment to optimally broadcast the simulated sessions to the online audience.

From experience and literature review of virtual modalities of education, we knew that large online groups are often challenging for engaging discussion so integral to the debriefing process.⁴ Therefore, we decided at the end of the simulation case to end the simulation center live feed and to conduct separate small-group debriefings in person and online. Simulation faculty observed the simulation session and were provided, in advance, with detailed case information and debriefing objectives. Additionally, in-person and online EM faculty debriefers communicated in real time via group text messaging during the simulation cases to refine the plans for the debriefings, based on shared observations of the simulated cases.

The learner survey results demonstrate that there were high rates of satisfaction for the online observation and debriefing sessions. Due to its success, this new method of hybrid simulation will be our plan for the foreseeable future, until COVID-19 abates.

Afterward, we may continue a hybrid method, particularly when we anticipate a high volume of learners or interested faculty who would prefer to observe the sessions from home. For example, early in the academic year, when there are more student rotators present, this hybrid model may offer a satisfactory method to optimize the participation and education of our students, residents, and faculty, while reducing overcrowding in the simulation center.

ORCID

Andrea Austin  <https://orcid.org/0000-0002-0201-716X>

Frances Rudolf  <https://orcid.org/0000-0002-8748-2545>

Paul Ishimine  <https://orcid.org/0000-0001-8069-3174>

REFERENCES

1. Redinger JW, Cornia PB, Albert TJ. Teaching during a pandemic. *J Grad Med Educ.* 2020;12(4):403-405.
2. Gordon M, Patricio M, Horne L, et al. Developments in medical education in response to the COVID-19 pandemic: a rapid BEME systematic review: BEME Guide No. 63. *Med Teach.* 2020;42(11):1202-1215.
3. COVID-19 Frequently Asked Questions: What Are the ACGME's Expectations Regarding the Conduct of Didactics Such as Educational Conferences, Journal Clubs, etc.? ACGME. c2000-2021. Accessed March 21. <https://www.acgme.org/COVID-19/Frequently-Asked-Questions#prdidactics>
4. Torres A, Domańska-Glonek E, Dzikowski W, Korulczyk J, Torres K. Transition to online is possible: solution for simulation-based teaching during the COVID-19 pandemic. *Med Educ.* 2020;54(9):858-859.

How to cite this article: Austin A, Rudolf F, Fernandez J, et al. COVID-19 educational innovation: Hybrid in-person and virtual simulation for emergency medicine trainees. *AEM Education and Training.* 2021;5:e10593. <https://doi.org/10.1002/aet2.10593>