

Recommendations for Optimizing Virtual Simulation: A Trial and Error Process From the COVID-19 Pandemic

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The COVID-19 pandemic has led many patients to delay or eschew care, causing the quantity and quality of clinical education to arguably suffer.¹⁻³ In response, many residency programs were forced to adjust their formal didactics to provide socially distanced education and augment lost clinical education.^{4,5} Simulation as a teaching modality provides residents and fellows with the efficacious and satisfying transfer of medical knowledge, as well as psychosocial, communication, and procedural skills in a relatively safe and low-stakes environment.⁶⁻⁹ Prior to COVID-19, residency programs typically scheduled regular simulation scenarios as part of their didactic conferences.

Our residency program transitioned from a monthly simulation session that was directly viewed and then live-debriefed by all conference attendees to a weekly remote format that featured prerecorded cases with a small group of residents and was subsequently broadcasted via a video conferencing platform to the larger virtual audience. Even with the reinstatement of in-person conferences, our transition illuminated various advantages to being able to effectively transmit simulation learning in a virtual format.¹⁰⁻¹³ By offering the opportunity to view and contribute feedback to participants remotely, faculty engagement with resident education has increased. Our program continues to conduct weekly live sessions with our core simulation faculty and a monthly virtual simulation to encourage participation from faculty at different campuses. This Perspectives article reviews our division's experience of this transition. We offer recommendations for overcoming obstacles and provide advice to other programs that may need to create or optimize a virtual simulation experience.

Although literature suggests that observers can gain from the viewing experience and the debrief, incorporating observers into the active learning phase

proved to be difficult.^{14,15} The viewing process must be optimized, as distanced learners can become quickly disengaged or distracted.^{16,17} The process of conducting remote simulation can be broken down into the following subtasks: conducting a pre-brief, recording the participants, broadcasting to the audience, and facilitating an interactive conversation during the debrief (BOX).

Recommendation 1: Prioritize Psychological Safety During the Pre-Brief

Multiple studies show that video review during simulation debriefing augments the experience,¹⁸⁻²⁰ but the preservation of psychological safety is of the utmost importance. The pre-briefing process for direct participants and observers must be standardized and must preemptively acknowledge and validate the stress associated with being recorded and critiqued by a large, and now remote, audience.²¹ The facilitator should obtain consent prior to recording, must establish the use of safe words (agreed-upon phrases that confer an immediate pause or end to the current scenario, such as "Stop Simulation"), and must reinforce The Basic Assumption, a core value from the Center for Medical Simulation that everyone is intelligent, capable, and trying their best to improve.²² After each session, faculty held unstructured and informal check-ins with residents to solicit their comfort levels and strategies for improvement. Despite video recording being a new facet of our simulation, residents stated they were indifferent or viewed the experience positively.

Recommendation 2: Identify Optimal Equipment to Record and Transmit Sessions to the Larger Audience

Effective recording of both video and audio components proved to be a difficult task, as has been documented in prior literature.^{14,16,17} After several trials, we chose to record with mobile phone cameras

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that were plugged into high-quality Shure external microphones.²³ Difficulty with broadcasting effectively has been documented by numerous programs transitioning to virtual simulation.¹⁴ Some problems include wi-fi and mobile services that are unable to support streaming videos, difficulty in conveniently distributing large audiovisual recordings files, and hospital security firewalls. Our ultimate solution was to transfer files onto a hardwired hospital desktop computer and then broadcast them via the Zoom platform's "optimize for video" feature.²⁴

Our initial attempts at debriefing by casting a physical white board proved unsatisfactory, as it was difficult for participants to view at home. Debriefing proved to be most engaging when using the Zoom built-in whiteboard feature and scribing on a tablet device.²⁵

Recommendation 3: Incorporate The Basic Assumption to Facilitate Effective Debriefing and Participant Well-Being and Increase Virtual Learner Engagement

The development of both technical and nontechnical skills is significantly enhanced when debriefing occurs.^{26–28} Debriefing is a delicate, multistep process with various forms and no clear superior method.²⁹ We utilized a Promoting Excellence and Reflective Learning in Simulation (PEARLS) debriefing architecture, soliciting participants' emotional responses before scribing Plus/Delta feedback on the virtual whiteboard, followed by a deeper discussion of the medical learning objectives.³⁰ Establishing a sense of ease and safety among participants is paramount to optimizing reflection and growth, especially with physicians' significantly elevated baseline anxiety levels during the COVID-19 pandemic.³¹ To establish a culture where individuals are comfortable volunteering and receiving feedback during simulation conferences, efforts should be tailored to consistent use of pre-briefing, skilled and positive facilitation, and maintenance of The Basic Assumption.^{14,21,22} The larger and impersonal audiences associated with virtual learning can lead to decreased willingness to participate due to anxiety around perceived failure.^{32,33} The in-person group of learners and facilitators should be kept relatively small and should be the primary drivers of the discussion. Remote observers should type their questions and comments into the chat box, where facilitators can read them aloud to the in-person participants or call on the person to unmute themselves. This will shrink the perceived size of the group and may mitigate any apprehension in participation.

BOX Recommendations for Optimizing Virtual Simulations During Residency

1. Prioritize psychological safety during the pre-brief.
2. Identify optimal equipment to record and transmit sessions to the larger audience.
3. Incorporate The Basic Assumption to facilitate effective debriefing and participant well-being and increase virtual learner engagement.
4. Use the pause button during the debriefing process for incremental reflection.

Recommendation 4: Use the Pause Button During the Debrief for Incremental Reflection

As noted earlier, video-assisted feedback has been shown to improve experiential learning.^{34,35} Utilizing video playback grants facilitators the ability to pause at a scenario's various branching points, which are optimal breaks for incremental reflection and focused discussion.³⁶ Facilitators benefit from cognitive off-loading in that they can address a particular learning objective and then move on.³⁷ Feedback on this methodology has been largely positive, with participants reporting that this makes the medical take-home points of cases more easily digestible. This method can also help participants develop a systematic approach to a case scenario. During a pause, the remote observers are encouraged to discuss their current opinions without knowing the progression of the case, which significantly augments genuine debriefing by limiting hindsight bias, and as an added bonus, helps ease anxiety levels of the participants.³⁸

COVID-19-Specific Barriers and Opportunities

The COVID-19 pandemic mandated adjustments to our simulation processes with its risk attached to in-person interactions. Most of these adjustments impeded the fluidity and comfort of the simulation experience, but they also better replicated the new work environment. Full personal protective equipment (PPE) was donned and doffed by all within the simulation environment, as per real-life practices. PPE makes both verbal and nonverbal communication challenging and makes all individuals more difficult to identify.^{39,40} Formal introductions, role assignments, closed loop communication, and direct eye contact became fundamental in real time and consequently warranted more attention during simulation. We commonly advise, "The more you treat this like an actual clinical encounter, the more you'll benefit." It was only fitting to embrace these inconveniences,

which became commonplace in the new daily work environment, to bolster the learning experience.

Conclusions

The COVID-19 pandemic has forced the medical education community to adapt to a new normal, one reliant on remote learning. The transition to video-broadcasted simulation learning can be difficult, but programs can incorporate these lessons to augment their simulation experience. We recommend that developers prioritize the reinforcement of psychological safety in well-planned pre-briefings, identify the optimal settings on readily available equipment and video conferencing platforms, incorporate The Basic Assumption into the virtual environment, and use the pause and reflect method during the debrief to highlight key learning points.

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