Telehealth Training During the COVID-19 Pandemic: A Feasibility Study of Large Group Multiplatform Telesimulation Training

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Abstract

Background: *Video telehealth is an important tool for health care delivery during the COVID-19 pandemic. Given physical distancing recommendations, access to traditional in-person telehealth training for providers has been limited. Telesimulation is an alternative to in-person telehealth training. Telesimulation training with both remote participants and facilitators using telehealth software has not been described.*

Objective: *We investigated the feasibility of a large group telesimulation provider training of telehealth software for remote team leadership skills with common neonatal cases and procedures.*

Methods: *We conducted a 90-min telesimulation session with a combination of InTouch™ provider access software and Zoom™ teleconferencing software. Zoom facilitators activated InTouch software and devices and shared their screen with remote participants. Participants rotated through skill stations and case scenarios through Zoom and directed bedside facilitators to perform simulated tasks using the shared screen and audio connection. Participants engaged in a debrief and a pre- and postsurvey assessing participants' comfort and readiness to use telemedicine. Data were analyzed using descriptive statistics and paired* t *tests.*

Results: *Twenty (*n = *20) participants, five Zoom and eight bedside facilitators participated. Twenty-one (21) pre- and 16 postsurveys were completed. Most participants were attending neonatologists who rarely used telemedicine software. Postsession, participants reported increased comfort with some advanced InTouch features, including taking and sharing pictures with the patient (*$p < 0.01$*) and drawing on the shared image (*$p < 0.05$*), but less comfort with troubleshooting technical issues, including audio and stethoscope (*$p < 0.01$*). Frequently stated concerns were troubleshooting technical issues during a call (75%,* n = *16) and personal discomfort with telemedicine applications and technology (56%,* n = *16).*

Conclusion: *Large group telesimulation is a feasible way to offer telehealth training for physicians and can increase provider comfort with telehealth software.*

Keywords: *education, telehealth, simulation, distance learning, COVID-19, pediatrics, telemedicine*

Introduction

Video telehealth systems are an increasingly important tool for health care delivery.[1–3] This is especially true during the current COVID-19 pandemic, which has forced both inpatient and outpatient health care providers to adopt telehealth so patients can receive care while physical distancing. Telehealth also allows for the reallocation of scarce medical resources and personal protective equipment to first-line responders treating COVID-19 patients. This year, the U.S. telehealth market is expected to see an 80% growth due to the COVID-19 pandemic, and 76% of U.S. hospitals are now connecting with patients remotely using video, audio, online chat, e-mail, and other technologies.[4]

Although hospitals have invested quickly in scaling up their telehealth capabilities during the pandemic, a problem exists in how to train health care providers to use telehealth software in the midst of the pandemic. The recommendations for "social distancing" during the pandemic have restricted health care providers from attending in-person telehealth training sessions. Therefore, identifying innovative ways to provide distance learning to health care providers on the use of telehealth software is urgently needed.[5]

Simulation is an effective teaching method of physician training and is increasingly being used to develop teamwork, procedural, and clinical reasoning skills in health care teams.[6–11] Simulation utilizes the basic tenets of adult learning theory by enabling a hands-on approach to skill improvement within a realistic environment.[6,12,13] Simulation-based

 DOI: 10.1089/tmj.2020.0357

learning is cemented by the repetition of new knowledge and skills, particularly when adequate time is set aside for reflection and debriefing.[13,14]

Telesimulation, the process of doing simulation using telecommunication, has also become more common in the training and education of health care teams.[3,15–18] Telesimulation studies have shown that video-based assessments can decrease the time required to appropriately stabilize a neonatal airway and improve overall provider confidence in assessing the stability of an infant before transport compared with telephone consultation.[3,19] Using telesimulation to train physicians how to use telehealth software may be one way to conduct such training safely in the midst of a pandemic. To the authors' knowledge, there are no prior reports describing the use of a multiplatform telesimulation to teach physicians how to use telehealth software.

In this study, we describe our experience creating and conducting a telesimulation session to teach physicians how to use telehealth software. Our primary aim was to assess the feasibility of conducting a large group multiplatform telesimulation session using both a specialized telehealth platform, InTouch™ (InTouch Technologies, Inc., Goleta, CA, USA), and a video teleconferencing platform, Zoom™ (Zoom Video Communications, Inc., San Jose, CA, USA). Our secondary aim was to assess provider comfort with telemedicine and to identify barriers to the ulitization of this approach to telesimulation. We hypothesized that a large group multiplatform telesimulation session was feasible and would increase physician comfort using specific telehealth software features.

Materials and Methods

STUDY DESIGN

A feasibility study consisted of a 90-min multiplatform telesimulation session conducted in April 2020 on the use of the InTouch provider access software platform. This telesimulation session was designed for the health care institution's providers as part of a new educational endeavor in teaching how to use a specialized telehealth platform for patient care. Participants were recruited from a division of neonatal health care providers rolling out telehealth services during the COVID-19 pandemic. The study was determined as exempt from further review by the Seattle Children's Institutional Review Board PIROSTUDY15919.

PARTICIPANT PRESESSION PREPARATION

Attendees were instructed to download the InTouch provider access software to their iPhone/iPad or Windows PC/laptop by logging in using their credentials before the session. Participants were asked to connect to one of the InTouch provided demo sessions (Demo Vici care or Demo Viewpoint) to practice navigating the platform. The session agenda and telehealth resources were provided for reference before the session. A secure Zoom meeting ID was provided for access on the day of the simulation. Zoom was used since it is a Health Insurance Portability and Accountability Act (HIPAA)-compliant teleconferencing software application actively used at the researchers' institution. Participants were instructed to join Zoom from a computer, ensure a strong Wi-Fi signal, and use a headset for best audio quality.

SIMULATION SESSION

The telesimulation session was facilitated over the Zoom teleconferencing platform. The facilitators logged into the InTouch provider access software and connected to InTouch end point devices that were positioned at remote simulation stations before sharing their screen through Zoom with remote participants in their breakout session. A schematic of the remote multiplatform telesimulation setup, including locations of the Zoom facilitators, InTouch devices, and bedside facilitators, is shown in *Figure 1*.

The lead telesimulation facilitator (R.U.) orchestrated the overall session remotely through Zoom. The participants were assigned into Zoom breakout rooms to participate in large and small group simulation sessions using the InTouch telemedicine software from their personal computers. Each Zoom breakout room was facilitated by another investigator who was available to troubleshoot any InTouch connection issues and communicate with the participants through Zoom, so the participants could optimally experience the simulations through the telehealth platform. To provide a simulated clinical experience, another group of investigators were assigned to act as bedside facilitators, who were stationed at a distant clinical site with an InTouch system receiving instruction on how to perform a procedure or a resuscitation by the participants learning how to operate the InTouch system in a simulated clinical setting.

At the start of the session, participants received an initial overview by the lead telesimulation facilitator. Participants were then divided into two Zoom breakout rooms for an overview of the telehealth platform features, including pan, zoom, live cursor, annotation, and the use of a Littman 3200 digital Bluetooth stethoscope (3M™ Littmann®, St. Paul, MN, USA). During these sessions, the facilitators demonstrated the features, then invited participants to assume remote control of their shared screen through Zoom to practice applying the demonstrated skill.

Participants were then assigned to four different Zoom breakout rooms: two skill stations (1) tension pneumothorax requiring needle thoracocentesis and (2) respiratory distress in an infant with a difficult airway requiring endotracheal intubation; and two simulation stations (3) neonatal resuscitation of a term infant with a history of abruption and (4) delivery

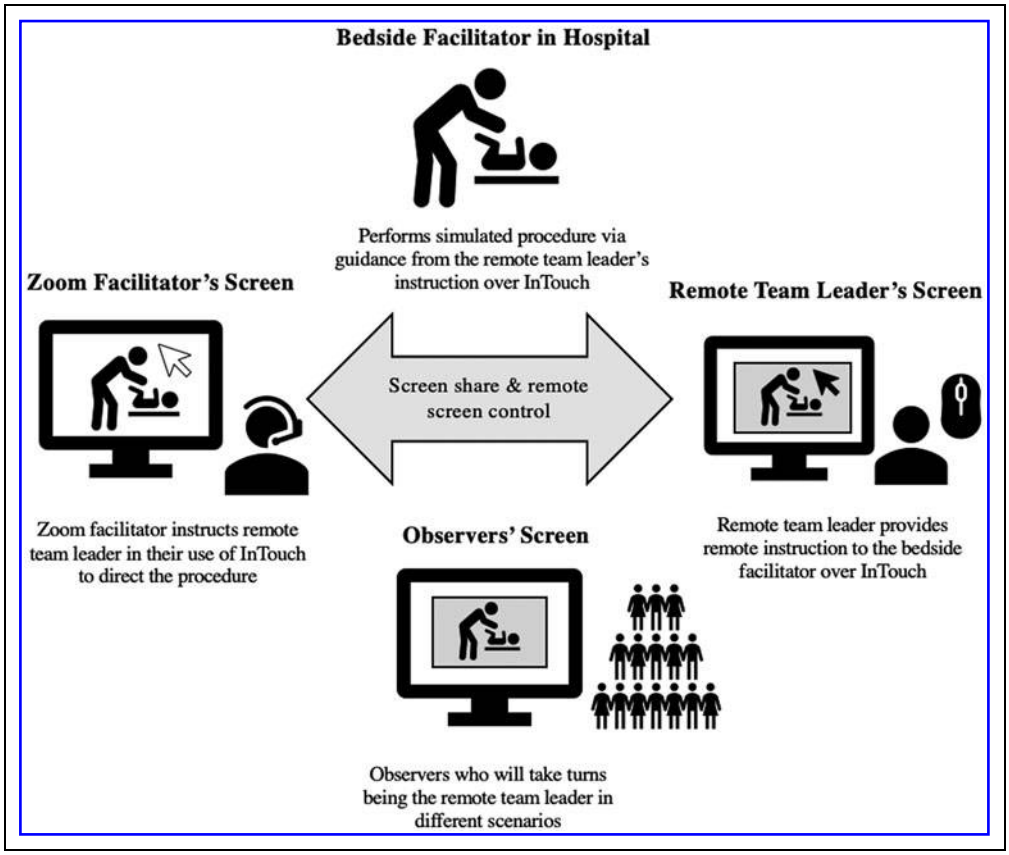

Fig. 1. Schematic of the remote telesimulation setup.

room management of a 26-week gestation premature infant (*Fig. 2*). Each station was managed by remote bedside facilitators who performed the simulated tasks under the direction of the participants who controlled the shared screen in the role of remote team leader. The other small group participants were engaged in the debrief at the end of each breakout session.

After all four stations were visited, participants and facilitators came together for a large group debriefing regarding the simulation experience. The debriefing conducted with the large group included observations regarding the interactions of the remote team leader (remote participants) and bedside facilitators. These observations focused primarily on communication between the bedside facilitators and the remote team leader.

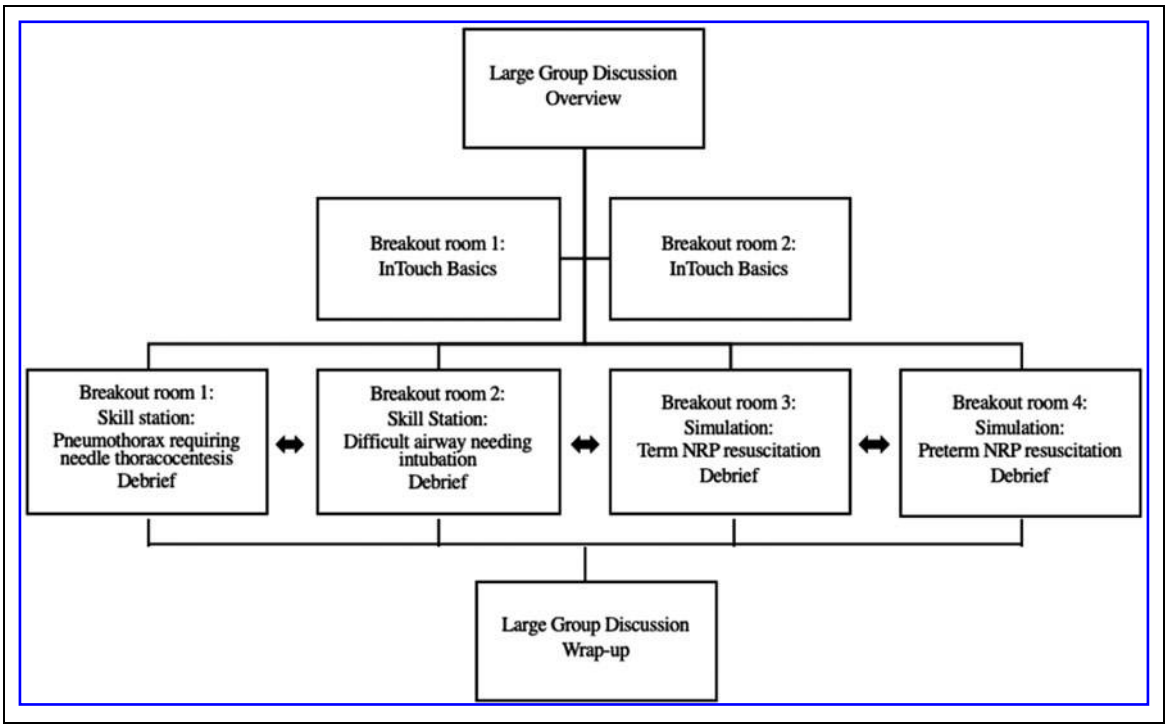

Fig. 2. Flow process during telesimulation.

SURVEY DATA COLLECTION

Remote participants and Zoom facilitators were instructed to complete a 29-item pre-event survey before the session. After the telesimulation, remote participants and Zoom facilitators were instructed to complete a 20-item postevent survey. As they did not have direct access to the telehealth interface during the training, the bedside facilitators did not complete the survey.

The pre- and postsurveys were developed by two investigators (M.M.G. and R.U.) and were used to assess each participant's level of comfort using the telemedicine InTouch software as well as to gauge readiness to use telemedicine. The survey questions included demographic data (provider role, age, experience with telephone consultations for transports, and unit consultations), comfort with using the multiple features of the InTouch platform, comfort with troubleshooting technological difficulties, barriers to using video for telemedicine, and plans for future use. In addition, the postsurvey asked participants to identify concerns they had for the use of telemedicine and to provide additional feedback regarding the telesimulation session (*Supplementary Table 1*).

STATISTICAL ANALYSIS

Participant survey data were analyzed using descriptive statistics. Categorical data are presented as number (n) and percentage (%). Paired t tests were used to compare matched pre- and postsurvey data. A p-value <0.05 was considered to be statistically significant. Statistical analysis was performed using STATA 14.2 (StataCorp, College Station, TX, USA).

Results

A total of 33 people participated in the multiplatform telesimulation session, which comprised 20 remote participants, 5 Zoom facilitators, and 8 bedside facilitators. A total of 21 presurveys and 16 postsurveys regarding the session were completed (presurvey response rate, 84%, $n=25$). Demographic information is provided in *Table 1*. Most participants were attending neonatologists ($n=16$) who frequently participate in telephone consultations but rarely use video telemedicine software. Approximately half of participants (48%, $n=10$) had downloaded the InTouch software before the session and knew how to call into InTouch devices located at originating sites remotely.

Presession, participants reported being comfortable or very comfortable with basic features including camera controls (zoom and pan) (56%, $n=16$) and local controls including audio and webcam settings (42%, $n=21$), but these ratings were less frequent with more advanced features such as stethoscope operation (10%, $n=21$) and image sharing using image grabber (10%, $n=21$). Participants were uncomfortable or very uncomfortable

Table 1. Presurvey Participant Demographics

Role	*n* (%)
Attending neonatologist	16 (76)
Fellow/pediatric hospitalist	5 (24)
Age	
25–35 years	6 (29)
36–45 years	6 (29)
46–55 years	2 (10)
≥56 years	7 (33)
On average, how often do you participate in NICU telephone consultations with advanced practice providers/fellows/hospitalist while on home call? ($n=16$)	
1–2/week	6 (38)
1–2/month	8 (50)
7–11/year	2 (13)
On average, how often do you participate in NICU telephone consultations for the management of transports? ($n=16$)	
1–2/week	4 (25)
1–2/month	7 (44)
3–6/year	2 (13)
<2/year	2 (13)
I do not participate in the management of transports	1 (6)
In the past 6 months, how many times have you used video teleconferencing to manage transports? ($n=16$)	
None	11 (69)
1–3 times	5 (31)
In the past 6 months, how many times have you used videoconferencing for assistance with patient management while on home call/while attending at home? ($n=16$)	
None	17 (81)
1–5 times	1 (5)
>5 times	3 (14)
In the past 6 months, how many times did you use photo sharing for assistance with patient management while on home call/while attending was on call from home? ($n=21$)	
None	5 (24)
1–5 times	8 (38)
>5 times	8 (38)
I have downloaded the InTouch provider access software application to my PC/laptop/iPhone/iPad	
Yes	10 (48)
I know how to remotely call into InTouch devices located at originating sites	
Yes	11 (52)

with troubleshooting technological difficulties such as audio (57%, $n=21$) or stethoscope function (81%, $n=21$). Fellows and hospitalists were uncomfortable or very uncomfortable with using the telehealth platform to communicate with off-site attending neonatologists (80%, $n=5$).

After the session, participants reported increased comfort with using advanced features of the telehealth software such as taking pictures and sharing with the patient ($p<0.01$), drawing on the shared image ($p<0.05$), and sharing images from my computer/device using image grabber ($p=0.06$) (*Fig. 3*).

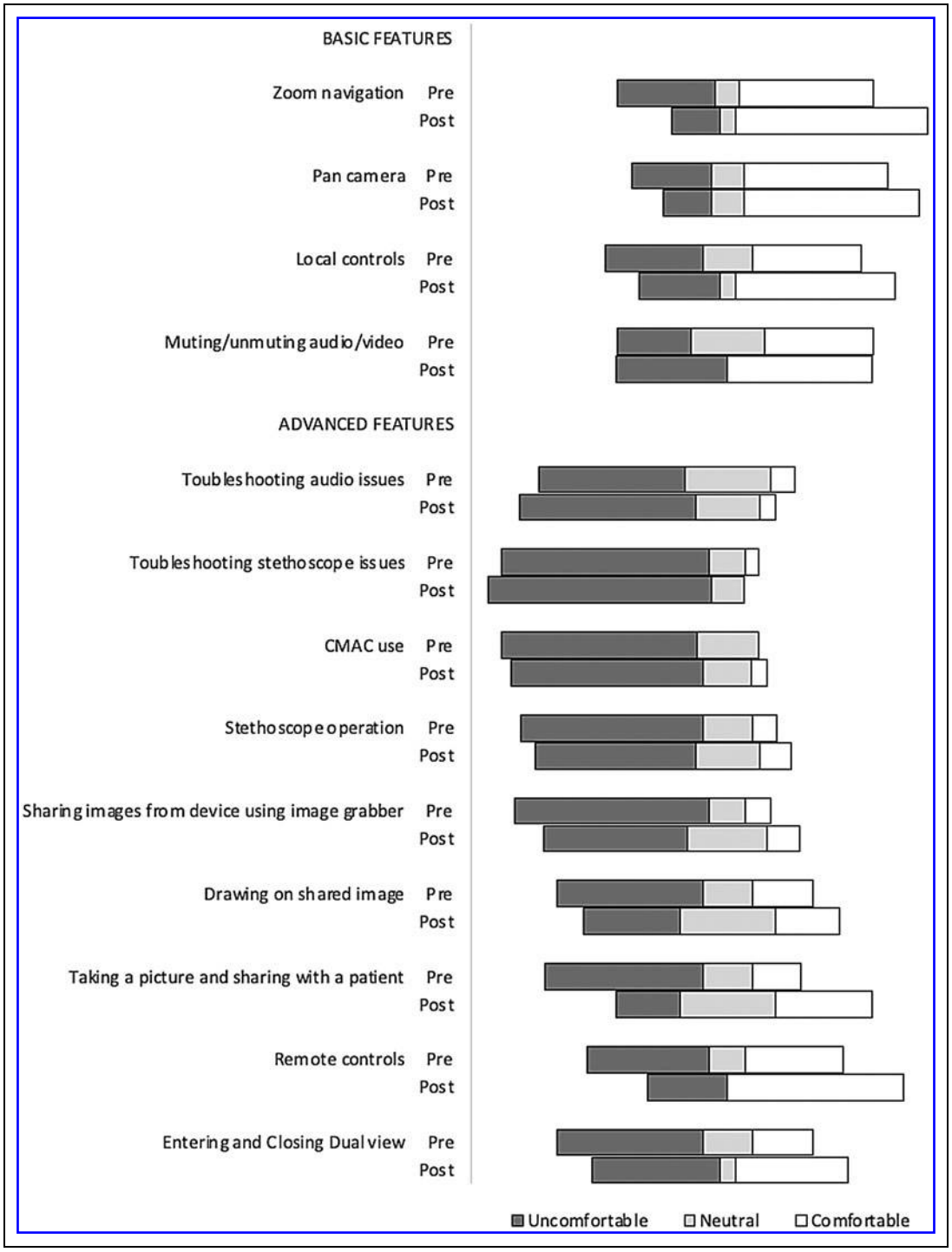

Fig. 3. Participants' comfort with specialized telehealth software tasks (pre- vs. postsession).

Participants also reported increased comfort in basic functions such as panning camera view ($p = 0.09$) and zoom navigation ($p = 0.07$). However, these differences did not reach statistical significance. Notably, postsession, more participants reported increased discomfort with troubleshooting audio ($p < 0.01$) and stethoscope issues ($p < 0.01$). Participants cited hardware or software issues as the biggest barrier to telemedicine (38%, $n = 8$).

In the postsurvey, participants' top three concerns regarding the use of telemedicine included discomfort with troubleshooting technical issues while on a call (75%, $n = 16$), personal discomfort with telemedicine applications and technology (56%, $n = 16$), and an unclear documentation plan (38%, $n = 16$). Despite these concerns, most participants (88%, $n = 16$) planned to experiment with telemedicine in the coming months and planned on regularly using telemedicine (56%, $n = 16$).

Discussion

We found that remote large-group multiplatform telesimulation training and debriefing is feasible and improved provider comfort with some advanced features of the InTouch telehealth platform. To our knowledge, this is the first study to demonstrate the feasibility of conducting large-group multiplatform telesimulation training with both remote participants and facilitators using a HIPAA compliant teleconferencing application in conjunction with a telehealth software platform. Our findings on the feasibility of telesimulation to conduct telehealth training demonstrate the potential for remote training in the use of telehealth platforms that are increasingly used during the COVID-19 pandemic response.

Simulation has been utilized to support best practices and explore educational outcomes in newborn resuscitation and neonatal transport.[3,19,20] When used in simulated settings, video telemedicine can decrease the time required to appropriately stabilize a neonatal airway and improve overall provider confidence in their assessment of an unstable infant compared with telephone consultation.[3,19]

Other studies have demonstrated the utility of telesimulation for technical and nontechnical skills using a variety of platforms that range from telepresence robots to augmented reality glasses.[18,21–26] Studies such as these that demonstrate the feasibility of telesimulation are relevant to procedure-based training of learners, particularly in low-resource and remote settings where access to instructors and equipment may be limited.[27–29] Although the COVID-19 pandemic has been largely disruptive to health professional education, this crisis has been the stimulus for innovation and creativity in delivering medical education through remote platforms.[5]

Before attending the session, attendees had a baseline comfort with Zoom teleconferencing as this technology was already widely used in this group for conferences and other educational settings. However, other video teleconferencing platforms with breakout room functionality such as BlueJeans Meetings™, Microsoft Teams™, or GoToMeeting™ could also be utilized for this approach of group telesimulation. Despite attendees' baseline experience with Zoom, some of the Zoom facilitators and remote participants required orientation to the more advanced features of Zoom, such as breakout rooms and remote control of a shared screen. In addition, although faculty attendees were very comfortable with using audio for transport calls across the Pacific Northwest region, they were less familiar with the use of videoconferencing for telemedicine, which is a future direction for the division to expand telemedicine capabilities.

There are various reasons for discomfort when health care teams transition from telephone-only to videoconferencing platforms. A recent study reported concerns expressed by behavioral health service providers in transitioning from audio to video capability in a telehealth system, including psychological safety, need for training on "video presence," and technological problem-solving.[30]

We sought to demonstrate that telemedicine simulations can increase participants' comfort with using new technology. After this telesimulation session, we found that participants' overall comfort level for basic software functions increased as did the number of providers who planned to continue experimenting with or regularly using telemedicine. However, the introduction to the advanced functions within the context of this brief training session and the realization of the scope of skills to learn may have led the participants to express decreased comfort with these functions. Although specific training on troubleshooting was not offered during the session, this finding likely reflects the need for additional targeted training on common problems such as what to do when telehealth software technology fails, if issues with hardware arise, how to conduct the session when bandwidth is low, and how to troubleshoot ancillary Bluetooth devices such as a stethoscope.

Debriefing each session revealed learning opportunities in the use of the platform as well as challenges experienced due to the multiplatform approach. Some telehealth platform features, such as annotation on the screen or the use of a live cursor to "point" to an area when instructing on a procedure, aided communication between the remote team leader and bedside team. Communication challenges encountered were similar to those seen in actual telehealth-supported procedures and resuscitation and support the fidelity of the telesimulation experience.[20,31,32]

1. Communication was occasionally required between the bedside and Zoom facilitators before and during the simulation session, to ensure that the bedside telehealth device camera was properly orientated toward the action.
2. Discussions during debriefs highlighted the importance of reminding bedside facilitators to use closed loop communication and avoid assumptions of what the remote participants could see or hear over the telehealth platform.
3. The simultaneous use of both software platforms resulted in a 2-s audio delay. Audio issues may result in missed observations by the remote team leader and facilitators.[15] Utilizing the InTouch platform alone, without Zoom might have mitigated this issue. This approach would be suitable for experienced users who already had access to the InTouch software and devices. However, there were limitations on the number of individuals who could log into each InTouch device (through multipresence), and the large group training and debriefing would have had to be conducted separately. In our case, the audio delay did not significantly disrupt the simulation experience. Although we did not utilize this feature, video-assisted debriefing is feasible during telesimulation, and the ability to save video clips may be a particularly useful tool for educators.[33,34] However, audio and video recording may be limited by the local configuration of the platform.

There are several limitations to our study. First, this was a single-center pilot study designed by and for the division of neonatology. Thus, the number of participants eligible to join the simulation session was limited and thus our study was inadequately powered to detect statistically significant trends in the educational impact of and participant comfort with our telesimulation session. Owing to time limitations, participants were not able to experiment with controlling the telehealth platform in every station. Instead, the emphasis was placed on participating in at least one station with hands on the controls and actively engaging in other stations. Finally, within the division, there was a wide range of comfort with telemedicine, as some faculty regularly used the existing telehealth platform for daily workflow, whereas others have never used the technology.

The variety of telemedicine exposure and lack of hands-on practice with the application likely impacted the self-reported comfort level of our participants postsession. Extending this telesimulation session to 3 h would allow for more individual hands-on experience with the technology. In addition, conducting separate sessions for basic and advanced learners may enhance the educational outcome of this training.

Conclusion

Large group multiplatform telesimulation training is feasible and may increase participants' comfort with using specialized telehealth software, expanding the telemedicine capacity of health care organizations in caring for patients during the COVID-19 pandemic. Multiplatform telesimulation training may be an alternative to in-person telehealth simulations, supporting social distancing efforts during the current COVID-19 pandemic.

Authors' Contribution

B.K.B. contributed to study design and data acquisition, carried out initial data analysis and interpretation of analyses, drafted initial article, and reviewed and revised the article. S.N. contributed to data acquisition, drafted initial article, and reviewed and revised the article. M.M.G. contributed to study design, data acquisition and data analysis, and reviewed and revised the article. S.H., M.C., A.H., R.D., S.K., T.S., U.M., C.C., J.M.M., Z.B., and T.S. contributed to data acquisition and critically reviewed the article for important intellectual content. R.U. conceptualized and designed the study, participated in data acquisition and interpretation, and reviewed and revised the article. All authors approved the final article as submitted and agree to be accountable for all aspects of the study.

Disclosure Statement

No competing financial interests exist.

Funding Information

No funding was received for this article.

Supplementary Material

Supplementary Table S1

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Received: August 15, 2020
Revised: November 21, 2020
Online Publication Date: December 31, 2020