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**Ultrasound Teleguidance to Reduce Healthcare Worker Exposure to Coronavirus Disease 2019**

**Abstract:** The global spread of coronavirus disease 2019 has accelerated the adoption of technologies that facilitate patient care while reducing viral spread. We illustrate a proof of concept application of teleguidance to ultrasound-guided bedside procedures as an example of an innovative solution that has been used at our institution to maximize patient and provider safety.

**Key Words:** coronavirus disease 2019; portable point-of-care ultrasound; remote supervision; teleguidance; ultrasound teleguidance

**To the Editor:**

The recent expansion of telemedicine during the coronavirus disease 2019 (COVID-19) pandemic is likely to continue based on the Food and Drug Administration's new guidelines supporting remote monitoring technologies as a means to reduce patient and provider exposure (1). Ultrasound teleguidance is one application of telemedicine that can minimize staff exposure while preserving patient safety and oversight during bedside procedures.

Ultrasound guidance for needle placement in central venous catheterization has become part of best practice guidelines (2, 3) and typically requires two practitioners: a sterile proceduralist and an assistant to adjust ultrasound settings and provide support or guidance to a trainee or novice proceduralist. The incorporation of teleguidance into the latest generation of handheld ultrasound devices allows a remote practitioner to interact with a sonographer in real-time, obviating the need for additional personnel at the bedside. In teleguided ultrasonography, the remote practitioner views the ultrasound image (Fig. 1A, left) coupled to video footage of the procedural field (Fig. 1A, right) from his or her computer. The proceduralist (Fig. 1B) uses a smartphone or tablet secured on a tripod and connected to the handheld ultrasound device to view the ultrasound image and for audio and video streaming. In our case, the remote practitioner is using the Butterfly iQ teleguidance system (Butterfly Network, Guilford, CT) to control the ultrasound settings, including depth, gain,

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color Doppler, and image capture, allowing the sonographer to remain hands-free. We have previously described portable point-of-care ultrasound as an emerging technology for improving patient safety given their ease of deployment (fits in back pocket), greater ease of use and decontamination given limited knobology, low price point (as low as \$2,000), shorter bootup times, and increased access to teleguidance and artificial intelligence capabilities compared with traditional ultrasound machines (4).

At the Massachusetts General Hospital, we have portable ultrasound devices readily available for use in our surgical ICUs and as proof of concept have used teleguidance of trainees performing central lines four times with a 100% success rate and no complications. Our supervising intensivists have found the teleguidance approach to be comparable to "over-the-shoulder" guidance, and prefer the increased flexibility that teleguidance affords while maintaining patient safety. The trainees performing the procedures have also preferred this method of supervision as it provided them an increased sense of autonomy while still being supported by appropriate level of supervision.

The global spread of COVID-19 has accelerated the adoption of technologies that facilitate patient care while reducing viral spread. The application of teleguidance to ultrasound-guided bedside procedures is an example of an innovative solution that has been used at our institution to maximize patient and provider safety.

All authors wrote and reviewed the article.

The authors have disclosed that they do not have any potential conflicts of interest.

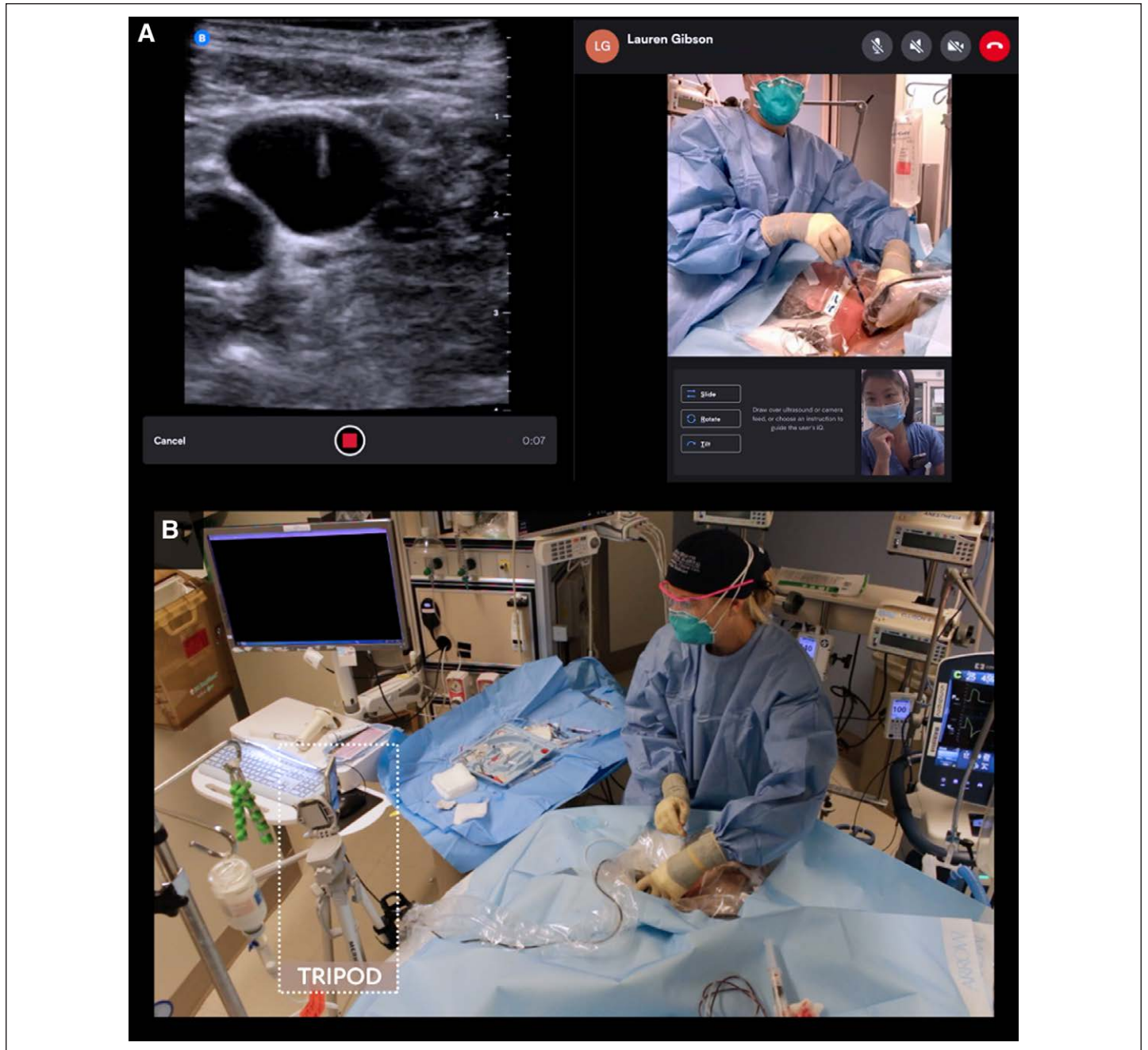
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**Figure 1.** The use of Butterfly iQ ultrasound teleguidance (Butterfly Network, Guilford, CT) to guide a trainee during placement of a central venous catheter into the internal jugular vein in a patient with coronavirus disease 2019 infection. The computer screen of the remote practitioner is shown in (A), displaying the ultrasound image (*left*) and the procedural field (*right*). The proceduralist is able to view the ultrasound image and communicate directly with the remote practitioner using a smartphone or tablet mounted on a tripod and connected to a handheld ultrasound device (B).