Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letters to the Editor

Preventing Contamination During Transesophageal Echocardiography in the Face of the Coronavirus Disease 2019 (COVID-19) Pandemic: A Glo Germ Experience

As cases of coronavirus disease 2019 (COVID-19) continue to rise, there have been increases in innovation and development of techniques to limit exposure and contamination of healthcare workers. In a recent letter to the editor, Dr. Jain described a novel method of minimizing contamination during transesophageal echocardiography (TEE). He proposed using an ultrasound probe cover over the TEE probe to minimize contamination of oral secretions from the probe to the TEE and anesthesia machines.[1] We used this novel method with a COVID-19–positive patient presenting for emergency repair of an acute type-A aortic dissection. Our only modification was to tape the open end of the probe cover to the base of the TEE handle, since the standard ultrasound covers at our institution are shorter in length (Fig 1). Follow-up with all personnel involved in the surgery ensured that no new cases of COVID-19 occurred.

Epidemiologic data suggest that transmission of severe acute respiratory syndrome coronavirus 2 occurs primarily from droplets expelled during face-to-face contact. However, contact with contaminated surfaces may lead to transmission.[2] Glo Germ is a commercially available liquid/gel or powder used to simulate contamination and teach methods of infection control.[3] Under ultraviolet light, Glo Germ produces a fluorescent glow that serves as a surrogate of environmental contamination. Experiments with Glo Germ have been helpful for marking the extent of contamination during procedures such as endotracheal intubation and extubation.[4,5] Glo Germ also has been used to evaluate new techniques, such as a closed technique for supraglottic airway-guided intubation.[6] We felt that Dr. Jain's design would be an excellent candidate for a qualitative simulation of contamination control using Glo Germ.

To test the effectiveness of this novel method, we compared containment of pathogens with a covered probe versus an uncovered TEE probe. After a configuration as described in Dr. Jain's letter was created (Fig 1), 1/4 teaspoon of Glo Germ powder mixed with lubricant was deposited into the mouth of a HeartWorks TEE simulator (Intelligent Ultrasound, Cardiff, UK) mannequin (Fig 2, A). Simulated contamination of the sheathed probe (represented by the presence of fluorescent Glo Germ) was seen within the distal end of the probe cover

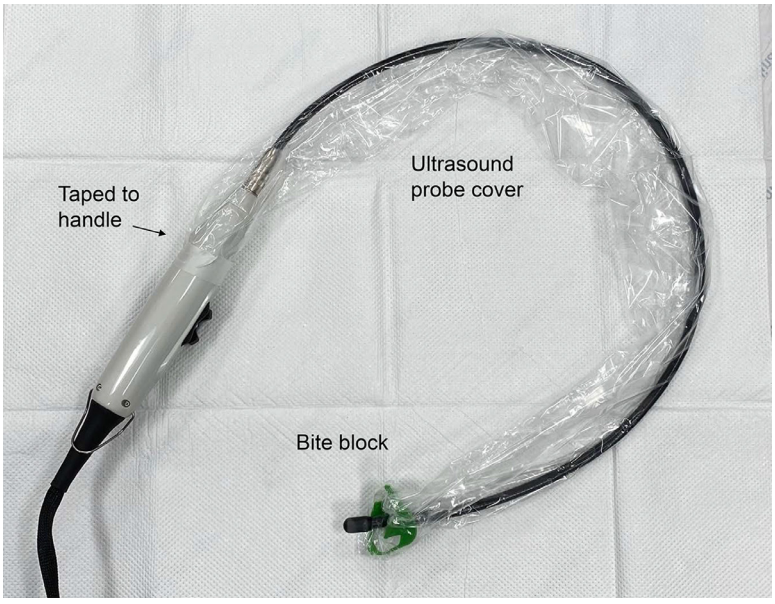

Fig 1. Modified covered TEE probe. TEE, transesophageal echocardiography.

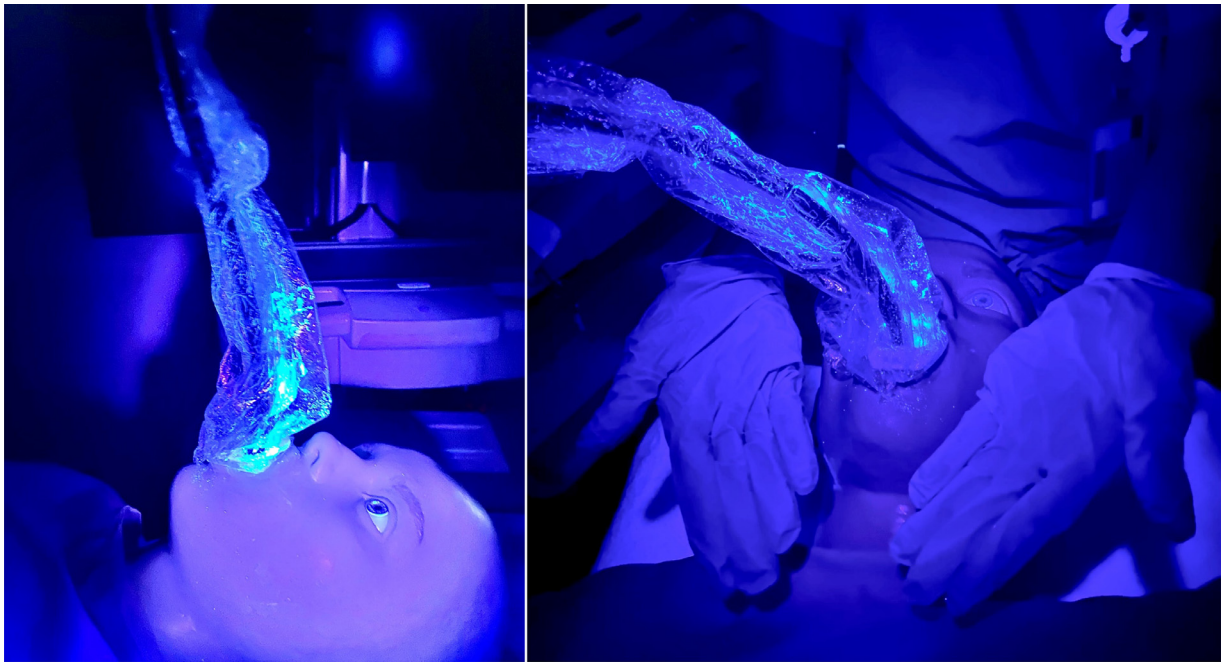

Fig 2. Sheathed TEE probe with Glo Germ simulation. Left-to-right: (A) Close up demonstrating deposition of Glo Germ within the probe cover, represented by the florescent glow. Minimal perioral spread. (B) No Glo Germ deposition on the echocardiographer's hands. Minimal perioral spread. TEE, transesophageal echocardiography.

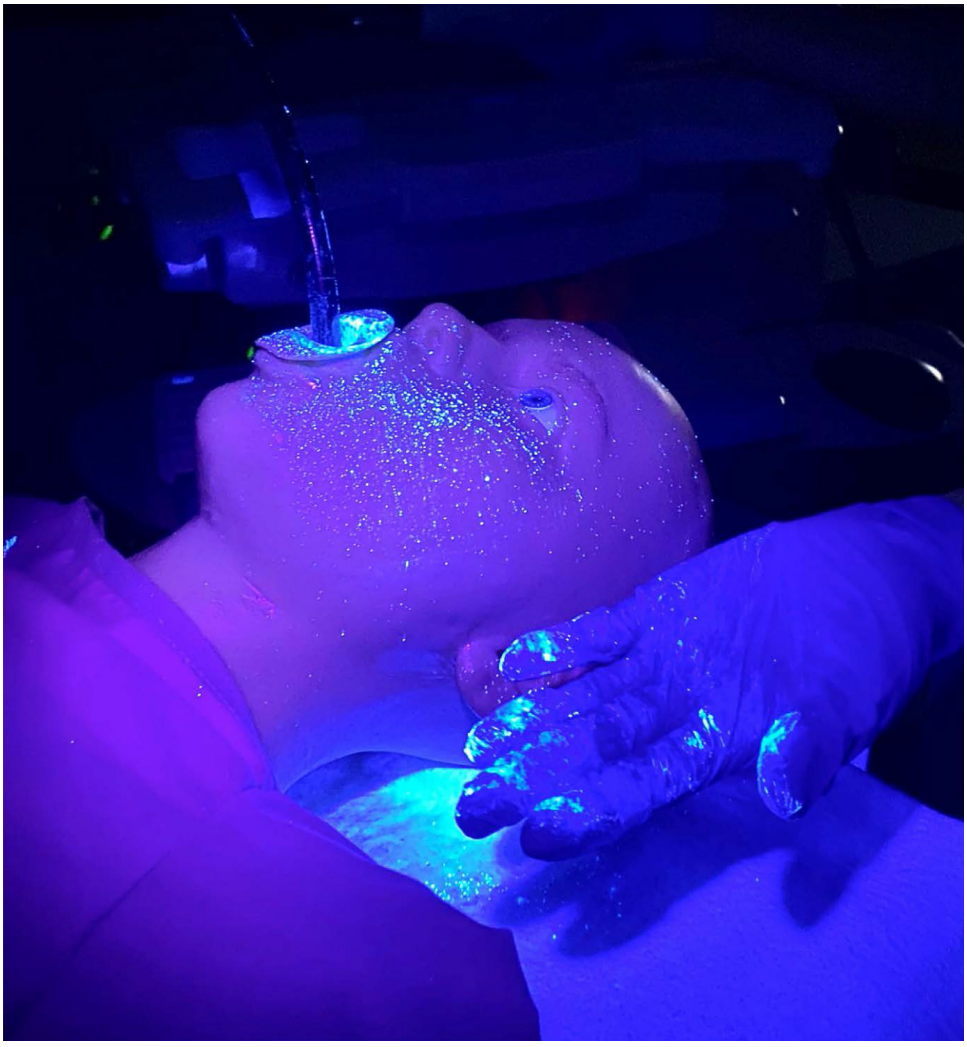

Fig 3. Unsheathed TEE probe with Glo Germ simulation. Glo Germ deposition on the echocardiographer's hand, mannequin's face, and the surface underneath the mannequin. TEE, transesophageal echocardiography.

(Fig 2, A). A minimal amount of Glo Germ was visible in the perioral region. No Glo Germ was detected on the echocardiographer's hands (Fig 2, B). The same operator performed the simulation of a covered TEE probe used with Glo Germ twice with identical results. Between experiments, the mannequin, surrounding surfaces, and TEE probe were cleaned with soap, water, and alcohol. The test was repeated one more time using an uncovered TEE probe. Contamination was visible on the echocardiographer's hand, a wide region of the mannequin's face, and the surface underneath the mannequin (Fig 3).

There were limitations to this simulated demonstration. The Heartworks TEE simulator mannequin does not have a removable bite block; thus, the end of the probe cover was not positioned as securely in the teeth as it would be on a patient. This likely contributed to the minimal perioral spread of Glo Germ. A major limitation to this simulation was that a mannequin cannot replicate the moisture and soft tissue structures of a human. For example, saliva may collect around the distal end of the probe cover in the mouth, increasing the risk of contact with infectious secretions. This risk may be reduced by double gloving, intentionally operating the probe several inches above the mouth of the patient, and placing the entire probe in a disinfectant bag or container to be sterilized using appropriate protocols.

Despite the significant limitations of this simulation, this test suggested that this protective cover represents a simple, economical, and widely accessible means to reduce contact with infectious secretions. As noted by Dr. Jain, this protective cover does not limit the imaging capabilities of the echocardiographer. Custom TEE probe covers can be twice as costly as standard ultrasound probe covers and may not be available at some institutions. In addition to taking the appropriate precautions and wearing personal protective equipment, this test supported that a standard ultrasound probe cover may reduce contamination risk of personnel and equipment. Future experimentation should include quantification of contamination reduction, as well as testing with echocardiographers who are using this setup for the first time. Before definitively recommending this method as a means of contamination control, there is a clear need for follow-up testing, such as a pilot study with human participants to test safety and effectiveness.

Conflict of Interest

The authors have no conflicts of interest to disclose.

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Intracardiac Echocardiography and Our Evolving Role

To the Editor:

We read with interest the recent work of Belani et al.[1] and thank them for this thought-provoking article, and agree with their sentiments that increasing demand for cardiac anesthesiologists in hybrid suites, cardiac catheterization laboratories, and even electrophysiology laboratories, supports the need to learn intracardiac echocardiography (ICE). At their respective centers, cardiac anesthesiologists provide uninterrupted services for patients and accommodate requests by cardiology colleagues in this growing field. Like Belani et al. suggested, cardiac anesthesiologists' active presence in many locations has led to requests for anesthesia services in a variety of situations including obese patients undergoing complex coronary interventions, balloon valvuloplasty, and in performing transesophageal echocardiography (TEE) for outpatients with valve pathology. In this way, cardiac anesthesiologists have seen firsthand how a proactive approach can lead to future success.

Belani et al. mentioned that sedation and ICE can be an alternative to avoiding general anesthesia and TEE-related complications. Although this certainly is true, in patients in whom there is no major contraindication to general anesthesia, we have noticed that many cardiologists prefer a motionless patient, as well as an anesthesia team for airway management and imaging via transthoracic echocardiography (TTE) and TEE. Relating to ICE, one concern that the cardiologists have raised is that with increasing device burden of stiff catheters in various cardiac chambers, any sudden patient movement has the potential for serious complications. Pulmonary hypertension also is common among patients undergoing structural heart interventions, and conscious sedation performed by cardiac catheterization laboratory nurses is unreliable in terms of depth of sedation and quality of end-tidal CO_2 monitoring. Recently, our cardiologists began performing novel patent foramen ovale (PFO) closure techniques, such as the

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