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Use of a Protective Shield Successfully Prevents Exposure to Aerosols and Droplets during Transesophageal Echocardiography



To the Editor:

Coronavirus disease 2019 (COVID-19) has been declared a pandemic and is affecting health care professionals all over the world. With several reports suggesting potential myocardial damage in patients with COVID-19,¹ cardiologists and especially car-

diac imaging services are also facing the challenge of this pandemic. The American Society of Echocardiography has recently published recommendations regarding echocardiography during the current pandemic and stated that need for transesophageal echocardiography (TEE) should be carefully evaluated, and when necessary, TEE should be performed with special caution.² However, despite careful screening and deferral of nonurgent cases, in some situations TEE is indispensable to guide diagnosis and further treatment.

TEE is an aerosol- and droplet-producing examination, and thus for the examiner it bears a high risk for exposure and infection. Because access to standard personal protective equipment (PPE) is not ensured everywhere, we have recently designed a mobile protective shield to increase protection for examiners during TEE. It is made of two pieces of acrylic glass mounted on a metal frame. The two pieces of acrylic glass are connected by two screws embedded in a slot. In this way the small shield can glide vertically, and the height of the protective shield can be adjusted individually (Figure 1A).

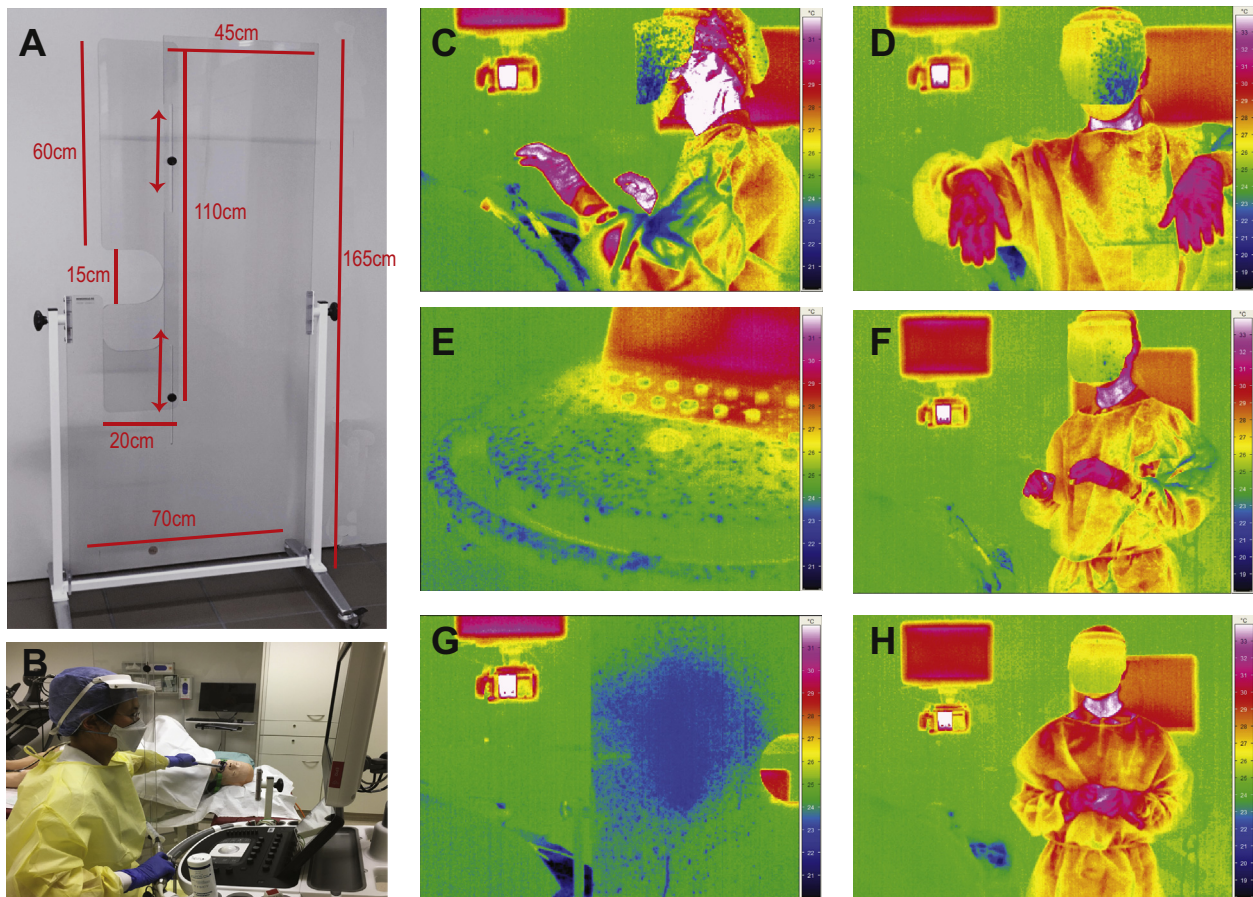


Figure 1 (A) Construction plan of the protective shield used for TEE. (B) Experimental setup. (C) Using infrared detection, water droplets are depicted as blue spots. Performing TEE while sitting, droplets are detected on the lateral side of the face shield, mask, cap, and left forearm. (D) The left side of the examiner, which faced the patient, is extensively contaminated. (E) The surface of the ultrasound machine is also contaminated. (F) Performing TEE in a standing position reduces potential contamination of the head. Droplets were found only on the left arm and the gloves. (G, H) When placing the protective shield between the mannequin and the examiner, droplets were blocked by the shield. Contamination was found only on the left forearm, which was placed in front of the shield.

We simulated cough using an endotracheal tube connected to a pressure sprayer filled with cold water. The tube was placed in the mouth of a mannequin next to the transesophageal probe, and water was released at 2 bar toward the examiner sitting or standing (Figure 1B, Supplemental Video 1, available at www.onlinejase.com). Water droplets were depicted as blue spots using an infrared camera (VarioCam; InfraTec, Plano, TX). Performing TEE while sitting, water droplets were found on the lateral side of the face shield, mask, cap, and left forearm and the ultrasound machine (Figures 1C–1E). Contamination of the head was less when standing (Figure 1F, Supplemental Video 2, available at www.onlinejase.com). Placing the mobile protective shield between mannequin and examiner, droplets were on the shield (Figure 1G, Supplemental Video 3, available at www.onlinejase.com) and the left forearm placed in front of the shield (Figure 1H) only. No contamination of the face shield was detected (Figure 1H).

Our simulation suggests that the lateral side of the examiner facing the patient is not adequately protected by standard personal protective equipment during TEE. Performing TEE while standing reduces contamination. But the most efficient protection was achieved using the mobile protective shield.

We are aware that our simulation method, although pragmatic, overproduced droplets in comparison with aerosols, and our detection method could not identify small quantities of aerosols. Nevertheless, we demonstrate additional protection using the protective shield. The protective shield is easily built and should be considered extra protection in addition to standard personal pro-

SUPPLEMENTARY DATA

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.echo.2020.04.028>.

tective equipment during TEE and perhaps even transthoracic echocardiography.

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