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.

system. By using POCUS in patients with COVID-19, disease pathologies ranging from pneumonia and acute respiratory distress syndrome to systolic heart failure and acute myocardial injury could be identified and monitored, while minimizing personnel and equipment exposure and personal protective equipment use.

In anticipation of a large burden of COVID-19 cases, UW acquired additional handheld ultrasound machines, some of which were provided free of charge by the manufacturers. Additionally, ultrasound simulators and mannequins were obtained to provide standardized training in image acquisition and interpretation for trainees.[5] Images obtained using handheld ultrasound machines would be uploaded to the picture archiving and communication system for image archiving. These images would therefore be virtually available, including to the echocardiography laboratory, which could provide support and feedback for POCUS users and provide guidance for potential subsequent imaging.

Our efforts have been positively received by clinicians across the UW system, as reflected by increasing participation in simulator training and implementation of the POCUS protocol. Our goal is to fully use POCUS during the COVID-19 pandemic to deliver high-quality care while ensuring the safety of patients and health care workers. We hope to not only continue this collaboration among the various subspecialties but also report findings from the application of this protocol in the near future.

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Echocardiography during Prone-Position Mechanical Ventilation in Patients with COVID-19: A Proposal for a New Approach

To the Editor:

During the severe acute respiratory syndrome coronavirus-2 pandemic, patients with coronavirus disease 2019 pneumonia tend to deteriorate and develop acute respiratory distress syndrome.[1] Most of these patients receive mechanical ventilation, and many may benefit from prone positioning as a lifesaving maneuver in the setting of severe hypoxemia, aiming to attempt to open the collapsed and congested parenchymal lung segments.[2] These patients require detailed cardiocirculatory evaluation because of the effects of sedation and the high respiratory pressures that affect venous return and right ventricular (RV) performance.[3] This evaluation often includes echocardiography.

It is known that mechanically ventilated patients generally do not present good ultrasound windows to allow high-quality echocardiography, because of the "curtain effect" of the left lung that reduces the ability of the ultrasound beam to penetrate to the heart and return to the transducer. Furthermore, echocardiography may be required during prone positioning. The "gold standard" solution to these issues is transesophageal echocardiography. Although transesophageal echocardiography performed in the prone position has been reported as a safe procedure,[4] in our opinion, one limitation may be the position of the neck and head of the patient, which is laterally rotated and may make it difficult to introduce the transesophageal echocardiographic probe. Additionally, given the large number of patients requiring this type of evaluation and the number of devices available, transesophageal echocardiography is often a logistic challenge.

To overcome these technical issues, transthoracic echocardiography (TTE) may play an important role, as it is noninvasive, reproducible, and easily available. Unlike the technique for TTE in a prone patient reported by Ugalde *et al.*,[5] we performed TTE in prone-positioned patients during mechanical ventilation without the need to adopt the "swimming position" (extension of the left arm above the head) and without the need to elevate the left shoulder with pillows. We temporarily deflated the lower thoracic section of the air mattress to position the probe optimally to obtain the apical four-chamber view, taking advantage of the gravitational effect on the heart, causing it to slide closer to the chest wall. The operator is positioned to the left of the patient and uses his or her left hand to position the transducer. The only ultrasound window we could assess was the apical four-chamber view (Figure 1). This allows evaluation of many of the parameters included in the assessment of left ventricular and RV performance: left ventricular ejection fraction, mitral annular plane excursion, diastolic functional parameters (mitral valve and annular Doppler velocities), aortic valve Doppler flow velocity (by tilting the probe, we can obtain the apical five-chamber view), RVend-diastolic diameter and its ratio to

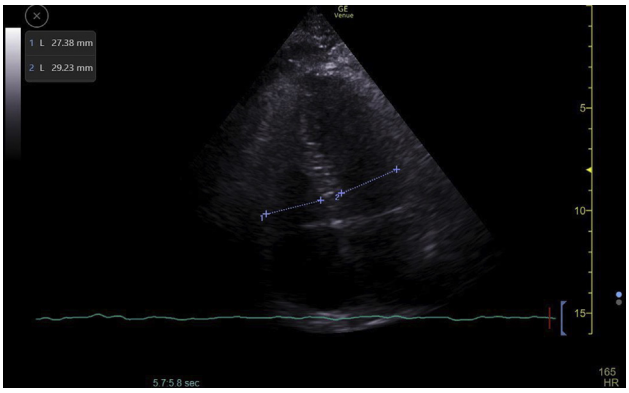

Figure 1 The apical four-chamber view and ventricular diameter measurements.

left ventricular end-diastolic diameter, RV systolic performance by tricuspid annular plane systolic excursion, and pulmonary artery systolic pressure from the tricuspid regurgitation peak Doppler velocity.

We used this approach in eight patients to assess cardiac performance. In only one case was the quality of the ultrasound view poor, and this was in a patient with a markedly increased body mass index of 60 kg/m^2.

In our experience during the current severe acute respiratory syndrome coronavirus-2 outbreak, prone-position TTE is feasible and provides sufficient information to monitor some basic aspects of cardiac performance.

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Safety of Ultrasonic Enhancing Agents in Patients with COVID-19

To the Editor:

Patients admitted with coronavirus disease 2019 (COVID-19) due to infection with severe acute respiratory syndrome coronavirus-2 present with a variety of respiratory and chest symptoms. Distinct and severe cardiovascular manifestations of COVID-19 have been reported.[1] Echocardiography is the mainstay of noninvasive cardiac assessment in these patients because of its immediate bedside availability, as the feasibility and safety of other diagnostic modalities may be limited. Prior studies have indicated that up to 30% of unenhanced echocardiographic examinations may have limited diagnostic utility in critical care settings.[2] This number is possibly higher in critically ill patients with COVID-19 because of respiratory distress syndrome and a high positive end-expiratory pressure requirement. Prior studies have consistently shown that the use of ultrasonic enhancing agents can significantly improve the diagnostic yield of echocardiographic studies and influence decision-making, but safety has not been established in patients with COVID-19.[3,4] We aimed to study the immediate safety of ultrasonic enhancing agents in patients with COVID-19, including critically ill patients.

In this retrospective study, we enrolled consecutive patients hospitalized at Mount Sinai Morningside Hospital (New York, NY) with COVID-19 who underwent clinically indicated echocardiographic examinations. Echocardiograms were obtained using portable ultrasound machines (CX50 [Philips Medical Systems, Bothell, WA] and Vivid S70 [GE Medical Systems, Milwaukee, WI]) and followed a focused, time-efficient protocol with appropriate use of personal protective equipment and limited viral exposure time. The ultrasonic enhancing agent was prepared in advance and was immediately available for the sonographer if needed. Contrast-enhanced images were obtained using contrast-specific, low–mechanical index settings after the administration of an ultrasonic enhancing agent, either Definity (perflutren lipid microsphere; Lantheus Medical Imaging, North Billerica, MA) or Optison (perflutren protein type-A microspheres; GE Healthcare, Little Chalfont, United Kingdom). The following were recorded as adverse events if they occurred in close temporal proximity (within 1 hour) to ultrasonic enhancing agent administration: sustained arrhythmic event, deterioration of respiratory status including endotracheal intubation, cardiac arrest, and death.

A total of 33 patients underwent contrast-enhanced echocardiography for clinical indications, including 14 patients on mechanical ventilation and 19 patients who did not require mechanical ventilation at the time of echocardiographic evaluation. The mean age

Conflicts of interest: None.