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Impact of Focused Echocardiography on Scan Time and Diagnostic Quality in Patients with COVID-19



To the Editor:

Severe acute respiratory syndrome coronavirus-2 infection and the resulting illness, coronavirus disease 2019 (COVID-19), have been characterized by widespread transmission of the virus leading to high morbidity and mortality.^{1,2} Cardiovascular imaging societies have recommended major changes to the way imaging is performed,^{3,4} with a focus on appropriateness and the use of abbreviated protocols (focused or limited scans) with the aim of shortening scan

time to reduce contact between sonographers and patients, thereby lowering the risk for virus transmission. There are limited data on the impact of these guideline recommendations on contact time between sonographers and patients and the resulting reproducibility and accuracy of these studies.

We identified all patients with proven (polymerase chain reaction swab positive) or suspected COVID-19 who underwent echocardiography between March 23, 2020, and April 24, 2020. This study was approved by the institution's clinical effectiveness office. Study acquisition time, number of images obtained, and adherence to minimum data set protocol were obtained. Study acquisition time was defined as time from first to last image. The time for measurements and reporting was not included, as these are performed away from the patient. All studies were reviewed by an independent reviewer, blinded to the examination period, to examine the interobserver variability of left ventricular and right ventricular systolic function. The clinical notes were reviewed for the week after the echocardiographic examination to identify any alternative data (invasive or clinical) or repeat imaging that refuted the echocardiography report. We included a control group of 50 patients who underwent inpatient echocardiography before the COVID-19 pandemic.

One hundred seventy-one patients with proven or suspected COVID-19, with a median age of 59 years, underwent echocardiography during the study period. The median scan time was 6 min (interquartile range IQR, 4–8 min). This was significantly reduced compared with the control group (median, 14.5 min; IQR, 10–16 min; $P < .0001$). The number of images obtained was significantly fewer (25 images; IQR, 17–36 images) than in the control group (55 images; IQR, 39–66; $P < .0001$). There was no difference in the proportion of studies that met the minimum data set (158 of 171 [92.4%] vs 47/50 [94%], $P = .99$). There was no difference in the proportion of patients with exact agreement for interobserver assessment of left ventricular function (162 of 171 [94.7%] and 49 of 50 [98%], $P = .46$). There was no difference in the proportion of cases with exact agreement of right ventricular function (160 of 171 [94.1%] and 48 of 50 [96%], $P = .74$). Alternative or repeat imaging refuting the report of the initial echocardiographic examination occurred in one of 171 cases (0.58%) and zero of 50 cases (0%) in the control group ($P = .99$).

Implementation of focused or limited scans during the COVID-19 pandemic significantly reduced scan time and exposure of sonographers by more than 50%. This confirms the findings of McMahon *et al.*⁵ and additionally shows that despite the reduction in acquisition time, quality was good, with a high adherence to protocols, a low degree of interobserver variability, and almost no refuted reports. There is a lack of evidence and uncertainty regarding the risk of COVID-19 to health care workers. Mitigation of potential risk by reducing exposure time is advisable. We have demonstrated that exposure time can be reduced while maintaining quality and benefit of the test to patients.

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Point-of-Care Ultrasound Findings and Clinical Outcomes in Patients with COVID-19



To the Editor:

Point-of-care ultrasound (POCUS) has been increasingly used for the efficient detection of cardiorespiratory complications of coronavirus disease 2019 (COVID-19).¹ Cardiac POCUS may have similar benefits to transthoracic echocardiography while decreasing staff exposure to patients with COVID-19. Cardiac POCUS has utility,¹ with up to 50% of patients with COVID-19 having cardiac abnormalities on echocardiography, leading to management changes in nearly one third.² POCUS of the lung enables diagnosis of pathologies such as alveolar consolidation and alveolar-interstitial syndrome. The relationship between POCUS findings and COVID-19 outcomes is unknown. The aim of this study was to identify how lung and cardiac POCUS findings in patients with COVID-19 relate to clinical outcomes.

We retrospectively reviewed lung and cardiac POCUS studies performed in patients with COVID-19 and suspected cardiorespiratory involvement at the time of presentation to New York hospitals between April 1, 2020, and May 15, 2020. POCUS was performed by certified emergency department physicians. Lung POCUS was used to identify the presence of A- and B-lines (Table 1). Cardiac POCUS was performed according to American Society of Echocardiography recommendations.³ The study cohort was divided into those who did (group 1) and did not (group 2) develop the primary outcome of death or need for mechanical ventilation.

Patients in group 1 were older (median age, 73 years [interquartile range, 58–59 years] vs 62 years [interquartile range, 52–73 years]; $P = .004$), but cardiovascular disease risk factors were similar between the groups. All lung POCUS examinations were interpretable.

Among cardiac POCUS studies, 99% and 88% had suitable imaging for left ventricular (LV) and right ventricular assessment, respectively. Lung POCUS findings in the two patient groups did not differ, with B-lines being prevalent in both groups. Lung POCUS has limitations in COVID-19 and may not detect centrally located consolidation from bacterial superinfection.

With cardiac POCUS, group 1 patients had a higher incidence of reduced LV ejection fraction (37.9% vs 16.2%; $P = .045$). Sud *et al.*⁴ showed that acute LV systolic dysfunction was present in approximately 20% of acutely ill patients with COVID-19 and was due to myocarditis, stress-induced cardiomyopathy, or coronary thrombosis. In the present study, it is possible that patients had preexisting LV dysfunction unrelated to COVID-19. Cardiac POCUS has a critical role in the management of patients with COVID-19. Our study showed that cardiac POCUS may risk-stratify acutely ill patients with COVID-19, on the basis of LV function, and identify patients with preexisting or new LV dysfunction who are at higher risk for adverse outcomes. The incidence of abnormal right ventricular findings was lower than in prior studies⁴; this may be explained by POCUS evaluation early in the clinical course, before further development of factors known to precipitate right ventricular pathology, including pulmonary embolism, progressive lung infection, hypoxia, and mechanical ventilation. POCUS may have utility in patients with suspected cardiac complications of COVID-19, by excluding cardiac involvement or triggering transthoracic echocardiography or computed tomography if POCUS imaging is insufficient.⁵

To our knowledge, this is the first study to evaluate cardiac and lung POCUS findings in relation to clinical outcomes in patients with COVID-19. The vast majority of POCUS studies were interpretable. The study was limited by being retrospective in nature with a small study population. Selection bias was relevant, as only the most ill patients with COVID-19 underwent POCUS. Larger POCUS studies of patients with different levels of risk profiles related to COVID-19 are required.

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