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CORRESPONDENCE

COVID-19-RELATED CORRESPONDENCE

Left Ventricular Systolic Function and Inpatient Mortality in Patients Hospitalized with Coronavirus Disease 2019 (COVID-19)



To the Editor:

Although prior studies have reported findings related to left ventricular function on transthoracic echocardiography (TTE) in patients with coronavirus disease 2019 (COVID-19),¹⁻⁵ the association of left ventricular ejection fraction (LVEF) with inpatient mortality in this population has not been well described.

To explore this further, we collected data on clinical variables and mortality for all patients hospitalized with COVID-19 who underwent an inpatient TTE between March 19, 2020, and April 30, 2020. Variables included age, sex, race, 17 preexisting medical conditions, intensive care unit stay, mechanical ventilation, intravenous pressor support, peak serum biomarkers (troponin T, pro-B-type natriuretic peptide [proBNP], D-dimer, C-reactive protein, interleukin-6, ferritin, and procalcitonin), and LVEF reported on initial inpatient TTE. Inpatient all-cause death and adjudicated cardiovascular death were assessed through June 1, 2020. To evaluate the association of LVEF with mortality relative to other variables, we performed an exploratory analysis of predictors of mortality. Variables significantly different in univariate analyses for patients who died compared with those who survived using a P value $< .05$ were placed into a stepwise logistic regression model, with a P value $< .05$ required to remain in the model. We also compared absolute mortality rates for patients with LVEF of $\geq 50\%$, 40% to 49%, 30% to 39%, and $< 30\%$.

A total of 75 patients hospitalized with COVID-19 underwent a TTE at a median of 8 days from admission, and 33 (44%) had a documented TTE before admission. The median age was 60 years (interquartile range, 47–66 years), 20 (27%) were women, and 17 (23%)

had LVEF $< 50\%$. Compared with patients with LVEF $\geq 50\%$, those with LVEF $< 50\%$ had higher troponin T ($P = .031$) and proBNP ($P = .008$) levels, with no differences in any baseline characteristics aside from prior history of reduced LVEF ($P = .049$), which was observed in 2 patients with LVEF $< 50\%$. Among patients with LVEF $< 50\%$, 11 of 17 (65%) died compared with 15 of 58 (26%) with LVEF $\geq 50\%$ ($P = .007$). Among eight of 31 candidate variables initially included in the stepwise model, mechanical ventilation (odds ratio, 22.6; 95% CI, 3.0–170.4), LVEF $< 50\%$ (odds ratio, 8.2; 95% CI, 1.4–46.9), and proBNP above the cohort median value (odds ratio, 5.8; 95% CI, 1.4–23.9) remained in the final model as the strongest predictors of mortality, with a C statistic of 0.86. Mortality rates were progressively higher with more severe left ventricular dysfunction ($P = .013$; Figure 1). Only two deaths were attributed to cardiovascular causes, both in patients with LVEF between 20% and 29% and no prior history of heart failure.

This study suggests that LVEF is strongly associated with inpatient mortality in patients hospitalized with COVID-19, even though deaths were primarily from noncardiovascular causes. Broader assessment of LVEF in patients with COVID-19 could help estimate the risk of death and guide acute medical management in this population. However, the cohort size limited our ability to determine associations with high precision. In addition, we only studied patients at a single center who underwent an inpatient TTE, and findings may vary in other populations. Larger studies incorporating LVEF based on TTE and point-of-care ultrasound are needed to more definitively determine the prognostic significance of LVEF in patients with COVID-19.

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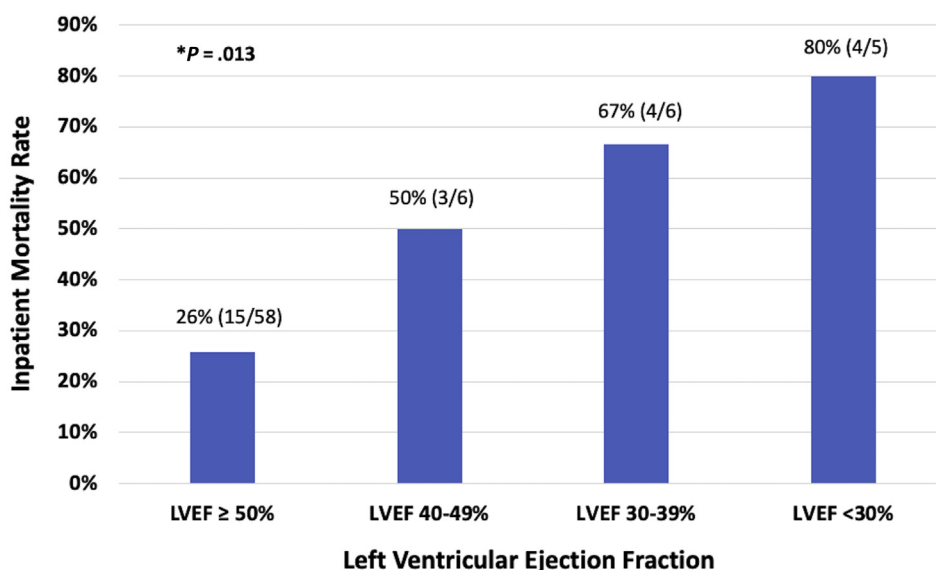


Figure 1 Inpatient mortality based on LVEF for patients hospitalized with COVID-19. * P value assessing difference in mortality across LVEF categories using the Fisher exact test. LVEF, Left ventricular ejection fraction determined by inpatient transthoracic echocardiogram.

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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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