examinations, in order to gain a more in-depth understanding of heart-lung interactions across different disease severity phases in the single patient (5); 3) an "operative" approach, in which echocardiography helps in tailoring therapy and in assessing its efficacy. For instance, the detection by echocardiography of RV dilatation and severe pulmonary hypertension may lead to initiation of inhaled nitric oxide therapy whose effects can be monitored in the single patients by serial echocardiographic examinations.

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The authors have disclosed that they do not have any potential conflicts of interest.

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The authors reply:

We thank Lazzeri et al (1) for their insightful comments on our article (2), recently published in *Critical Care Medicine*, and support their notion that assessment of right ventricular (RV) dysfunction (RVD) is important in the management of patients with coronavirus disease 2019 (COVID-19) acute respiratory distress syndrome (ARDS).

They correctly highlight that we did not perform transthoracic echocardiography (TTE) in all our COVID-19 ICU patients, introducing a selection bias: a common flaw in retrospective (3) and prospective (4) critical care echocardiography studies. However, TTE requests were screened and protocolized: patients must have had an elevated high sensitivity (HS)-troponin I (> 14 ng/dL). As such, although one-third of these patients did not receive a TTE, they displayed a low risk of RVD and mirrored the normal RV subgroup. They had low median HS-troponin I values (12 [interquartile range (IQR), 5–14]), D-dimer values (1,264 [IQR, 510–2,230]), prevalence of renal replacement therapy (RRT) (28.1%), and 90-day mortality rate (23.6%). Nonetheless, we have not characterized RV function in all COVID-19 ICU patients, and this remains a notable limitation of the study.

Second, we suspect RV dilation was associated with venous congestion due to the weak correlation between urine output and RV:left ventricular end-diastolic area, however, agree that this requires prospective validation. Although approximately half of the cohort received RRT, this was at any time point during ICU stay and not necessarily during the time of TTE. The lack of association between liver function tests and RV size does not exclude an isolated congestive hepatopathy (5). The hepatic arterial buffer response may protect the liver at any given central venous pressure/right atrial pressure where kidney dysfunction occurs. It is unknown whether the weak correlations observed between ventilator parameters and RV fractional area change were a cause, consequence, or simply an association of the RV systolic function that was measured.

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Moving forward, to assess the prognostic value of RVD, we agree that RV function should be prospectively assessed in all patients with ARDS, longitudinally, both across ICU stay and after the institution of RV protective measures such as prone positioning, nitric oxide, and extracorporeal/mechanical circulatory support.

Although these measures may improve RV function, in order for them to translate to patient benefit, RVD must directly contribute to patient outcomes and not simply be an epiphenomenon of disease severity/inflammatory burden/patient comorbidity.

To evaluate the role of RVD as a therapeutic target, we must first identify an RV phenotype that demonstrates a consistent and independent association with patient centered outcomes. Although defining RVD is currently controversial, with different criteria used across many studies, consensus may be achieved through the use of 1) more sensitive/specific markers of RV failure such as RV free wall longitudinal strain, 3D RV ejection fraction, and RV:pulmonary artery coupling and 2) clustering approaches that are nonbinary, data-driven, and holistic in their characterization of circulatory failure in ARDS, to identify underlying subphenotypes and the specific TTE criteria and cutoff values that were most important in their derivation.

If RVD directly contributes to patient outcome, then many RV protective measures that failed to improve outcomes when applied broadly to ARDS populations should be targeted to this prognostically and mechanistically enriched RV subphenotype.

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Hemoglobin Level at Admission Is Less Important

To the Editor:

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We read with great interest the study by Acosta et al (1) published in a recent issue of *Critical Care Medicine*, which investigated the relationship between hemoglobin at admission and neurologic outcome in patients with spontaneous intracranial hemorrhage (ICH). They found that high hemoglobin levels at admission were associated with improved neurologic outcomes in crude and adjusted analysis. In the dose-response analysis, there was also a linear relationship between admission hemoglobin level and neurologic outcomes across the entire hemoglobin range (7–16 g/dL). The study by Acosta et al (1) was well designed. However, several issues should be noted when interpreting the findings.

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