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Reply: COVID-19 Mortality Differences: Patient-related Data and Intensive Care Unit Load Are Prerequisites

From the Authors:

We keenly read the letters to the editor by Tsolaki and colleagues and Jimenez and colleagues about our work on the comparison of traditional versus expanded intensive care unit (ICU) mortality during the first coronavirus disease (COVID-19) surge of 2020. Our study showed a similar in-hospital mortality between traditional and expanded ICUs after adjusting for several key factors, including hospital occupancy (1).

During the first wave of the pandemic in New York, the number of intubated patients overwhelmed the original ICU capacity. Previous prepandemic analyses have observed that exceeding ICU capacity was associated with increased mortality of ICU patients (2, 3). More recently, similarly increased mortality was observed in critically ill patients with COVID-19 (4). Our findings that increased hospital occupancy for mechanically ventilated patients with COVID-19 was associated with increased mortality, regardless of the type of ICU (traditional or expanded) for their admission, is consistent with these studies. Certainly, future studies should focus on further elucidating the mechanisms through which ICU crowdedness influences mortality. Nonetheless, our results in the context of the existing literature strongly suggest that we should always consider the effect of ICU crowdedness on patient outcomes, including mortality.

We also agree with Jimenez and colleagues that it is worthwhile to evaluate the seemingly disparate results of our study and others they cited. First, the study by Taccone and colleagues showed that the ICU overflow or increased proportion of COVID-19–specific supplementary ICU beds was associated with patient mortality (5). This result implies that the scales related to ICU crowdedness can negatively impact general ICU patient outcomes, including both the patients admitted to new ICU beds and those admitted to conventional ICU beds. However, it does not imply that the mortality of the patients admitted to newly opened ICUs, which we termed “expanded ICUs,” was higher than that of those admitted to conventional ICUs, because it was not evaluated by Taccone and

colleagues. Furthermore, Jimenez and colleagues showed that a 30-day in-hospital mortality in temporary ICUs was higher than among those in conventional ICUs without adjusting for the scale of ICU crowdedness (6). We believe that our results are not inconsistent with these findings and those of other studies (2), because although our results showed that the mortality between patients admitted to expanded versus traditional ICUs was different in the univariate analysis, this difference disappeared after adjusting for several factors, such as hospital occupancy. We suggest that future studies should account for some measure of ICU and hospital crowdedness.

Second, it is possible that our management for expanded ICUs with a 1:2 nurse-to-patient ratio and direct supervision by critical care physicians influenced our results. As was noted, the nurse-to-patient ratio, which was as high as 1:13, can adversely impact patient outcomes. As pointed out by Jimenez and colleagues, this is a great challenge for health systems and hospitals across the globe. As such, we fully acknowledge the privilege of working in a well-resourced setting. Our health system oversees 23 hospitals with many tertiary care centers with critical care abilities available to them. We rapidly deployed traveling ICU nurses to mitigate the nursing staff shortages, reassigned respiratory therapists and other allied health professionals working in ICUs within the health system to hospitals most impacted, and staffed expanded ICUs with dedicated dual-boarded, critical care physicians who, before the pandemic, would have worked part of their time in non-ICU settings. We were fortunate to have such resources available and believe the most important factor contributing to our results is personnel. We recommend further studying our model in settings conducive to rapid deployment and expanding ICUs. ■

Author disclosures are available with the text of this letter at www.atsjournals.org.

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