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COVID-19 Mortality and Stress to the Hospital System From High Patient Load

To the Editor Asch and colleagues¹ analyzed 6-month variation in hospital mortality rates for patients admitted with COVID-19, highlighting a strong association between the higher prevalence of COVID-19 in the community and an increased in-hospital mortality. In the related editorial, Boudourakis and Uppal² found this association plausible because hospitals perform worse when they are overwhelmed.

Lombardy, Northern Italy, a region with about 10 million inhabitants, was the first region of the western world to be severely hit by COVID-19 after February 20, 2020. The sharp rise in critically ill patients requiring urgent hospital care was a tsunami for an advanced health care system of the western world.³ The concentration of many cases in a short period of time is thought to be a leading cause of the high mortality, which exceeded that reported in other areas of the western world.⁴

During the first devastating wave of the COVID-19 pandemic in early 2020, many referral hospitals in Lombardy, Italy, entirely converted to COVID-19 care, and faced the abrupt rise in severe COVID-19 cases arriving daily in the emergency room by rapidly expanding bed capacity: entire wards were opened overnight and health staff doubled their shifts with extraordinary abnegation. Nevertheless, a high death rate was observed, and patient load (measured through number of daily admissions and total daily census) independently contributed to in-hospital mortality,⁵ possibly for the same reasons postulated by Asch et al¹ and Boudourakis and Uppal²: a higher stress to the hospital system caused by the impending surge in patient flow stretches the hospital's capacity, risks saturating hospital resources, and results in worse performance and worse patient outcome.

We suggest assessing the association between variables reflecting hospital stress (eg, the number of daily admissions, total daily hospital census) and the in-hospital mortality using the large database of Asch and coworkers,¹ as these data could be more informative and accurate indicators of the overload of individual hospitals than the trend of the epidemic in the community. Easy trade-off variables for estimating the stress on the hospital system (ie, number of daily admissions and total daily census) could be valuable tools to monitor in a timely way the risk of overwhelming hospital health system capacity. As the COVID-19 pandemic is far from over, beyond the ultimate imperative to flatten the curve, operational research to appraise indicators of hospital

stress should be fostered and tested in different multiple settings to ameliorate hospital performance even in difficult conditions.

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In Reply In the early days of the COVID-19 pandemic, the world witnessed the human cost of Lombardy, Italy's severe wave. Soria and colleagues rightly note that the hospital strain observed in that region and others is better measured at the level of individual hospitals in such forms as admissions, churn, or census. We did not have information at that level, but we could see what was happening in counties. The associations we observed between county-level burden of COVID-19 and hospital COVID-19 mortality or discharge to hospice¹ could reflect those strain mechanisms or they could reflect other causal pathways. Regardless, these associations suggest that the outcomes of individual patients depend in part on the behaviors of those around them. We are all in this together.

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