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A More Accurate Measurement of the Burden of Coronavirus Disease 2019 Hospitalizations

To the Editor—While preventing infection was the initial focus of the coronavirus disease 2019 (COVID-19) pandemic response, with increasing population immunity and variant transmissibility, the current focus has shifted to reducing hospitalization and deaths, particularly in vulnerable communities [1]. During the recent surge in disease activity driven by the Omicron variant, an increased proportion of "COVID-19 hospitalizations" were incidentally discovered infections in patients newly hospitalized for other reasons [2–6], resulting in decreased measurements of in-hospital disease severity and mortality compared to prior disease surges [6–9]. However, estimates of the proportion of total COVID-19 hospitalizations accounted for by these incidental infections range widely from 15% to 68% [2–6], due to heterogeneity in case definitions for these incidental infections and variability across populations with respect to vaccination status and other risk factors for severe COVID-19.

We propose utilizing the Centers for Disease Control and Prevention (CDC) criteria for severe COVID-19, based on need for supplemental oxygen or oxygen saturation <92%, to define COVID-19 hospitalization [10]. To study the impact of this case definition, we reviewed medical records of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) polymerase chain reaction (PCR)–positive patients admitted to LAC + USC Medical Center, a safety net hospital serving predominantly Latino and low-income patients in Los Angeles, California, during the local Omicron variant surge between 10 December 2021 and 19 January 2022. We abstracted data on age, vaccination and prior infection history, disease severity assessed by oxygen requirement, hospital length of stay, and mortality via retrospective medical record review.

Using this case definition based on the CDC criteria for severe disease, 67.5% of SARS-CoV-2 PCR-positive hospitalized patients would not have met criteria for a COVID-19 hospitalization. These patients had significantly lower median age (44 years vs 57 years), median hospital length of stay (2 days vs 3 days), and in-hospital mortality (3.5% vs 14%) (Table 1). While unadjusted analysis did not show significant association between exposure to vaccine or prior infection and non-severe disease (odds ratio [OR], 0.79 [95% confidence interval {CI}, .53–1.17]; $P = .24$), exposure to vaccine or prior infection was associated with non-severe disese upon adjustment for age using logistic regression (OR, 0.58 [95% CI, .38–.89]; $P = .01$).

The high frequency of incidental COVID-19 infection among hospitalized patients detected using the case definition based on lack of oxygen requirement exceeds the rates reported in previous studies that used more stringent case definition based on complete absence of COVID-19 symptoms [2] or were performed during periods of the pandemic prior to the Omicron variant surge [3]. However, the high frequency of incidental COVID-19 is very similar to measurements based on the case definition of severe COVID-19 [6] or correlates, such as administration of steroid treatment [5] during the Omicron surge. Given that nonsevere COVID-19 infections not requiring supplemental oxygen can generally be treated on an outpatient basis, we propose that the number of hospitalized COVID-19 patients requiring supplemental oxygen be reported alongside the total number of hospitalized COVID-19 patients in public health statistics used to inform the public or make policy decisions. One caveat is that patients with nonsevere COVID-19 are hospitalized at a higher rate than patients without COVID-19 [4], which may reflect nonrespiratory complications of COVID-19 including thrombosis or multisystem inflammation or exacerbation of underlying chronic diseases, although these complications are often difficult to attribute directly to

Table 1. Characteristics of Hospitalized Patients With Nonsevere Versus Severe Coronavirus Disease 2019 Infection During the Omicron Variant Surge

Characteristic	All COVID-19 Patients	Nonsevere COVID-19	Severe COVID-19	*P* Value[a]
No.	462	312	150	
Age, y, median (IQR)	50 (32–62)	44 (30–59)	57 (44–72)	<.001
Immunized[b], No. (%)	268 (58.5)	186 (60.4)	82 (54.7)	.24
LOS[c], d, median (IQR)	2 (1–4)	2 (1–4)	3 (1–5)	<.005
Death, No. (%)	32 (6.9)	11 (3.5)	21 (14.0)	<.001

Abbreviations: COVID-19, coronavirus disease 2019; IQR, interquartile range; LOS, length of stay.

[a] *P* value for Wilcoxon rank-sum test (for age and LOS) or Pearson χ^2 test (for immunized and death) comparing nonsevere vs severe COVID-19 groups.

[b] "Immunized" is defined as having any exposure to severe acute respiratory syndrome coronavirus 2 vaccination or prior infection confirmed by polymerase chain reaction or antigen testing; 6 patients were missing data for either vaccination or prior infection.

[c] Hospital LOS among patients who survived to discharge.

COVID-19 in individual patients. An updated case definition resulting in more accurate measurement of COVID-19 hospitalizations will facilitate more effective health policy and trust with the public.

Notes

Patient consent. Patient consent is not applicable to this work, as patient data were collected via retrospective review of electronic medical records with the approval of the Institutional Review Board of the University of Southern California under protocol HS-20-00880.

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