COVID-19 Outcomes in Underserved Populations: Reaping What One Sows

In this issue of RESPIRATORY CARE, Chaudhary and colleagues[1] report their single-center experience caring for a group of critically ill patients with severe COVID-19 pneumonia. This cohort of 128 subjects consisted of 64% Black, 13% Hispanic, 5% white, and 19% other races and came from a community where almost half of the population live below the poverty line. Nearly 90% of the subjects had cardiovascular comorbidity, and 78% had ≥ 2 comorbidities. These subjects were stricken with severe respiratory failure with an average P_{aO_2}/F_{IO_2} of 109 mm Hg, Murray score indicative of severe lung injury, elevated inflammatory markers, and evidence for acute kidney injury. In this group, 97% required intubation and subsequently were found to have very stiff lungs.[1] Multivariable regression analysis revealed that, among Black subjects, increased age, positive fluid balance, and tocilizumab treatment were associated with mortality, whereas higher platelets and intermediate-dose anticoagulation were protective. Among other groups, higher total bilirubin and higher lactate were associated with a higher mortality rate, whereas tocilizumab treatment was protective.[1] The authors noted that race and ethnicity did not seem to be markers for poor outcomes. Their study provides a full data set and indicates access to all vital equipment for care of the critically ill, application of contemporary treatments, and management paradigms that would be expected from an academic institution. Notwithstanding, in-hospital mortality was a sobering 63%.[1]

Corticosteroids remain the only therapeutic intervention associated with mortality benefit in the treatment of severe COVID-19 pneumonia. In the RECOVERY trial,[2] use of dexamethasone resulted in an absolute mortality benefit of 2.8% compared with usual care in the treatment of subjects hospitalized with COVID-19 infection. The magnitude of the mortality benefit rose to 12.1% among subjects who received invasive mechanical ventilation. Tocilizumab, a monoclonal antibody that blocks the interleukin-6 receptor, is used for the treatment of cytokine release syndrome associated with CAR-T cell therapy in the ICU. In the largest randomized controlled trial that recruited hospitalized COVID-19 subjects with hypoxia and evidence for systemic inflammation, absolute mortality reduction of 4% favoring tocilizumab was reported.[3] Nonetheless, the utility of this drug remains unclear for the treatment of COVID-19 pneumonia, and its use has received moderate-strength recommendation from the National Institutes of Health COVID-19 treatment guidelines in the face of disparate results from other trials. Remdesivir, an antiviral drug that inhibits viral RNA transcription, is not associated with mortality benefit but may shorten recovery time.[4]

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None of these therapeutic drug interventions had adequate support for clinical use at the time that Chaudhary et al[1] conducted their study. Nevertheless, as in other academic medical centers at the time, the investigators report the use of corticosteroids in 33%, tocilizumab in 71%, and remdesivir in 13% of subjects.[1] Notwithstanding, the absence of widespread use of these therapeutic interventions should not account for the high mortality rate in its entirety. The overall salutary effect of corticosteroid use is not surprising, as reported. The differential impact of tocilizumab use on outcomes (ie, higher risk for Black, but protective in white/Hispanic/other subjects) should be hypothesis-generating rather than guiding, given the retrospective nature of the investigation. Mechanical ventilation practices (eg, tidal volume, use of prone positioning, noninvasive ventilation) did not differ between the racial/ethnic groups. Average driving (tidal elastic) pressure of 15 cm H_2O was slightly higher than some reports of mechanically ventilated subjects with COVID-19[5-7] but similar to other studies.[8,9] Prone positioning was adopted for 35% of subjects, which may be lower than some reports[6,7] but is similar to other studies conducted around the same time.[8,9] Notably, the investigators report an average respiratory system static compliance of 26 mL/cm H_2O, lower than other reports.[6,7,9,10] One is tempted to speculate that this observation may be a marker for late presentation.

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Why, then, did such a high proportion of subjects perish compared to other studies, which reported in-hospital or 28-d mortality of 17–39% for mechanically ventilated patients?[5-7,10] How do we put the study by Chaudhary and colleagues[1] in perspective?

In the absence of distinct differences in care rendered in the hospital, the demographic composition of the cohort could be considered as a possible explanation. In fact, racial and ethnic disparities in the community impact on COVID-19 have been well documented since the early days of the pandemic. At an Ochsner Health System facility in Louisiana, 76.9% of the hospitalized patients and 70.6% of who died were Black, while Blacks constituted only 31% of the Ochsner Health System population.[11] Hospitalization and death rates among the New York City boroughs were highest in the Bronx, which has the highest proportion of racial/ethnic minorities and number of individuals living in poverty.[12] Data from 2,026 U.S. counties show that counties with higher proportions of Black residents and adverse social determinants experienced higher death rates.[13]

As the authors' multivariable regression analysis shows, such pervasive differences may not originate from race or ethnicity per se.[1] In their study of 336 Black and 408 White subjects hospitalized for COVID-19, Krishnamoorthy and colleagues[14] also reported that Black subjects hospitalized with COVID-19 did not necessarily fare worse compared to White subjects after adjusting for comorbidities, body mass index, neutrophil count, time from symptoms, and medication use. Thus, the reasons for discrepancy in outcomes likely stem from factors outside of the hospital walls. First, comorbidities such as hypertension, diabetes, obesity, which are established risk factors for poor COVID-19 outcomes, afflict Blacks more frequently. At the SUNY Downstate Medical Center in Brooklyn, New York, among the 1,103 consecutive subjects with COVID-19 (88% Black), hypertension was present in 79%, diabetes mellitus in 56%, and more than half of the subjects were in the obese range.[15] Comorbidities were present in 98% of the 529 hospitalized subjects in this cohort. Second, Blacks may be predisposed to a higher risk of infection compared to Whites. Data from Michigan's disease surveillance system indicate that COVID-19 infection and mortality rates that were 5.5 and 6.7 times higher for Blacks, respectively, than rates for Whites.[16] Strikingly, the investigators reported that the dramatic difference was driven by the sheer number of COVID-19 infections in Blacks rather than age-specific variation in case fatality rates. In essence, Blacks were exposed to the virus much more frequently than Whites. This is not surprising when considering that Blacks are more likely to live in more crowded conditions, work in essential, public-facing jobs, and use public transportation.[17] To add further complexity, disparities in availability of testing to Black communities[18] may have resulted in ineffective infection identification and control.

The findings of Chaudhary et al[1] add to a growing body of evidence that comorbidities, adverse socioeconomic factors, and poor health care access may account for dismal COVID-19 outcomes in Black and other disadvantaged communities.[19] The term "racially minoritized" has been advocated to describe individuals who suffer the consequences of exposure to racism.[20] This term is appropriate when biological and genetic differences between races are not the cause of poorer outcomes. Instead, systemic discrimination creates the disadvantageous circumstances that produce the inevitable aftermath.

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REFERENCES

1. Chaudhary S, Benzaquen S, Woo JG, Rubinstein J, Matta A, Albano J, et al. Clinical characteristics, respiratory mechanics and outcomes in critically ill subjects with COVID-19 infection in an underserved urban population. Respir Care 2021;66(6):897-908.
2. RECOVERY Collaborative Group, Horby P, Lim WS, Emberson JR, Mafham M, Bell JL, et al. Dexamethasone in hospitalized patients with Covid-19. N Engl J Med 2021;384(8):693-704.
3. RECOVERY Collaborative Group, Horby PW, Pessoa-Amorim G, Peto L, Brightling CE, Sarkar R, et al. Tocilizumab in patients admitted to hospital with COVID-19 (RECOVERY): preliminary results of a randomised, controlled, open-label, platform trial. medRxiv 2021 [Epub ahead of print].
4. Attaway AH, Scheraga RG, Bhimraj A, Biehl M, Hatipoğlu U. Severe covid-19 pneumonia: pathogenesis and clinical management. BMJ 2021;372:n436.
5. Cummings MJ, Baldwin MR, Abrams D, Jacobson SD, Meyer BJ, Balough EM, et al. Epidemiology, clinical course, and outcomes of critically ill adults with COVID-19 in New York City: a prospective cohort study. Lancet 2020;395(10239):1763-1770.
6. Ziehr DR, Alladina J, Petri CR, Maley JH, Moskowitz Ari, Medoff BD, et al. Respiratory pathophysiology of mechanically ventilated patients with COVID-19: a cohort study. Am J Respir Crit Care Med 2020;201(12):1560-1564.
7. Ferrando C, Suarez-Sipmann F, Mellado-Artigas R, Hernández M, Gea A, Arruti E, et al. Clinical features, ventilatory management, and outcome of ARDS caused by COVID-19 are similar to other causes of ARDS. Intensive Care Med 2020;46(12):2200-2211.
8. Schenck EJ, Hoffman K, Goyal P, Choi J, Torres L, Rajwani K, et al. Respiratory mechanics and gas exchange in COVID-19-associated respiratory failure. Ann Am Thorac Soc 2020;17(9):1158-1161.
9. Bhatraju PK, Ghassemieh BJ, Nichols M, Kim R, Jerome KR, Nalla AK, et al. Covid-19 in critically ill patients in the Seattle region: a case series. N Engl J Med 2020;382(21):2012-2022.
10. Auld SC, Caridi-Scheible M, Blum JM, Robichaux C, Kraft C, Jacob JT, et al. ICU and ventilator mortality among critically ill adults with coronavirus disease 2019. Crit Care Med 2020;48(9):e799-e804.
11. Price-Haywood EG, Burton J, Fort D, Seoane L. Hospitalization and mortality among black patients and white patients with Covid-19. N Engl J Med 2020;382(26):2534-2543.

12. Wadhera RK, Wadhera P, Gaba P, Figueroa JF, Joynt Maddox KE, Yeh RW, et al. Variation in COVID-19 hospitalizations and deaths across New York City boroughs. JAMA 2020;323(21):2192-2195.
13. Dalsania AK, Fastiggi MJ, Kahlam A, Shah R, Patel K, Shiau S, et al. The relationship between social determinants of health and racial disparities in COVID-19 mortality. J Racial Ethn Heal Disparities 2021 [Epub ahead of print].
14. Krishnamoorthy G, Arsene C, Jena N, Mogulla SM, Coakley R, Khine J, et al. Racial disparities in COVID-19 hospitalizations do not lead to disparities in outcomes. Public Health 2021;190:93-98.
15. Gupta R, Agrawal R, Bukhari Z, Jabbar A, Wang D, Diks J, et al. Higher comorbidities and early death in hospitalized African-American patients with Covid-19. BMC Infect Dis 2021;21(1):78.
16. Zelner J, Trangucci R, Naraharisetti R, Cao A, Malosh R, Broen K, et al. Racial disparities in coronavirus disease 2019 (COVID-19) mortality are driven by unequal infection risks. Clin Infect Dis 2021;72(5):e88-e95.
17. Webb Hooper M, Nápoles AM, Pérez-Stable EJ. COVID-19 and racial/ethnic disparities. JAMA 2020;323(24):2466-2467.
18. Mody A, Pfeifauf K, Geng EH. Using Lorenz curves to measure racial inequities in COVID-19 testing. JAMA Netw Open 2021; 4(1):e2032696.
19. Aleligne YK, Appiah D, Ebong IA. Racial disparities in coronavirus disease 2019 (COVID-19) outcomes. Curr Opin Cardiol 2021; 36(3):360-366.
20. Milner A, Jumbe S. Using the right words to address racial disparities in COVID-19. Lancet Public Heal 2020;5(8):e419-e420.