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POINT: Is Considering Social Determinants of Health Ethically Permissible for Fair Allocation of Critical Care Resources During the COVID-19 Pandemic? Yes

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There is growing agreement that triage protocols for scarce medical resources such as ICU beds and ventilators should—at the very least—not exacerbate the profound disparities in health outcomes that are occurring during the COVID-19 pandemic among racial or ethnic minorities, persons with disabilities, and low-income people. Some have suggested that ICU triage guided solely by medical prognosis (ie, chances of survival to hospital discharge) will accomplish this. Although pure prognosis-based triage may seem equitable, it is not; it would exacerbate health disparities that have become a national priority to mitigate. Counterintuitively, this would be the case even if there were no differences in medical prognoses among hospitalized patients according to race or other forms of social disadvantage. Therefore, if we take seriously the commitment to fairness in triage, we cannot rely solely on prognosis-based triage. To show equal respect for all members of society, we must take steps to lessen the extent to which disadvantaged people are further disadvantaged by triage processes.

We delineate three mechanisms by which triage solely according to medical prognosis would exacerbate health inequities. We then argue that to accomplish the dual ethical goals during a public health emergency of promoting population health outcomes and promoting fairness, additional criteria beyond medical prognosis should be incorporated into triage protocols. We focus on one strategy to do so: adding a correction factor to the triage scores of patients from highly disadvantaged neighborhoods to lessen the extent to which triage would exacerbate disparities arising from structural inequities.

Disparities in COVID-19 Outcomes
Disadvantaged groups, including racial or ethnic minorities, low-income people, and individuals with disabilities, are dying at disproportionately high rates during the COVID-19 pandemic. For example, recent data from the United States indicate that the rate of hospitalization requiring ICU admission was more than three times higher among Black individuals than White (191 per 100,000 vs 60 per 100,000). Structural racism (ie, differential access to goods, services, and opportunities by race) has contributed to racial disparities in COVID-19 through two primary mechanisms: individual risk and place-based risk. Increased individual risk comes from differential access to opportunity (eg, quality education) that has resulted in a disproportionate number of racial/ethnic minorities working in essential, high-exposure jobs; decreased access to health care has resulted in worse baseline health among Black individuals; the chronic stress of discrimination has increased their risk of diseases such as hypertension, obesity, and cardiovascular disease. Place-based risk arises from persistent racial residential segregation in which Black neighborhoods are more likely to have housing facilities that are poorly ventilated and densely populated, less likely to have resources needed to shelter in place (eg, grocery stores), and more...
likely to have higher indexes of neighborhood disadvantage, which independently correlate with COVID-19 burden.\textsuperscript{5}

Other disadvantaged groups also have disproportionately affected by the pandemic. For example, people with cognitive disabilities—who are significantly more likely to live in disadvantaged neighborhoods\textsuperscript{6}—have experienced high rates of infection and death from COVID. Thus, neighborhood disadvantage is a common denominator among groups experiencing a disproportionate burden during the pandemic, including racial or ethnic minorities, low-income people, and those with disabilities.

**Mechanisms by Which Pure Prognosis-Based Triage Would Exacerbate Racial Disparities**

There are several mechanisms by which purely prognosis-based triage would further disadvantage socially marginalized populations; here we focus on the impact on Black patients. First, prognosis-based triage would worsen racial disparities because Black patients disproportionately present for care with higher severity of illness, and therefore lower survival probabilities, compared with White patients. This is likely attributable to several sources of structural inequity, including higher rates of comorbid conditions (eg, congestive heart failure and chronic kidney disease), limited access to health care facilities, and delayed care-seeking behaviors because of institutional distrust. Two recent studies from large, diverse cohorts in Chicago, Illinois, and New Haven, Connecticut, found that Black patients have a worse survival prognosis at the time of triage compared with White patients and would therefore be more frequently disadvantaged by a triage strategy focused narrowly on prognosis of survival to hospital discharge.\textsuperscript{7,8}

Second, the most commonly recommended risk prediction score in states’ triage protocols—the Sequential Organ Failure Assessment (SOFA) score—is miscalibrated across races in a way that systematically disadvantages Black patients. For example, Ashana and colleagues\textsuperscript{9} found that the SOFA score underestimates in-hospital mortality for White patients and overestimates in-hospital mortality for Black patients with the same scores.\textsuperscript{5} Miller and colleagues\textsuperscript{10} reported a similar SOFA miscalibration, which led to 16% of Black patients unjustifiably being deprioritized for scarce resources in triage simulations.\textsuperscript{10}

Third, because disadvantaged groups disproportionately require ICU care during the pandemic because of social determinants of poor health, they will also be disproportionately harmed if resource shortages arise that require triage of critically ill patients. Using published data on US racial disparities in rates of ICU admission during the pandemic, Table 1 illustrates how purely prognosis-based triage would widen racial disparities among patients with COVID-19 compared with when there is no shortage of ICU resources. This example likely underestimates the extent to which prognosis-based triage would worsen disparities because it (counterfactually) assumes there are no baseline differences in triage scores across racial groups and no racial bias in triage scores. In the setting of a moderate to severe shortage of ICU resources, the use of prognosis-based triage would cause the population-based excess death rate among Black patients compared with White patients to increase from 55 deaths per 100,000 in times of no ICU bed shortages to 70.9 deaths per 100,000 in times of ICU scarcity in which pure prognosis-based triage is used. In short, prognosis-based triage would exacerbate racial disparities because it would transform the fact that Black individuals disproportionately need ICU-level care into a disproportionately high rate of treatment denial to Black patients during times of scarcity.

**Potential Strategies to Mitigate Inequitable Outcomes**

Elsewhere we have proposed a multi-principle framework to allocate scarce ICU resources to achieve the dual ethical goals of promoting population outcomes and promoting equity.\textsuperscript{11} Our proposal is not intended as a redress for the many harms of historical and present-day racism in the United States. Instead, the goal of introducing equity considerations into ICU triage is far more limited: to lessen the extent to which the act of triage widens the health disparities occurring during the pandemic, which arise from unjust social conditions.

Using medical prognosis as a core allocation criterion, we proposed several strategies to mitigate health inequities during ICU triage: introducing a correction factor into patients’ triage scores to reduce the impact of baseline structural inequities (described later), giving heightened priority to frontline essential workers (who are disproportionately racialized minorities), giving heightened priority to the young (on the grounds that dying young is a severe form of disadvantage, which is disproportionately experienced by already disadvantaged groups), and rejecting use of categorical exclusion criteria and consideration of longer-term life
We and others have defended each of these criteria elsewhere.\textsuperscript{12,13} We focus our analysis here on adding a correction factor to triage scores for patients who have experienced high levels of unjust disadvantage that negatively affect their health outcomes (eg, structural racism and ableism). Although it would be infeasible during ICU triage to conduct a detailed assessment of each patient’s individual degree of disadvantage, it is feasible to use an established composite measure of disadvantage, such as the Area Deprivation Index (ADI).\textsuperscript{14} The ADI is a geographic measure of socioeconomic disadvantage that is calculated at the level of census blocks (approximately 1,500 people). The ADI is an aggregate measure of disadvantage on a 10-point scale, based on 17 measures of disadvantage related to poverty, education, employment, physical environment, and infrastructure within a neighborhood.\textsuperscript{15} Less than a minute is needed to determine a patient’s ADI score by entering their home address into a publicly accessible online calculator. Because the strongest association between ADI scores and health outcomes occurs at the highest levels of disadvantage, one way to use this disparity-mitigating strategy is to incorporate an adjustment into the triage score for individuals that reside in the most disadvantaged neighborhoods (ie, ADI scores of 8, 9, or 10).

A strength of using the ADI metric is that, rather than directly considering a patient’s race or disability status in triage decisions, which in the United States would be legally and politically fraught,\textsuperscript{16,17} it targets key mechanisms by which structural racism and ableism adversely affect health outcomes. Using an ADI correction to promote equity has been shown to be feasible among inpatients for the allocation of scarce COVID therapeutics.\textsuperscript{18}

Some may object to the use of a population-based measure such as the ADI on the grounds that it may misclassify some individuals as disadvantaged who are not. However, just as we accept using probabilistic approaches to increasing the number of lives saved with triage (eg, by using probabilistic mortality prediction scores), we should also accept using a probabilistic approach to lessen the extent to which triage exacerbates disparities (eg, via incorporating an ADI correction into triage scores).

### Conclusion

Allocating scarce ICU resources according to medical prognosis alone may seem equitable, but in fact doing so would widen the health disparities that have occurred during the pandemic. Incorporating equity...
considerations—such as a correction factor to triage scores using a geographic measure of disadvantage—is one strategy to show equal respect for all during the pandemic. More broadly, ICU triage policies should be one among a suite of policy interventions to address the profound inequities in health outcomes that disadvantaged groups are experiencing during the pandemic.

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References

1. Hick JL, Hanfling D, Wynia MK, Toner E. Crisis standards of care and COVID-19: what did we learn? How do we ensure equity? What should we do? NAM Perspect. 2021;2021. https://doi.org/10.31478/202108e
2. Gostin LO, Powers M. What does social justice require for the public’s health? Public health ethics and policy imperatives. Health Aff (Millwood). 2006;25:1053-1060.
3. Acosta AM, Garg S, Pham H, et al. Racial and ethnic disparities in rates of COVID-19–associated hospitalization, intensive care unit admission, and in-hospital death in the United States from March 2020 to February 2021. JAMA Network Open. 2021;4. e2130479-e.
4. Peek ME, Simons RA, Parker WF, Ansell DA, Rogers SO, Edmonds BT. COVID-19 among African Americans: an action plan for mitigating disparities. Am J Public Health. 2021;111:286-292.
5. Tung EL, Peek ME, Rivas MA, Yang JP, Voleraman A. Association of neighborhood disadvantage with racial disparities in COVID-19 positivity in Chicago. Health Aff (Millwood). 2021;40:1784-1791.
6. Danielewicz AL, Dos Anjos JC, Bastos JL, Boing AC, Boing AF. Association between socioeconomic and physical/built neighborhoods and disability: a systematic review. Prev Med. 2017;99:118-127.
7. Tolchin B, Oladele C, Galusha D, et al. Racial disparities in the SOFA score among patients hospitalized with COVID-19. PLoS One. 2021;16(9):e0257608.
8. Bhavani SV, Liao Y, Miller WD, et al. Simulation of ventilator allocation in critically ill patients with COVID-19. Am J Respir Crit Care Med. 2021;204:1224-1227.
9. Ashana DC, Anesi GL, Liu VX, et al. Equitably allocating resources during crises: racial differences in mortality prediction models. Am J Respir Crit Care Med. 2021;204(2):178-186.
10. Miller WD, Han X, Peek ME, Charan Ashana D, Parker WF. Accuracy of the sequential organ failure assessment score for in-hospital mortality by race and relevance to crisis standards of care. JAMA Neto Open. 2021;4:e2113891.
11. White DB, Lo B. Mitigating inequities and saving lives with ICU triage during the COVID-19 pandemic. Am J Respir Crit Care Med. 2021;203:287-295.
12. White D, Lo B. Promoting equity with a multi-principle framework to allocate scarce ICU resources. J Med Ethics. 2021;48(2):133-135.
13. Persad G, Joffe S. Allocating scarce life-saving resources: the proper role of age [Published online ahead of print March 22, 2021]. J Med Ethics. 2021. https://doi.org/10.1136/medethics-2020-106792
14. Singh GK. Area deprivation and widening inequalities in US mortality, 1969-1998. Am J Public Health. 2003;93:1137-1143.
15. Kind AJH, Buckingham WR. Making neighborhood-disadvantage metrics accessible: the neighborhood atlas. N Engl J Med. 2018;378:2456-2458.
16. Schmidt H, Gostin LO, Williams MA. Is it lawful and ethical to prioritize racial minorities for COVID-19 vaccines? JAMA. 2020;324(20):2023-2024.
17. Persad G. Allocating Medicine Fairly in an Unfair Pandemic (September 25, 2020). University of Illinois Law Review, Forthcoming, U Denver Legal Studies Research Paper No. 20-26. Accessed November 12, 2021. https://ssrn.com/abstract=3699769
18. White DB, McCready E, Pathak P, et al. Developing and implementing a weighted lottery to equitably allocate scarce COVID-19 medications. Am J Respir Crit Care Med. 2021;203: A1013.

COUNTERPOINT:

Is Considering Social Determinants of Health Ethically Permissible for Fair Allocation of Critical Care Resources During the COVID-19 Pandemic? No

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COVID-19 has laid bare existing inequities in health care,1,2 and the disproportionate impact on the poor and communities of color have rightfully driven a search for solutions to improve access across the spectrum of medical care delivery. Identifying at-risk areas of our community for targeted interventions is thus a key mitigation strategy to reduce further impact.

Social determinants of health are environmental, structural, and socioeconomic factors that shape the health of communities and individuals alike. Identifying these risks and mitigating them allows everyone the best opportunity for optimal health service access. Individual health is not, however, dictated by social determinants but remains a complex interplay with other factors such as genetics, environment, and conscious decisions—decisions such as whether to make appointments, take medication, or receive vaccinations. It is not on physicians to assess or judge to what degree each

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