Scarce Resource Allocation Scores Threaten to Exacerbate Racial Disparities in Health Care

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Significant alarm has been generated in recent years by the realization that algorithms that are assumed to be unbiased have unintentionally perpetuated racial biases. For instance, bias has been incorporated in algorithms for credit scoring, policing, hiring, and even in health care: an algorithm that was widely used to identify patients with complex health needs and triage resources to them was biased against black patients because it estimated health needs based on cost, but cost is lower for black patients than for white patients because of disparate access to care.[1] The coronavirus disease 2019 (COVID-19) pandemic has provoked fears of medical resource shortages; as a result, a variety of scarce resource allocation algorithms have been developed at the hospital, state, and national levels. Fortunately, it appears unlikely that such rules will need to be implemented in the short term. However, with the significant uncertainty that continues about the potential course of the pandemic and concerns regarding a "second surge," it is essential to use the time that we

have to weigh the trade-offs in these policies carefully and to ensure that they enact our best values. To this end, it is important to evaluate the potential for these rules to propagate racial bias and prevent this if possible.

All healthcare allocation rules in the United States have the explicit intention to avoid discrimination based on race or ethnicity.[2-4] They aim to maximize benefits by directing scarce resources at individuals most likely to benefit from them. However, it is unclear which benefits should be maximized: the greatest number of lives or the greatest number of life-years. Maximizing lives saved calls for focusing on the probability of survival to hospital discharge, whereas maximizing life-years saved calls for explicit incorporation of life expectancy. For example, consider a severely ill young patient with no comorbid conditions and an older patient with several chronic medical problems who has milder acute illness. In this case, maximizing lives saved prioritizes the older patient, whereas maximizing life-years would prioritize the younger patient. There is active ethical debate over how to balance these two principles, and proposed allocation rules deal with this dilemma in strikingly different ways (Table 1).[2-4]

One significant point of divergence is the emphasis that allocation rules place on chronic diseases, with some allocation scores ignoring medical history while others incorporate even moderate comorbidities, such as end-stage renal disease (ESRD).[2-4] When chronic diseases are incorporated into allocation algorithms, the rationale for doing so is that they lower life expectancy; therefore, patients have fewer potential life-years to be saved from the resource.[2] Importantly, however, racial and ethnic minorities disproportionately bear chronic disease burdens, in terms of prevalence, control, and complications, from conditions such as ESRD, cardiovascular disease, diabetes mellitus, and cancer. For example, compared with white patients, the risk of ESRD is 3.6 times higher among black patients and 2 times higher among Latino patients.[5] Therefore, the more that comorbid chronic medical conditions are emphasized in priority scores, the higher the risk of systematically deprioritizing racial/ethnic minorities.

Because deprioritizing chronic conditions would further limit the opportunities of marginalized populations, it is essential to critique the rationale of such a policy. First, there is wide variation in life expectancies within and

between the "example" chronic medical conditions. Second, individuals who have no premorbid illness may experience disabilities and shorter life-expectancies as a result of critical illness, thereby limiting the real-life years gained. Third, although guidelines give examples of chronic conditions that limit life expectancy, these lists are arbitrary and certainly not exhaustive and, in some cases, have been removed (although triage

TABLE 1] Priority Scores and Chronic Comorbidity Points

Variable	Major Chronic Conditions	Severe Chronic Conditions
Model policy (Pennsylvania[a], Oklahoma)	Examples of major comorbidities: • Moderate dementia • Malignancy with <10-year expected survival • NYHA Class III heart failure • Moderately severe chronic lung disease (COPD, IPF) • End-stage renal disease, age <75 y • Severe, inoperable multivessel coronary artery disease; cirrhosis with history of decompensation	Examples of severely life limiting comorbidities: • Severe dementia • Metastatic cancer receiving only palliative treatments • NYHA Class IV heart failure with frailty • Severe chronic lung disease plus evidence of frailty • Cirrhosis with MELD >20, ineligible for transplant; end-stage renal disease, age >75 y
	2 "points" Equivalent ethical weight to a SOFA difference of 4 to 10 points (25% to 60% reduction in short-term survival)	4 "points" Equivalent ethical weight to the maximum possible difference in SOFA scores (80% to 100% reduction in short-term survival)
Maryland	Not used	Examples of severely life limiting comorbidities: • NYHA Class IV heart failure • Severe chronic lung disease • Primary pulmonary hypertension with NYHA Class III or IV heart failure • Chronic liver disease with Child-Pugh score >7 • Severe trauma • Advanced untreatable neuromuscular disease; metastatic malignant disease
		3 "points" Equivalent ethical weight to a SOFA score difference of 7 to 14 (50% to 70% reduction in short-term survival)
New York	No points for chronic conditions. Assign priority based on SOFA score.	…
University of Chicago Proposal	Assign priority based on SOFA score. Acceptable to use severely life-limiting conditions with <5% one-year survival (confirmed by expert consultation) and age to break ties within patients with similar short-term survival. If uncertainty about prognosis exists, do NOT use medical history in allocation. Ethically, the first consideration is saving lives, and this principle is NOT weighed equally with life-years gained.	…

We give examples of how such a comorbidity might be affected by the allocation rules in 3 adjacent states, followed by our proposed approach. The ethical equivalence calculations are performed based on the SOFA score categories and a published SOFA calibration study. IPF = idiopathic pulmonary fibrosis; MELD = model end stage liver disease; NYHA = New York Heart Association; SOFA = sequential organ failure assessment.
[a]In April 2020, Pennsylvania removed its example list of chronic comorbidities due to concern raised by disability rights advocates. However, comorbidities are still considered in the policy, and this influential policy with this list was adopted in other states and in many local hospitals throughout the United States.

personnel are still encouraged to consider comorbidities and life expectancy, with less concrete guidance).[2] As a result, the evaluation of chronic diseases will be subjective, which could introduce implicit biases that lead to deprioritization of racial/ethnic minorities and other marginalized populations.

Critical care allocation rules will not be able to rectify deep and longstanding health care disparities. Such disparities are multifactorial in nature but arise, in part, from longstanding structural inequities, such as poverty, residential segregation, substandard housing, racial discrimination, unemployment, and limited access to medical care. Nevertheless, no allocation rule should exacerbate preexisting inequities. Comorbid conditions and life expectancy should be considered in the context of their uneven distribution throughout the population. Given the significant risk of "double penalizing" or devaluing marginalized communities, we believe that comorbid conditions should be deprioritized in allocation rules.

To accomplish this goal, we and others have developed and advocate for an allocation policy that does not include moderate or major chronic conditions.[4] We agree that maximizing life-years permits the consideration of comorbid conditions that are very severe, with a life-expectancy of less than one year. However, we argue this should be applied only as a "tie-breaker" after assignment of the initial priority and is used only if there are insufficient resources to meet the needs of all individuals with similar probability of short-term survival. Furthermore, we suggest that deprioritizing an individual based on the prognosis of a comorbid condition should occur after emergency consultation to a specialist, when possible, who normally would oversee the treatment of such a disease, to

confirm the limited prognosis. This approach was created through an iterative process between our institutional experts and our community advisory panel.

Marginalized communities, which include racial/ethnic minorities, are likely to suffer disproportionately during a public health emergency, which is a reality that already is manifesting in cities and states across the United States. It is the duty of clinicians and policymakers to mitigate this disparity. We believe that our approach truly represents a fairer allocation of resources, one that seeks to maximize the well-being of society at large (life-years saved principle) without falling into the trap of incorporating a factor that inadvertently penalizes marginalized populations.

Acknowledgments

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