

Racial Bias in Clinical Algorithms Increases Health Disparities

Written by The Life Science Feed Editorial Team · Published 13 June 2026 · Edited by William Lopes

The integration of clinical algorithms into medical practice aims to standardise care and improve outcomes. However, when these algorithms incorporate race as a biological variable rather than a social construct, they can perpetuate and exacerbate existing health disparities, leading to delayed diagnoses and inadequate treatment for minority populations. This issue demands immediate attention to ensure equitable healthcare delivery.

KEY TAKEAWAYS

- **The Pivot:** Clinical algorithms, intended to improve care, often embed racial biases that lead to differential treatment.
- **The Data:** Algorithms using race as a proxy for biological difference can misclassify disease risk, leading to under-referral for specialist care in minority groups.
- **The Action:** Clinicians should critically evaluate algorithm outputs, considering the social determinants of health and individual patient context over race-based algorithmic scores.

Clinical decision support systems and predictive algorithms are increasingly utilised across various medical specialties, from risk stratification for kidney disease to guiding treatment for heart failure. The underlying premise is that these tools enhance diagnostic accuracy and treatment efficacy by processing vast datasets. However, a critical flaw emerges when race is incorporated into these algorithms as a biological variable, rather than acknowledging its social and historical context. This practice can lead to systematic underestimation of disease severity or overestimation of health in racialised groups, resulting in delayed interventions and poorer health outcomes. For example, algorithms used to estimate glomerular filtration rate (eGFR) have historically included a race coefficient, specifically for Black patients, which can lead to an overestimation of kidney function.¹ This overestimation can delay referrals for nephrology consultation, transplantation evaluation, and access to guideline-directed medical therapies, contributing to advanced kidney disease at presentation.²

Impact on Patient Care and Outcomes

The consequences of racially biased algorithms extend beyond nephrology. In cardiology, risk prediction models for heart failure or cardiovascular events may similarly misclassify risk. For instance, if an algorithm assigns a lower risk score to a Black patient due to an embedded racial adjustment, that patient may not receive the same intensity of monitoring or preventative interventions as a white patient with an objectively similar clinical profile. This differential treatment can lead to higher rates of adverse cardiovascular events in the former group.³ Similarly, in pain management, algorithms that incorporate race may contribute to the documented disparities in pain assessment and treatment, where minority patients

are often undertreated for pain.⁴ The reliance on race as a biological determinant, rather than a social risk factor, ignores the complex interplay of socioeconomic status, access to care, environmental exposures, and systemic discrimination that disproportionately affect racialised communities. These social determinants are the true drivers of health disparities, not inherent biological differences linked to race.⁵

The development of these algorithms often relies on historical datasets that reflect existing biases in healthcare delivery. If a dataset contains fewer diagnoses or treatments for a particular racial group due to past discrimination, an algorithm trained on this data will perpetuate those patterns. This creates a feedback loop where existing inequities are amplified. For example, a study examining a widely used algorithm for predicting healthcare needs found that it systematically assigned lower risk scores to Black patients than to white patients, even when both groups had the same number of chronic conditions.⁶ This algorithmic bias resulted in Black patients receiving less access to care management programs. The ethical implications are substantial, as these tools, intended to be objective, can inadvertently embed and scale human biases, leading to significant clinical harm. Addressing this requires a fundamental shift in how race is conceptualised and integrated into clinical tools, moving towards race-neutral algorithms or those that explicitly account for social determinants of health.⁷

The methodology behind incorporating race into these algorithms often stems from historical epidemiological observations that linked racial groups to differing disease prevalence or outcomes. However, these observations frequently failed to adequately control for confounding socioeconomic and environmental factors. For instance, early studies on kidney disease noted differences in creatinine levels between racial groups, leading to the assumption of inherent biological differences in muscle mass or creatinine generation. This assumption then translated into race-based adjustments in eGFR equations without robust evidence to support a biological basis for these differences. The patient populations affected by these biases are diverse, encompassing individuals from various racial and ethnic minority groups who are disproportionately impacted by systemic health inequities. The consequences are particularly severe for conditions requiring timely diagnosis and intervention, such as acute kidney injury or severe cardiovascular disease, where delayed recognition can lead to irreversible organ damage or mortality. The limitations of current algorithmic approaches are not merely technical; they are deeply rooted in a flawed understanding of race and its relationship to health. The continued use of race as a proxy for biological difference in clinical algorithms perpetuates a cycle of health disparities, undermining efforts to achieve health equity. Future algorithm development must prioritize the inclusion of diverse, representative datasets and employ rigorous validation methods that specifically assess for and mitigate racial bias. Furthermore, a deeper understanding of the social and structural determinants of health is crucial for developing algorithms that truly improve care for all patient populations.

CLINICAL IMPLICATIONS

The pervasive issue of racial bias in clinical algorithms presents a stark challenge to the medical community. When an eGFR calculation, for example, systematically overestimates kidney function in Black patients, it directly delays access to critical nephrology care, including evaluation for transplantation. This is not a minor statistical anomaly; it is a mechanism by which systemic racism is codified into clinical practice, leading to tangible harm. Clinicians must exercise heightened vigilance, particularly when an algorithm's output seems incongruent with the patient's overall clinical picture or their lived experience of health. Relying solely on an

algorithm without critical appraisal is a dereliction of professional duty, especially when the algorithm's inputs are known to be flawed.

The industry, including developers of electronic health records and clinical decision support systems, bears a significant responsibility. The continued deployment of algorithms that incorporate race as a biological variable, despite clear evidence of its detrimental impact, is unacceptable. Companies like Epic Systems or Cerner, whose platforms are ubiquitous, must prioritise the development and implementation of race-neutral algorithms or, at minimum, provide clear warnings and guidance on the limitations of race-adjusted calculations. Furthermore, professional bodies and guideline committees, such as the National Kidney Foundation or the American Heart Association, must issue unequivocal recommendations against the use of race-based coefficients in clinical algorithms, pushing for their removal from standard practice. The recent move by the National Kidney Foundation and the American Society of Nephrology to recommend race-free eGFR equations is a step in the right direction, but similar efforts are needed across all specialities.

For patients, particularly those from racialised minority groups, this issue underscores the importance of self-advocacy and seeking second opinions. They are often the ones who bear the brunt of these algorithmic biases, experiencing delayed diagnoses and suboptimal treatment. While it is not their burden to correct systemic flaws, awareness can empower them to question care plans that do not align with their symptoms or concerns. Ultimately, the goal of equitable healthcare cannot be achieved if the very tools designed to improve care are instead perpetuating and amplifying racial disparities. A thorough, ongoing re-evaluation of all race-adjusted clinical algorithms is not merely an academic exercise; it is an ethical imperative with direct implications for patient morbidity and mortality.

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