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## Pulse oximetry may underestimate hypoxaemia in black patients, study finds

Owen Dyer

Pulse oximetry devices used for warning of low blood oxygenation in covid-19 and other diseases may be missing three times as many cases of occult hypoxaemia in black patients as in white, says a study report published in the *New England Journal of Medicine*.<sup>1</sup>

Researchers looked at over 48 000 pulse oximetry readings in 8675 US white patients and 1326 US black patients, comparing them with more accurate arterial oxygen saturation measures taken almost contemporaneously.

Among white patients whose pulse oximetry readings were 92-96%, the proportion who actually had arterial oxygen saturation below 88% was 3.6% (95% confidence interval 2.5% to 4.6%). But among black patients the proportion actually below that figure was 11.4% (7.6% to 15.2%).

“Our results suggest that reliance on pulse oximetry to triage patients and adjust supplemental oxygen levels may place black patients at increased risk for hypoxaemia,” noted the study authors, from the University of Michigan Medical School. The study is the latest of many to find that current assumptions and algorithms, often derived from heavily white patient populations, may work against black patients.<sup>2</sup>

### Race adjustment

Earlier this month a study published in *JAMA* questioned the benefit of a “race adjustment” that is widely used in estimating kidney function.<sup>3</sup> The adjustment, based on past studies in which black patients tended to have higher creatinine levels for the same kidney function as white patients, applies a multiplier of about 1.2 to black patients’ glomerular filtration rate (GFR)—the principal measure of kidney function, estimated using creatinine levels.

Used by at least 90% of US pathology labs, the race adjustment has been dropped by several leading institutions this year, not least because it is seen as perpetuating myths of differing biology among perceived racial groups.

But the authors of the *JAMA* study, while broadly supportive of dropping the race adjustment, also warned of unforeseen consequences. Their research found that abandoning the adjustment would move more than one in 30 African-American adults—about a million people—from being “disease free” to a diagnosis of early stage kidney disease. This could lead to added medical costs and the loss of access to drugs deemed a kidney risk, such as some diabetes medicines.

Even with the adjustment in place, black Americans are nearly four times as likely as white Americans to have kidney failure diagnosed.

One of the originators of the race adjustment is Andrew Levey, a nephrologist at Tufts University in Boston, who told *Nature* that he no longer believed in either keeping it or dropping it but preferred a new, more accurate GFR estimation technique proposed this month in the *American Journal of Kidney Diseases*, which was tested in diverse populations.<sup>4</sup>

Until its adoption, suggested Levey, physicians might consider telling black patients how their race is used in clinical decisions. “I don’t think that we have been transparent in speaking with our patients about how we do this,” he said.

- 1 Sjoding MW, Dickson RP, Iwashyna TJ, Gay SE, Valley TS. Racial bias in pulse oximetry measurement. *N Engl J Med* 2020;383:2477-8. <https://www.nejm.org/doi/full/10.1056/NEJM2029240>. doi: 10.1056/NEJM2029240 pmid: 33326721
- 2 Noor P. Can we trust AI not to further embed racial bias and prejudice? *BMJ* 2020;368:m363. doi: 10.1136/bmj.m363 pmid: 32051165
- 3 Diao JA, Wu GJ, Taylor HA, et al. Clinical implications of removing race from estimates of kidney function. *JAMA* 2020 Dec 2. doi: 10.1001/jama.2020.22124. <https://jamanetwork.com/journals/jama/fullarticle/2773808>.
- 4 Inker LA, Couture SJ, Tighiouart H, et al. A new panel estimated GFR, including  $\beta$ 2-microglobulin and  $\beta$ -trace protein and not including race, developed in a diverse population. *Am J Kidney Dis* 2020 Dec 7. doi: 10.1053/j.ajkd.2020.11.005. [https://www.ajkd.org/article/S0272-6386\(20\)31126-4/fulltext](https://www.ajkd.org/article/S0272-6386(20)31126-4/fulltext).