Inaccuracy of pulse oximetry in darker-skinned patients is unchanged across 32 years

To the Editor:

We read with interest the recent report in the *European Respiratory Journal* by CROOKS *et al.* [1], who document greater errors with pulse oximetry in patients who have dark skin pigmentation than in white patients. The study is important because of the large number of data points collected prospectively.

The authors stress that pulse oximeters tend to provide falsely high oxygen saturations, as reflected by positive mean differences between paired measurements of pulse oximetry and true invasive arterial saturations. That is correct, but the reported 95% confidence limits, ranging from −25.9% to 36.8%, indicate that pulse oximetry also provides falsely low oxygen saturations in black patients [1].

In the 32 years since we first reported greater inaccuracy with pulse oximetry in black patients [2], the physical structure of pulse oximeters has undergone tremendous change but inaccuracy in black patients has not lessened. The mean difference between pulse oximetry and arterial saturations was 3.3% in black patients we studied [2], and 5.4% in the black patients reported by CROOKS *et al.* [1]. We recognise that the two study populations differ in multiple respects, but the data collected in 2020–2021 do not suggest an improvement in pulse oximeter accuracy in black patients since 1990. In the interval, we are not aware of any manufacturer introducing adjusted algorithms into the software of pulse oximeters to resolve the inferior performance in patients with darker skin [3]. If data in 1990 had shown that pulse oximetry was less accurate in white patients than in black patients for some unknown reason, we wonder whether we would not have witnessed the publication of articles by manufacturers documenting vigorous efforts to resolve inferior performance of pulse oximetry across ethnic groups.

The data of CROOKS *et al.* [1] are interesting in another respect. The authors have more than 850 readings of arterial oxygen saturations lower than 85% in patients with suspected COVID-19, and by study design none of these patients had been admitted to an intensive care unit. Do the authors know how many of these patients were discharged from hospital without requiring endotracheal intubation and mechanical ventilation? Unfortunately, many hospitals have employed protocols that mandated pre-emptive intubation of COVID-19 patients who had arterial oxygen saturations of less than 90% [4, 5]. Unjustified endotracheal intubation has been a major cause of increased mortality in COVID-19 patients [6, 7].

Shareable abstract (@ERSpublications)
The structure of pulse oximeters has changed tremendously over time, but inaccurate readings of oxygen saturation in black patients have not improved across 32 years and manufacturers do not report efforts to resolve the problem https://bit.ly/3KYc7Zo

Martin J. Tobin and Amal Jubran ⓘ

Division of Pulmonary and Critical Care Medicine, Hines Veterans Affairs Hospital and Loyola University of Chicago Stritch School of Medicine, Hines, IL, USA.

Corresponding author: Martin J. Tobin (mtobin2@lumc.edu)

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