Eliminating Skin Color Bias in Pulse Oximeters

A Brown University PhD student recognized the health disparity people with darker skin experienced from pulse oximeters

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People with darker skin experience less accurate readings from pulse oximeters, the fast noninvasive tool used to estimate a person's blood oxygen level via light shone through skin.

Citing the inaccuracy of pulse oximeters for people of color, Rutendo Jakachira, a second-year Brown University PhD student in physics, is working on developing new optical techniques that provide accurate oxygen saturation level readings regardless of a person's skin tone.

Pulse oximeters are known to overestimate blood oxygen for people with dark skin. During the COVID-19 pandemic, many Black and Latino people received delayed or sometimes no treatment at all due to inaccurate oxygen readings from the devices, according to a study published in JAMA Internal Medicine.

"It has been found that there can be up to a 10% difference in oxygen saturation measurements among different pulse oximeters for individuals with darker skin tones," Jakachira said in a Brown University news release. "It has also been found that people of darker skin tones are three times more likely to have hypoxemia, and it is likely to be missed by pulse oximetry."

Inaccurate readings are linked to the amount of melanin, the dark pigment found in skin and hair, a person has, which tends to absorb light as it travels through the skin. Jakachira, along with Kimani Toussaint, a professor of engineering, hopes to use radially polarized light to reduce the interference caused by the surface of the skin.

Jakachira and Toussaint believe they have created the first LED-based light source that can emit radially polarized light. A preliminary study conducted on five people showed promising results, despite its small size. A study with a larger group and a clinical trial are to follow, Jakachira said.

"Rutendo has approached this project with a combination of dedication, ingenuity and strong interest," Toussaint said. "This has allowed us to gain a better understanding of the problem in terms of the underlying optical physics and to creatively think outside of the box in developing a solution."

To learn more, read “Pulse Oximeters More Likely to Be Inaccurate for Black Patients.”
