

The Clinical Utility of Noninvasive Pulse Co-oximetry Hemoglobin Measurements in Dark Skinned Critically Ill Patients.

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BACKGROUND: The primary objective of this study was to assess the clinical usefulness of a point-of-care device which measures hemoglobin noninvasively (SpHb) in a group of critically ill participants with dark skin pigmentation.

METHODS: One hundred forty-six adult and pediatric participants from a multidisciplinary intensive care unit had intermittent readings of noninvasive hemoglobin measurements performed at a minimum of 4 hourly intervals. A total of 371 readings were analyzed. Concurrent blood samples were taken to assess hemoglobin levels using point-of-care blood gas analyzer, as well as sent to a central laboratory where hemoglobin was measured using the sodium lauryl sulfate method. Bland-Altman plots were constructed to assess the agreement between results from the 2 point-of-care devices with the reference standard (laboratory hemoglobin).

RESULTS: SpHb exhibited significant bias when compared to laboratory hemoglobin, while blood gas hemoglobin did not. Mean bias for SpHb was +1.64 with limits of agreement of -1.03 to 4.31 compared to blood gas hemoglobin which showed a bias of 0.26 and limits of agreement of -0.84 to 1.37. The magnitude of the bias for SpHb increased with increasing mean hemoglobin levels. Of all the additional study variables assessed for effect on the bias, only Acute Physiology and Chronic Health Evaluation II score in adult patients ($P < .0001$) and mean arterial blood pressure ($P = .001$) had an effect. Skin pigmentation did not have any effect on the magnitude of bias.

CONCLUSIONS: Noninvasive Hemoglobin measurement is a promising tool in dark skinned critically ill patients with low hemoglobin levels, but requires further refinements for it to have clinical usefulness.