

Noninvasive Measurement of Hemoglobin Using Spectrophotometry: Is it Useful for the Critically Ill Child?

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This study compared the accuracy of noninvasively measuring hemoglobin using spectrophotometry (SpHb) with a pulse CO-oximeter and laboratory hemoglobin (Hb) measurements. A total of 345 critically ill children were included prospectively. Age, sex, and factors influencing the reliability of SpHb such as SpO₂, heart rate, perfusion index (PI), and vasoactive inotropic score were recorded. SpHb measurements were recorded during the blood draw and compared with the Hb measurement. Thirteen patients (low PI in 9 patients and no available Hb in 4 patients) were excluded and 332 children were eligible for final analysis. The mean Hb was 8.71 ± 1.49 g/dL (range, 5.9 to 12 g/dL) and the mean SpHb level was 9.55 ± 1.53 g/dL (range, 6 to 14.2 g/dL). The SpHb bias was 0.84 ± 0.86 , with the limits of agreement ranging from -2.5 to 0.9 g/dL. The difference between Hb and SpHb was >1.5 g/dL for only 47 patients. Of these, 24 patients had laboratory Hb levels <7 g/dL. There was a weak positive correlation between differences and PI ($r=0.349$; $P=0.032$). The pulse CO-oximeter is a promising tool for measuring SpHb and monitoring critically ill children. However, PI may affect these results. Additional studies investigating the reliability of the trend of continuous SpHb values compared with simultaneously measured laboratory Hb values in the same patient are warranted.