

A noninvasive hemoglobin monitor in the pediatric intensive care unit.

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BACKGROUND: Critically ill pediatric patients frequently require hemoglobin monitoring. Accurate noninvasive Hb (SpHb) would allow practitioners to decrease anemia from repeated blood draws, traumatic blood draws, and a decreased number of laboratory Hb (LabHb) medical tests. The Food and Drug Administration has approved the Masimo Pronto SpHb and associated Rainbow probes; however, its use in the pediatric intensive care unit (PICU) is controversial. In this study, we define the degree of agreement between LabHb and SpHb using the Masimo Pronto SpHb Monitor and identify clinical and demographic conditions associated with decreased accuracy.

MATERIALS AND METHODS: We performed a prospective, observational study in a large PICU at an academic medical center. Fifty-three pediatric patients (30-d and 18-y-old), weighing >3 kg, admitted to the PICU from January-April 2013 were examined. SpHb levels measured at the time of LabHb blood draw were compared and analyzed.

RESULTS: Only 83 SpHb readings were obtained in 118 attempts (70.3%) and 35 readings provided a result of "unable to obtain." The mean LabHb and SpHb were 11.1 g/dL and 11.2 g/dL, respectively. Bland-Altman analysis showed a mean difference of 0.07 g/dL with a standard deviation of ± 2.59 g/dL. Pearson correlation is 0.55, with a 95% confidence interval between 0.38 and 0.68. Logistic regression showed that extreme LabHb values, increasing skin pigmentation, and increasing body mass index were predictors of poor agreement between SpHb and LabHb ($P < 0.05$). Separately, increasing body mass index, hypoxia, and hypothermia were predictors for undetectable readings ($P < 0.05$).

CONCLUSIONS: The Masimo Pronto SpHb Monitor provides adequate agreement for the trending of hemoglobin levels in critically ill pediatric patients. However, the degree of agreement is insufficient to be used as the sole indicator for transfusion decisions and should be used in context of other clinical parameters to determine the need for LabHb in critically ill pediatric patients.