

Noninvasive Measurement of Hemoglobin Concentration in Children with Chronic Anemia.

Muntz D., Brady K., Strouse J. *Proceeding of the American Society of Pediatric Hematology Oncology Annual Meeting*. 2011.

Background

The measurement of hemoglobin concentration is one of the most frequent indications for blood sampling in children and causes pain and distress. Pulse CO-Oximetry is approved for the noninvasive measurement of total hemoglobin (SpHb) but has not been evaluated in children with chronic anemia. Objectives: To evaluate the accuracy of the SpHb measurement in children with chronic anemia.

Design

We performed a prospective study of children with chronic anemia (Hb <10 g/dL) and no blood transfusions within two weeks. A ReSposable SpHb sensor (R2 20a or R2 25a based on weight, rev E) was placed on the index or ring finger and connected to the Rainbow Pulse CO-Oximeter (Masimo Corporation, Irvine, CA). Hemoglobin was measured by spectrophotometry (Sysmex XE2100, Mundelein, IL) on venous blood collected within two hours of the noninvasive measurements.

Results

We collected 10 paired samples from nine children (three with β -thalassemia major, two with iron deficiency, two with chemotherapy-associated anemia, one with autoimmune hemolytic anemia, and one with Fanconi anemia). There were 4 females and 5 males with a median age of 9 years. Hemoglobin values measured with the central laboratory analyzer were between 6.1 and 14.2 g/dL. The mean difference between noninvasive and laboratory measurements was 0.1 g/dL with a standard deviation of 1.5 g/dL.

Conclusion

These limited data demonstrate the feasibility and potential of noninvasive measurement of Hb with Pulse CO-Oximetry in children with chronic anemia. Further study is necessary to define the accuracy in this and other special populations.

Table: Descriptive Statistics

Mean Bias	0.1 g/dL
Std Dev	1.5g/dL
Limits of Agreement	-2.8 to 3.1 g/dl
N	10
Median Age (IQR)	9 years (4.4,13.5)