Noninvasive hemoglobin monitoring in critically ill pediatric patients at risk of bleeding.

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OBJECTIVE: To determine the accuracy and usefulness of noninvasive continuous hemoglobin (Hb) monitoring in critically ill patients at risk of bleeding.
DESIGN: An observational prospective study was made, comparing core laboratory Hb measurement (LabHb) as the gold standard versus transcutaneous hemoglobin monitoring (SpHb).

SETTING: Pediatric Intensive Care Unit of a tertiary University Hospital.

PATIENTS: Patients weighing >3kg at risk of bleeding.

INTERVENTIONS: SpHb was measured using the Radical7 pulse co-oximeter (Masimo Corp., Irvine, CA, USA) each time a blood sample was drawn for core laboratory analysis (Siemens ADVIA 2120i).

VARIABLES: Sociodemographic characteristics, perfusion index (PI), pleth variability index, heart rate, SaO2, rectal temperature, low signal quality and other events that can interfere with measurement.

RESULTS: A total of 284 measurements were made (80 patients). Mean LabHb was 11.7±2.05g/dl. Mean SpHb was 12.32±2g/dl (Pearson 0.72, R(2) 0.52). The intra-class correlation coefficient was 0.69 (95%CI 0.55-0.78)($p<0.001$). Bland-Altman analysis showed a mean difference of 0.07 ±1.46g/dl. A lower PI and higher temperature independently increased the risk of low signal quality (OR 0.531 [95%CI 0.32-0.88] and 0.529 [95%CI 0.33-0.85], respectively).

CONCLUSIONS: SpHb shows a good overall correlation to LabHb, though with wide limits of agreement. Its main advantage is continuous monitoring of patients at risk of bleeding. The reliability of the method is limited in cases with poor peripheral perfusion.