Noninvasive Monitoring of Hemoglobin Concentration in Pediatric Critical Patients

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Background and Aims

One of the major concerns in patients at high risk of bleeding is to detect it and optimize hemoglobin (Hb), leading to repeated blood tests. Our objective is to describe our experience with a new method of a noninvasive continuous measurement of Hb concentration in these patients.

Methods

Prospective observational study in children at risk of bleeding in a PICU, from January to December 2012. SpHb monitoring was performed continuously (Pulse Co-Oximeter Radical/7.8.0.1, Masimo Corp., Irvine, CA). When each blood sample was taken, we collected the data from Radical-7, using the automated Hb measurement in the laboratory as a reference method (SiemensADVIA2120i). The agreement between two methods was evaluated by Pearson correlation and Bland-Altman analysis. Data are reported as mean values and SD (normally distributed) and median values and interquartile range(distribution non-normal).

Results

284 samples were drawn from 80 sedated patients, with a median age of 14,5 months(3-60), and a median weigh of 8,5 kg(4,4-18,5). SpO2 was 98% (96-100%), heart rate 123,5±24,2 bpm, rectal temperature 36,2±2°C and perfusion index median of 1,5(0,93-3,32). Mean Hb on the laboratory analyzer was 11,7±2,05 g/dl and mean Hb on the pulse oximeter (SpHb) was 12,32±2 g/dl, with a correlation coefficient 0,72 ($p< 0,05$). The median of differences between both methods was 0,66±1,4 g/dl. Limits of agreement of Bland-Altman plot were -3,7 and 2,4.

Conclusions

SpHb offers moderately acceptable accuracy although the limits of agreement are wide. The primary benefit is the continuous monitoring of the trend in patients at risk of bleeding.