

Use of a Noninvasive Hemoglobin Monitor for Volume Kinetic Analysis in an Emergency Room Setting. Svensen C.H., Rodhe P., Lundström N., Berglund E., Sjöstrand F. *Eur J Anaesthesiol.*, May 2011. Abs 665.

Background

The present study examines whether continuous measurement of noninvasive Hb (SpHb) provides data similar to that generated by serial, invasive sampling of venous blood in patients admitted to the emergency room in a tertiary setting.

Methods

Thirty patients in two age groups (≤ 40 yrs with a mean age of 30 yrs and ≥ 75 yrs with a mean age of 84 yrs) admitted for various reasons to the emergency room were included. A crystalloid glucose solution of 7 ml/kg was given intravenously for 15 minutes to induce plasma volume expansion. At the same time from another venous cannula, blood samples were taken at 0, 5, 10, 15, 30, 45, 60, 75 and 90 minutes and measured for total haemoglobin (tHb) with the Sysmex XE-5000 automated hematology analyzer. Subjects were also continuously monitored with a Radical-7 Pulse CO-Oximeter, software version 7.6.0.1 (Masimo, Irvine, CA) and adult resposable sensors (rev E,) for SpHb, which rendered nine pairs of samples per subject. Any data pair with low signal quality was eliminated from the analysis. Bland Altman plots were used to assess the agreement between the two methods. A volume kinetic calculation (ref) according to a one volume model was performed using both tHb and SpHb values.

Results

tHb values ranged from 9.4 to 16.5 g/dL. SpHb values showed a bias and standard deviation of -0.2 ± 1 g/dL, respectively, when compared to the Sysmex XE-5000. Bland Altman plots showed fairly good agreement between tHb and SpHb values across the entire measurement range with limits of agreement of -2.2 to 1.8 g/dL (Figure 1). Volume kinetic analysis showed no statistical difference between the target volumes (V) but showed a consistent difference for the elimination constant (kr), which was higher when analyzed with SpHb values ($p < 0.05$). The latter showed difference for both controls and geriatric patients.

Conclusions

SpHb monitoring provides hemoglobin values with good agreement to laboratory analysis of blood. In our volume kinetic model, SpHb monitoring detected the initial distribution of fluid (V) but SpHb values from the elimination phase after the end of infusion (kr) were consistently higher than those obtained from invasive sampling.