

USE OF A NON INVASIVE DEVICE FOR HEMOGLOBIN MEASUREMENTS – USEFUL FOR KINETIC CALCULATIONS OF?

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Background: Sequential measurements of hemoglobin values can be used for kinetic calculations of fluid distribution. Conventionally, this has been done by analysis of invasive samples (Hb). It would be beneficial to use non-invasive measurements to simplify clinical use. To measure Hb by illumination of capillaries (SpHb) is a new technique. This study was a pilot to determine if SpHb and Hb correlate well enough to justify SpHb for kinetic analysis.

Methods: Thirty patients in two groups, 20-40 years and > 75 years admitted to the ER were included. Patients were monitored by noninvasive Hb (Radical 7, Masimo Inc, Irvine, CA) while getting 7 ml/kg of a glucose solution 25 mg/ml during 15 min. Venous hemoglobins were taken simultaneously. Study time was 90 min. Bland Altman plots were used to compare the two different methods. Three plots were designed: one for all patients, one where five patients with poor perfusion signals were excluded and one where $Hb \leq 117$ g/l. Pearson correlation coefficients were also studied.

Results: Mean difference (SpHb-venousHb) $\pm 1,96$ SD for all patients were $-4,6\text{g/L} \pm 21,3\text{g/L}$ ($-6,0 - -3,2$ g/L $\pm 18,9 - 23,6$ g/L, $p \leq 0,05$). In the group with good perfusion $-2,0\text{g/L} \pm 16,3\text{g/L}$ ($-3,9 - 0,0$ g/L $\pm 14,3-18,2$ g/L, $p \leq 0,05$) and anemia group $1,2\text{g/L} \pm 14,3$ g/L ($-0,4 - 2,8$ g/L $\pm 11,5-17,1$ g/L, $p \leq 0,05$). Pearson correlation gave $r=0,76$ for all patients, $r=0,85$ for group with good perfusion and $r=0,55$ for the anemia group.

Conclusion: Measurements were best for patients with adequate perfusion and for patients with lower hemoglobins. Non invasive measurements are probably good enough for trends but may not be accurate enough for precise kinetic calculations.

Mean difference : $-4,6\text{g/L}$ ($-3,2 - -6,0$, 95% CI)

Mean $+1,96\text{SD}$: $16,7\text{g/L}$ ($14,3 - 19,0$, 95% CI)

Mean $-1,96\text{SD}$: $-25,9\text{g/L}$ ($-23,5 - -28,2$, 95% CI)

= patients >75 yo = patients 20-40 yo

The figure shows the mean Hb analyzed both by invasive samples and the SpHb samples in a Bland Altman plot. There is larger variation for the older patients.

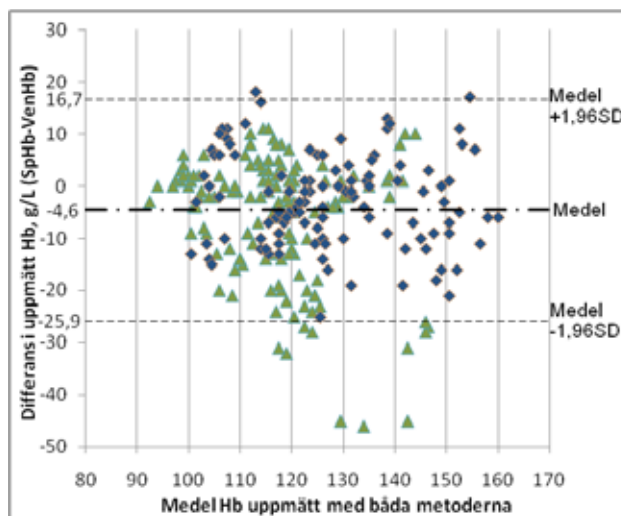


Figure : All patients and values. 30 patients, 250 values.