

Transforming Hemoglobin Measurement in Trauma Patients: Non-Invasive Spot Check Hemoglobin

Joseph B., Aziz H., Pandit V., Kulvatunyou N., Tang A.L., Wynne J.L., O'Keeffe T., Vercruyse G.A., Friese R.S., Rhee P. *27th Eastern Association for the Surgery of Trauma (EAST) Annual Scientific Assembly, January 14-18, 2014, Naples, Florida. Abs.20*

Objectives

Studies have reported poor correlation between continuous non-invasive hemoglobin (Hgb) devices with invasive Hgb in trauma patients. Advancements in technology have allowed for a Spot check non-invasive Hgb measurement. The aim of our study was to assess non-invasive Spot-check Hgb measurement using the Pronto-7® Pulse Co-Oximeter in trauma patients.

Methods

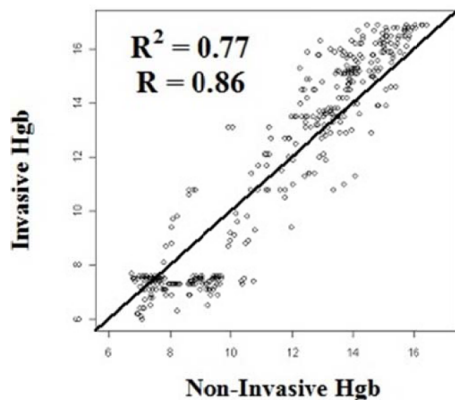
We performed a prospective cohort analysis of all trauma patients presenting to our level 1 trauma center. Invasive (IHgb) and Spot-check hemoglobin measurements were obtained simultaneously upon presentation of the patient. Spot-check was measured three times for each invasive Hgb value. We defined normal Hgb as $>8\text{mg/dL}$. Spearman and Bland-Altman correlation plot analysis was performed.

Results

A total of 525 patients had attempted Spot-check Hgb and success rate was 86%(n=450). We recorded 1,350 Spot check Hgb and 450 IHgb. The mean age was 41 ± 21 years, 74% male, and mean ISS 20 ± 13 . 38% (n=173) patients had $\text{Hgb}\leq 8$. The mean IHgb was $11.5\pm 4.36\text{g/dL}$, mean Spot-check Hgb $11.4\pm 2.5\text{g/dL}$, and the mean difference mean was $0.1\pm 1.9\text{g/dL}$ (p=0.2). Sensitivity was 96%, accuracy was 77%, positive predictive value was 73%, negative predictive value was 88%, and specificity was 44%. Spearman Correlation plot coefficient revealed a correlation of $R^2=0.77$ and $R=0.86$. Spot-check Hgb values had strong correlation with invasive Hgb measurements (ICC=0.73; CI: 0.7-0.8) and also within the repetitive Spot-check Hgb values (ICC=0.92; CI: 0.8-0.9). Bland-Altman plot revealed that 98.7% of the measurements within 2 standard deviations of mean difference.

Conclusions

Contrary to continuous non-invasive Hgb monitoring, the Spot-check Hgb monitor allows for immediate and accurate Hgb measurements in critically ill trauma patients. Spot-check Hgb monitoring has excellent correlation with invasive Hgb measurements. This new technology has the potential to transform the practice of trauma care.



Spearman Correlation Plot: Invasive and spot check Hgb