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

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INTRODUCTION: Technological advances now allow for non-invasive hemoglobin measurements. Previous studies have reported the efficacy of continuous non-invasive hemoglobin devices. Recently, a new device, Spot check Pronto-7® Pulse CO-oximeter has become available. The aim of our study was to assess non-invasive hemoglobin measurement 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. Spot check was measured three times with each invasive Hgb value. Normal Hgb was defined as > 8mg/dL. Spearman correlation and Bland-Altman analysis was performed.

RESULTS: A total of 525 patients had attempted Spot check Hgb measurements with a success rate of 86% (n = 450). A total of 450 invasive and 1,350 Spot check Hgb measurements were obtained. The mean age was 41 ± 21 years, 74% were male, and mean Injury Severity Score was 21 ± 13. 38% (n = 173) patients had Hgb ≤ 8 on presentation. The mean IHgb was 11.5 ± 4.36 g/dL, mean Spot check Hgb 11.1 ± 3.60 g/dL, and mean difference was 0.3 ± 1.3 g/dL. Spotcheck Hgb values had strong correlation with invasive Hgb measurements ($R^2 = 0.77$, $R = 0.86$, $p = 0.04$) with 76% accuracy and 95.4% sensitivity.

CONCLUSIONS: Spot check Hgb monitoring had excellent correlation with IHgb measurements. Application of Spot check has more clinical utility as compared to previous continuous Hgb monitoring. This novel technology allows immediate and accurate Hgb measurements in trauma patients.