Noninvasive Hemoglobin Monitoring in Trauma Patients.

Engels P.T., Romanovsky A., Bagshaw S.M. *Am J Respir Crit Care Med* 2011:183: A5851.

Background

Detection of occult bleeding is critical in management of severe trauma patients. Invasive sampling and clinical observations are key indicators, but may not be obvious or timely. Use of a noninvasive hemoglobin monitor may detect drops in patient hemoglobin and alert clinicians of immediate risk. In this observational study, we evaluated the accuracy of noninvasive hemoglobin monitoring in resuscitation of critically ill major trauma patients.

Methods

We performed a prospective, observational, pilot study of 10 critically ill trauma patients admitted to the General Systems Intensive Care Unit (ICU) at the University of Alberta Hospital from May 1 to June 30, 2010. All patients were continuously monitored with the Masimo Rainbow Pulse CO-Oximetry device for hemoglobin (SpHb) when admitted. Blood samples were taken as clinically indicated as part of standard care and measured in the central laboratory by CO-Oximetry (Beckman Coulter, LH750). SpHb measurements were recorded at the time of the blood draw and compared to CO-Oximeter values. Data were also captured on demographics, mechanisms of injury, acute physiology and laboratory variables.

Results

The mean (SD) age was 32 (10.1) and 70% were male. Blunt injury was the mechanism in 90% (78% due to motor vehicle collision). The mean (SD) injury severity score was 38 (17.7). All patients were mechanically ventilated and 50% required emergency operative interventions. Patients were monitored with the Masimo resposable sensors (rev E) for an average of 43.9 hr (+/- 23.5 hr.). Thirty one paired measurements showed a mean bias, precision and A_{RMS} of -0.2, 1.2 and 1.2 g/dl. Figure 1 shows the Bland Altman of the SpHb vs. laboratory CO-Oximeter. Figure 2 shows the SpHb trending versus the laboratory values over 48 hrs time on one representative patient.

Conclusions

The measurement of SpHb in major trauma shows reasonable accuracy across several days of care in trauma patients. A larger prospective investigation of this novel bedside tool is warranted. Figure 1: Bland Altman of Noninvasive Masimo Rainbow® SpHb values compared with invasive central laboratory values.

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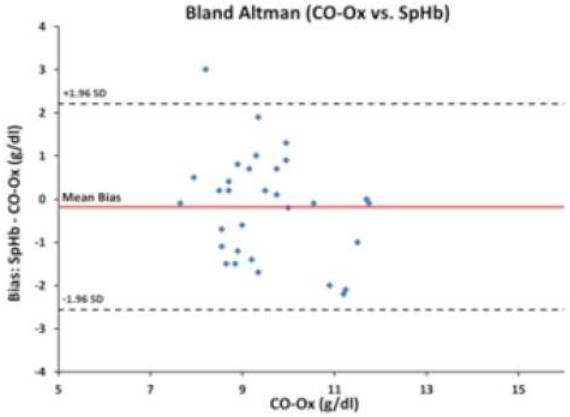

Figure 2: A representative case plot of SpHb values compared with invasive central laboratory values over time.