

Do Pulse CO-Oximeter Measures of SpMet and SpO2 Correlate with Blood Gas CO-Oximetry in Neonates?

Goldstein M. R., Saesim D., Macknet M., Allard M., Peverini R. *Anesthesiology* 2008; 109 A1218.

Introduction

The noninvasive measurement of pulse oximetry (SpO₂) is a standard of care in the neonatal intensive care unit (NICU). Until recently, more frequent CO-Oximeter blood gas analysis to measure methemoglobin toxicity has been the only option for tracking elevation in methemoglobin (MetHb). This information is discontinuous, often hard to obtain, and leads to increased resource utilization. The measurement of continuous non-invasive CO-Oximetry data could significantly impact care. *Objective:* We asked if use of a continuous noninvasive multi-wavelength Pulse CO-Oximeter could be successfully used to measure methemoglobin saturation (SpMet) without loss of accuracy of oxygen saturation measurement (SpO₂).

Methods

Neonates were consented for participation based on continued need for oximetry and the presence of an arterial line for blood gas determination. A Rainbow R25 L disposable sensor capable of continuous SpMet and SpO₂ read-out was placed on a post ductal extremity and connected in line to a Radical-7 Pulse CO-Oximeter (Masimo, Irvine, CA). Blood gas determinations were drawn based on clinical acuity. Blood gas CO-Oximetric data (Radiometer America Inc., Westlake, OH) was compared to SpO₂ and SpMet measured non-invasively. 3.0% ARMS SpO₂ and 1.0% ARMS SpMet were required for significance.

Results

As noted in the figure, blood gas SaO₂ and MetHb were correlated with SpO₂ and SpMet saturations. SpMet values demonstrated a bias 0.17, standard deviation 0.92, and average root mean square 0.93. SpO₂ values showed a bias 1.4, standard deviation: 2.46, and average root mean square 2.86.

Conclusions

Elevation in MetHb levels can be induced with Nitric Oxide use in the treatment of pulmonary hypertension. There are other exogenous sources of MetHb production including nitrates, nitrites, prilocaine and lidocaine, and aniline dyes. Methemoglobinemia can present with blue/cyanotic undertones. For this reason, monitoring of SpO₂ alone can give misleading information in an "at risk" situation. Continuous monitoring of MetHb allows better assessment of toxicity and helps identify need for ongoing treatment. As noted in the figures, the accuracy of SpO₂ and SpMet measurement is maintained. A multi-wavelength Pulse CO-Oximeter can simultaneously measure SpMet and SpO₂ in neonates.

Figure 1
Test SpO₂

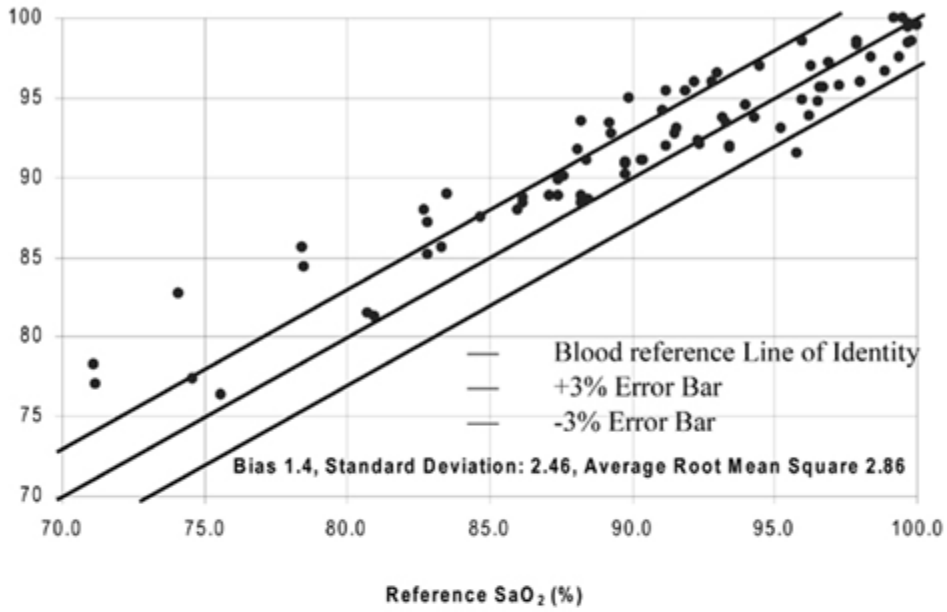


Figure 2

