Comparison of Pulse Oximetry Sensors in Children with Congenital Heart Disease with Cyanotic Lesions
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Introduction
Children and adults with cyanotic heart disease frequently must undergo sedation or general anesthesia for procedures. While standard pulse oximeters focus on detecting saturations of 80% or greater, this unique population requires accurate pulse oximeter monitoring at lower saturation levels. Thus, the Masimo Blue sensor was developed with technology that claims to detect lower saturations. Although smaller preliminary trial studies have shown this sensor to be accurate, a more thorough comparison study is needed to validate the Masimo Blue Sensor. The purpose of this study is to determine the accuracy of the Blue Sensor with standard sensors (the Masimo LNCS sensor and the standard Nellcor Sensor) compared with co-oximetry, the gold standard for detecting arterial oxygen saturation.

Methods
Patients with oxygen saturations <85% undergoing procedures requiring an arterial line and an expectation of obtaining at least two arterial blood gases were selected for the study. After obtaining IRB approval and the patients’ parental consent, 49 subjects were enrolled. Data was collected from the Masimo Blue Sensor, the Masimo LNCS sensor, and the Nellcor Sensor while the patient underwent general anesthesia in addition to arterial saturations using co-oximeter.

Results:
44 subjects completed the study. Bias (with 95% CI) and the standard deviation of each sensor were determined in comparison to the co-oximetry values (Table 1) and also after categorization of data in different oxygen saturation ranges (<70%, 70-80%, 80-90%, 90-100%) (Table 2). Bland-Altman plots were also calculated (Fig 1).

Discussion:
Compared to oxygen saturation measurements using standard Nellcor and Masimo LNCS, the Masimo Blue sensor does seem to have lower bias. The Masimo Blue sensor seems to have improved accuracy at low oxygen saturations.

References: