**Discrepancies between Arterial Oxygen Saturation and Functional Oxygen Saturation Measured with Pulse Oximetry in Very Preterm Infants.**

Rosychuk R.J., Hudson-Mason A., Eklund D., Lacaze-Masmonteil T. *Neonatology.* 2011 Jul 26;101(1):14-19.

## Background

Discrepancies between pulse oximetry saturation ($SpO_2$) and arterial saturation ($SaO_2$) at low blood oxygenation values have been previously reported with significant variations among instruments and studies. Whether pulse oximeters that attenuate motion artifact are less prone to such discrepancies is not well known. *Objective:* To prospectively assess the agreement of the Masimo V4 pulse oximeter within the critical 85-95% $SpO_2$ target range.

## Methods

For all consecutive babies with gestational age <33 weeks, postnatal age <7 days, and an umbilical arterial line, $SpO_2$ was measured continuously and $SaO_2$ analyzed on an as-needed basis. Bland-Altman techniques provided estimates of the difference ($D = SaO_2 - SpO_2$), standard deviation (SD), and 95% limits of agreement ($D \pm 2*SD$).

## Results

There were 1,032 measurements (114 babies) with $SpO_2$ between 85 and 95%. The 95% limits of agreement were $-2.0 \pm 5.8$, $-2.4 \pm 9.2$, and $-1.9 \pm 5.3$ in the $SpO_2$ categories 85-95, 85-89, and 91-95%, respectively. For the $SpO_2$ categories 85-89% and 91-95%, only 52% (53/101) and 59% (523/886) of $SpO_2$ values, respectively, corresponded to the analogous $SaO_2$ categories. In the 85-89% $SpO_2$ category, $SaO_2$ was lower than 85% in 39 of the 101 (39%) measurements.

## Conclusion

$SaO_2$ was lower on average than $SpO_2$ with an increased bias at lower saturation. The $-2.4 \pm 9.2$ 95% limits of agreement for $SaO_2 - SpO_2$ in the 85-89% $SpO_2$ category suggest that $SpO_2$ and $SaO_2$ are not interchangeable and intermittent $SaO_2$ assessments are warranted when the targeted $SpO_2$ is within this range.