Accuracy of Pulse Oximeter Readings from Probe Placement on Newborn Wrist and Ankle.

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Objective

To compare the accuracy of pulse oximetry oxygen saturation (SpO(2)) measured on the wrist compared with the ipsilateral palm, and SpO(2) measured on the ankle compared with the ipsilateral sole.

Study Design

In this prospective observational study, neonates admitted to the neonatal intensive care unit were enrolled. We recorded SpO2 (Masimo Radical-7 pulse oximeter) detected at the palm and ipsilateral wrist initially, then at 30 s, and at 1 min, and we repeated the same procedure over the sole and ipsilateral ankle. We recorded the time to obtain the SpO2 readings from all these sites. Regression analysis was performed to determine the relationship between paired SpO2 measurements. The mean difference (bias) and standard deviation of the paired SpO(2) differences (precision) were calculated (Bland-Altman plots).

Results

A total of 150 patients (birth weight 2381±1020 g, gestational age 34.3±4.3 weeks, median postnatal age 3.5 days (25th-75th percentile 1-16 days)) were enrolled. There was a good correlation between SpO2 measured at the palm versus the wrist ($r=0.95$, $P<0.001$ (right); $r=0.97$, $P< 0.001$ (left)) and between SpO2 measured at the sole versus the ankle ($r=0.92$, $P<0.001$ (right); $r=0.91$, $P<0.001$ (left)). There was also a good agreement between paired SpO2 measurements from these sites. The bias and precision for SpO2 at the right palm and right wrist was 0.08±0.94% and for the left palm and left wrist 0.22±0.87%. Similarly, the bias and precision for SpO2 at the right sole and right ankle was -0.03±0.93% and for the left sole and left ankle was -0.01±0.93%.

Conclusion

Our results show that the wrist and ankle can be used as alternative sites to measure SpO2 in newborn infants in place of the routinely used palm or sole.