

Motion-Resistant Pulse Oximetry during Circumcision in Neonates.

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Objective

The objective of this study was to compare the effects of motion on measurements of oxygen saturation (SpO₂) and pulse rate (PR) made with a new pulse oximetry technology, Masimo SET (MAS), with the same measurements made with Nellcor N-200 (NEL). *Background:* Pulse oximetry is widely used in neonates. However, its use is greatly affected by motion artifact. Clinicians, confronted with numerous false alarms often verify the SpO₂ value by correlating the pulse oximeter's PR to the ECG heart rate (HR).

Methods

Continuous pulse oximetry, and HR monitoring were performed in seven term infants (birth weight=3408±458g) undergoing circumcision (CIRC), using MAS and NEL pulse oximeters and HP cardiac monitor. Simultaneous minute-by-minute behavioral sleep and activity codes were also assigned. In each infant, base line data was collected for 10 minutes during quiet sleep and continued during and after CIRC for a total duration of one hour. Average values for SpO₂, PR, and HR were computed and behavioral state was coded each minute. SpO₂ and PR data from MAS and NEL were then compared during the three periods. The oximeter pulse rates were related to the reference HR. The effect of behavioral activity on SpO₂ during CIRC was also evaluated.

Results

As shown in the table below, when compared to NEL, SpO₂ and PR signals from MAS were less variable during all three periods. Also, the MAS-PR signal more accurately predicted the HP-HR, with lower residual error, during all periods. During CIRC, the SpO₂ remained stable for MAS but decreased for NEL (95.6±1.9 vs. 80.0±12.0, p<0.01). This decrease in SpO₂ correlated with degree of behavioral activity (r²=0.42).

Conclusions

Our data suggest that Masimo SET may offer significant improvement in pulse oximetry performance, specifically in clinical situations such as circumcision in neonates, when extreme motion artifact is likely.