



CO-Oximetry Validation of a New Pulse Oximeter in Sick Newborns

Holmes M, Thomas A, Vogt J, Gangitano E, Stephenson C, Liberman R. *Respiratory Care* 1998;43(10):860

Introduction

The authors had been evaluating Masimo Signal Extraction Technology in their NICU in engineering models and various prototypes. Experience had shown that the Masimo SET SpO₂ often correlated much closer to the actual SaO₂ than conventional pulse oximeters. The authors carried out a formal study to assess the accuracy of this new technology compared to actual SaO₂.

Methods

“A prototype Masimo SET pulse oximeter and a Nellcor N-200 oximeter (Nellcor Puritan Bennett, Pleasanton, CA) were attached to opposing feet and covered to prevent LED cross-talk. Data (ECG heart rate, SpO₂ and pulse rate) were collected every second (1 Hz) by a system composed of a laptop computer, 8-channel multiplexer, and data acquisition software. Sixty-eight samples of arterial blood were analyzed from 18 sick newborns. Demographics were: gestational ages of 26 to 41 weeks and weights of 825 to 4055 gms. All infants were intubated and on various forms of continuous mechanical ventilation: 8 IMV, 6 SIMV, and 4 HFOV. An AVL OMNI blood analyzer (AVL List GmbH Medizintechnik, Graz, Austria) was used for analysis of pH, PCO₂, PO₂, %COHb, %MetHb, total Hb, and functional %SaO₂. The AVL OMNI uses an array of 66 wavelengths to determine its oximetry calculations.”

Results

	Masimo SET	Nellcor N-200
Bias	0.9%	1.0%
Precision	2.4%	5.1%
Zero Outs	0%	4.4%

Bias and Precision for both manufacturers versus measured arterial functional oxygen saturation.

“The Nellcor findings included a spurious point of 63% (97% SaO₂ and 99% SpO₂ Masimo) even though the Nellcor pulse rate matched the ECG. Three N-200 zero-outs were ignored in the calculations where low perfusion adversely affected the Nellcor even though Masimo read through these events without any problem (97/97/97% SaO₂ and 99/100/99% SpO₂ Masimo). All Masimo data points were included.”

Authors' Discussion and Conclusion

“We have used Masimo SET for 16 months and have published on the dramatic improvement in continuous measurement and reduced false alarms compared to conventional pulse oximeters ... **Masimo SET accurately reflects SaO₂ in sick infants. Our prior findings of reduced false alarms and continuous operation during motion and low perfusion compared to a conventional pulse oximeter occurs without a loss in accuracy of the SpO₂ displayed.**”