

Evaluation of a New Reflectance Forehead Sensor in Detecting Oxygen Desaturation in Patients Undergoing Polysomnography

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Introduction

Pulse oximetry provides a critical parameter in the diagnosis and treatment of sleep apnea. This group of researchers has studied Masimo SET pulse oximetry in the past and found it to have better fidelity for Sleep-Disordered Breathing testing as compared to Nellcor pulse oximetry.^{1,2} In this study, these researchers wanted to test whether the Nellcor MaxFast forehead sensor, used with the Nellcor OxiMax system improved the performance of the Nellcor system in this clinical environment as compared to the Masimo SET technology.

Methods

Twenty (20) patients undergoing polysomnography were monitored with both MaxFast forehead and Masimo LNOP-Adult digit sensors which were applied according to manufacturer's instructions and connected to the Nellcor N-595 and Masimo Radical pulse oximeters, respectively. The pulse oximeters were turned on simultaneously at the start of the study and turned off simultaneously at the end of the study, and data from the pulse oximeters were downloaded into PROFOX oximetry analysis software. The mean SpO₂, lowest SpO₂, and time with SpO₂ less than 90% were extracted.

Results

In eight (8) of the twenty (20) studies (40%) using the MAXFAST sensor, artifact was clearly identifiable in the graphic output of the saturation profile. This artifact caused erroneous data which was characterized by a sudden shift in saturation that was maintained for a substantial time period not characteristic of desaturation profiles associated with sleep-disordered breathing. No artifact was observed with the Masimo digit sensor. The data pairs were divided into two groups, one comparing the data from the two pulse oximeters for the 8 studies with the MaxFast sensor and having artifact, and the second group with the remaining 12 studies without artifact. (See tables)

Sensor	Mean SpO ₂	Lowest SpO ₂	Time < 90%
 LNOP-Adt	96.2 ± 2.0 %	83 ± 8%	0.5 ± 1.3%
Nellcor MAX-FAST	94.0 ± 2.6%	73 ± 11%	14.9 ± 17.4%

Group 1. Data from 8 patients with artifact displayed by MaxFast sensor

Sensor	Mean SpO ₂	Lowest SpO ₂	Time < 90%
 LNOP-Adt	94.6 ± 2.3 %	78± 14%	5.5 ± 12.3%
Nellcor MAX-FAST	94.2 ± 2.7%	82 ± 11%	7.1 ± 15.5%

Group 2. Data from 12 patients with no artifact displayed

Authors' Conclusions

"The Nellcor MAX-FAST reflectance forehead sensor failed to provide accurate SpO₂ data in 40% of the patients undergoing polysomnography. In these cases, the forehead sensor registered a significantly greater percent of time with saturation less than 90%. The use of this sensor during anesthesia could negatively impact the therapeutic approach in patients with sleep apnea during pre-anesthesia and during post-anesthesia recovery."

1. Whitman RA. Comparison of the new Masimo SET V3 technology with a conventional pulse oximeter during polysomnography. *Sleep* 2001;24:A412.
2. Whitman RA, Garrison ME, Oestrich PJ. Influence of pulse oximeter technology on hypopnea diagnosis using the newly proposed definition of a respiratory hypopnea. *Sleep* 2002; 25: A509(727.R).