Reliability of Conventional and New Pulse Oximetry in Neonatal Patients

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Introduction

Pulse oximetry is widely used in the Neonatal Intensive Care Unit (NICU), however, clinicians often distrust the displayed SpO_2 and pulse rate (PR) values (particularly during patient motion) and are frustrated by the associated incidence of false alarms and inability to detect hypoxemia and bradycardia events.

Methods

The authors compared a Masimo SET pulse oximeter to one conventional (Nellcor N-200) and three claimed new generation pulse oximeters (Nellcor N-395, Novametrix MARS and Philips Viridia 24C Rev B.0). They studied a total of 33 non-sedated NICU infants (26 for Masimo vs. N-200 and 7 for Masimo vs. new generation) who were on supplemental oxygen and/or mechanical ventilation. ECG heart rate, SpO_2 and PR were captured by a computer PC for a total of 184 hours.

Results

Compared with the new generation pulse oximeters, false desaturations, data dropouts, and false bradycardias were lowest for Masimo SET, while the capture of true desaturations and bradycardias was highest for Masimo SET. Notably, the new generation devices differed greatly in their ability to detect changes in PR (i.e., an acute change in ECG HR > 25 bpm). See table below for these results. Compared with the Nellcor N-200, Masimo SET had 86% fewer false alarms, which also were shorter in duration, resulting in 92% less total alarm time. Masimo SET also identified 12 of 14 bradycardias (86%) vs. 2 of 14 (14%) for the N-200 (26 patients).

	Masimo SET®	Nellcor N-395	Novametrix MARS	Philips / HP Viridia Rev. B.0
"False" Hypoxemia	1	42	33	10
Missed Desaturations	1	4	12	6
"False" Bradycardia	1	1	61	2
Frozen Pulse Rate	0	6	46	11
Data Drop-out	1	10	93	21

Authors' Discussion and Conclusions

"Masimo SET pulse oximetry recorded markedly fewer false SpO_2 and PR alarms and identified more true hypoxic and bradycardic events than either a conventional or three other new generation pulse oximeters. Decreased false alarming should benefit the infant's behavioral state and improve the caregiver's response to monitoring a vital parameter. Improved confidence in SpO_2 and heart rate changes could reduce clinician stress. The missed detection of changes in heart rate by some new generation pulse oximeters is worrisome. **Routine use of Masimo SET should improve clinician confidence leading to more accurate administration of oxygen with possible reductions in hypoxic (e.g., pulmonary hypertension) and hyperoxic (e.g., retinopathy of prematurity) pathology."**