A Laboratory Comparison of the Newest "Motion-Resistant" Pulse Oximeters During Motion and Hypoxemia.

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Introduction

Resistance to patient motion and fast response to respiratory events are two of the defining characteristics of "Next Generation" pulse oximetry. These researchers tested the motion tolerance of five current generation oximeters during hypoxemia when set in their fastest SpO_2 response modes (averaging times).

Methods

Using standard protocol, ten volunteers were monitored with three shielded oximetry sensors on one hand and three shielded oximetry sensors on the other hand. One hand was placed on a motor-driven tabletop to induce clinical motion conditions. The other hand was left stationary as a control. The room temperature was deceased to 16-18°C to reduce peripheral perfusion. Values from the test hand were compared against simultaneous values from the control hand. Data was recorded during room-air breathing and during rapid desaturations to $SpO_2 \approx 75\%$. Pulse oximeters studied were Nellcor N-595, Datex-Ohmeda 3900 , Novametrix MARS, Philips Viridia, and Masimo Radical.

Results

The Masimo Radical displayed the fewest missed events, the fewest false alarms, and the highest sensitivity and specificity of all tested instruments. *Sensitivity is defined as the ability to detect true events; specificity is defined as the ability to reject false events.*

Pulse Oximeter	Missed Events	Sensitivity	Specificity	False Alarms	Averaging Time (sec)
Masimo Radical (V 4)	*1*	*99%*	*97%*	*4*	*2*
Nellcor N-595 (v 3000)	*15*	*63%*	*73%*	*16*	*2*
MARS (v2001)	*15*	*63%*	*50%*	*30*	*2*
Datex Ohmeda 3900 (v9/11)	*16*	*63%*	*88%*	*7*	*3*
Philips Viridia (C1)	*9*	*78%*	*82%*	*11*	*5*

Author's Conclusion

"Using our standardized motion/hypoxemia protocol, we found a wide range in sensitivity and specificity values. The Masimo Radical performed much better than all four of the other models tested."