A Comparison of the Nellcor N-395 and Masimo SET Pulse Oximeters during Hypoxemia and Motion in Human Volunteers.

Barker S.J., Morgan S.E. *Anesthesiology* 2000; 93 (3A):A-549 .

Introduction

We have previously compared the performances of various pulse oximeters in human volunteers during hypoxemia and controlled hand motions. (1,2) In the present study, we compare both SpO2 and pulse rate accuracy of two of the newest instruments (Nellcor N-395 and Masimo SET) and one older instrument (Nellcor N-200).

Methods

Ten volunteers were each instrumented with six pulse oximeter sensors: three on the moving "test" hand, and three on the stationary "control" hand. The Masimo SET, Nellcor N-395, and Nellcor N-200 oximeters were compared in each subject. A motor-driven motion table produced controlled, repeatable finger tapping and rubbing motions. Measurements of SpO2 and pulse rate were made while breathing room air and during rapid desaturations to SpO2 = 75%. The motion was started before beginning the desaturation. Values obtained during motion were compared with simultaneous values from the control hand. Test and control values were compared using sensitivity and specificity for detection of hypoxemia, and area under the ROC curve. The hypoxemia alarm threshold was SpO2 = 90%. The Saturation Performance Index PI(sat) is the percentage of time during which the device provided an SpO2 reading that was within 7% of the control value. PI(pulse) is a similar index for pulse rate, with a 10% error margin.

Results

The Table summarizes results for a total of 40 hypoxemic motion events and 60 normoxic (room air) motion events in the ten subjects.

Discussion

Both of the new oximeters show superior performance to the older generation N-200. The Masimo SET performed better than the Nellcor N-395, yielding higher sensitivity (true alarm rate), specificity (1 - false alarm rate), and performance indices for both saturation and pulse rate. These results imply that the Masimo SET pulse oximeter will have higher reliability and accuracy during patient motion than either N-200 or N-395.

References. (1) Anesth, 1997;86:101-108. (2) Anesth, 1999;91:3A,A581.

	Sensitivity	Specificity	ROC area	PI(sat)	PI(pulse)
N-200	50%	53%	0.52	51%	23%
N-395	63%	82%	0.81	69%	47%
Masimo	95%	97%	0.99	91%	83%