

A Comparison of Nellcor N-395, N-595 and Masimo Radical Pulse Oximeters during Motion and Hypoxemia.

Barker S.J., Morgan S. *Anesth Analg.* 2003;97(2S):A9.

Introduction

We compared performance of Nellcor N-395, N-595 and Masimo Radical pulse oximeters during combined motion and hypoxemia using our standardized laboratory protocol. The Masimo demonstrated superior performance in sensitivity, specificity and failure rate.

Pulse oximeters are subject to a number of errors caused by patient motion, including failure to display current SpO₂ values and displaying inaccurate values that are either high or low. We have developed a standardized volunteer protocol that has been successfully used to compare the performances of many instruments during motion and hypofusion.^{1,2} This protocol has yielded results that are consistent with published clinical studies.³ In the current experiments, we compared a new instrument from Nellcor, the N-595, with both the N-395 and the latest version of the Masimo Radical.

Methods

Six healthy volunteers were studied with IRB approval and informed consent. As per our standard protocol, each subject was instrumented with three oximeter sensors on the moving (test) hand and three on the stationary (control) hand. Standard, motor-driven, continuous motions were used as described in Ref 2. Values obtained during motion while breathing room air and during rapid arterial desaturation to SpO₂ of 75%. Tabulated results include sensitivity and specificity for detection of hypoxemia (threshold: SpO₂ < 90%), missed hypoxemic events, false alarms, failure to display a pulse rate value and %-time during which no pulse rate is displayed.

Results

Results are shown in Table 1. Masimo Radical has the highest sensitivity, followed by N-395 and then N-595. Radical also has the highest specificity (fewer false alarms) followed by N-595 and then N-395. The two Nellcor instruments exhibited failures to display a pulse rate for 6.2% (N-595) and 4.5% (N-395) of the time while the Masimo experienced no pulse rate failures.

Discussion

Nellcor has recently released the N-595 pulse oximeter as an improvement in performance over their N-395. In our standardized motion/hypoxemia protocol, we did not find N-595 performance to be significantly better than that of the N-395. The Masimo Radical performed better than either Nellcor model.

- 1) Barker S. *Anesthesiology* 1997;86:101-108; 2) Barker S. *Anesth Analg* 2002; 95:967-972; 3) Bohnhorst B. *Crit Care Med* 2000; 28(5):1565-1568.