



# Motion-Resistant Pulse Oximetry

Elfadel IM, Weber WM, Barker SJ. *Journal of Clinical Monitoring* 1995;11(4):262

## Introduction


“Motion artifacts constitute a major contributor to the high rate of false alarms in pulse oximetry. Reducing the number of false alarms and giving reliable oximetric reading to the practitioner, even in the presence of patient motion, are two major goals that must be attained by any pulse oximeter designed for use in ambulatory or critical care medicine. The main purpose of this paper is to show that these two goals are, indeed, attainable.” This study compared conventional pulse oximetry technology to a prototype pulse oximeter utilizing the new Masimo SET pulse oximetry technology.

## Methods

Eight healthy volunteers were studied to determine the effects of motion on the readings of 5 commercially available conventional pulse oximeters (Criticare 504-US, Nellcor N-200 and N-200 with C Lock, Novametrix Oxypleth, and Ohmeda 3740) and a Masimo SET pulse oximeter prototype. A mechanical device was used to systematically produce motion (4 Hz) at the sensor application site. SpO<sub>2</sub>% and pulse rates were recorded and compared with the readings of a reference sensor connected to a non-moving site.

## Results

SpO<sub>2</sub>% readings were evaluated in terms of error rate (average number of times the absolute value difference between the instrument saturation and the reference saturation was > 3%), failure rate (average number of times SpO<sub>2</sub>% display zeroed out) and total error (sum of error rate and failure rate).

	 Masimo SET	Nellcor N-200	Nellcor N-200 C-Lock	Novametrix Oxypleth	Ohmeda 3740	Criticare 504-US
<b>Error Rate</b>	00.00%	03.44%	03.55%	27.44%	27.00%	38.44%
<b>Failure Rate</b>	00.22%	00.00%	03.33%	00.00%	04.78%	03.89%
<b>Total Error</b>	<b>00.22%</b>	<b>03.44%</b>	<b>06.88%</b>	<b>27.44%</b>	<b>31.78%</b>	<b>42.33%</b>

## Authors' Discussion and Conclusions

“We report on a prototype pulse oximeter (Masimo SET pulse oximetry technology) designed to reject motion artifacts and compute the correct oxygen saturation of arterial hemoglobin even in the presence of patient motion ... We also show actual oxygen saturation results obtained under a variety of clinical situations in which other oximeters (conventional pulse oximetry technology) fail to give the correct values. By and large, the Masimo SET prototype device performed the best in this type of motion environment.”

 **Outstanding Abstract, Technology Innovation Award, Society for Technology in Anesthesia, 1995 Annual Meeting**