

More Reliable Oximetry Reduces the Frequency of Arterial Blood Gas Analyses and Hastens Oxygen Weaning After Cardiac Surgery: A Prospective, Randomized Trial of the Clinical Impact of a New Technology

Durbin CG, Rostow SK. *Critical Care Medicine* 2002;30(8):1735-1740

Introduction

While pulse oximetry is an accepted standard of care, too few studies have analyzed its direct bearing on patient outcomes and clinical satisfaction. Among the complaints against pulse oximetry, high failure rates in monitoring the seriously ill, and high frequency of false alarms predominate. These researchers tested Masimo SET, a new, "innovative" technology claiming to have remedied the problems long associated with pulse oximetry, against an Ohmeda 3740, an oximeter deemed "conventional." Their general hypothesis was that improved oximetry would make a marked difference in patient outcome, while their specific hypothesis was that ventilator weaning and time to extubation would be reduced if caregivers were aided by truly innovative pulse oximetry.


Methods

A total of 89 patients undergoing coronary bypass surgery were monitored by both the conventional and the Masimo SET pulse oximeters, with sensors shielded and placed on the same hand. Data was recorded by both pulse oximeters, but clinicians were blinded to one of the pulse oximeters' readings, and were told only that they were taking part in a study on pulse oximetry. Times of pulse oximetry failure were recorded and used to compare "oximeter reliability," and clinical behavior was recorded and compared, including time to extubation, total weaning time, and arterial blood gas (abg) samples taken. When abgs were taken, the data was used by the researchers to calculate the bias and precision of both instruments according to Bland-Altman plots.

Results

The Masimo SET oximeter matched its claims.

- Significantly fewer blood gases were taken.
- Clinical trust was heightened and demonstrated by the choice to wean patients from high F_iO_2 more rapidly.
- Fewer false alarms led to decreased clinical distractions.

Oximeter Used	Age, Yrs	Average Time to Extubation, Min \pm SD	No. of ABGs to Extubation or $F_iO_2 = 0.4 \pm$ SD	Average Time to $F_iO_2 = 0.4$, Min \pm SD	No. of Ventilator Changes to $F_iO_2 = 0.4 \pm$ SD
 Masimo SET [®]	63 \pm 12.9	634 \pm 329	2.7 \pm 1.2	176 \pm 111	2.9 \pm 1.2
Ohmeda 3740	64 \pm 8.6	706 \pm 459	4.1 \pm 1.6	348 \pm 425	2.9 \pm 1.7
Significance, <i>p</i>	.827	.412	.000015	.0125	.908

Authors' Conclusion

"Presenting more reliable oximetry data to clinicians resulted in more rapid and efficient weaning of the F_iO_2 , with fewer arterial blood gas measurements. This is all the more remarkable because clinicians were unaware of this arm of the study, and they had no independent knowledge of the improved reliability or accuracy of the [Masimo SET] device."