

Comparison of the New Masimo SET V3 Technology with a Conventional Pulse Oximeter during Polysomnography.

Whitman R.A., Garrison M.E. *Sleep*. 2001;24:A412.

Introduction

The aim of this study was to compare the saturation profile of patients undergoing polysomnography using the new Masimo SET V3 technology with the Nellcor N-200, a conventional pulse oximeter commonly used in the sleep laboratory for assessing arterial oxygen saturation. Masimo SET technology has been shown to provide greater accuracy in situations involving low perfusion and motion artifact.^{1,2}

Methods

In thirteen patients referred to the sleep disorders laboratory for evaluation of possible sleep disordered breathing, a Quartz Medical Q-400 with Masimo SET V3 technology (Q) and two Nellcor N-200s were applied to the patient concurrently. One N-200 was placed in the Mode 1 operating configuration (N1), which has a stated data averaging time of 5 to 7 seconds. The other N-200 was placed in the Mode 2 configuration (N2), which has a stated data averaging time of 2 to 3 seconds and is the recommended operating mode for polysomnography (operators manual). The Q-400 was configured in the 2-second data averaging mode. The N1 oximeter was placed on the index finger of one hand and the N2 and Q were placed randomly on the ring and index finger of the opposite hand. All three oximeters were turned on simultaneously at the beginning of the study and turned off simultaneously at termination of the study. The data from all three oximeters were downloaded into PROFOX oximetry analysis software (version PFWS 08/99). Three saturation indices, mean, low and number of desaturations $\geq 4\%$ were extracted from the report and analyzed.

Results

There were no differences in mean saturation between Q, NN and N1 ($95.8 \pm 1.5\%$, $96.2 \pm 1.4\%$, $96.9 \pm 1.6\%$ respectively) with no difference greater than one percent among the three oximeters for individual patients. The lowest saturations recorded were 68%, 13% and 44% for Q, N2 and N1 respectively. Individual patient differences in the lowest recorded saturation for Q versus N2 ranged from +9% (when Q was lowest) to -56% (when N2 was lowest). Q was lower than N2 in 8 out of 13 patients with a mean difference of 5%. When N2 was lower, the mean difference was 30%. When comparing Q to N1, the difference ranged from +6% to -24%, Q being lower in 9 patients with a mean difference of 8% and a mean difference of 10% when N1 was lower. There was a large difference in the number of desaturations greater than 4% between Q and both N2 and N1. The mean number of desaturations was 78 ± 102 , 51 ± 93 and 51 ± 92 for Q, N2 and N1 respectively.

Conclusions

In this population of patients referred for polysomnography, data from the Quartz Medical Q-400 using a 2-second averaging mode was associated with a greater number of significant desaturations than the Nellcor N-200 in either mode 1 or mode 2 operation while overall mean saturations were the same. This finding suggests that Masimo SET V3 technology has higher signal fidelity relative to actual physiologic changes in saturation than conventional oximetry technology, which should lead to improved diagnostic capabilities.