

## **Differences in Pulse Oximetry Technology Can Affect Detection of Sleep-Disordered Breathing in Children.**

Brouillette R.T., Lavergne J., Leimanis A., Nixon G.M., Ladan S., McGregor C.D. *Anesth Analg.* 2002 Jan;94(1 Suppl):S47-53.

### **Introduction**

Newer pulse oximeters have been developed to be motion resistant and thus have few false alarms. However, they have not yet been evaluated in a pediatric sleep laboratory setting. While evaluating new oximeters for use in our laboratory, we obtained simultaneous pulse oximetry data from two Masimo oximeters and from two Nellcor oximeters during nocturnal polysomnography in children referred for sleep-disordered breathing (SDB).

### **Methods and Results**

In series 1, comprising 24 patients, comparisons were made between a Masimo oximeter with 4-second averaging time and the Nellcor N-200 oximeter set for 3 to 5 second averaging. A maximum of 20 events per patient were randomly selected for analysis, an "event" being a desaturation of  $\geq 4\%$  registered by either oximeter. Interobserver agreement for event classification was 93%. Eighty-eight percent of 220 desaturation events occurring during wakefulness and 38% of 194 events occurring during sleep were classified as motion artifact on the Nellcor oximeter. Neither the Masimo oximeter nor the transcutaneous oxygen probe confirmed that the desaturation was real, in most of these cases. During sleep, there were 119 events detected by either or both oximeters: 113 (95%) by the Nellcor versus 82 (69%) by the Masimo. For these 119 events, the extent of desaturation was slightly less for the Masimo than the Nellcor oximeter,  $4.5 \pm 2.4\%$  versus  $5.5 \pm 2.5\%$ , respectively.

In series 2, 22 patients were studied comparing a Masimo Radical oximeter with 2 second averaging to the Nellcor N-200 oximeter. The extent of desaturation was slightly greater for the Masimo oximeter. The Masimo oximeter detected more non-artifactual desaturation events occurring during sleep than the Nellcor oximeter, 90% versus 76% ( $\chi^2 = 9.9$ ,  $p < 0.01$ ).

In series 3, comprising 128 events in 5 patients, a Nellcor N-395 oximeter detected fewer desaturations during non-movement, sleep periods and had more movement related "desaturation" events, compared to a Masimo Radical oximeter.

### **Conclusions**

The Masimo oximeters register many fewer false desaturations due to motion artifact. Using 4-second averaging, a Masimo oximeter detected significantly fewer SaO<sub>2</sub> dips than the Nellcor N-200 oximeter but using 2-second averaging, the Masimo oximeter detected more SaO<sub>2</sub> dips than the Nellcor N-200 oximeter. The sensitivity and motion artifact rejection characteristics of the Nellcor N-395 oximeter are not adequate for a pediatric sleep laboratory setting. These findings suggest that in a pediatric sleep laboratory, use of a Masimo oximeter with very short averaging time could significantly reduce workload and improve reliability of desaturation detection.