Performance of Pulse Oximeter Technologies in a Pediatric Sleep Lab Setting.

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Background

Newer pulse oximeters have been developed to be motion resistant. However, they have not yet been evaluated in a pediatric sleep laboratory, a setting where manual scoring for suspect pulse oximetry values is routine.

Methods

While evaluating new pulse oximeter technology, we obtained simultaneous data from two versions of Masimo pulse oximeters (Quartz Q-400 and Masimo Radical) and from a Nellcor device (N-200). Events were randomly selected for analysis, an event being a desaturation of 4% registered by either oximeter. In series 1, comparisons were made in 24 patients between a Quartz in 4 second averaging time and theN-200 set in their shortest, 3 to 5 second averaging (Mode 2). In series 2, 22 patients were studied comparing a Radical with 2 second averaging to theN-200, again in Mode 2.

Results

Inter observer agreement for event classification was 93%. Series 1: 88% of 220 wakeful events and 38%of 194 sleep events were classified as motion artifact on the N-200. Neither the Q-400 nor transcutaneous oxygen confirmed a drop in the majority of these cases. During sleep, there were 119 events detected by either or both the N-200and Q-400: 113 (95%) by the N-200 versus 82 (69%) by the Q-400. For these 119events, the extent of desaturation was slightly less for both Q-400 than theN-200 oximeter, 4.5 ± 2.4% versus 5.5 ± 2.5%, respectively. Series 2: The extent of desaturation was slightly larger for the Radical. The Radical detected more non-artifactual desaturation events occurring during sleep than the N-200, 90%versus 76% ($C2 = 9.9$, $p<0.01$).

Conclusions

Both Masimo pulse oximeters register many fewer false desaturations due to motion artifact. Using4 second averaging, a Q-400 detected significantly fewer SaO2 dips than theN-200 but using 2 second averaging, the Radical detected more SaO2 dips than the N-200. These findings suggest that in a pediatric sleep laboratory, use of the Radical pulse oximeter with short averaging times could significantly reduce workload and improve reliability of detecting desaturations.