Is Pulse Search Technology a Predictor of Unreliable Saturation Monitoring?

Goldstein MR, Louie N, Yang LL, Ochikubo CG, Martin GI. *Anesthesiology* 2003;99:A555.

Introduction

To increase clinical confidence in true alarm situations, such as desaturations, and to reduce the lack of confidence in good data during episodes of patient motion, manufacturers claiming motion tolerant pulse oximetry have attempted to provide easy and continuous assessments of the signal quality of the information used in SpO_2 and pulse rate measurement. The "Pulse Search" warning on the Nellcor N-395 and N-595 oximeters is such a measure. The product manual on the N-395 states, "If the acquired pulse is lost during monitoring, the N-395 enters Pulse Search. During pulse search, the monitor attempts to detect a pulse from which to take a measurement." The Masimo indicator of suspect data is the "Low Signal IQ" message display, which flashes on the screen of the Masimo Radical pulse oximeter when the received signal may be overly compromised. These researchers tested the reliability of the Masimo and Nellcor suspect data indicators.

Methods

The subjects of the test were 19 at-risk neonates. Sensor placement was randomized to one of four extremities and all oximeters were connected to a data collection computer. When a false desaturation to < 85% was noted and confirmed by lack of central cyanosis and presence of normal readings on the other pulse oximeters, presence or absence of the warning indicator (PS or Low SIQ) was recorded. When false desaturation occurred without the presence of a warning indicator, the desaturation was classified as "Unwarned". Conversely, if the false desaturation occurred with the presence of a warning indicator it was classified as "Warned". The duration of the warning indicator was noted and compared to the duration of the associated false desaturation event. Data was compared for statistical significance by ANOVA and a p value of < 0.05 was considered significant.

Results

6,811 minutes of oximetry data were studied. A significant difference in the reliability of the warning indicators to indicate false events occurred (see table).

Comparison of Pulse Search and Low Signal IQ to Warn of False Desaturation Events					
	"Warned" # events	Total Time (seconds)	Low SIQ / PS indicator (% total time)	"Unwarned" # events	Total Time (seconds)
Masimo Radical	45	835	96.2	11	65
Nellcor N-595	15	1150	33.0	67	1036
Nellcor N-395	19	510	28.0	37	635

*ANOVA analysis showed a statistically significant difference between the Pulse Search events and duration comparing N-395 / N-595 and the Masimo Radical Low Signal IQ measure for p<0.001.

Authors' Conclusion

"Significant differences in total warned time, duration of warning indicator and unwarned time for detecting false desaturation events are evident between Masimo Radical and the N-395 and N-595 oximeters. The Masimo Radical Low Signal IQ measurement was more reliable in its ability to discern potentially confounding false desaturation."