

## A Comparison of Two New Generation Pulse Oximeters: The Masimo Radical and the Philips Viridia.

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### Background

In the past ten years, dramatic improvement in the state of the art of pulse oximetry technology has allowed for the use of this device as the "fifth vital sign." In the neonatal intensive care unit, better technology has given rise to improved care not only to the neonate at extremis but also to the growing premature who was formerly felt to be at significant risk for retinopathy of prematurity and chronic lung disease from inappropriate oxygen titration. Nevertheless, the NICU environment remains a challenge for even these newer devices. Low perfusion, high motion, unpredictable levels of interference all confound the clinician's ability to continually monitor reliable saturation and pulse rate values.

### Methods

To ascertain the clinical utility of these devices, we compared the Masimo Radical and the Philips Viridia. 19 neonates were entered into the study and studied for a total of 6811 minutes. Oximeter probes were placed according to the manufacturer's specification and rotated to minimize effects local perfusion to a particular extremity. ECG readings were obtained simultaneously to corroborate pulse rate data. Both oximeters were studied with respect to false desaturation less than 85% (determined by lack of corroborating physical findings and presence of a "good" saturation reading on the other oximeter), "zeroing" out of the saturation value, and heart rate that differed by more than 25 beats per minute from the value reported by the ECG. Although the Masimo Radical has a Low Signal IQ measure that can help discern the presence of a false desaturation and erroneous pulse rate, this measurement was not taken into consideration for the comparison, as the Philips Viridia has no comparable feature set.

### Results

From the table, considerable differences in false desaturation and pulse rate variability from the ECG are noted between the two devices. The rate of both these occurrences in the Philips Viridia exceeds that of the Masimo Radical by greater than twofold; and duration, by greater than threefold. The Philips Viridia was noted to zero out more than 10 times more than the Masimo Radical for more than 25 times as long a period of time.

	False Desaturations <85% (events)	False Desaturations <85% (# of minutes)	Signal Dropouts (events)	Signal Dropouts (# of minutes)	Changes in HR >25 BPM (events)	Changes in HR >25 BPM (# of minutes)
Masimo Radical*	56	15	19	8	7	5
Philips Viridia	176	31	194	201	26	11

\* p <0.0001

### Conclusion

The importance of evaluation of the device in the at-risk population cannot be over emphasized. Although the newer pulse oximetry technologies are not able to generate a valid pulse oximetry reading in all clinical circumstances, technological advances are not uniform among the different models available. The Masimo Radical appears to have an advantage in monitoring the at risk neonate.