

## **Performance of Motion-Resistant Pulse Oximeters in Tracking Neonatal Heart Rate Variability.**

Goldstein M.R., Furman G.I., Pernia M.L., Lawas-Alejo P., Yang L.L., Sidel B.D., Ochikubo C.G., Martin G.I. *Anesth Analg.* 2002;94:S102(A5).

### **Introduction**

Motion resistant pulse oximeters (MRPO) have fewer false alarms than conventional pulse oximeters during neonatal motion.<sup>1</sup> The monitoring and analysis of heart rate variability is important to the physiologic assessment of the acutely ill neonate<sup>2</sup> We observed that some MRPOs “froze” the displayed pulse rate (PR) during rapid changes in an infant’s heart rate (HR). Masimo SET (a MRPO) has been found to track bradycardia<sup>3</sup>, but does it or other MRPOs accurately follow acute changes in heart rate?

### **Methods**

Seven neonates with a history of decisive HR changes were monitored concurrently with four MRPOs: the Agilent Viridia 24C, rev B, Radical with Masimo SET V3, Nellcor N-395 V1620, and Novametrix MARS ver. eng -2001-13. MRPO sensors were placed in a randomized fashion on each limb. The PR of the MRPOs was compared to the HR from the ECG channel of the Agilent Viridia 25C. The PR and HR were collected via a computer at 1 Hz. MRPO PR data was categorized as “frozen” (i.e. missed PR change) if displayed PR was constant (defined as change  $\leq$  1 BPM (i.e., a change of meaningful physiologic consequence).

### **Results**

74 epochs of acute HR deceleration or acceleration were found in 23.7 hours of data collection. The range of missed PR changes (1-31) reveals large and significant difference in the four MRPOs tested. The Novametrix MARS unit had the highest rate of missed PR changes, followed by the Agilent Viridia, the Nellcor N-395. The Masimo SET tracked the ECG HR variability most closely with one missed episode.

### **Conclusions**

Of the four motion-resistant pulse oximeters tested, the Radical with Masimo SET was the only one that reliably tracked acute heart rate changes in the neonates tested. The other pulse oximeters froze extensively and missed events of diagnostic importance.

References: 1) Bohnhorst et al., *Crit Care Med* 2000; 28(5):1565-8.; 2) Poets et al., *Pediatr Res* 1993; 34(2):144-7.; 3) Hay et al., *Pediatr Res* 1999; 45(4):304A.