Performance of Pulse Oximeters in Tracking Heart Rate Variability.

**Introduction**
The objective of this project was to determine the reliability of the latest generation of pulse oximeters for tracking heart rate changes in preterm infants. We hypothesized that the Nellcor N-595 pulse oximeter was as reliable or superior as the Masimo Radical for tracking pulse rate in preterm infants.

**Methods**
2 pulse oximeter sensors (Nellcor MAX-N or Nellcor MAX-I and a Masimo LNOP Neo) were attached to separate distal extremities and their respective pulse oximeters (N-595, rev 3.0, Nellcor, Pleasanton, CA; Radical, v3, Masimo Corp., Irvine CA). Both oximeters and an ECG monitor (Nellcor N-3200) were connected to a computer for continuous data recording (1 Hz) during the 4-hour study per patient. True bradycardia events were defined as pulse rates >100 bpm detected simultaneously by a minimum of 2 of the 3 monitors for $\geq 10$ sec. A trained observer confirmed all events. A significant difference in true events, false events and % time pulse rate undetected between oximeters was determined with chi square or Fisher’s exact test. A p value $< 0.05$ was considered significant.

**Results**
19 infants with median (range) age and wt of 14 d (1-84) and 1910 gm (920-3750), respectively, were studied in a NICU. There were a total of 57 true bradycardia events.

**Conclusions**
We conclude that the N-595 and Radical pulse oximeters report significantly fewer false alarms than the N-3200, with the best performance coming from the N-595. Although there was a statistical difference between oximeters in pulse rate undetected, this accounted for less than one percent of the total monitoring time. All three monitors performed equally well detecting true bradycardia events.