

## **Pulse Oximeters' Reliability in Detecting Hypoxemia and Bradycardia: Comparison between a Conventional and Two New Generation Oximeters.**

Bohnhorst B., Peter C.S., Poets C.F. *Crit Care Med.* 2000 May;28(5):1565-8.

### **Objective**

Pulse oximeters are increasingly used for patient monitoring; however, they are traditionally very prone to motion artifact. Newly developed instruments have lower false alarm rates. We wanted to know whether this is achieved at the expense of an increased proportion of false negative alarms such as missed or delayed identification of hypoxemia and/or bradycardia.

### **Methods**

*Design:* Observational study. *Setting:* Neonatal intensive care unit. *Patients:* A total of 17 unsedated preterm infants (median gestational age at birth, 25 wks; range, 24-30 wks). *Interventions:* Long-term recordings of transcutaneous partial pressure of oxygen (PTcO<sub>2</sub>), heart rate, pulse oximeter saturation (SpO<sub>2</sub>), and pulse rate from a conventional oximeter and two new generation oximeters.

*Measurements:* Recordings were analyzed for episodes with PTcO<sub>2</sub> <40 torr or with heart rate <80 beats/min for >5 secs. Hypoxemia was considered identified if SpO<sub>2</sub> had fallen to <85% within 2 mins of PTcO<sub>2</sub> reaching 40 torr, and bradycardia was considered identified if pulse rate had fallen to <80 beats/min within 2 min of the heart rate reaching this threshold.

### **Results**

A total of 202 falls in PTcO<sub>2</sub> to <40 torr occurred; 174 (86%) were identified by all three oximeters. Of the remaining episodes, manual analysis of red and infrared absorption signals confirmed that SpO<sub>2</sub> had indeed been <85% for > or =10 sec in 11 episodes; therefore, these episodes should have been identified by all three oximeters. None of these had been missed by the conventional oximeter, but 10 (5.4% of the total) were missed by one of the new generation instruments (Nellcor), and one (0.5%) was missed by the other (Masimo). Of 54 bradycardias, only 14 were identified by all three oximeters; 17 (32%) were missed by the conventional, 37 (69%) by the Nellcor, and 4 (7%) by the Masimo instrument.

### **Conclusions**

One of the two new generation instruments investigated in this study missed 5.4% of hypoxemic episodes and 69% of bradycardias. It thus appears that this instrument's reduced false alarm rate is achieved at the expense of an unreliable and/or delayed identification of hypoxemia and bradycardia. The other instrument identified both conditions equally as or more reliably than a conventional pulse oximeter.