

False Alarms and Sensitivity of Conventional Pulse Oximetry vs. the Masimo SET Technology in the Pediatric Postanesthesia Care Unit

Malviya S, Reynolds PI, Voepel-Lewis T, Siewert M, Watson D, Tait AR, Tremper KK. *Anesthesia and Analgesia* 2000;90(6):1336-1340

Introduction

Pulse oximetry in the postanesthesia care unit (PACU) is routine. Poor performance of pulse oximeters due to motion and low perfusion conditions (e.g., cool extremities) during the perioperative period are well documented. This sort of artifact is particularly troublesome in children during their early PACU recovery from anesthesia where they are at greatest risk for a compromised airway and hypoxemia. Therefore, a pulse oximeter with resistance to this artifact would increase monitoring safety of children during their PACU experience.

Methods

75 children were studied in a PACU to compare the reliability of a new technology pulse oximeter (Masimo SET) with that of a conventional pulse oximeter (Nellcor N-200). Acquisition of ECG heart rate and pulse oximetry saturation and pulse rate data were collected from the two pulse oximeters and an ECG monitor. Pulse oximeter sensors were placed on different digits of the same hand and shielded to prevent optical cross-talk. The children were monitored during their PACU period until deemed sufficiently recovered from anesthesia to warrant removal from monitoring (i.e., consistent with routine practice). Potential sources of artifact were logged, which included motion and care events. The simultaneous data were analyzed for significant differences between the conventional and new technology pulse oximeters.

Results

Total monitoring time was 42 hours (35 ± 22 minutes/child). Masimo SET was significantly better in detecting true hypoxemic events while reducing false alarms. Of particular concern was that the Nellcor pulse oximeter missed 41% of the hypoxemic events. Moreover, some of the hypoxemic events missed by the Nellcor pulse oximeter exceeded four minutes. The findings of significant differences between conventional pulse oximeter and Masimo SET pulse oximeters are listed in the table.

	Masimo SET		Nellcor N-200	
	Events	Duration (sec.)	Events	Duration (sec.)
True Alarms Missed	0	0	11	909
False Alarms	4	319	10	676
True Alarms Detected	27	2364	16	1468

Authors' Discussion and Conclusions

Conventional pulse oximetry often provides spurious or no data for children monitored during their PACU experience. This can be particularly worrisome in children during their early recovery from anesthesia where they are at greatest risk for a compromised airway and hypoxemia. A new technology pulse oximeter (Masimo SET) was shown in a large study to be resistant to this artifact thereby increasing the margin of safety for children during their PACU experience. This performance enhancement was found not to compromise the accurate detection of true alarm conditions. **In fact, Masimo SET caught one-third more of the true alarm events than the Nellcor device. "This study demonstrated that Masimo SET significantly reduced the incidence and duration of false alarm compared with conventional pulse oximetry in the pediatric PACU. There was a greater than 50% reduction in the incidence and duration of false alarm with Masimo SET compared with CPO. Furthermore, in this setting, Masimo SET pulse oximetry identified all of the true alarm events that responded to clinical intervention."**