

Respiratory Abstracts

AN EVALUATION OF FOREHEAD REFLECTANCE OXIMETRY IN INTRAOPERATIVE SURGICAL PATIENTS.

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INTRODUCTION- Pulse oximetry is the standard of care in both the operating room and the ICU. Technology developments continue to improve the performance of pulse oximetry during adverse conditions such as motion and low tissue perfusion. Recent studies have demonstrated potential differences in response time for detection adverse events between finger sensors and forehead sensors. The purpose of this study is to evaluate the accuracy and reliability of the new Max-Fast sensor and the Nellcor N595 technology on stable intraoperative surgical patients.

METHODS- Following IRB approval, 42 adult surgical patients, undergoing general anesthesia were enrolled prospectively in a clinical trial conducted concurrently at two major academic centers. In addition to routine monitoring, probes from 3 pulse oximeters were attached: Nellcor N595 via the Max-Fast forehead sensor, Nellcor N200 via D25 finger sensor, and Masimo SET Radical via Adt LNOP sensor. The 2 digit sensors were optically shielded from one another. The SpO₂ and PR values from these three oximeters were recorded digitally to a laptop computer at a frequency of 1Hz. The mean of the two digit sensors was calculated, as was the bias and precision of the two digit sensors. Error is defined as the difference between the forehead sensor and the mean of the 2 digit sensors during stable patient conditions. The bias (mean error) and precision (SD of the error) as well as the E7 (% of time during which the error was greater than 7% in stable conditions) were calculated for the forehead sensor as well.

RESULTS- Data is presented as mean (+ SD). The mean age of the patients was 55.6 (+ 18.2) years. The mean length of surgery (minutes) was 144.5 (+ 86). The mean bias and precision of the digit sensors was 0.17 (+ 0.50) and 0.73% (+ 0.70) respectively. The mean bias and precision of the forehead sensor was -5.28 (+ 7.57) and 4.05 (+ 4.12) respectively. The mean E7 (minutes) was 45.4 (+ 65.2). In 17 of 42 patients (40%), E7% was greater than 20% of the total duration of the surgical procedure.

DISCUSSION- Reflectance oximetry sensors for use on the forehead have been developed. Previous studies from 12 years ago showed these sensors performed poorly (J Clin Monit 1991:102-103). Despite advancements in technology, this study demonstrates similar poor performance of the forehead reflectance pulse oximeter. In this series of patients, the Max-Fast sensor attached to the N595 oximeter demonstrated an unacceptable bias and precision and was in error by more than 7% for more than 20% of the total operative time in 17 (40%) of the cases studied.

CONCLUSION- The results of this study suggest that the Max-Fast sensor attached to the N595 oximeter might not accurate or reliable enough for use in surgical patients.