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### EVALUATION OF 2 FOREHEAD REFLECTANCE OXIMETERS IN INTRAOPERATIVE SURGICAL PATIENTS.

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**Summary:** We compared two forehead reflectance oximeters to two finger sensors as controls in intraoperative surgical patients. The Masimo Adt LNOP forehead sensor demonstrates superior performance when compared to the Nellcor N595 MaxFast forehead sensor in sensitivity, precision and failure rate.

**Introduction:** Recent studies have evaluated the use of pulse oximetry and alternate monitoring sites such as the forehead. This study evaluates the accuracy and reliability of two new reflectance forehead sensors, the MaxFast attached to the Nellcor N595 oximeter, and the LNOP TF-1 attached to the Masimo SET Radical oximeter, in stable surgical patients.

**Methods:** Forty-four surgical patients were studied, after obtaining informed consent as per approved IRB protocol. These patients were monitored with the Nellcor N200 using the D25 finger sensor and the Masimo SET Radical using the TF-1 finger sensor as a control. They were concurrently monitored with the Masimo SET Radical Adt LNOP forehead sensor and the Nellcor N595 MaxFast forehead sensor. SpO<sub>2</sub> and heart rate from all four sensors were continuously logged on computer throughout surgery. Error is defined as the difference between either of the forehead sensors and the mean of the two finger sensors during stable patient conditions. Data were analyzed using bias (mean error) and precision (standard deviation of error) for each patient and E-7 (percentage of time during which error was greater than 7% during stable conditions).

**Results:** The mean and standard deviation of the bias and precision of the finger sensors (44 patients) were  $-0.3(\pm 0.8)$  and  $0.6(\pm 0.6)$  respectively. The forehead and pooled finger sensors are presented in Table 1 below. In 32% of patients, the Nellcor MaxFast error was greater than 7% during more than 20% of the duration of the surgical procedure.

**Discussion:** In this population of adult surgical patients we demonstrated statistically significant performance differences between the Nellcor and the Masimo forehead sensors. The Nellcor MaxFast sensor had significantly longer periods of time where SpO<sub>2</sub> reading were falsely low. This monitor demonstrates an unacceptable use in the surgical patient. The Masimo Radical Adt LNOP forehead sensor, in contrast, performed better with a small bias and precision.

Table 1- Data Mean (SD) for the Nellcor Max Fast and the Masimo TF-I forehead sensors.

	Nellcor Max Fast	Masimo TF-I	p value (between Max Fast and TF-I)
Bias (%)	$-5.1 \pm 8.0$	$0.3 \pm 1.0$	0.00003
Precision (%)	$3.9 \pm 5.7$	$0.8 \pm 0.7$	0.0003
E7 (%)	$22.2 \pm 37.99$	$1.5 \pm 3.0$	0.0004
Performance Index	71.2	98.2	