Masimo Signal Extraction Pulse Oximetry.
Goldman J.M., Petterson M.T., Kopotic R.J., Barker S.J. *J Clin Monit Comput*. 2000;16(7):475-83.

Introduction

To describe a new pulse oximetry technology and measurement paradigm developed by Masimo Corporation. Patient motion, poor tissue perfusion, excessive ambient light, and electrosurgical unit interference reduce conventional pulse oximeter (CPO) measurement integrity. Patient motion frequently generates erroneous pulse oximetry values for saturation and pulse rate. Motion-induced measurement error is due in part to widespread implementation of a theoretical pulse oximetry model which assumes that arterial blood is the only light-absorbing pulsatile component in the optical path.

Methods

Masimo Signal Extraction Technology (SET) pulse oximetry begins with conventional red and infrared photoplethysmographic signals, and then employs a constellation of advanced techniques including radiofrequency and light-shielded optical sensors, digital signal processing, and adaptive filtration, to measure SpO2 accurately during challenging clinical conditions. In contrast to CPO which calculates O2 saturation from the ratio of transmitted pulsatile red and infrared light, Masimo SET pulse oximetry uses a new conceptual model of light absorption for pulse oximetry and employs the discrete saturation transform (DST) to isolate individual "saturation components" in the optical pathway. Typically, when the tissue under analysis is stationary, only the single saturation component produced by pulsatile arterial blood is present. In contrast, during patient motion, movement of non-arterial components (for example, venous blood) can be identified as additional saturation components (with a lower O2 saturation). When conditions of the Masimo model are met, the saturation component corresponding to the highest O2 saturation is reported by the instrument as SpO2.

Conclusion

The technological strategies implemented in Masimo SET pulse oximetry effectively permit continuous monitoring of SpO2 during challenging clinical conditions of motion and poor tissue perfusion.