Comparison of Three New Generation Pulse Oximeters in a Medical Intensive Care Unit.
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Introduction

Pulse oximeters (SpO2) must be accurate and new generation oximeters must be evaluated before adoption in the critical care setting. New Generation technology is available either in stand-alone devices or integrated in bedside multi-parameter monitors. SpO2 measures from new generation pulse oximeters, whether stand alone or integrated, will agree with blood CO-Oximetry.

Methods

100 critically ill patients were studied. Patients were compared for accuracy of SpO2 and pulse rate (PR) readings from two standalone new generation oximeters (Nellcor Oximax N-600 and Masimo SET Radical and an integrated oximeters (Philips Intellivue Fast SpO2) to measured SaO2 via CO-Oximetry and ECG-derived heart rate (ECG-HR). Adhesive digit sensors were applied to the same had and shielded to prevent optical cross-talk. Following sensor placement SpO2, PR and ECG-HR was recorded under stable conditions prior to and following arterial blood gas (ABG) sampling for clinical care. ABGs were immediately analyzed, including CO-Oximetry. Number of occurrences where PR from each oximeters was >5, 10 and 25 bpm different than ECG-HR were compared.

Result

100 measurements were obtained with each patient studied once. Bias and precision for each oximeter vs. measured SaO2 were calculated using Bland-Altman method. Bias +/- precision (%) for Nellcor, Masimo and Philips were 0.18 +/-2.25, 0.31 +/-- 1.98 +/- 2.8, respectively. There were no statistical differences in bias between the three systems. A statistically significant different in precision observed between Philips and Masimo (p=0.008). No unsuccessful measurements occurred. Mean SaO2 (%) was 95 +/- 2.7 (range 80-990. No statistical differences in PR and ECG-HR between devices noted.

Conclusions

We conclude that all three new generation pulse oximeters devices evaluated in this study demonstrated comparable bias and precision. There were little clinical differences observed between devices.