

Accuracy of multiple pulse oximeter brands in stable critically ill patients - Oxygap study

Blanchet MA, Mercier G, Delobel A, Nayet E, Bouchard PA, Simard S, L'Her E, Branson R, Lellouche F. *Respir Care*. 2023 Jan 3:respcare.10582. doi: 10.4187/respcare.10582.

An accurate SpO₂ value is critical in order to optimally titrate oxygen delivery to patients and to follow oxygenation guidelines. Limited prospective data exist on real world performance of pulse oximeters in critically ill patients. The objective of this study was to assess accuracy and bias of the SpO₂ values measured by several oximeters in hospitalized patients. We included stable adults in the intensive care unit with an arterial catheter in place. Main exclusion criteria were poor SpO₂ signal, and SpO₂ > 96%. In each subject, we simultaneously evaluated four oximeters: Nonin (Plymouth, MN) embedded in the FreeO₂ device (Oxynov, QC, Canada), Masimo (Radical 7, Irvine, CA), Philips (FAST, Eindhoven, Netherlands), and Nellcor (N600, Pleasanton, CA). Arterial blood gases were drawn and simultaneously, each oximeters' SpO₂ values were collected. SpO₂ values were compared to the reference (SaO₂ value) to determine bias and accuracy. The ability for oximeters to detect hypoxemia and the impact of oximeters on oxygen titration were evaluated. We included 193 subjects (153 men, mean age 66.3 years) in whom 211 sets of measurements were performed. The skin pigmentation evaluated by Fitzpatrick scale showed 96.2% of subjects were light skin (types 1 and 2). One oximeter overestimated SaO₂ (Philips, +0.9%) while the three others underestimated SaO₂ (Nonin -3.1%, Nellcor -0.3%, Masimo -0.2%). SaO₂ was underestimated with Nonin oximeter in 91.3% of the cases while it was overestimated in 55.2% of the cases with Philips oximeter. Moderate hypoxemia (SaO₂ 86-90% or PaO₂ 55-60 mmHg) was detected in 92%, 33%, 42% and 11% of the cases with Nonin, Nellcor, Masimo and Philips respectively. We found significant bias and moderate accuracy between the tested oximeters and the arterial blood gases, in the studied population. These discrepancies may have important clinical impact on the detection of hypoxemia and management of oxygen therapy.