

A Prospective Comparison of 3 New-Generation Pulse Oximetry Devices during Ambulation after Open Heart Surgery.

Richards N.M., Giuliano K.K., Jones P.G. *Respir Care*. 2006 Jan;51(1):29-35.

Objective

To assess the clinical performance of 3 new-generation pulse-oximetry signal-processing software systems (Philips FAST, Masimo SET, and Nellcor N-3000) during ambulation after open-heart surgery.

Methods

Design: Prospective, convenience sample. *Setting:* Cardiac surgical progressive care unit in a 629-bed, not-for-profit, tertiary-care teaching hospital. *Patients:* Status post-cardiac-surgery patients (n = 36) during their first postoperative ambulation. *Interventions:* None. *Protocol:* Randomization was used for digit and hand selection, and all 3 devices were used continuously during ambulation. Data on dropouts, false alarms, and correlation with heart rate were recorded. We continuously measured arterial oxygen saturation via pulse oximetry during ambulation with all 3 devices.

Results

Pairwise comparisons indicated significant differences among the 3 devices for data dropout and false alarm. In repeated-measures analysis, the Nellcor N-3000 had the greatest likelihood of data dropout (odds ratio of 31.9 to Masimo and 5.6 to Philips, at the 95% confidence interval). However, the converse was true for false alarms; the Masimo had the most false alarms, with an odds ratio of 17.9 to Nellcor and 2.3 to Philips, at the 95% confidence interval. There were also significantly more dropouts with all 3 devices when readings were taken on a hand on an arm from which a radial graft had been taken ($p = 0.004$). For heart-rate correlation, the mean absolute difference among the 3 devices was similar: Philips = 4.3 beats/min, Masimo = 5.1 beats/min, and Nellcor = 3.0 beats/min.

Conclusions

There are significant differences among the 3 devices with regard to dropout and false alarms. High numbers of dropouts are problematic because no pulse-oximetry patient information is available during dropout. However, false alarms are even more problematic, because they desensitize clinicians to alarms and call into question the accuracy of displayed data. While our data highlight the statistical differences between the studied oximeters, the clinical implications of these differences warrant further study.