Comparison of Two Pulse Oximeters during Sub-Maximal Exercise in Healthy Volunteers: Effects of Motion.

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Exercise-induced motion artifacts can adversely affect the accuracy of Pulse oximeters (OX) for measurements of arterial oxygen saturation (SaO2) and pulse rate (PR). The purpose of this study was to compare the SaO2 and PR measurements at rest and during exercise from two new motion-resistant OX; the Oxi-Reader® and N-395®.

Ten apparently healthy subjects volunteered for this study. Subjects were connected simultaneously to both OX and underwent a 16 min sub-maximal exercise treadmill test, including 2 min of standing rest (no motion) at the beginning and conclusion of the test. SaO2 values less than 92%, or exercise SaO2 values which decreased 4% from the mean rest SaO2 value, and PR values 20 b/min less than the preceding min of progressive workload exercise were considered errors.

Results revealed statistically significant ($p<0.05$) correlations between the OX for SaO2 under both non-motion ($r=0.663$) and motion ($r=0.708$) conditions. Likewise, correlations for PR were significant under non-motion ($r=0.981$) and motion ($r=0.485$) conditions. However, during exercise, the Oxi-Reader averaged 1.7 PR errors/subject while no PR errors occurred with the N-395. The mean value for the Oxi-Reader PR errors was 63.7□10.8 b/min while the corresponding N-395 PR value was 108.9□15.3 b/min ($p<0.001$). The Oxi-Reader PR errors during exercise were consistent with resting PR values, not sub-maximal exercise PR values. No SaO2 readings were in error.

The results of this investigation demonstrated that the N-395 performed better than the Oxi-Reader for PR during exercise. However, there was no difference between the OX on resting PR or SaO2 at rest or during exercise. Thus, during exercise applications, the N-395 can be utilized without electrocardiogram (EKG) monitoring while the Oxi-Reader cannot.