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Accuracy of pulse oximeters in detecting hypoxemia in patients with chronic thromboembolic pulmonary hypertension.

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**PURPOSE:** Pulse oximetry is routinely used to continuously and non-invasively monitor arterial oxygen saturation (SaO<sub>2</sub>). When oxygen saturation by pulse oximeter (SpO<sub>2</sub>) overestimates SaO<sub>2</sub>, hypoxemia may be overlooked. We compared the SpO<sub>2</sub> - SaO<sub>2</sub> differences among three pulse oximeters in patients with chronic thromboembolic pulmonary hypertension (CTEPH) who spent their daily lives in a poor oxygen state.

**MATERIAL AND METHOD:** This prospective observational study recruited 32 patients with CTEPH undergoing elective cardiac catheterization. As we collected arterial blood samples in the catheter laboratory, SpO<sub>2</sub> values were simultaneously recorded. Three pulse oximeters were used on each patient, and SpO<sub>2</sub> values were compared with oximetry readings using a blood gas analyzer. To determine the optimal SpO<sub>2</sub> value by which to detect hypoxemia (SaO<sub>2</sub> ≤ 90%), we generated receiver operating characteristic (ROC) curves for each pulse oximeter.

**RESULT:** The root mean square of each pulse oximeter was 1.79 (OLV-3100), 1.64 (N-BS), and 2.50 (Masimo Radical). The mean bias (SpO<sub>2</sub> - SaO<sub>2</sub>) for the 90%-95% saturation range was significantly higher for Masimo Radical (0.19 +/- 1.78% [OLV-3100], 0.18 +/- 1.63% [N-BS], and 1.61 +/- 1.91% [Masimo Radical]; p < 0.0001). The optimal SpO<sub>2</sub> value to detect hypoxemia (SaO<sub>2</sub> ≤ 90%) was 89% for OLV-3100, 90% for N-BS, and 92% for Masimo Radical.

**CONCLUSION:** We found that the biases and precision with which to detect hypoxemia differed among the three pulse oximeters. To avoid hypoxemia, the optimal SpO<sub>2</sub> should be determined for each pulse oximeter.