

## Transcutaneous PCO<sub>2</sub> Monitoring During Initiation of Noninvasive Ventilation.

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**BACKGROUND:** To assess the efficacy of transcutaneous PCO<sub>2</sub> (PtcCO<sub>2</sub>) measurements for monitoring alveolar ventilation in patients requiring noninvasive positive-pressure ventilation (NPPV).

**METHODS:** In a prospective study on method agreement pairs of PaCO<sub>2</sub> and PtcCO<sub>2</sub> (SenTec Digital Monitor; SenTec AG; Therwil, Switzerland), measurements were performed every 10 min during the establishment of NPPV over a 4-h period in 10 patients (8 patients with COPD) presenting with acute-on-chronic hypercapnic respiratory failure, thus providing 250 pairs of measurement.

**RESULTS:** Mean (+/- SD) PaCO<sub>2</sub> decreased from 67.2 +/- 11.9 mm Hg (PtcCO<sub>2</sub>, 65.5 +/- 13.9 mm Hg) to 54.6 +/- 8.8 mm Hg (PtcCO<sub>2</sub>, 47.8 +/- 8.8 mm Hg), and mean pH increased from 7.36 +/- 0.03 to 7.44 +/- 0.04. Following PtcCO<sub>2</sub> assessment, PtcCO<sub>2</sub> in the ensuing 2-min period was the strongest predictor for PaCO<sub>2</sub> compared to PtcCO<sub>2</sub> in the ensuing 5-min period and to real-time measurements. PtcCO<sub>2</sub> was highly correlated with PaCO<sub>2</sub> ( $r = 0.916$ ;  $p < 0.001$ ), as determined by linear regression analysis. The mean difference between PaCO<sub>2</sub> and PtcCO<sub>2</sub> was 4.6 mm Hg, and the limits of agreement (bias +/- 1.96 SDs) ranged from -3.9 to 13.2 mm Hg, following the Bland and Altman analysis. Retrospective drift correction produced an even higher correlation ( $r = 0.956$ ;  $p < 0.001$ ) with lower limits of agreement (-1.7 to 7.5 mm Hg).

**CONCLUSIONS:** PtcCO<sub>2</sub> measurements provide a sensitive, continuous, and noninvasive method for monitoring alveolar ventilation in patients who are receiving short-term NPPV therapy. Drift correction of PtcCO<sub>2</sub> measurements improves the accuracy of PtcCO<sub>2</sub> monitoring compared to the "gold standard" PaCO<sub>2</sub> assessment. A lag time of approximately 2 min is present for reliable PtcCO<sub>2</sub> values compared to PaCO<sub>2</sub> values. However, individual variance between PaCO<sub>2</sub> and PtcCO<sub>2</sub> cannot be excluded. Trial registration: [www.uniklinik-freiburg.de/zks/live/uklregister/Oeffentlich.html](http://www.uniklinik-freiburg.de/zks/live/uklregister/Oeffentlich.html) Identifier:UKF001271.

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