Accuracy of a Novel Bioacoustic Sensor in Adult Postoperative Patients with and Without Lung Disease.

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Purpose

Monitoring respiration of spontaneously breathing patients with chronic obstructive lung disease (COPD) is a concern in a variety of clinical areas including the operating room, post anesthesia care unit (PACU), and on the general care wards. These patients require careful vigilance. We evaluated the accuracy of prototype bioacoustic sensor in adult patients with and without COPD in the PACU.

Methods

Following IRB approval and informed consent, upon arrival to the PACU, 38 patients were enrolled. All patients received standard monitors; in addition, a nasal cannula was connected to a capnometer (SIMS, Waukesha WI). A prototype adhesive bioacoustic sensor connected to a breathing frequency monitor (Masimo Corp, Irvine CA) was applied to the neck lateral to the cricoid cartilage. The capnometer and bioacoustic monitor were connected to a computer for continuous recording and subsequent analysis. The accuracy of the new acoustic sensor and the capnometer were compared to a reference respiratory rate from a manual scoring system. Bias, precision and A_{RMS} were calculated in the usual fashion, as either bioacoustic sensor-reference or capnometer-reference.

Results

All data is expressed as mean ± standard deviation. 27 patients without COPD (age = 51.6 ± 22.5 years) and 11 patients with COPD (age = 51.1 ± 9.8 years) were enrolled. Duration of monitoring time was 69.4 ± 39.9 min. For the patients without COPD, the resultant bias, precision and ARMS for the capnometer was –0.74, 2.37, and 2.48 and bioacoustic sensor was –0.01, 2.38, and 2.38 respectively. For the patients with COPD, the resultant bias, precision and ARMS for the capnometer was –0.31, 2.46, and 2.48 and bioacoustic sensor was 0.01, 2.76, and 2.76 respectively.

Conclusions

The new prototype bioacoustic respiratory sensor demonstrates accuracy for respiratory rate monitoring as good as capnometry in PACU patients with and without COPD. *Clinical Implications:* This data suggests the new bioacoustic sensor may provide an improved monitoring system for patients in a general care setting.