

Accuracy of Acoustic Respiration Rate Monitoring in an Acute Nursing Unit.

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Introduction

Measurement of respiratory rate is critical, but manual measurement requires direct observation and has observer variation. Capnography has patient compliance issues, and impedance pneumography is inaccurate. We sought to evaluate the accuracy of a new acoustic monitoring technology that provides continuous respiratory rate from an acoustic sensor placed in the neck in the acute nursing units outside of the intensive and intermediate care units.

Methods

The data are based on observations made during a limited market release product evaluation of the acoustic monitoring technology in an acute nursing unit. Twenty five adult patients wore the Rainbow acoustic sensors (RA 125, Rev A) on their neck, connected to a Rad-87 (Masimo, Irvine, CA) Rainbow Acoustic Monitor (RAM) and Pulse CO-Oximeter. During standard care visits to the bedside, nursing staff auscultated the neck opposite the sensor location and observed patient breathing for a period of 1 minute to determine respiratory rate via manual count. At the time of the manual count, the acoustic respiratory rate (RRa) reported by the Rad87 was recorded. Bias, precision, and accuracy root mean squared (A_{RMS}) were calculated for RRa compared to the manual count. A Bland Altman plot was generated to assess agreement between the two methods.

Results

One hundred eighty seven respiratory rate data pairs were collected from 25 patients (7.4 +/- 4.6 data pairs per patient). Patients exhibited respiratory rates ranging from 8 - 36 breaths per minute (bpm). Bias, precision, and A_{RMS} for pooled data were 0.8, 3.4 and 3.5 bpm, respectively.

Conclusion

Rainbow acoustic monitoring is a simple and automatic method of measuring respiration rate at the bedside, with clinically acceptable accuracy. This method could be of significant value in a wide range of clinical settings including the general floor, PACU, OR, sleep laboratories, and any care area utilizing conscious sedation.

Figure 1

