

Accuracy of Acoustic Respiration Rate Monitoring in Pediatric Patients

Patino M., Redford D.T., Quigley T.W., Mahmoud M., Kurth C.D., Szmuk P. *Paediatr Anaesth.* 2013 Sep 3.

Background

Rainbow acoustic monitoring (RRa) utilizes acoustic technology to continuously and noninvasively determine respiratory rate from an adhesive sensor located on the neck.

Objective

We sought to validate the accuracy of RRa, by comparing it to capnography, impedance pneumography, and to a reference method of counting breaths in postsurgical children.

Methods

Continuous respiration rate data were recorded from RRa and capnography. In a subset of patients, intermittent respiration rate from thoracic impedance pneumography was also recorded. The reference method, counted respiratory rate by the retrospective analysis of the RRa, and capnographic waveforms while listening to recorded breath sounds were used to compare respiration rate of both capnography and RRa. Bias, precision, and limits of agreement of RRa compared with capnography and RRa and capnography compared with the reference method were calculated. Tolerance and reliability to the acoustic sensor and nasal cannula were also assessed.

Results

Thirty-nine of 40 patients (97.5%) demonstrated good tolerance of the acoustic sensor, whereas 25 of 40 patients (62.5%) demonstrated good tolerance of the nasal cannula. Intermittent thoracic impedance produced erroneous respiratory rates (>50 b·min⁻¹ from the other methods) on 47% of occasions. The bias \pm SD and limits of agreement were -0.30 ± 3.5 b·min⁻¹ and -7.3 to 6.6 b·min⁻¹ for RRa compared with capnography; -0.1 ± 2.5 b·min⁻¹ and -5.0 to 5.0 b·min⁻¹ for RRa compared with the reference method; and 0.2 ± 3.4 b·min⁻¹ and -6.8 to 6.7 b·min⁻¹ for capnography compared with the reference method.

Conclusions

When compared to nasal capnography, RRa showed good agreement and similar accuracy and precision but was better tolerated in postsurgical pediatric patients.