Range90 as indicator for ventilator output versus patients demand: NAVA and pressure support for non-invasively ventilated patients

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Introduction: Neurally Adjusted Ventilatory Assist (NAVA) is a ventilation mode that triggers breaths based on diaphragm electrical activity (Eadi). Since ventilator input is determined from patient ventilatory demand, it offers potential advantages over standard pressure support (PS) mode for patient-ventilator synchrony. It is expected that tidal volume (Vt) would better match Eadi under NAVA than PS. *Materials and methods:* A comparative study of patient-ventilator interaction was performed for 13 non-invasively ventilated patients during standard PS with clinician determined ventilator settings; and NAVA. NAVA gain is set to ensure same peak airway pressure as in PS. A 20 minute continuous recording was performed in each mode. Respiratory rate, Vt, and Eadi were recorded, and Vt/∫Eadi was assessed for every breath. For each patient, Range90 (5-95% range of Vt/∫Eadi) was calculated. A smaller range indicates better matching of Vt to Eadi demand, and if larger range, a lesser ability to match Vt to Eadi demand. This ratio also normalizes differences in demand within and between patients or ventilatory modes. *Results and discussion:* For NAVA, the median [IQR] Range90 = 0.0228 [IQR: 0.0162-0.0993]. For PS, Range90 = 0.0424 [IQR: 0.0244-0.2387]. As a larger range indicates less matching, the median [IQR] of the ratio of Range90 values for each patient (PS/NAVA) is 2.08 [IQR: 1.21-3.19], showing that NAVA significantly outperformed PS. PS/NAVA ratio < 1.21 had relatively equivalent performance, and only 1 patient had a value less than 1.00 (value: 0.59), indicating that PS performed better in only 1 case. NAVA provided better matching of Vt output to Eadi ventilatory demand for 12 of 13 NIV patients. These results were achieved regardless of any differences in ventilatory demand or its variability for a given patient or ventilatory mode. They are consistent with the improved patient-ventilator synchrony for NAVA reported in the literature.