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Comment on "Average Volume-Assured Pressure Support Modes for Hypercapnic Respiratory Failure: Its Early Use in the Emergency Department"

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To the Editor,

Average volume-assured pressure support (AVAPS) is a ventilatory mode that maintains an adequate tidal volume under variations in the inspired pressures between a minimum and maximum range. This ventilatory mode is especially useful in patients with alveolar hypoventilation.[1]In patients with acute respiratory decompensation and, especially, changes in partial pressure of carbon dioxide (pCO_2) and pH, AVAPS could quickly act by lowering pCO_2 and normalizing pH, improving the clinical condition of the patient, and especially, the one inherent in the narcotic effect of pCO_2 on the central nervous system and the level of consciousness.[2]Therefore, the rapid use of a noninvasive mechanical ventilator (NIMV) with AVAPS in a specific group of patients with acute respiratory hypercapnic failure could have a great clinical impact with favorable results if applied from the medical emergency department (ED) arrival.[3]Recently, we read the original article titled, "Comparison of BPAP S/T and AVAPS Modes for Hypercapnic Respiratory Failure in the Emergency Department: A Randomized Controlled Trial".[3]The authors of this study randomized 33 patients from the S/T group and compared them with 47 patients from the AVAPS group to determine the improvement of PCO_2 and pH values.

We would like to congratulate Murphy et al. for carrying out this study; however, we have made a few remarks.

First, No specific causes of acute hypercapnic respiratory failure are reported. The authors do not establish the causes of acute hypercapnic respiratory failure in both S/T vs. AVAPS groups although they emphasize that 79.8% of their patients had chronic obstructive pulmonary diseases (COPD) and the remaining 21.2% had respiratory failure hypercapnia by other unspecified causes. Studies have shown variability of results between the uses of NIMV in patients with different causes of acute hypercapnic respiratory failure, COPD, obstructive sleep apnea syndrome, asthma, kyphoscoliosis, and neuromuscular diseases[1]

Second the absence of evaluative parameters for ventilator mode monitoring that may influence the results. The authors reported a range of pressure values that are programmed for inspiratory positive airway pressure (IPAP) (12–26 cmH_2O) and tidal volume (TV, target 6–8 ml/kg/ideal weight). However, they do not provide monitoring data for the patient's IPAP or exhaled TV. High expired tidal volumes expressed in >9.5 ml/kg/ideal weight are predictors of the results of NIMV usage.[4]Additionally, the significant changes in systolic and diastolic blood pressure in the AVAPS group are striking ($P < 0.001$), which may have been influenced by inspired pressure levels causing changes in elasticity and compliance of the respiratory system when using AVAPS with mean arterial pressure changes.[5]Further, the authors report insufficient compliance with the use of AVAPS 1.14 (0.53–2.43). The rapid recovery of the sensorium and excessive leakage could be determining factors of compliance and adaptation to the use of AVAPS in patients with hypercapnic encephalopathy.[6]

Third missing data in the follow-up of patients could affect the final results. Of the patients included in the study, 13 were transferred to the intensive care unit of other hospitals. The mean length of the patients' ED stay was 49.3 ± 52.6 h. The NIMV failure can be immediate, mediate, and late, therefore the lack of data in the follow-up of patients could especially affect the secondary outcomes regardless of patient survival. The authors report a rapid discharge of patients from the ED in favor of AVAPS (risk relative 1.38 [0.62–3.09]). This rapid discharge may be influenced by certain ventilatory parameters inherent to the use of AVAPS, such as the inspired pressures necessary to maintain an expired TV that guarantees minute ventilation and the presence of leakage.

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In patients with acute illness undergoing NIMV in daily practice, initially set high pressures are not well-tolerated and are, therefore, not usually set higher than a range of 20– to 25 cm of water.

In summary, the use of AVAPS in an acute clinic setting upon ED arrival of patients could provide rapid recovery of the sensorium with blood gases and minute ventilation improvement with rapid clinical repercussion on the level of consciousness. However, its results compared with the standard S/T modes of NIMV should be evaluated under similar and appropriate circumstances when evaluating the applicability of ventilatory mode in this acute setting in the ED.

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