

Title: Role of HACOR score in predicting non-invasive ventilation failure in COPD patients.

Abstract

Background: Various guidelines on management of respiratory failure in patients with chronic obstructive pulmonary disease (COPD), strongly advise the use of non-invasive ventilation (NIV). Non-invasive ventilation decreases the work of breathing, while increasing minute ventilation, balancing intrinsic positive end-expiratory pressure (PEEP) and improving gas exchange. NIV reduces the need for intubation and invasive mechanical ventilation in patients with hypoxemic or hypercapnic respiratory failure. Despite the fact that NIV decreases the requirement for intubation in COPD patients, mortality increases considerably if NIV failure occurs. Thus, early identification of patients at risk for NIV failure and timely intubation and invasive ventilation may lower mortality.

The Heart rate, Acidosis, Consciousness, Oxygenation, and Respiratory rate (HACOR) score was developed and validated by Duan et al, as a clinical prediction score for NIV failure in patients with hypoxemic respiratory failure of different aetiologies. Authors found that HACOR score was a rapid and convenient tool to assess and predict NIV failure. The **objective** of this study was to evaluate the efficacy of Heart rate, Acidosis, Consciousness, Oxygenation, and Respiratory rate (HACOR) score in predicting NIV outcome in COPD-associated respiratory failure.

Methodology: A prospective observational study was conducted in 100 COPD patients with acute respiratory failure who were initiated for non-invasive ventilation. HACOR score was calculated at the start of NIV (BiPAP) and after 1-2 hours, then at 12 and 24 hours. NIV failure was defined as progression to invasive mechanical ventilation or death. NIV success was defined as weaning from NIV prior to 7th day of hospital admission and not meeting criteria for failure.

Result: In this study, 100 patients of COPD with respiratory failure were enrolled. Their mean age was 65.34 year (8.19 SD). Male patients were predominant (n=81). 89% patients were smokers and remaining had exposure to biomass fuel. At initiation of NIV, the median HACOR score was 3 (IQ: 2,4). There were 17 (17%) patients whose HACOR score at initiation was more than or equal to 5. In 13 (13%) patients there was NIV failure. In patients with HACOR score ≥ 5 , NIV failure rate was 76.4 %. Seven patients died during the course of hospitalization. Six patients among them had HACOR score ≥ 5 at initiation of NIV. Hence mortality was 41.1 % in patients with HACOR score ≥ 5 . AUC for prediction of NIV failure by HACOR score at initiation with cut off level ≥ 5 , was 0.980 (P value<0.05).

Conclusions: The HACOR score had high sensitivity as well as specificity for prediction of NIV failure, recorded at initiation of NIV. A higher HACOR score predicts the high chance of NIV failure. Obtaining the HACOR score at the bedside makes it convenient for assessing the efficacy of NIV in patients with COPD. In high-risk patients identified by HACOR score assessed at initiation of treatment and with a cut off value of ≥ 5 , elective and early intubation will result in decreased hospital mortality. Hence, HACOR score is a rapid, simple and effective bedside tool for assessment of COPD patients receiving non invasive ventilatory support.