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Title: Who benefits most from non-invasive ventilation for hypercapnic exacerbations of chronic obstructive pulmonary disease

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Body: Introduction: Non-invasive ventilation (NIV) has revolutionised the management of hypercapnic exacerbations of chronic obstructive pulmonary disease (COPD). We wished to evaluate factors related to its overall success in the "real-life" setting. Methods: A retrospective analysis of patients receiving NIV for a hypercapnic exacerbation of COPD was performed. Demographics, laboratory data, blood gases and outcomes (hospital discharge or in-patient death) were extracted and subsequently analysed to identify factors relating to its overall success or failure. Results: Over 6 years, 240 patients (mean age 70 years), received NIV with mean pH and pCO₂ prior to NIV 7.24 and 10.4kPa respectively; of these, 167 survived to hospital discharge with a median age (70 vs. 74; p=0.02) lower than non-survivors. Absolute values of pH and pCO₂ (higher and lower respectively) prior to NIV and at 1 hour were both associated with successful hospital discharge. An improvement (p=0.02) in pH within an hour of receiving NIV - but not pCO₂ - was associated with surviving to hospital discharge. Of all laboratory data assessed, only baseline urea was significantly (p=0.021) associated with a successful outcome. Conclusion: Younger patients with a lower urea, higher pH and lower pCO₂ at baseline and who demonstrate an improvement in pH within 1 hour, are more likely to have a successful outcome when given NIV for a hypercapnic exacerbation of COPD on an unselected basis.