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Title: A randomised controlled trial comparing stepwise versus immediate withdrawal from non-invasive ventilation in chronic obstructive pulmonary disease patients recovering from acute hypercapnic respiratory failure

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Body: Background COPD patients who suffer from exacerbation with acute hypercapnic respiratory failure (AHcRF) benefit from non-invasive ventilation (NIV). The best withdrawal method of NIV is not known. Aim and objectives To compare the success rate of withdrawal in NIV between stepwise withdrawal and immediate withdrawal in COPD patients with AHcRF. Method This was a prospective, single-centre, open-labelled randomised study comparing stepwise and immediate withdrawal of NIV. The primary end-point was the success rate of NIV withdrawal. The secondary end-points were hospital length of stay and duration of NIV use. Results Sixty patients were randomised: 35 patients to the stepwise withdrawal group and 25 patients to the immediate withdrawal group. There was no statistically significant difference in the success rate of withdrawal of NIV and length of stay after randomisation, with the success rate of 74.3% and 56% in stepwise and immediate withdrawal group respectively ($p = 0.139$). There was statistically significant difference in the duration of NIV with median duration of 5 days and 3 days in stepwise and immediate withdrawal group respectively ($p = 0.001$). The post-hoc analysis showed the use of LAMA, higher inhaled steroid dosage and higher arterial pH value on randomisation were the factors associated with success in withdrawal in the immediate group. Conclusion Our study showed no significant difference in the success rate and length of stay between stepwise withdrawal and immediate withdrawal of NIV. Duration of NIV was significantly shorter in the immediate withdrawal group.