Nocturnal Non-invasive Ventilation for COPD: New Evidence for Improvement in Outcomes

Jeremy E. Orr, MD, Fellow, Division of Pulmonary and Critical Care Medicine, UCSD

Key Points Nocturnal Non-invasive Ventilation for COPD:

1. Nocturnal non-invasive positive pressure ventilation may improve mortality in COPD patients with chronic respiratory failure.
2. Use of higher intensity support to improve daytime PCO2 might be responsible for the disparate findings of this study compared to prior randomized trials.
3. Important questions remain regarding appropriate patient selection, feasibility of follow up, proper modes of ventilation, and potential presence of OSA-COPD overlap syndrome.

Patients with chronic respiratory failure due to COPD have an increased mortality relative to controls. One postulated mechanism is progressive failure of respiratory muscles, which may be weak in COPD patients relative to inspiratory load. Nocturnal non-invasive positive pressure ventilation (NPPV) is effective at resting inspiratory muscles, and therefore is a potential strategy to promote recovery and improve compensation. Starting in the 1980s, numerous studies have examined the effect of NPPV on COPD outcomes; however, a consistent benefit has not been found (1, 2). More recently, at least one randomized trial has found a modest mortality benefit, albeit at the cost of worsened quality of life (3).

In an article recently published in *The Lancet Respiratory Medicine*, Kohnlein *et al* (4) report a randomized controlled trial of nocturnal NPPV versus usual care in a group of 195 COPD patients with chronic hypercarbic respiratory failure. In contrast to prior studies, high levels of pressure support were used to target a 20% reduction in PCO2, a strategy advocated by several of the co-authors in prior publications (5). Those in the intervention group received NPPV using bi-level positive airway pressure with back up rates, or control ventilation; the individual settings were at the discretion of the physician. Both NPPV and control groups had scheduled hospitalizations at the start of the study and regular intervals for 1 year total. Enrolled subjects were mostly in their 60s, slightly male predominant, non-obese, and with severe to very-severe obstruction. At the 1 year analysis, average use in the NPPV group was 5.9 hours/night, with an average inspiratory pressure of 21.6 mmHg, expiratory pressure 4.8 mmHg, and backup rate of 16.1/min. For their primary outcome, mortality at 1 year was significantly higher in the control group (33%) than the NPPV group (12%). This finding was associated with a 7.4% reduction in the PCO2 from mean baseline PCO2 of 58 mmHg in those using NPPV. Quality of life was also slightly better in the NPPV group compared to controls.

Kohnlein and colleagues conclude that nocturnal NPPV improves mortality in COPD patients with hypercarbic respiratory failure. They emphasize that the reduction in PCO2 distinguishes this trial from others in which benefit was not shown and therefore might be crucial for efficacy. While these findings are heartening for severe COPD patients with dismal effective treatment options, numerous questions remain. The study was non-blinded, so co-interventions could have

certainly resulted in some bias, an assertion supported by the increased number of hospital days in the intervention group as part of scheduled follow up. Moreover, all subjects had intensive follow up with regular hospitalizations, which stands in contrast to usual care in most clinical settings, and raises concerns about real-world feasibility. Device modes and settings were also not specified or analyzed, but are a practical consideration for clinicians who need to avoid using more advanced and expensive devices than needed. The presence of COPD-OSA overlap syndrome was also not assessed. If present, benefits seen in the NPPV group might have been attributable to relief of obstruction, rather than inspiratory muscle rest. Overall, the mechanism of benefit remains unclear, and further investigation is warranted to better focus treatment, but this study reveals promise for improved outcomes in chronic respiratory failure from COPD.

References:

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