

Noninvasive ventilation reduced deaths and the need for intubation in acute-on-chronic obstructive pulmonary disease

Plant PK, Owen JL, Elliott MW. Early use of non-invasive ventilation for acute exacerbations of chronic obstructive pulmonary disease on general respiratory wards: a multicentre randomised controlled trial. *Lancet*. 2000 Jun 3;355:1931-5.

QUESTION

In patients with mild-to-moderate acidosis caused by exacerbation of chronic obstructive pulmonary disease (COPD), does early introduction of noninvasive ventilation reduce in-hospital mortality and the need for intubation?

DESIGN

Randomized (allocation concealed*), unblinded,* controlled trial with follow-up to discharge from hospital.

SETTING

General respiratory wards of 14 hospitals in the United Kingdom.

PATIENTS

236 patients (mean age 69 y, 54% men) who were admitted to the emergency department with an acute exacerbation of COPD, were tachypneic with a respiratory rate > 23/min, and had a pH of 7.25 to 7.35 and a PaCO₂ > 6 kPa. Exclusion criteria were a Glasgow coma scale score < 8, pneumothorax, or active treatment deemed inappropriate.

INTERVENTION

118 patients were allocated to standard treatment, and 118 were allocated to standard treatment plus pressure-supported ventilation through a face or nasal mask.

MAIN OUTCOME MEASURES

Need for intubation, in-hospital mortality, respiratory rate, and levels of arterial blood gases.

MAIN RESULTS

Analysis was by intention to treat. Fewer patients in the standard-treatment-plus-ventilation group needed intubation ($P < 0.02$) or died than did those in the standard-treatment-alone group (Table). Noninvasive ventilation led to a more rapid improvement in pH in the first hour

($P = 0.02$), a greater decrease in respiratory rate at 4 hours ($P = 0.04$), and a reduced duration of breathlessness ($P = 0.03$).

CONCLUSION

In patients with mild-to-moderate acidosis caused by an exacerbation of chronic obstructive pulmonary disease, noninvasive ventilation reduced deaths and the need for intubation on general respiratory wards.

Source of funding: Northern and Yorkshire NHS Executive. Ventilators loaned by ResMed (UK) Ltd.

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*See Glossary.

Standard treatment plus noninvasive ventilation (NIV) vs standard treatment alone in chronic obstructive pulmonary disease at discharge from hospital†

Outcomes	NIV	Standard	RRR (95% CI)	NNT (CI)
Need for intubation	15%	27%	44% (7 to 66)	9 (5 to 69)
Death	10%	20%	50% (6 to 74)	10 (6 to 98)

†Abbreviations defined in Glossary; RRR, NNT, and CI calculated from data in article.

COMMENTARY

The study by Plant and colleagues highlights the limited access to intensive-care-unit (ICU) or high-dependency-unit (HDU) beds in the National Health Service in the United Kingdom; it also points to the need to consider alternative venues for provision of noninvasive ventilation for acute exacerbations of COPD (1). It is impressive that on the wards chosen for this study the nurses were generally unfamiliar with noninvasive ventilation; no ward had previously used the ventilator chosen for this study. The amount of formal training required for this change was only 7.6 h/mo in the first 3 months and 0.9 h/mo thereafter. The median nurse-to-patient ratio was 1:11. Noninvasive ventilation led to only a 26-minute increase in nursing workload within the first few hours of admission, and no difference existed after 8 hours. This finding was reproducible at the various study sites, which suggests that provision of noninvasive ventilation could be implemented as a quality improvement project, usually easily fundable at any hospital. The small increase in workload also reflects the ease of use of the ventilator and masks. Once the mystery is removed, noninvasive ventilation is a tool that can be widely used by specialists and nonspecialists alike with immediate and profound clinical benefits for patients.

Standard procedures included bronchodilation, anti-infectives, and steroids (2); however, because the study was unblinded, and although the need for intubation was well-defined, mortality (the hard outcome) still may have been somewhat dependent on the course of therapy provided by the attending physicians.

With our growing elderly population, the widespread underdiagnosis and undertreatment of COPD in the community, and the absence of a disease-modifying medication, this study is timely. COPD remains a forgotten illness with considerable morbidity, health-related costs, and mortality. We should seriously contemplate incorporation of this protocol into our COPD pathways.

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References

- Elliott MW, Boudouin SV. Respiratory intensive care in Europe: lessons for the UK. *Thorax*. 1998;53:798-802.
- The COPD Guidelines Group of the Standards of Care Committee of the BTS. BTS guidelines for the management of chronic obstructive pulmonary disease. *Thorax*. 1997;52(Suppl):S1-28.