THE LINDE GROUP

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Non-invasive positive pressure ventilation in COPD.

The new evidence.

Linde: Living healthcare

The new research.

"A study of non-invasive positive pressure ventilation (NPPV) for the treatment of severe stable chronic obstructive pulmonary disease: a prospective, multicentre, randomized, controlled clinical trial."

NPPV in COPD: background

Until now no study has convincingly demonstrated that long-term non-invasive positive pressure ventilation (NPPV) improves survival in patients with stable hypercapnic chronic obstructive pulmonary disease (COPD).

A study by Thomas Köhnlein et al[1] investigated the effect of long-term NPPV, targeted to markedly reduce hypercapnia, on survival in patients with severe, stable hypercapnic COPD.

Method and design

Köhnlein's clinical trial enrolled patients with stable GOLD stage IV COPD and PaCO2 of 7 kPa (51.9 mm Hg) or higher and pH higher than 7.35 (n=195).

Patients in the control group received optimised COPD therapy without NPPV (n=93).

Patients in the intervention group received optimised COPD therapy plus NPPV (n=102).

Patients were recruited over a period of six years, with follow up taking place over one year.

- → NPPV was targeted to reduce baseline PaCO2 by at least 20% or to achieve PaCO2 values lower than 6.5 kPa (48·1 mm Hg).
- → Ventilator settings were individually tailored according to body constitution, airway obstruction, and compliance of the lungs and the thorax to achieve a maximum of PaCO2 reduction in all patients.
- → Ventilators were set in pressure support ventilation mode and ventilation was performed with high backup rates to achieve controlled ventilation.
- → Mean inspiratory pressure was 21.6 cmH_2O and mean expiratory pressure 4.8 cmH_2O. Mean backup frequency was 16.1 BPM.
- → Mean NPPV usage was 5.9h/day.

"...the addition of NPPV targeted to greatly reduce hypercapnia to standard treatment improves overall survival, exercise capacity, and HRQL over one year in patients with chronic hypercapnic COPD compared with guideline-oriented COPD treatment without NPPV."

[1] Non-invasive positive pressure ventilation for the treatment of severe stable chronic obstructive pulmonary disease: a prospective, multicentre, randomised, controlled clinical trial, Thomas Köhnlein, et al. The Lancet Respiratory Medicine, Volume 2, Issue 9, September 2014, Pages 698-705 http://www.sciencedirect.com/science/article/pii/S2213260014701535.

Improved COPD patient outcomes.

"The study found improvements in overall survival, lung function, and quality of life."

Primary outcome

→ The main finding of Köhnlein's study is the positive effect of long-term NPPV on overall survival in patients with hypercapnic, chronic, stable COPD (p=< 0.001).

→ This survival benefit became evident over one year of treatment and seemed to persist thereafter without further increase.

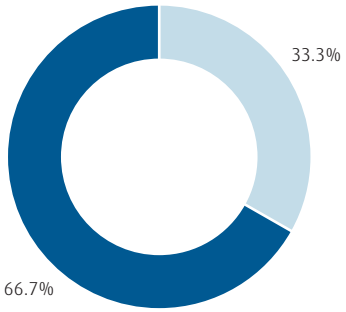
Secondary outcome

→ NPPV treatment was associated with significant improvements in PaCO2, pH, bicarbonate, FEV1, and health related quality of life (HRQL).

Of the 93 patients in the control group (no ventilation), 33.3% died during the one year observation period. However the mortality rate was only 11.8% among the 102 patients in the intervention group (using NPPV). This remarkable result equates to a reduction in mortality risk of 76% for patients with severe COPD.

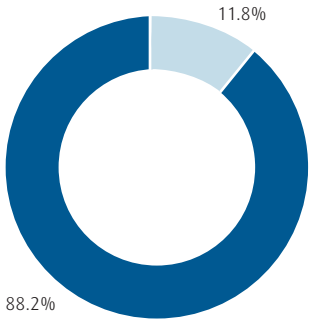
Survival rate without NPPV

Mortality after 12 months ■ Survival rate after 12 months



Control group (93 patients)

Survival rate with NPPV



Intervention group (102 patients)

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