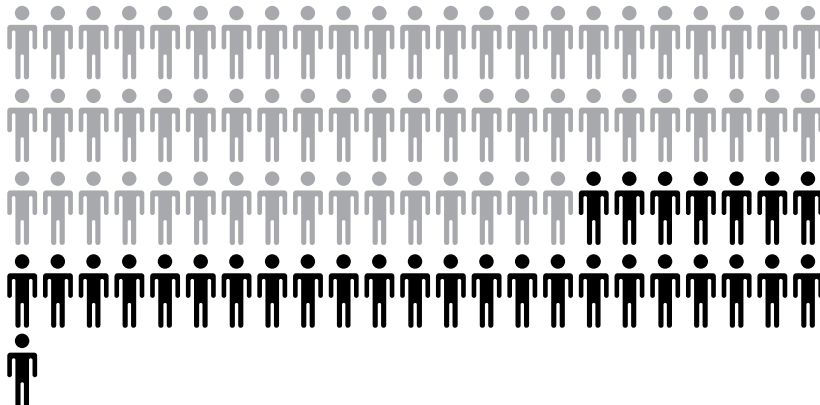




NIV Intervention group



Control group



NIV therapy reduces the risk of death by **76%** in chronic COPD patients over one-year<sup>1</sup>

# Non-invasive positive pressure ventilation for the treatment of severe, stable chronic obstructive pulmonary disease: a prospective, multicentre, randomised, controlled clinical trial.<sup>1</sup>

## Study Design

Investigator initiated, prospective, multicentre (Germany, Austria), randomised controlled trial of 195 patients (open label but assessors were blinded).

Stable GOLD stage IV COPD and a partial pressure of carbon dioxide (PaCO<sub>2</sub>) of 7 kPa (51.9 mmHg) or higher and pH higher than 7.35 (non acidotic) measured after at least one hour rest in a sitting position.

Patients were randomised to;

- a control group (n=93) that received optimised standard treatment.
- a treatment group (n=102) who received NIV for at least 12 months.

The primary outcome was one-year all-cause mortality and analysis was intention to treat.

## Main exclusion criteria

- abnormalities of the thorax or lung other than COPD
- obesity with a BMI ≥35kg/m<sup>2</sup>
- severe heart failure

## Therapy

NIV was targeted to reduce baseline PaCO<sub>2</sub> by 20% or more, or achieve PaCO<sub>2</sub> values lower than 6.5kPa (48.1 mm Hg).

Support ventilation mode (plus back-up rate preferred) and advised to use > 6hrs/day.

Outcome assessors were blinded to treatment.

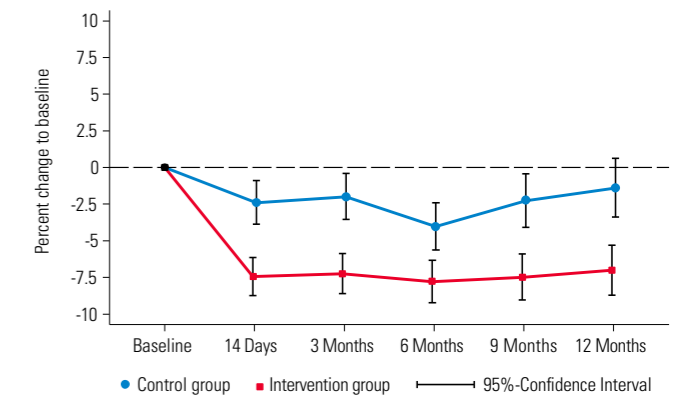
## Settings and adherence

- Mean IPAP = 21.6 cmH<sub>2</sub>O (SD 4.7)
- Mean EPAP = 4.8 cmH<sub>2</sub>O (SD 1.6)
- Mean back-up (where used) = 16/min (SD 3.6)
- Mean usage 5.9 hrs (SD 3.1)

## Better quality of life

Using the St George's Respiratory Questionnaire, patients treated with NIV reported that their quality of life was 5.8 points higher than patients treated without NIV (p=0.0289).

## PaCO<sub>2</sub> (p<0.0001)



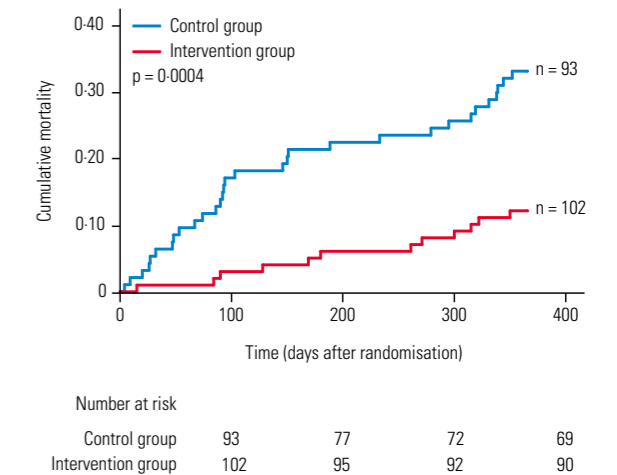
## Relevance to clinical practice

Stable, chronic, hypercapnic COPD patients can significantly benefit from NIV treatment in terms of reduced mortality and improved QoL.

- by using an adequate dose (pressure and usage) of ventilation
- and focusing on reducing PaCO<sub>2</sub> as the clinical target.

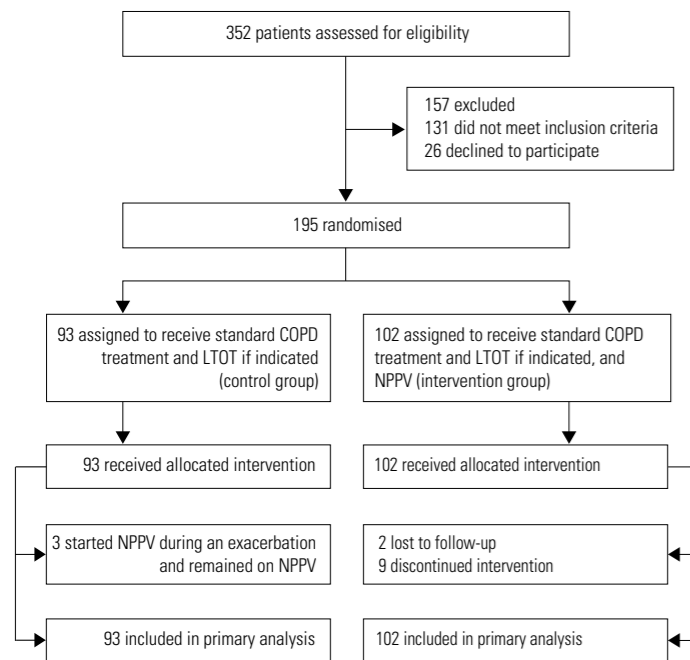
## Mortality Risk Reduction of 76% over 1 year

One-year mortality in the NIV group was 11.8% vs. 33.3% in the control group (HR 0.24, CI 0.11-0.49; p=0.0004).



	Control group (n=93)	Non-invasive positive pressure ventilation group (n=102)
Age, years	64.4 (8.0)	62.2 (8.6)
Male, n (%)	56 (60%)	65 (6.4%)
Body-mass index, kg/m <sup>2</sup>	24.5 (5.8)	24.8 (5.8)
FVC % predicted	53.3% (13.8)	50.4% (13.3)
FEV <sub>1</sub> predicted	27.5% (8.9)	26% (11.0)
FEV <sub>1</sub> /FVC %	41.2% (11.4)	40.4% (11.5)
Residual volume/total lung capacity, %	72.7% (8.9)	73.0% (8.5)
pH	7.39 (0.05)	7.39 (0.04)
PaCO <sub>2</sub> , kPa	7.7 (0.7)	7.8 (0.8)
PaO <sub>2</sub> , kPa*	8.7 (1.9)	8.6 (2.1)
SaO <sub>2</sub> , %*	90.8% (5.9)	90.3% (6.2)
HCO <sub>3</sub> <sup>-</sup> , mmol/L	33.9 (4.1)	34.3 (4.0)
Base excess, mmol/L	8.0 (3.09)	7.8 (3.8)
6-min walk distance, m	249.6 (145.3)	226.7 (121.2)
Long term oxygen treatment, n (%)	60 (65%)	67 (66%)

Data are mean (SD), unless otherwise stated. FVC=forced vital capacity. FEV<sub>1</sub>=forced expiratory volume in 1s. PaCO<sub>2</sub>=arterial carbon dioxide pressure. PaO<sub>2</sub>=arterial oxygen pressure. SaO<sub>2</sub>=arterial oxygen saturation. HCO<sub>3</sub><sup>-</sup>=bicarbonate. \*In patients with long term oxygen was applied via nasal cannula at the previously prescribed flow rate.



COPD=chronic obstructive pulmonary disease. LTOT=long-term oxygen therapy. NPPV=non-invasive positive pressure ventilation.

*"NIV improves survival, and quality of life, if CO<sub>2</sub> is reduced"*<sup>2</sup>

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- 1 PD Dr. Thomas Köhlein, et al. Non-invasive positive pressure ventilation for the treatment of severe stable chronic obstructive pulmonary disease a prospective, multicentre, randomised, controlled clinical trial. *The Lancet Respiratory Medicine* 2014 Jul 24. pii: S. 2213 – 2600(14)70153-5. doi: 10.1016 / S. 2213 – 2600(14)70153-5. (Epub ahead of print) (NIPPV zur Behandlung schwerer stabiler COPD – eine prospektive, multizentrische, randomisierte, kontrollierte klinische Studie).
- 2 Domiciliary NIV for COPD: where are we now? Elliott, M. *The Lancet Respiratory Medicine* 25th July 2014.