

A close-up photograph of an elderly patient lying in a hospital bed. The patient is wearing a white nasal cannula with blue tubing. The patient's eyes are closed, and they appear to be resting or sleeping. The background is a blurred hospital room.

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Chronic Obstructive Pulmonary Disease*

Long-term effects of oxygen-enriched high-flow nasal cannula treatment in COPD patients with chronic hypoxemic respiratory failure

Key points of the paper

- In chronic obstructive pulmonary disease (COPD) patients with chronic hypoxemic respiratory failure treated with long-term oxygen therapy (LTOT), nasal high flow (NHF) therapy:
 - Reduced exacerbation and hospital admission rates
 - Improved dyspnea, quality of life, exercise performance, and CO₂ retention levels compared to control

Study background

There is increasing evidence for using NHF in both the acute and chronic settings. This study evaluated the use of NHF in COPD patients with chronic hypoxemic respiratory failure treated with LTOT.

Aim

To determine the long-term effects of NHF in COPD patients with chronic hypoxemic respiratory failure treated with LTOT

Study design

A prospective, randomized, controlled trial with a 12-month treatment period

Background

Setting

Patients were recruited from 4 outpatient clinics in Denmark between December 2013 and July 2015.

Population

N = 200

- COPD patients with chronic hypoxemic respiratory failure treated with LTOT

Methods

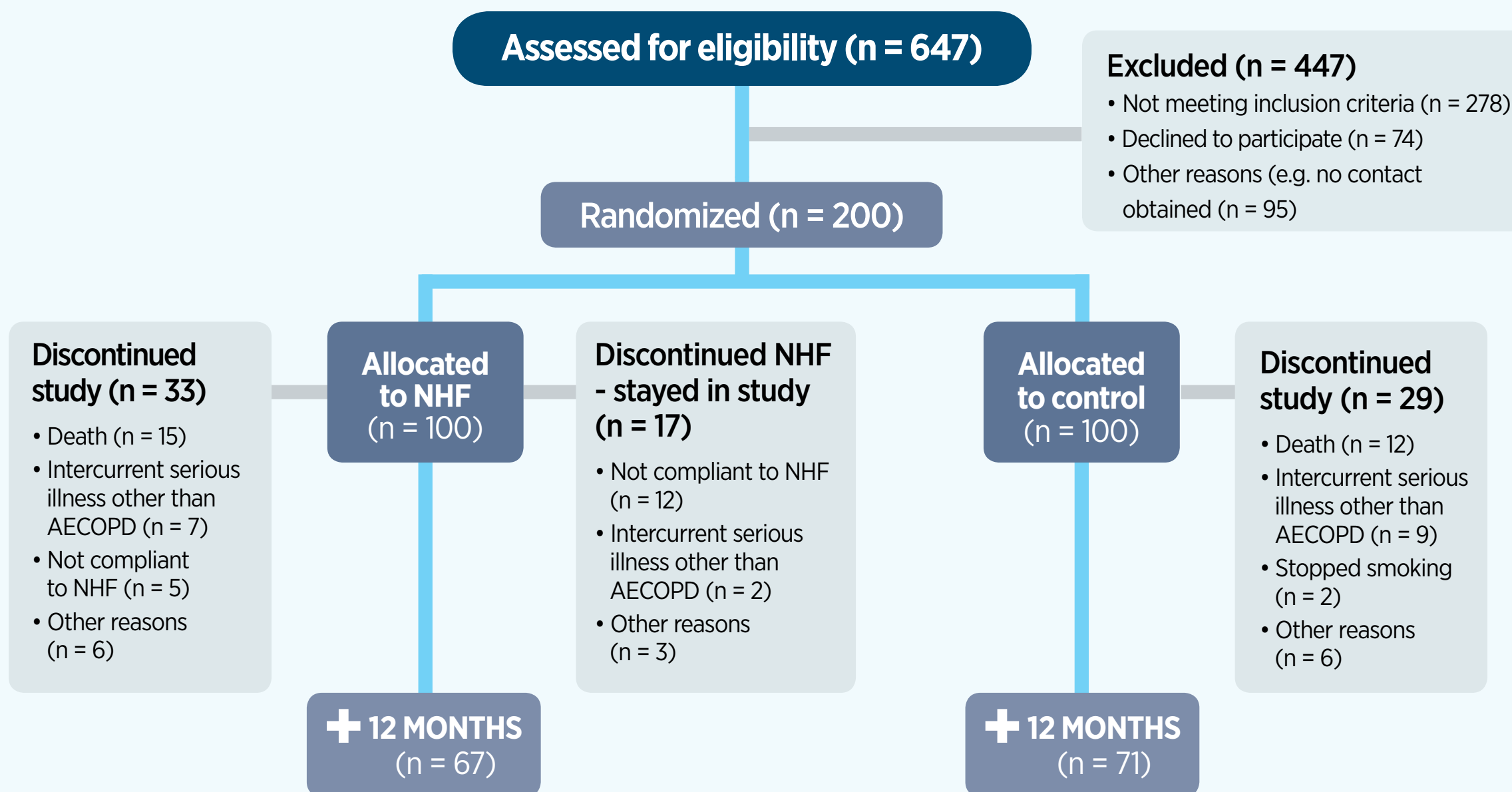
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| PRIMARY OUTCOME | SECONDARY OUTCOMES |
|---|---|
| Acute exacerbation of COPD (AECOPD) rates | Hospital admission rates |
| | Dyspnea assessed by modified Medical Research Council (mMRC) score |
| | Quality of Life assessed by Saint George's Respiratory Questionnaire (SGRQ) |
| | PaCO ₂ |
| | All cause mortality |
| | Exercise performance measured by 6-minute walk test (6MWT) |

Methods

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| INCLUSIONS | EXCLUSIONS |
|---|--|
| COPD patients | Malignant disease, terminal non-malignant disease |
| Chronic hypoxemic respiratory failure | Unstable psychiatric disease |
| Previously prescribed LTOT by a pulmonary medicine specialist at least 3 months prior to start of the study | Home treatment with noninvasive ventilation |
| | Change in smoking habits during the study period |



Methods

- NHF was administered using AIRVO™ via an Optiflow™ nasal cannula.
- Patients were instructed to use NHF for at least 8 hours/day preferably at night, at a flow rate of 20 L/min.
 - Actual average use was 6 hours/day throughout the study period.
 - Actual use patterns:
 - Night only: 53%
 - Day only: 32%
 - Both night and day: 15%

Results

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Baseline characteristics

| CHARACTERISTIC | NHF + LTOT | LTOT ONLY |
|--|--------------|--------------|
| Age (years) | 71.0 ± 8.2 | 70.4 ± 9.0 |
| Female (%) | 56 | 63 |
| Exacerbations in the preceding year | 3.23 ± 3.1 | 2.9 ± 2.8 |
| mMRC score | 3.3 ± 0.9 | 2.9 ± 0.9 |
| PaO ₂ (kPa) ¹ | 9.9 ± 1.8 | 9.9 ± 1.7 |
| PaO ₂ (mmHg) ^{1,2} | 74.3 ± 13.5 | 74.3 ± 12.8 |
| PaCO ₂ (kPa) | 6.5 ± 1.3 | 6.4 ± 1.0 |
| PaCO ₂ (mmHg) ² | 48.8 ± 9.8 | 48.0 ± 7.5 |
| 6MWT (m) | 254.6 ± 89.2 | 245.2 ± 85.0 |

¹ Arterial blood gas on usual supplementary oxygen supply

² Converted into mmHg using a conversion factor of 1 kPa = 7.5 mmHg

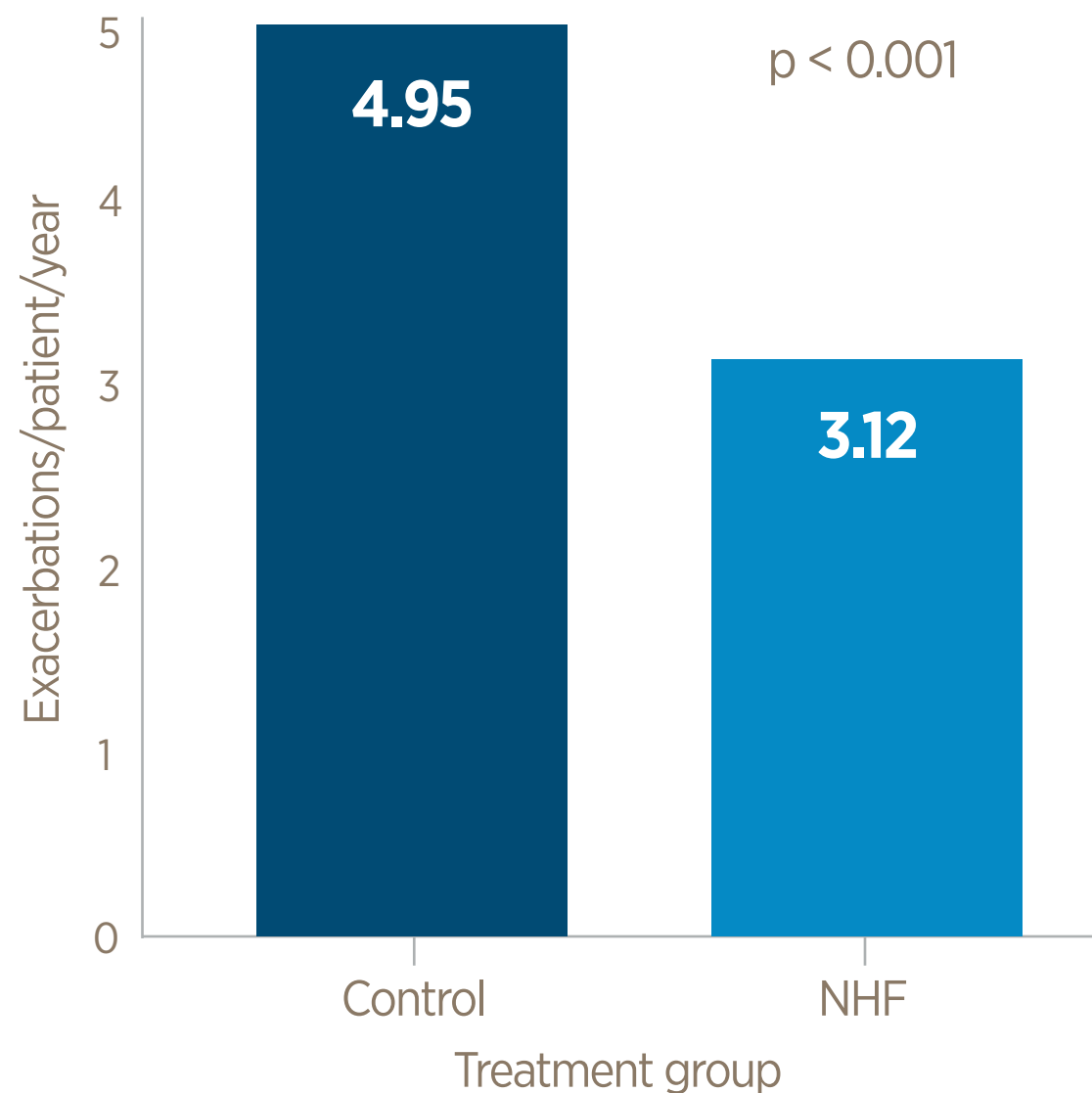
Data are presented as mean ± SD where applicable.

Results

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Primary outcome *(intention to treat analysis)*

- AECOPD rates were significantly lower in patients in the NHF + LTOT group compared to the LTOT only group

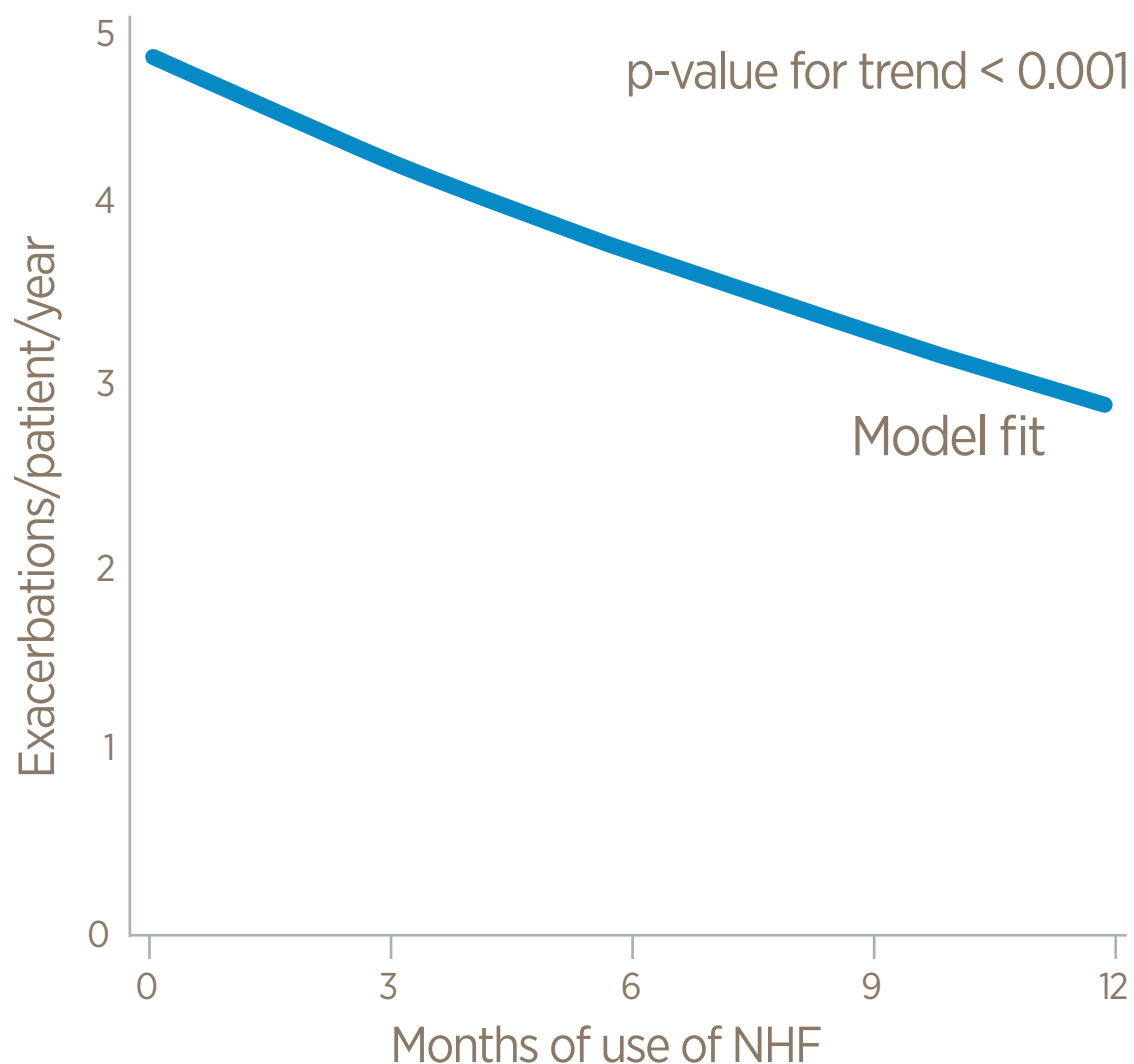


Results

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Primary outcome *(per protocol analysis)*

- COPD exacerbation rates reduced with increasing duration of NHF use



Results

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Secondary outcomes

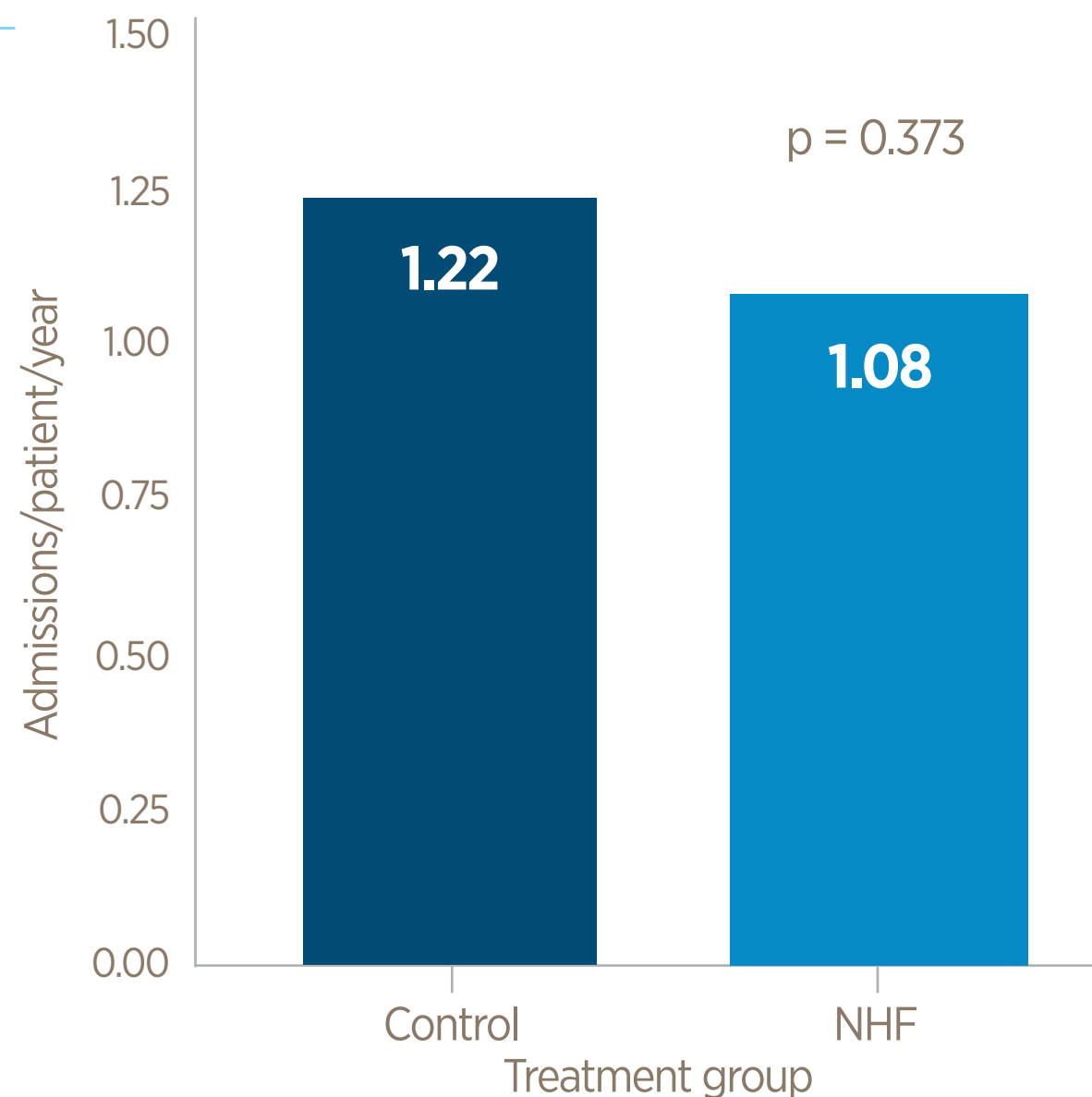
- NHF with LTOT compared to LTOT alone improved:
 - Hospital admission rates for those who followed the protocol
 - mMRC score
 - SGRQ score
 - PaCO₂
 - 6MWT
- Mortality: no difference between the 2 groups

Results

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Secondary outcomes *(intention to treat analysis)*

- There was no significant difference in hospital admission rates in the NHF + LTOT group compared to the LTOT only group

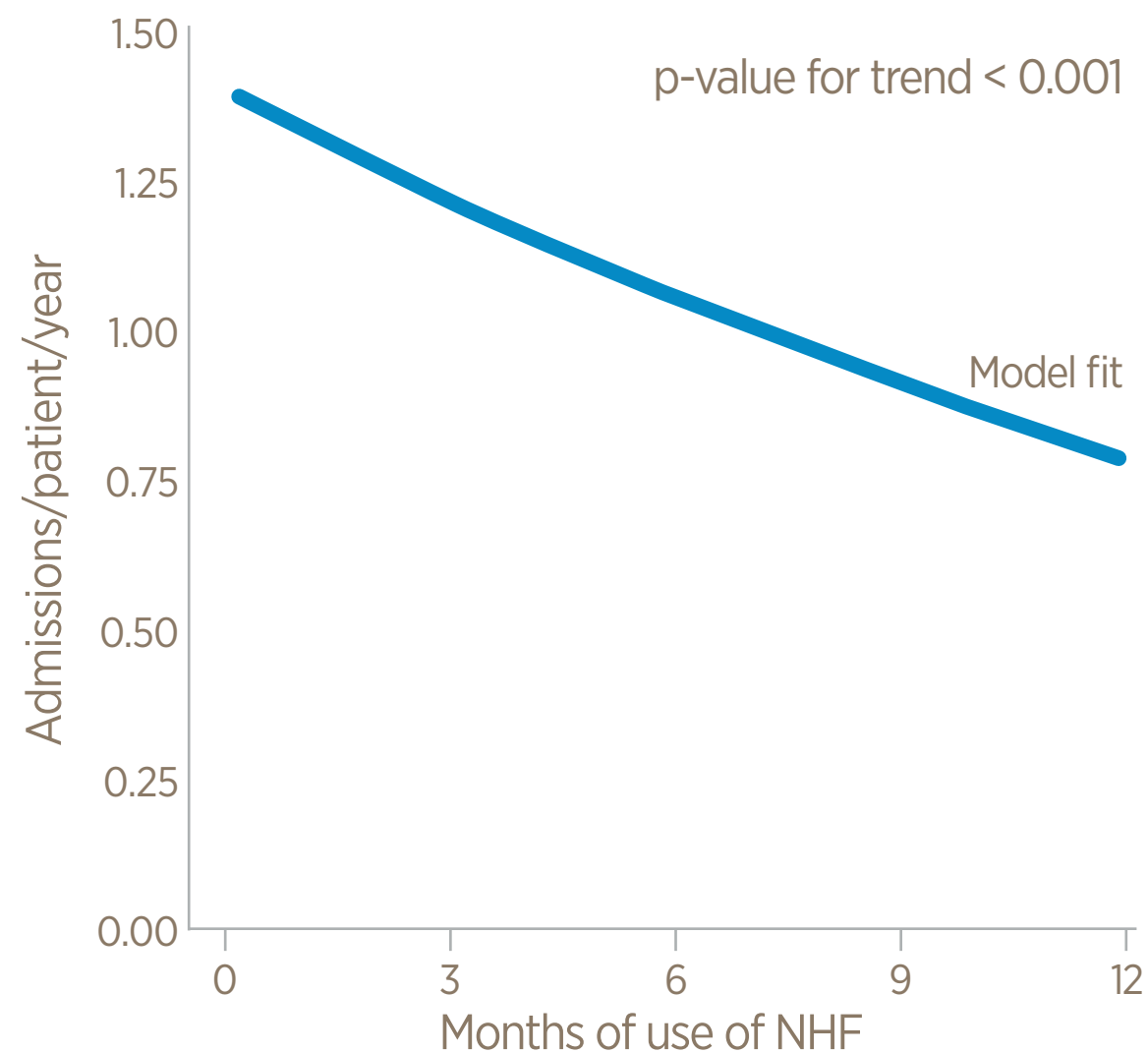


Results

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Secondary outcomes *(per protocol analysis)*

- Hospital admission rates reduced with increasing duration of NHF use



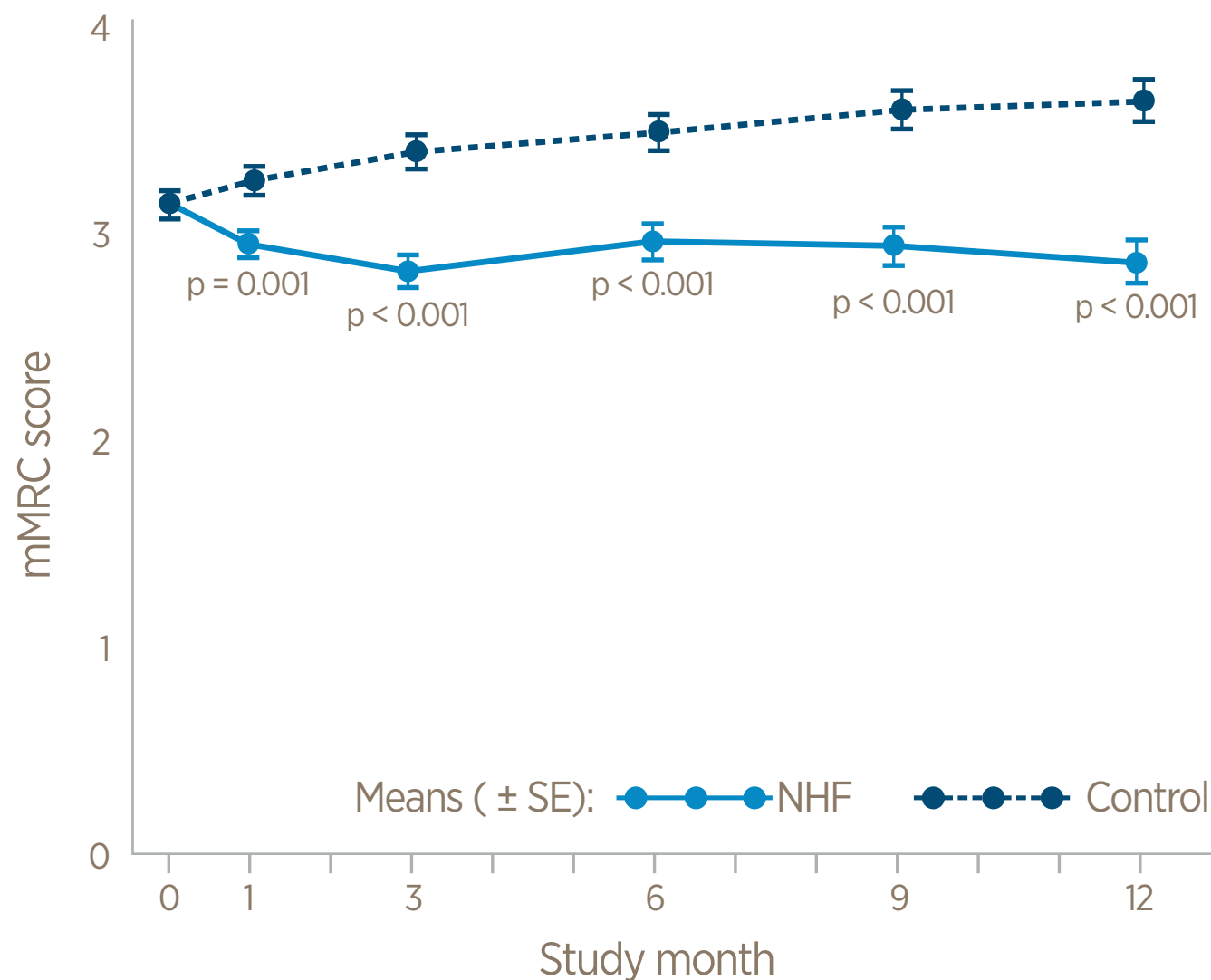
Results

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Secondary outcomes

mMRC score (dyspnea)

- Lower scores indicate less dyspnea



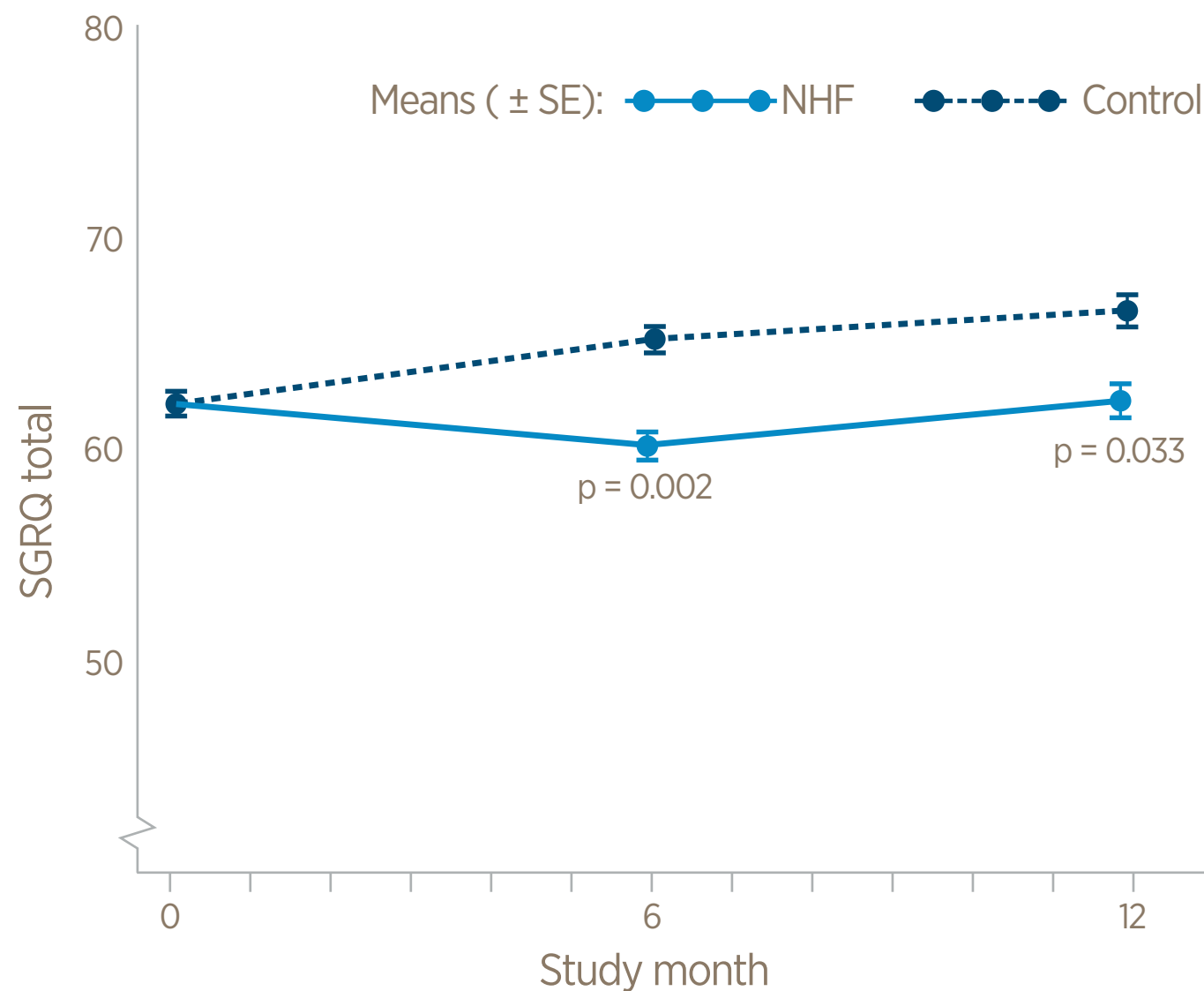
Results

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Secondary outcomes

SGRQ (Quality of Life)

- Lower scores indicate better quality of life



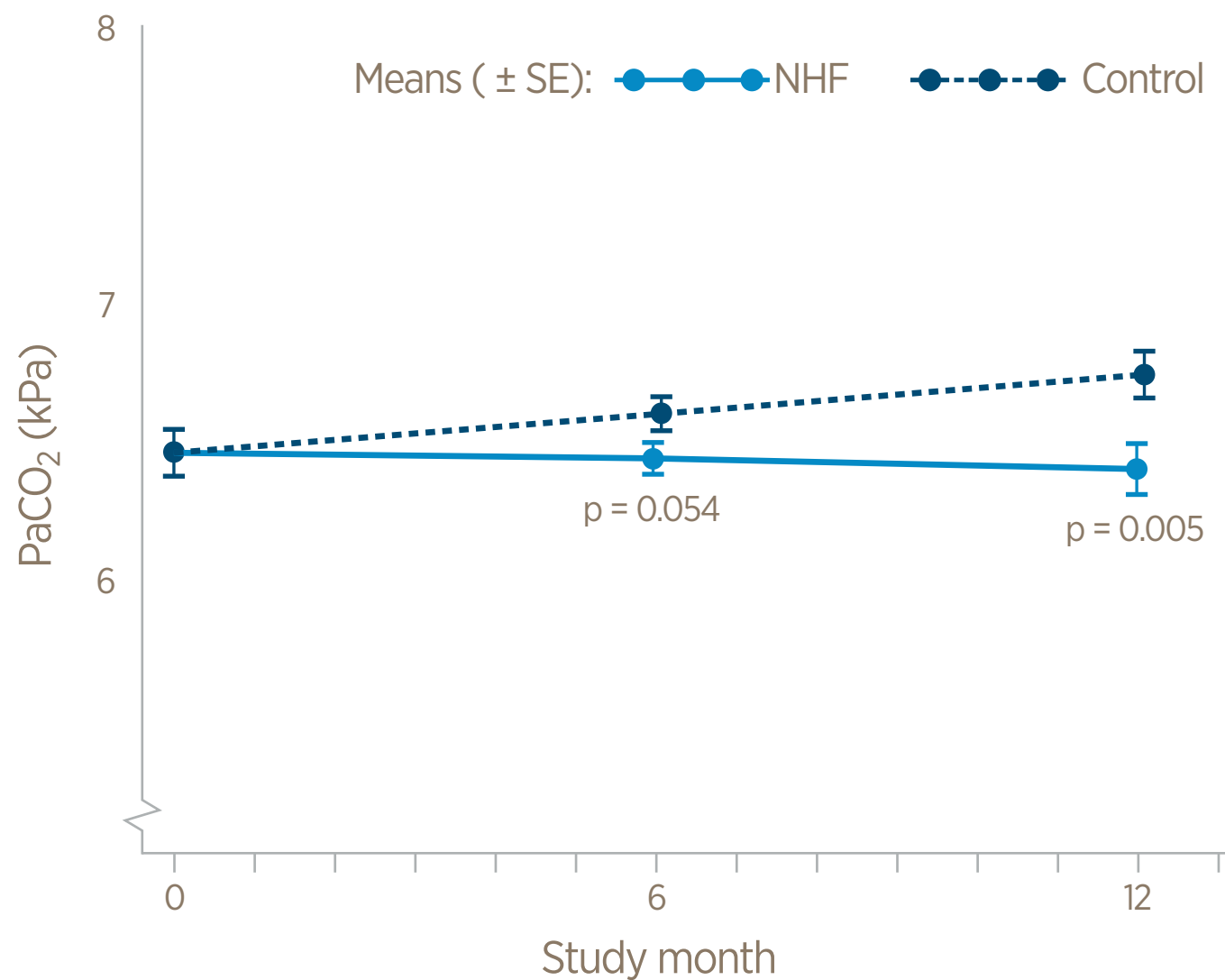
Results

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Secondary outcomes

PaCO₂ (partial pressure of arterial CO₂)

- Lower PaCO₂ values indicate less CO₂ retention



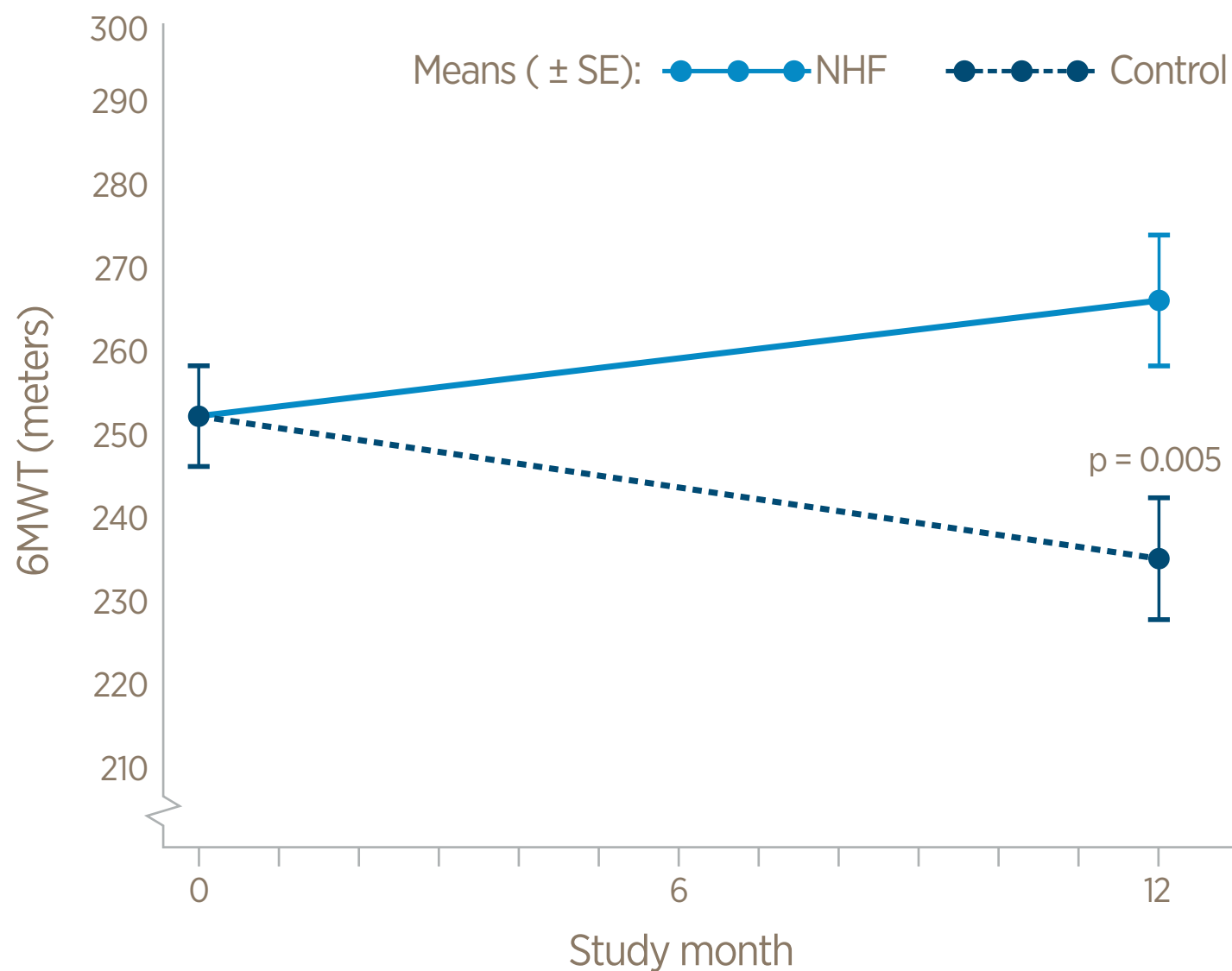
Results

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Secondary outcomes

6-minute walk test (6MWT)

- Longer distances indicate increased exercise performance



Conclusions

- NHF reduced AECOPD and hospital admission rates in COPD patients with chronic hypoxemic respiratory failure treated with LTOT.
- NHF stabilized the clinical condition of advanced COPD patients as measured by mMRC score, SGRQ, PaCO₂, and 6MWT compared to control.
- NHF should be considered as a complementary treatment for COPD patients with chronic hypoxemic respiratory failure.

Additional information

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- Link to full article
<https://www.dovepress.com/long-term-effects-of-oxygen-enriched-high-flow-nasal-cannula-treatment-peer-reviewed-article-COPD>
- Clinical Trial Register: NCT02731872
- Fisher & Paykel Healthcare contributed equipment, administration costs, and statistical analysis costs.

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