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High-flow therapy in domiciliary care for COPD

Clinical and patient outcomes

Improvements in:

- Secretion management[1]
- Dyspnoea during high intensity exercise[2,4]
- Work of breathing (WOB)[5]

- Patient comfort
- Patient quality of life (QoL)[6,7]
- Acute exacerbations of COPD (AECOPD)[6,7]
- Rates of hospital admission[6,7]

Indications

Based on the early available evidence, home HFT could be indicated for use in COPD patients prescribed long-term oxygen therapy (LTOT), or on its own in patients not requiring LTOT but experiencing secretion management issues.[1,6]

HFT can be administered in different ways.
In this document, «HFT» refers to nasal high-flow therapy.

> Potential HFT indications include domiciliary use in COPD patients with excessive secretions, and as adjunctive therapy in any COPD patient requiring LTOT.

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HFT setup

Key components of home HFT units include an air/oxygen mix (with or without a blender), a flow generator, heater, humidifier, warmed inspiratory circuit (to prevent condensation) and, in the case of nasal HFT, a soft, non-occluding nasal cannula. HFT can provide warmed and humidified air, with or without supplemental oxygen, to patients in the home setting at a higher flow than LTOT alone.[6,7,8]

HFT is suited for domiciliary use, as home devices do not require a high-pressure oxygen wall supply, the blower is located inside the machine, and the design facilitates easy training and operation in the home. Some HFT units are also suitable for remote monitoring.

> Simplicity and ease of operation make HFT well suited to home use.

Shifting HFT into the home

High flow nasal cannula (HFNC) therapy started to appear as an alternative means of respiratory support for the treatment of mild-to-moderate acute hypoxemic failure[10] and appears to be well tolerated by patients.[7] HFT has recently begun emerging as an option for the long-term, home-based treatment of patients with stable COPD and has shown promising results.[6,7]

HFT is simple and easy-to-operate and delivers both clinical and patient outcome benefits in domiciliary use for COPD. HFT is currently used in the acute hospital setting in adults and is emerging as an option for long-term home use in COPD patients.[6,7]

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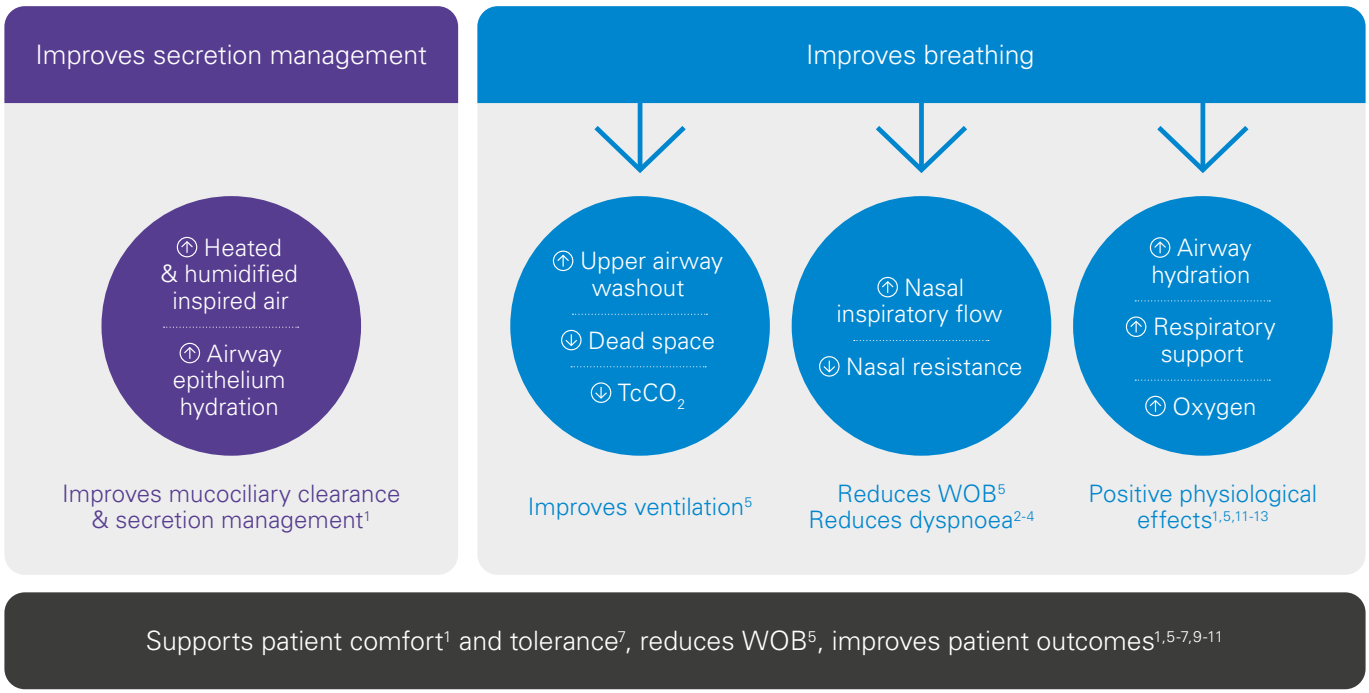
Mechanisms of action and clinical benefits



Although the precise mechanisms of action of HFT are still being elucidated, there is evidence to support the following:

Improved secretion management

By heating and humidifying inspired air to saturation, HFT hydrates the airway epithelium. This could improve mucociliary clearance and secretion management both of which are important in COPD[1].

> An important clinical benefit of HFT is that it may improve mucociliary clearance.[1]

Improved breathing

HFT improves breathing via a combination of effects:

- **Increased upper airway washout** reduces dead space and $TcCO_2$ and improves ventilation[5].
- **Increased nasal inspiratory flow** contributes to reduced WOB by matching or exceeding the patient's peak inspiratory flow.[5] It can also reduce dyspnoea during high intensity exercise[2-4] and published reports suggest that patients breathe more comfortably.
- **The mechanisms of airway hydration, respiratory support and the provision of supplemental oxygen** support patient comfort and contribute to distinct positive physiological effects.[1,5,11-13]

HFT works via multiple mechanisms including mucociliary clearance and secretion management, and improved respiratory mechanics which reduce WOB and improve patient comfort.[1,5,11-13]

Patient comfort

HFT seems to be well tolerated by patients[7] and supports patient comfort by improving mucociliary clearance and secretion management[1] and reducing dyspnoea during high intensity exercise.[2-4]

Positive effects on QoL

Patients with COPD receiving long-term HFT at home have shown preserved or improved QoL scores vs those receiving usual care, including LTOT alone.[6,7] In one study, patients treated with HFT had improved modified Medical Research Council (mMRC) scores from 3 months onwards and also demonstrated improved St George's Respiratory Questionnaire (SGRQ) scores at 6 months ($p=0.002$) and 12 months ($p=0.033$) compared with patients who received usual care ($p<0.001$).[6] In another study, patients who received HFT had significantly better SGRQ scores at 3 and 12 months compared with the control group.[7]

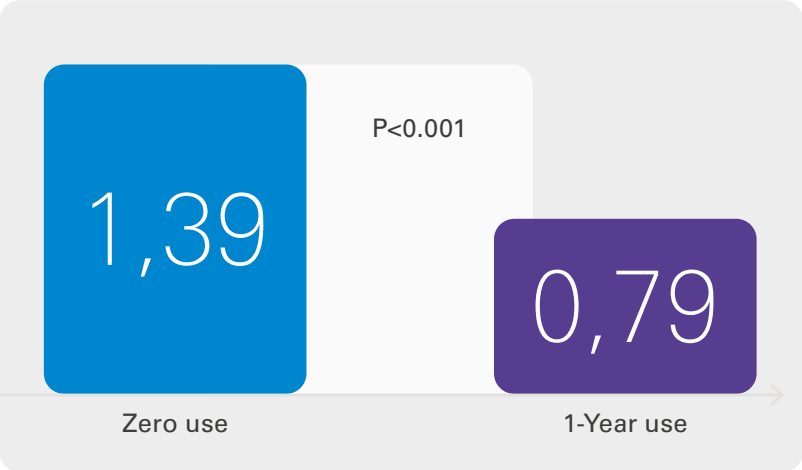
Reduced exacerbation and hospitalisation rates

Studies in patients with COPD demonstrate that HFT significantly reduces AECOPD), rates of hospital admission and symptoms in patients with hypoxemic respiratory failure – increasing the time to first exacerbation and improving QoL.[6,7]

In a randomised, long-term study of 200 patients with chronic hypoxemic respiratory failure receiving domiciliary LTOT, adjunctive HFT significantly reduced the AECOPD rate (3.12/patient/year vs 4.95/patient/year with usual care; p<0.001).[6] Patients receiving home HFT also had a reduction in hospital admissions and improvement in symptoms (dyspnoea during high intensity exercise), QoL and exercise performance.[6]

> Long-term domiciliary HFT has been shown to significantly reduce acute exacerbation rates and hospital admissions in COPD patients.[6]

Predicted hospitalisation rate per patient per year by HFT usage[6*]



*Calculated using actual number of days of use of HFT as an explanatory continuous variate, using previous year's admissions as baseline covariate

In a recent study, hypoxemic patients treated with home HFT and LTOT had lower rates of AECOPD than those treated with LTOT alone. Just 1-2 hours per day of HFT decreased the number of exacerbation days and increased the time to first exacerbation.[6,7]

Adjunctive home HFT can reduce acute exacerbation and hospitalisation rates in COPD patients,[6,7] and improve symptoms such as mucus retention[1], cough[1] and dyspnoea during high intensity exercise,[2-4] whilst maintaining or improving patient QoL vs usual care.[6,7]

Limitations

Whilst further research is needed to confirm indications and to identify those COPD patients who would benefit the most from HFT, there is already some evidence for clinical and patient outcome benefits to support the use of domiciliary HFT.[1, 5-7,9-11]

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