Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Appraisal

Critically appraised paper: In people with chronic obstructive pulmonary disease, initiation of nocturnal non-invasive ventilation at home is non-inferior to initiation during a hospital admission

Synopsis

Summary of: Duiverman ML, Vonk JM, Bladder G, van Melle JP, Nieuwenhuis J, Hazenberg A, et al. Home initiation of chronic non-invasive ventilation in COPD patients with chronic hypercapnic respiratory failure: a randomised controlled trial. *Thorax.* 2020;75:244–252.

Question: In people with chronic obstructive pulmonary disease and stable chronic hypercapnia, is home initiation of non-invasive ventilation non-inferior to in-hospital initiation in reducing arterial carbon dioxide pressure during spontaneous breathing? ***Design***: Randomised controlled trial (without blinded outcome assessment). ***Setting***: University Medical Centre Groningen, Netherlands. ***Participants***: Inclusion criteria were: moderate-to-severe chronic obstructive pulmonary disease, a partial pressure of carbon dioxide in arterial blood measured during waking hours and breathing room air > 45 mmHg, no recent exacerbation, and sufficient social support for home initiation of non-invasive ventilation. Exclusion criteria were unstable severe cardiac comorbidities and/or previous or current use of continuous positive airway pressure. Randomisation of 67 participants allocated 33 to an intervention group and 34 to a control group. ***Interventions***: The intervention group initiated non-invasive ventilation at home. A specialised nurse visited the participant on day 1 to install the equipment and to practise with it. Participants started using the non-invasive ventilation equipment on day 2. Monitoring of ventilator settings, use and overnight transcutaneous carbon dioxide was achieved using telemedicine technology, with ventilator settings titrated remotely during daily calls. The control group had the non-invasive ventilation initiated and titrated during a hospital stay. In both groups, titration was finalised once the person could sleep at least 6 uninterrupted hours using the ventilator and overnight transcutaneous carbon dioxide was acceptable. ***Outcome measures***: The primary outcome was the partial pressure of carbon dioxide in arterial blood measured during daytime spontaneous breathing on room air, at 6 months. The non-inferiority margin for this outcome was set at 3 mmHg. The secondary outcome measure was cost. ***Results***: A total of 49 participants completed the 6-month assessment (23 in the intervention group and 26 in the control group). There was no between-group difference in change in arterial carbon dioxide pressure (MD 0.3 mmHg, 95% CI −2.3 to 2.9). The cost of initiating non-invasive ventilation at home (€3,768, A$6,299) was less than that of in-hospital initiation (€8,537, A$14,271). ***Conclusion***: In people with chronic obstructive pulmonary disease and stable chronic hypercapnia, initiation of non-invasive ventilation in the home is non-inferior to initiation in hospital, and is less costly.

Provenance: Invited. Not peer reviewed.

Vinicius Cavalheri
School of Physiotherapy and Exercise Science, Curtin University, Australia

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Commentary

Even before the COVID-19 pandemic gave rise to social distancing and shelter-in-place orders, many older people preferred to receive their healthcare at home.[1] Such services are highly relevant for people with chronic obstructive pulmonary disease, in whom disabling symptoms and travel burden are known barriers to accessing healthcare.[2] Home-based models are increasingly attractive as an alternative to inpatient admissions, which in chronic obstructive pulmonary disease are the primary contributors to healthcare costs.[3]

Duiverman et al tested whether initiation of high-intensity non-invasive ventilation at home, including remote adjustment of ventilator settings, was non-inferior to in-hospital initiation for patients with chronic obstructive pulmonary disease and chronic hypercapnic respiratory failure. The between-group difference for the primary outcome (change in daytime partial pressure of carbon dioxide in arterial blood at 6 months) was not clinically significant, with a 95% confidence interval that excluded the non-inferiority margin of 3 mmHg. Improvements in health-related quality of life and symptoms were similar across groups. The cost reduction was considerable (56% lower at home); however, the applicability of this finding will vary across health systems. Hospital initiation of high-intensity non-invasive ventilation required a median of 7.5 inpatient days, which was a major driver of the cost difference. This may not reflect practice in other settings with shorter length of stay, or outpatient-based non-invasive ventilation initiation.[4]

This study provides confidence that home initiation of non-invasive ventilation is clinically efficacious in severe chronic obstructive pulmonary disease. Home non-invasive ventilation initiation required at least two home visits from a specialist nurse, plus additional visits when technical problems were encountered. Eligible patients were those with sufficient social support to manage home initiation of non-invasive ventilation, which could exclude an important minority of patients who live alone or have no caregiver.[5]

Provenance: Invited. Not peer reviewed.

Anne Holland
Monash University and Alfred Health

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