Use of home oxygen therapy in adults

MAXINE HARDINGE, DARYL FREEMAN, SABI HIPPOLYTE AND JAY SUNTHARALINGAM

Home oxygen therapy can provide significant health benefits in selected patients with chronic respiratory disease. This article provides a summary of the main types of oxygen therapy and the guidelines for their use.

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full name</th>
<th>What is it?</th>
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<tbody>
<tr>
<td>LTOT</td>
<td>Long-term oxygen therapy</td>
<td>Oxygen used for at least 15 hours per day in chronically hypoxaemic patients</td>
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<tr>
<td>AOT</td>
<td>Ambulatory oxygen therapy</td>
<td>Supplemental oxygen used during exercise and activities of daily living</td>
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<td>POT</td>
<td>Palliative oxygen therapy</td>
<td>Oxygen used to relieve the sensation of refractory, persistent breathlessness in advanced disease or life-limiting illness irrespective of underlying pathology where all reversible causes have been or are being treated optimally</td>
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<td>NOT</td>
<td>Nocturnal oxygen therapy</td>
<td>Oxygen administered overnight alone without additional oxygen therapy during awake or daytime hours</td>
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<tr>
<td>SBOT</td>
<td>Short-burst oxygen therapy</td>
<td>Oxygen used intermittently for short periods, for example 10–20 min at a time, for the relief of breathlessness</td>
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Table 1. Summary of different types of home oxygen therapy

Selected patients with chronic respiratory disease can benefit from using home oxygen therapy. Patient assessment is key: in the past, home oxygen was frequently provided without adequate assessment, leading to lack of clinical benefit and potentially wasted resources. In 2011, new regional contracts for home oxygen providers were introduced. Since that time, oxygen has been ordered via home oxygen order forms (HOOF) rather than GP prescription. In most areas, patients are assessed for home oxygen by home oxygen assessment and review teams, with primary care only involved for the provision of urgent oxygen on occasion out of hours.

There are five main categories of home oxygen, some of which are more often known by their acronyms (see Table 1). Long-term oxygen therapy (LTOT) has the greatest evidence base, but this is largely drawn from two small and historic randomised controlled trials in chronic obstructive pulmonary disease (COPD) patients. Evidence in other patient groups is limited and often extrapolated from COPD outcome data.

The British Thoracic Society (BTS) has recently published its first home oxygen guideline, which presents available evidence and recommendations for home oxygen use. This review summarises the guideline recommendations relevant to primary care for each type of oxygen alongside practical considerations.

**Long-term oxygen therapy**

LTOT involves the use of continuous oxygen for at least 15 hours in every 24-hour period, at a flow rate to deliver sufficient oxygenation to achieve $\mathrm{SpO}_2 >92$ per cent. There are many misconceptions surrounding LTOT: the health benefits include improved life expectancy (usually after 18 months of use) and a potential (not universal) relief of dyspnoea. Use for up to 24 hours may be of additional benefit.

The two most important studies for LTOT use in COPD patients showed significant benefit and it would now be difficult to randomise patients to a placebo-controlled trial without home oxygen. Most of the arterial blood gas, hours of use and patient selection criteria are derived from these studies. Interestingly smokers were not excluded, nor their outcomes described separately to nonsmokers. Evidence
• Patients with a resting stable oxygen saturation (SpO₂) of ≤92 per cent

• Patients with clinical evidence of peripheral oedema, polycythaemia or pulmonary hypertension with SpO₂ levels ≤94 per cent (to identify patients with a resting PaO₂ ≤8kPa)

• Patients who have been stable for at least eight weeks from their last exacerbation

• Patients with frequent exacerbations who are unable to achieve a period of stability lasting eight weeks may need to be assessed at an earlier stage after exacerbation. If LTOT is ordered for such patients, they should be counselled that in the future, LTOT may no longer be required once they achieve clinical stability

• Patients who have borderline oxygen saturations, ie 93–94 per cent, should have their oxygen saturations monitored at their annual review with their GP or practice nurse, or sooner if they experience an exacerbation in the interim

Table 2. Guidance for selecting patients for referral for long-term oxygen therapy (LTOT) assessment

patients not to use AOT. However, for selected patients, use of AOT can promote independence outside the home and enable exercise, which is beneficial to respiratory disease outcomes, eg in patients with cystic fibrosis.

A formal assessment should be carried out by home oxygen teams using a graded exercise test such as a shuttle walk test with and without oxygen. Suitable patients for referral are those who are ambulant outside their homes, who desaturate on exercise but in whom exercise capacity is limited by breathlessness with a prolonged or distressing recovery time.

Nocturnal oxygen therapy
Some patients with advanced cardiac failure develop periodic breathing patterns at night. They often wake recurrently due to low oxygen levels and consequently can suffer extreme daytime tiredness. An overnight sleep study or oximetry can detect this problem, and a trial of nocturnal oxygen therapy (NOT), usually given at low flow rates of 1L/min, can improve sleep quality and daytime alertness. There is no evidence to support overnight oxygen therapy alone in other patient groups, eg those with COPD and interstitial lung disease, outside current LTOT recommendations.

Palliative oxygen therapy
Palliative oxygen therapy (POT) can be considered in patients with cancer or end-stage cardiorespiratory disease who are experiencing intractable breathlessness, or who are hypoxaemic with resting SpO₂ less than 92 per cent or who have normal resting oxygen levels but in whom all other approaches have been exhausted. Opioids have been shown in small studies to be more effective than oxygen in both hypoxaemic and non-
Home oxygen therapy  |  PRESCRIBING IN PRACTICE

- The subjective severity and intensity of breathlessness should be recorded regularly to evaluate the degree of suffering caused and the effect of treatment.
- A numerical rating scale (NRS) from 0 to 10 is useful:

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<thead>
<tr>
<th>Score</th>
<th>Description</th>
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<tbody>
<tr>
<td>0</td>
<td>no shortness of breath</td>
</tr>
<tr>
<td>1-3</td>
<td>mild shortness of breath</td>
</tr>
<tr>
<td>4-6</td>
<td>moderate shortness of breath</td>
</tr>
<tr>
<td>7-9</td>
<td>severe shortness of breath</td>
</tr>
<tr>
<td>10</td>
<td>worst shortness of breath imaginable</td>
</tr>
</tbody>
</table>
- Treatment should focus on patients with dyspnoea scores (NRS) of ≥4, and especially those with scores ≥7.
- As distress from breathlessness is not correlated with degree of hypoxaemia, the flow rates should be determined by symptom score on an individual basis rather than SpO₂ reading. Usual range from 2–5L/min. Concentrator or cylinder as determined by patient’s needs.
- Most benefit is likely to occur in the first 24 hours, and nearly all symptomatic and functional improvements are seen within the first three days of use. Follow-up and assessment of response should fit with these timescales.

Table 4. Guidance for assessing response to palliative oxygen therapy (POT)

hypoxaemic patients. Other options may be more effective and are outlined in Table 3.

If a patient remains distressed despite the above strategies, palliative oxygen can be ordered. Practical considerations regarding assessing response to POT are outlined in Table 4.

Short-burst oxygen therapy
Oxygen administered from large static cylinders used to be the commonest form of home oxygen therapy. Patients would use oxygen for short periods when breathless or for reassurance, hence the name short-burst oxygen therapy (SBOT). However, there is no evidence base to support its use. When funding arrangements for home oxygen changed from a ‘per cylinder’ to ‘daily use’ tariff, SBOT was identified as a significant waste of resources. Many patients, however, remain strongly adherent to the concept of SBOT, and removal of this form of home oxygen can be personally challenging. However, the number of patients now being started on SBOT is dwindling as home oxygen assessment teams become more established and community services offer improved support for respiratory patients following hospital discharge.

Risks of home oxygen therapy
Oxygen is highly flammable and there is increasing recognition and reporting of accidents related to fire in home oxygen patients. Risks involve all flammable sources, but the most frequently occurring risk is patients, or other household members, smoking. Patients should undergo smoking cessation counselling and support prior to initiation of home oxygen. For all households, a risk assessment should be carried out to minimise risk, particularly to children and those in multiple occupancy dwellings.

Other risks include trip and fall risks owing to oxygen tubing; these remain the responsibility of the home oxygen supplier who has a contractual duty to carry out a risk assessment.

Conclusion
This article has summarised the indications for use of the five different types of home oxygen therapy and highlighted some practical concerns around assessment and safety issues. More detail on patient assessment and monitoring can be found in the full British Thoracic Societies Guidelines published in 2015. The establishment of specialised home oxygen assessment and review teams is key to ensuring correct home oxygen usage. Nevertheless, certain clinical scenarios remain challenging such as the use of oxygen in palliative care, and more research in this area would be welcome so that patients are given the best possible support to address their symptoms.

References

Declaration of interests
Dr Hardinge has received speaker fees from pharmaceutical companies (GSK, Chiesi, Pfizer, Boehringer) over the past two years. Dr Freeman has received honoraria for speaking from Boehringer Ingelheim, Novartis, AstraZeneca, Almirall and Pfizer; he has also received educational support/grants from Napp and Pfizer. Dr Suntharalingam has received educational support from Bayer, GSK and Actelion, speaker fees from AstraZeneca, Teva, GSK and Actelion and consultancy fees from Boehringer, Bayer and Actelion. Dr Hippolyte has no interests to declare.

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