

Home oxygen therapy

Introduction

This opinion sheet on home oxygen therapy summarises the current guideline advice on assessing and treating patients who require oxygen therapy. It highlights the different sorts of home oxygen therapy available - long term oxygen therapy (LTOT), ambulatory oxygen, and short burst oxygen therapy - and the indications for treatment, the need for ongoing supervision and follow-up, and the current administrative procedures for prescribing home oxygen therapy in the UK.

Breathlessness

Breathlessness is not the same as hypoxia and it is important that patients are assessed to confirm the diagnosis and cause of their breathlessness and hypoxia.

Indications for oxygen therapy

Long term oxygen therapy (LTOT) is indicated for the management of confirmed chronic hypoxaemia. LTOT is usually given for at least 15 hours a day; it is advisable that usage includes night time administration as arterial hypoxaemia worsens during sleep, and this also encourages some day time activity as 8 hours of LTOT use can be achieved overnight in bed.

Chronic hypoxaemia is defined as a resting PaO₂ at or below 7.3 KiloPascals (kPa). LTOT should not be ordered for people with an arterial blood gas (ABG) PaO₂ value above 8kPa.

Conditions where chronic hypoxaemia may occur and LTOT is indicated are:

- Cystic fibrosis
- Chronic obstructive pulmonary disease (COPD)
- Interstitial lung disease
- Severe chronic asthma
- Pulmonary vascular disease

- Primary pulmonary hypertension
- Bronchiectasis
- Pulmonary malignancy
- Chronic heart failure

LTOT can be prescribed for people with chronic hypoxaemia and a clinically stable PaO₂ between 7.3kPa and 8 kPa with the presence of either of the following:

- Secondary polycythaemia
- Pulmonary hypertension confirmed by echocardiogram

Palliative care

Oxygen therapy may be administered for breathlessness in pulmonary malignancy, although this group of patients are often not hypoxic.

Assessment of patients for oxygen therapy

There is a need for effective clinical assessment and these arrangements will be by local agreement. In general, oxygen assessments are undertaken by a hospital or community-based respiratory team. Pulse oximetry is a useful tool to aid selection of patients who may require arterial blood gas analysis. As a guide, pulse oximetry (recorded as O₂ sats or SaO₂) results reflect a partial pressure of oxygen in the arterial system:

- SaO₂ >95% likely to be 10-14 kPa
- SaO₂ <92% is likely to be <8kPa

It is important to remember that the lower the SaO₂, e.g. <92% reading, the less correlation there is with arterial blood results.

Adults

The clinical diagnosis should be confirmed and medical management optimised. Following a clinically stable period of at least five weeks, arterial blood from the radial or femoral artery or ear lobe may be used for assessment. The level of PaCO₂, which may be elevated or normal, does not influ-

ence the need for LTOT but would indicate the need for non-invasive ventilation (NIV) assessment.

The LTOT assessment

- The patient should breathe atmospheric air for at least 30 minutes.
- Baseline ABGs are taken. If the results confirm hypoxaemia, supplementary oxygen should be administered for at least 30 minutes at a flow rate of 2litres/minute via nasal cannula, or 24% controlled oxygen via a facemask, preferably through the same equipment that will be used at home.
- ABGs should be repeated after 30 minutes; if PaO₂ remains below 8kPa the flow rate should gradually be increased, whilst checking the stability of the PaCO₂.
- ABGs should be repeated every 30 minutes until flow rate corrects hypoxaemia with an improved PaO₂ without adversely increasing PaCO₂.

The oxygen flow rate needed for the home concentrator will then be determined; flow rates above 4l/min may require a second or third concentrator although some newer devices have high flow rates.

Patients who do not meet the criteria for LTOT should have repeat ABGs performed after three months.



BOC Concentrator

Nocturnal Hypoventilation due to:

- Obesity
- Obstructive sleep apnoea
- Neuromuscular, spinal or chest wall disease.
- End stage COPD

These patients develop hypercapnic respiratory failure and using LTOT alone has the potential to cause a further rise in PaCO₂ which may be dangerous. Hypercapnia should be suspected in patients complaining of morning headaches. Specialist referral is indicated as LTOT should be used with ventilatory support such as non-invasive ventilation (NIV) or continuous positive airway pressure (CPAP). These patients require an overnight sleep study to assess the need for oxygen or respiratory support.

Ambulatory oxygen

Ambulatory oxygen is provided for periods of exercise and activities of daily living. Where applicable, the assessment should be performed after the patient has attended pulmonary rehabilitation. The type of portable system provided will depend on the patient's level of mobility. Nasal cannula are usually used with portable systems. A conserving device may be issued with ambulatory cylinders or a liquid system if the patient is able to activate it (they need to be nasal breathers and need to demonstrate that they can trigger the device when breathing). Oxygen conserving devices will allow the patient three times longer per cylinder - for example, the lightweight cylinder will last 2.5 hours on 2l/min without a conserving device; with the conserving device it will last approximately 7.5 hours.



BOC ambulatory oxygen system



BOC Lightweight ambulatory liquid system

Conditions where ambulatory oxygen may be indicated:

- Cystic fibrosis
- Interstitial lung disease
- COPD
- Severe chronic asthma
- Pulmonary vascular disease
- Primary pulmonary hypertension

Aims of ambulatory oxygen:

- Improved quality of life
- Increased everyday activities
- Improved exercise capacity
- Less breathlessness
- Enhanced rehabilitation
- Increased hours of use of LTOT

Criteria for ambulatory oxygen assessment:

● **Grade 1 LTOT with low exercise activity**

Patients with severe hypoxaemia do not require formal ambulatory oxygen assessment, as their exercise capacity will be limited. They may require an ambulatory system to leave their home occasionally. The rate required will be set for the same as LTOT.

● **Grade 2 LTOT active group**

Ambulatory oxygen assessment is indicated for patients with LTOT who are mobile and leave their home regularly. Liquid oxygen may be suitable as it will be used regularly and will not be left to evaporate.

● **Grade 3 non-LTOT group**

If LTOT is not indicated by the ABG results but moderate hypoxaemia (PaO₂>7.3) is identified, an ambulatory oxygen assessment to assess exercise desaturation should be performed.

The ambulatory oxygen assessment

- The aim is to correct exercise desaturation. The walk test should be performed with the same type of equipment that will be provided by the oxygen company i.e. small lightweight cylinder/O₂ conserving device. The patient should breathe atmospheric air for at least 30 minutes before the walk commences.
- Pre and post Borg scores should be taken.
- Pulse oximetry is used to measure baseline resting SaO₂.
- A 6-minute walk or shuttle test is performed on air, whilst monitoring SaO₂. Walking distances and SaO₂ are documented. The aim is to keep SaO₂ greater than 90%.
- If there is no exercise arterial oxygen desaturation, ambulatory oxygen is not required. If the Borg score does not correlate with the objective measurements, consideration should be given to alternative methods for managing breathlessness i.e. breathlessness clinic/ pulmonary rehabilitation.

- Patients with exercised arterial oxygen desaturation, defined as a fall of 4% <90%, will rest for 30 minutes breathing atmospheric air. The test will then be repeated using 2 litres of oxygen. The process will be repeated at 4 litres of oxygen if necessary.

Starting LTOT is often followed by a reluctance by patients to leave their homes. Encouragement to use ambulatory oxygen and to remain as active as possible should therefore remain a priority in the management of these patients.

Other conditions where a home cylinder of oxygen may be indicated:

- Cluster Headaches
- Epilepsy

Short Burst Oxygen

Traditionally, short burst oxygen has been prescribed to relieve periods of breathlessness. To date, there is no evidence to support the use of oxygen in this manner. Short burst oxygen should only be used if an improvement in breathlessness or exercise tolerance is evident. Other causes of breathlessness should be excluded and if SaO₂ <92%, an LTOT assessment should be considered.

Prescribing oxygen in the NHS

Orders for home oxygen should be generated following formal assessment by the respiratory team. Oxygen may be ordered by appropriate health care professionals - this will usually be by local agreement. The contractor will deliver the oxygen systems directly to the patient, install the system, and give instruction on how to use the equipment. The oxygen requirements will be installed according to levels requested on the order.

Administrative procedures

It is recommended that all assessments be documented on a home oxygen record form (HORF) and be included in the patients hospital/community records. With the first order for oxygen, the patient is required to sign a home oxygen consent form (HOOF) allowing information to be shared with the contractor. A copy should be given to the patient and a copy filed in the medical notes.

To place the order, a home oxygen order form (HOOOF) is completed. It is essential that this is fully completed. A copy is faxed to the contractor, GP,

PCT and a copy placed in the patient's hospital records. A paperless system will be introduced in the future.

A hospital discharge order may consist of a next day response for delivery of a temporary concentrator pending stable assessment for LTOT.

Emergency oxygen may be ordered for a total of 3 days. There is a price premium for this service, as the supplier is required to deliver this service within 4 hours of receipt of the order. This order may not be automatically cancelled after 3 days and it is the responsibility of the health professional to cancel the order. The process for changing the order should be identified with the locality provider.

Oxygen may be ordered for patients who travel to other parts of England or Wales. This order will be sent from the local contractor to the contractor servicing the locality where the patient will be staying. This service will be costed to the patient's home address, and the costing for the home service will remain for this period of time. Costings for concentrator oxygen systems are at a daily rate.

Delivery systems for oxygen therapy

See examples shown in this opinion sheet

Advising patients on use, safety and precautions

Oxygen equipment advice will be provided by the field engineer, who will also undertake a risk assessment for all installations whatever the modality pre-installation including domestic assessment for certain systems such as liquid oxygen, when to use the back up oxygen cylinder, home servicing, electricity reimbursement and emergency breakdown contact numbers.

The engineer will set up the equipment with the flow rate which has been ordered, and will give safety advice, including the dangers of smoking while the oxygen is on.

The health professional should provide education and written information for the patient and carer to include:

- The length of time oxygen should be used
- How the flow rate has been set following assessment

- The importance of compliance
- Why they are to use nasal cannula
- Dangers of smoking near oxygen equipment (some systems have an in-line firebreak for oxygen delivery tubing)
- The reasons for follow up assessments

Ongoing supervision and follow up

If home oxygen is provided for palliation, hospital/community assessment may not be necessary.

LTOT follow up:

- 4 weeks after LTOT commenced - home visit for review and SaO₂ on air and oxygen
- 3 months - after commencing LTOT specialist review with ABGs on air and oxygen
- 6 monthly - home visit for review and SaO₂ on air and oxygen
- 12 monthly - review and ABGs should be checked
- The respiratory specialist should perform reassessment at anytime if there is clinical deterioration.

Ambulatory oxygen follow-up

- For those patients also using LTOT, assessment of ambulatory oxygen use will take place at the same time.
- 12 monthly - review and ABGs should be checked

Short Burst Oxygen follow-up

- Annual review by GP. If clinical deterioration, refer to hospital specialist for review and ABG Assessment.

References

1. Pearce L. Changes to the home oxygen provision service in the UK. *Prim Care Resp J* 2005;14(6):279-81.
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3. <http://www.psn.org.uk>
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BOC Standard liquid system



BOC Home oxygen cylinder

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