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NHS London Service Specification

Home Oxygen Assessment and Review Service (Adult)

Updated Service Specification October 2020

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Contents

A: Purpose of the Home Oxygen Assessment and Review Service

USER NOTE

This specification has been designed to assist London commissioners in the delivery of services for adults with clinical conditions requiring treatment with home oxygen.

The specification is not mandatory and the commissioner should review the whole of the specification to ensure that it meets local needs and, once agreed with the Provider, it should form part of a re-negotiated contract or form the relevant section of the NHS Standard Contract.

Given the increased demand on all health and care services due to the COVID-19 pandemic, partners within each ICS (full form) will need to work together to ensure their local HOS-ARs have the capacity required to support new care models (e.g. Covid Care@Home) as they develop.

Home Oxygen Service -Assessment and Review (HOS-AR) Services

In 2011, Primary Care Commissioners produced a good practice guide for clinical assessment and efficient supply of home oxygen therapy in England.[1] Central to this guide was Home Oxygen Therapy-Assessment and Review (HOS-AR) services. They proposed that these teams should consist of specialist trained health care professionals who were experienced in assessment for, and ongoing use of, home oxygen therapy to ensure the best possible outcomes for the people that needed it. This document seeks to update the service specification with available best practice to ensure home oxygen therapy is used in a clinically appropriate, safe, and evidence-based manner.

Home oxygen is an umbrella term for oxygen (medical gas) used in a variety of different situations as outlined in the British Thoracic Society Guidelines for Home Oxygen in Adults[2]:

- Long-term oxygen therapy (LTOT) is oxygen provided at rest for a minimum of 15 hours per day to correct chronic hypoxaemia, prevent end organ damage and improve mortality. Assessment for LTOT falls under the remit of the HOS-AR.
- Nocturnal Oxygen Therapy (NOT) is oxygen administered overnight alone, i.e. without additional oxygen therapy during awake or daytime hours. Assessment for this usually requires initial review by a sleep or home ventilation service to clarify the diagnosis and treatment plan, who then work with the HOS-AR to enable safe oxygen provision. Other indications for NOT may include cardiac disease or sickle cell anaemia which would also fall under the remit of the HOS-AR.
- Ambulatory Oxygen Therapy (AOT) is defined as the use of supplemental oxygen for exercise or activities of daily living prescribed for those whose oxygen level drops during activity. This drop in oxygen levels (desaturation) may become apparent before a person meets LTOT criteria although most LTOT users who leave the house will also require AOT. Patients may require specialist portable equipment to enable them to mobilise outside of the house. Assessment for AOT falls under the remit of the HOS-AR but may be regionally delivered.
- Short burst oxygen therapy (SBOT) is an historical indication for oxygen use after exercise but is not supported by evidence and is no longer recommended, except for the treatment of cluster

[1] https://www.networks.nhs.uk/nhs-networks/east-of-england-respiratory programme/documents/
[2] https://www.brit-thoracic.org.uk/quality-improvement/guidelines/home-oxygen/

headaches, which is the only indication for home oxygen therapy in the absence of hypoxia. Assessment for cluster headaches falls under the remit of the HOS-AR. In some cases, oxygen may be recommended or initiated by neurology teams however ongoing annual reviews remain under the remit of the HOS-AR service.

- Oxygen in the palliative phase of illness (Palliative Oxygen Therapy - POT) is indicated to treat symptomatic hypoxia in patients with life limiting diagnoses, with the focus on palliation of symptoms rather than prolonging life or modifying the natural history of the underlying condition. Oxygen is not indicated for the treatment of refractory breathlessness in the absence of hypoxia. Oxygen is only indicated if there is breathlessness with hypoxia which fails to respond to evidence based treatments such as opioids or fan therapy. Oxygen in the palliative phase of illness falls under the remit of the HOS-AR but this may depend on local service structures, and the role of the oxygen team may be advisory and supportive.

Having a standardised HOS-AR specification will help to ensure:

- A reduction in health inequalities and increased value by creating equal access to high quality HOS-AR services to all service users across the London Region
- the benefits of the HOS contract are realised by service users, clinicians, and commissioners

Historically, some HOS-AR teams focused on service provision for patients with Chronic Obstructive Pulmonary Disease (COPD) only, which currently accounts for just 33% of the London adult HOS population[3]. However, there is a gap in the service specification of these local HOS-AR teams which means they are unable to meet this need. Although a review and risk assessment are now required for all home oxygen patients annually, some conditions e.g. interstitial lung disease may require more frequent reviews and modifications than others e.g. cluster headaches. This should be enabled in the commissioning of a given service.

Key objectives of a Home Oxygen Assessment and Review Service

The aim of the Home Oxygen Assessment and Review Service (HOS-AR) is to ensure that home oxygen is appropriately prescribed to those adults who clinically require and benefit from it[3]. It should ensure that people prescribed oxygen and prescribing clinicians alike are well informed about the nature, scope and capability of the home oxygen service, and that provision is evidence-based, clinically led, has robust governance and continually strives to improve outcomes.

The high-level objectives of the HOS-AR are:

1. to provide an integrated patient-centred service
2. to provide easy access to evidence based clinical assessment and follow up carried out by appropriately qualified and trained healthcare professionals using appropriate diagnostic equipment
3. to provide a service that meets patients' care needs with timely assessment and reassessment at regular intervals
4. to reduce waste, harm, and risk of adverse outcomes due to ineffective or inappropriate treatment, and to ensure value through focusing care on those who will benefit from home oxygen
5. to reduce potential harm through inappropriate prescribing and clinical risk

[3] Commissioning toolkit for respiratory services accessed at https://www.gov.uk/government/publications/commissioning-toolkit-for-respiratory-services

6. to prevent the initiation of home oxygen in unsafe environments such as smoking households

7. to ensure a high standard of clinical treatment and improved outcomes

8. to ensure that users of the service have a positive experience of care, and understand the limitations of oxygen therapy/ceilings of treatment depending upon individual diagnosis and prognostic indicators

9. to work as part of an integrated respiratory care pathway with other multidisciplinary teams involved in the patients' care

10. to provide an inclusive service for all patients who meet criteria for home oxygen therapy, no matter what their underlying condition, and to reduce health inequalities

Why is Home Oxygen Assessment and Review important for improving outcomes?

Long-term oxygen therapy in appropriate individuals can improve survival rates by around 40%. However, 30% of people on home oxygen therapy currently derive no clinical benefit from it. Conversely, 20% of people with COPD would benefit from home oxygen therapy but do not access it[4] . While the primary aim of a HOS-AR is to improve care and outcomes, there are also significant opportunities for local systems to reduce waste and costs through an appropriately commissioned home oxygen service.

- The total annual cost of the service in England is approximately £120m, of which £10m is accounted for within the London region. Significant savings can be achieved through reviewing oxygen ordering processes coupled with the introduction of a formal assessment. For example, a HOS-AR service in North East London was able to reduce spend on HOS by 44% between 2012 (£316k/yr.) and 2019 (176k/yr.). This included a reduction in patient numbers following a review of inappropriate oxygen accounts and adjusting existing users to achieve maximum patient benefit[5].

- In September 2020, across London there were 716 HOS accounts with ambulatory oxygen equipment in place without refill activity in the previous 12 months. This is at a minimum cost of £45k to the NHS for unused equipment. The HOS-AR service has a role in helping review such accounts and remove equipment where it is not appropriate or recommend alternative modalities based on service user needs[6].

- As of September 2020, across London there were 365 smoking households with oxygen equipment in place[6]. This makes up 5.8% of the region's home oxygen population. Prevalence of smoking households with oxygen and how this is managed vary across London. Between 2017 and 2020 there were 41 smoking related reportable serious incidents associated with home oxygen service users. These can include facial burns, inhalational injury, or death. It is imperative that home oxygen provision is managed by specialist HOS-AR teams who can ensure appropriate risk assessment and mitigation around oxygen and smoking.

[4] COPD Commissioning toolkit accessed at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/212876/chronic-obstructive-pulmonary-disease-COPD-commissioning-toolkit.pdf

[5] Tower Hamlets HOS-AR audit data (2012)

[6] London HOS contract monthly data supplied by Air Liquide (2020)

B: National and Local Context

National context

Several publications at the national level have recommended home oxygen assessment and review.

The recently published NHS Long Term Plan states that there will be delivery of world-class care for major health problems. Amongst these health problems are those that require oxygen therapy such as COPD, interstitial lung disease, asthma, cardiac disease, neurological, and sleep related disorders[7]. As with other medicines and therapies, oxygen is a medical gas that requires specific expertise to prescribe and titrate the right amount that meets the treatment aims for individual patients.

The long-term plan describes the ways that the plan will deliver for patients of which several are relevant to the HOS-AR service provision. Some of these include

- investing in diagnosis and treatment of lung conditions early to prevent hospital stays
- medicines optimisation, including the use of medical gases
- increasing funding through primary and community care
- bringing together different professionals to coordinate care
- helping people to live independently at home for longer
- giving more people more say about the care they receive and where they receive it, particularly towards the end of their life[4]

Local Context

In April 2020, 6516 people had home oxygen in the London region, with a gradual decline in the number of patients requiring home oxygen over the last four years[6]. The number of home oxygen patient accounts reduced by 16% (1237 patient accounts) between March 2017 and March 2020 because of ongoing work by effective HOS-AR services in London. However, there are still significant numbers of patients who are started on home oxygen by non-specialists without thorough initial assessment or ongoing clinical review. The associated risk of inappropriate oxygen initiation includes clinical harm to patients, adding to treatment burden, safety issues for patients and those around them as well as financial implications for commissioners.

At the time of writing, London has 32 boroughs of which 30 have active HOS-AR services. Within the 30 HOS-AR services, there is variation in the commissioning of these, such that some provide review only, or only care for patients with COPD and not other indications for home oxygen. As a result, there is unwarranted variation in clinical care and outcomes for home oxygen patients across London. With the development of Integrated Care Systems (ICS) across London there is further scope to ensure population level consistent care is delivered for patients who need home oxygen, for which this service specification is a resource.

The commissioning of HOS-AR services to a consistent specification will help increase consistency of care, improve patient experience and outcomes, and reduce the number of patients who are lost to follow-up post initiation of home oxygen therapy.

7 NHS London Term Plan - https://www.longtermplan.nhs.uk/publication/nhs-long-term-plan/

C: Scope of service provision

Patient groups

HOS-AR services should assess all adult patients referred for LTOT, AOT, and SBOT (cluster headaches only). Services should come to a consensus with local palliative care teams as to how they may best support oxygen treatment at the end of life and this should be described in a clinical pathway which is consistent with the principles of responsible oxygen prescribing (as set out in London resources; see Appendix 1).

Provision should also be made for children who meet criteria for home oxygen, however given the differences in clinical considerations and healthcare professional expertise required , this specification is for adult HOS-AR services only. For further information on London's oxygen services for children please contact the regional leads for the home oxygen service.

Exclusion criteria for this Service

- People without an established quality assured diagnosis as to the cause of their hypoxia
- People in whom the underlying clinical condition causing a need for home oxygen is not optimised
- People who are not hypoxic at rest or on exertion
- People who require emergency oxygen for the treatment of COVID-19

Equity of access to services, venues, and operational hours

The HOS-AR service should ensure its services are accessible to all without discriminating against service user's characteristics or needs. Service provision should abide by the Equalities Act 2010.

The HOS-AR service may be required to make reasonable adjustments to adapt to the local population's requirements such as provision of language services and site accessibility adaptations.

- The HOS-AR Service will need to be easily accessible to people. There should be adequate parking and good public transport links, with easily accessible buildings, including provision for people with disabilities.
- Special consideration should be given to those people who are most limited by their breathlessness (i.e. MRC score of 5 – housebound) with regards to the provision of transport or assessment at home.
- Home oxygen can be initiated in a variety of care settings where a full patient home assessment and ongoing patient review is not always possible. The HOS-AR service must be equipped with testing equipment and be able to do home visits which will ensure patients are appropriately initiated on home oxygen factoring in clinical findings and home environment factors.
- A risk and suitability assessment of the venue must be undertaken (The HOS Supplier will be expected to conduct this and may veto clinical selection if any equipment selected is deemed unsafe or is otherwise unsuitable or inappropriate).

Referral sources

The Provider can receive referrals from a broad range of sources where patients have demonstrated low / reducing oxygen saturations or partial pressure of arterial oxygen (PaO_2), which include but are not be limited to, organisations in the following settings:

- Primary Care

- Community services
- Secondary Care
- Tertiary Care
- Others (for example: occupational health, private health, self-referral by patients who have had an assessment elsewhere)

Interdependencies with other services

The HOS-AR must be integrated with and supported by a respiratory MDT to ensure appropriate clinical governance, avoid duplicative fragmented care, and promote person centred high value care. Interdependencies include:

- Multi-professional respiratory MDT led by senior respiratory decision maker: to provide clinical governance and oversight; regular MDM discussion of cases; clinical audit; training and CPD; support with common challenging clinical scenarios.
- London Fire & Rescue Service: the fire service should conduct an on-site home safety check/risk assessment when liquid or cylinder oxygen is provided. Households where people smoke have a higher risk of domestic fire which potentially dangerous when liquid or cylinder oxygen is involved.
- London Ambulance Service: information on patients with long term oxygen therapy should be shared with the LAS when appropriate, via 'Coordinate My Care' including details of care plans which include oxygen management in an emergency
- Local Borough Council: identified risks and safeguarding issues may need to be escalated to the local council
- Home Oxygen Service Provider
- Local sleep or home mechanical ventilation services: if partial pressure of arterial carbon dioxide ($PaCO_2$) rises by > 1 KPa on supplemental oxygen the patient should be discussed with a consultant respiratory physician and referred on to a sleep / home mechanical ventilation service where appropriate
- Neighbouring HOS-AR services: to ensure continuity of care for patients
- Acute and community healthcare service providers including primary and palliative care
- Home Oxygen Service Regional Lead
- London Clinical Oxygen Network (LCON)

Service Requirements

The HOS-AR team will be required to

- Provide clinical assessment to patients who may require or have been recently initiated on home oxygen
- Undertake home risk assessments for oxygen suitability and patient safety. This will include consideration and mitigation of:
    - tobacco dependence (with exhaled CO monitoring) and electronic cigarette use

  - substance misuse disorder
  - gas fires / gas cookers
  - candles
  - hoarding hazards
  - trip hazards
  - mobility levels
  - frailty
  - presence of working smoke detectors
  - any identifiable social concerns within the patient's home environment
- Provide ongoing timely reviews of patients' home oxygen therapy
- Adhere to the requirements of safeguarding policies and procedures
- Provide advice and information to service users and their relatives or carers
- Provide very brief advice (VBA) and onward referral for smoking cessation treatment and support
- Provide a confidential and safe service
- Adhere to evidence-based recommendations and guidelines
- Adhere to local policies
- Manage all complaints
- Support the investigation and shared learning of reported serious incidents
- Support the implementation of changes associated with serious incidents
- Review monthly oxygen concordance reports
- Review monthly invoice data
- Engage with the London Clinical Oxygen Network
- Join quarterly regional HOS-AR meetings
- Act as an educational resource to generalist and other non-specialist colleagues to support evidence-based care and safe effective clinical pathways

COVID-19

The HOSAR service should work with local commissioners to ensure they have the capacity, and required governance arrangements, to support COVID-19 pathways in local non-acute settings where oxygen concentrators have been supplied through the EPRR process. The HOS-AR service is also required to support the NHS with the management of patients affected by the COVID-19 who need home oxygen; this includes but is not limited to the following activities.

a. assessments
b. reviews
c. ongoing follow-up
d. supporting treatment pathways
e. staff training support for acute and non-acute providers

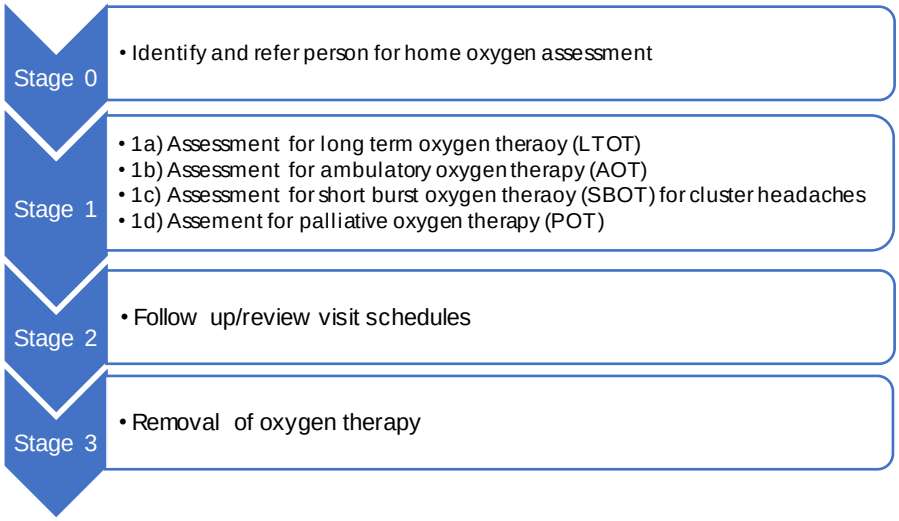
For further information on the use of oxygen therapy for Covid 19 please access the link to London guidance on page 16 of this document.

D: Service Delivery requirements for HOS-AR pathway

The HOS-AR Service must ensure effective integration with several different patient pathways. Good communication between all multidisciplinary staff is essential; the patient's primary health and care record/s need to be up-to-date and there should be a register in every locality of all people prescribed home oxygen. Integration and ongoing liaison with acute care is essential if the oxygen is prescribed in acute care.

The purpose of this document is to set out the principal requirements and characteristics which are expected of a systematic and integrated service for HOS-AR, and the outcomes that are expected when these requirements are met.

There are four principal stages of the HOS-AR service pathway.



The detailed requirements for each stage are set out below, including the key deliverables and associated indicators at each stage. Stage 0 is included in the service specification to confirm the obligations to be placed on the Stage 0 Provider by the Commissioner as it is critical to the success of the service being commissioned.

Stage 0 Identify and refer patient for home oxygen assessment

People should have a quality-assured clinical diagnosis and be medically optimised before referral. They should also receive regular medical reviews to ensure they remain medically optimised.

In considering the need for LTOT or AOT, the first step is pulse oximetry, to determine whether the individual is hypoxic. Pulse oximetry should be routinely available in general practice. People who are shown to desaturate after walking into a consultation but who recover to >92% after a few minutes should be referred to the HOS-AR for an assessment of AOT.

Any person who is hypoxic needs a confirmed and quality-assured diagnosis. Where the person's diagnosis is unclear or when significant co-morbidity might contribute to breathlessness or hypoxia, e.g. heart failure, they should be referred to an appropriate specialist physician if they are not known to one already. People with potential hypercapnic respiratory failure should be also reviewed by a physician for consideration of referral to sleep or ventilation services.

People whose oxygen saturation levels are satisfactory (above 94%) do not need to be seen by a HOS-AR service.

Patients whose oxygen saturation level is borderline (between 93 and 94%) may need further assessment if breathless on exertion or when sleep disordered breathing is a possibility and specialist referral is required. The onward referral pathway will be dependent upon the patient's clinical history and diagnosis and further discussion between the referrer and the HOSAR maybe required.

People who show constant or transient (e.g. on walking into the room) hypoxia (oxygen saturation 92% or below) need to be referred to a HOS-AR service.

Patients with cluster headaches should only be referred for oxygen therapy after full assessment by their neurology team. They should continue to have follow-up with neurology to monitor for any treatment effect, and oxygen should be removed if it is not effective in symptom management.

Patients who are approaching the end of their life may develop persistent breathlessness. If the breathlessness is related to hypoxia this may respond to oxygen therapy. Where there is no hypoxia, breathlessness is usually best managed pharmacologically. Palliative care teams, GPs or other specialist teams may still refer patients for oxygen assessment if their breathlessness persists despite pharmacological management.

The prescription of oxygen in people that smoke is not recommended due to the risks to themselves and others from fire, and the unclear evidence of clinical benefit from oxygen in this setting.[8]

Patients who are hypoxic and tobacco dependent are a high-risk group, and require focused multidisciplinary follow up, with evidence-based tobacco dependence treatment and support.

Patients identified as such by a HOS-AR team should be discussed in a respiratory MDT to agree an appropriate care and follow up plan. Household members who smoke should be made aware of the risks and given very brief advice and offered evidence based smoking cessation treatment and support.

Stage 1 Home Oxygen Service Assessment

The assessment should include noting the quality-assured diagnosis; taking a subjective history with particular attention to tobacco dependence, social situation and support; completing a thorough risk assessment using the Individual Home Oxygen Risk Mitigation form (IHORM); and assessment of resting and if indicated ambulatory finger or earlobe oximetry. All patients should have an exhaled carbon monoxide (CO) measurement as part of routine care. In addition, measurement of arterial blood gases will be required if oxygen saturation at rest is 92% or below (except for patients at the end of life).

Once need is identified, home oxygen equipment is provided to the patient by the local oxygen supply company. From 2011, the contracts impose an obligation on companies to ensure that any improvements or innovation in relation to such equipment are adopted rapidly. The HOS-AR team should ensure that people prescribed oxygen and their carers understand how to use the oxygen equipment and manage their treatment. Training and written information (in appropriate languages for non-English speakers) should be offered to the patient/carer and repeated at reviews. Information about safety should be provided by the HOS-AR service and repeated at every opportunity. A full risk assessment (e.g. smoking, risk of falls etc) should be undertaken using the IHORM form before oxygen is ordered.

The HOS-AR team must also discuss with the patient that the oxygen supply company is not part of the NHS, therefore the patient must consent for their details to be provided to the oxygen supply company to enable deliveries. Patients should complete the Home Oxygen Consent Form (HOCF) before oxygen is requested. The oxygen supply company request that both the IHORM and the HOCF are repeated at least annually.

[8] Calverley PM, Leggett RJ, McElderry L, et al. Cigarette smoking and secondary polycythemia in hypoxemic corpulmonale. *Am Rev Respir Dis* 1982; 125:507–10

In addition, people who make regular trips out of the home for work or leisure may need assessment for ambulatory oxygen and consideration for pulmonary rehabilitation. In some cases, referral to social, psychological, dietary, occupational therapy, respiratory out-patients and/or palliative care services will be required.

HOS-AR staff would be expected to be trained to provide very brief advice (VBA) to smokers, to refer to smoking cessation services as appropriate, and to ensure follow up.

The electronic Home Oxygen Order Form (HOOF) must be completed and sent to the relevant oxygen supplier. Details of the plan for managing the person's condition should be sent to his/her GP and, where appropriate, consultant physician and home care team.

Skills required

HOS-AR health care professionals should be trained and competent in the skills required for oxygen assessment. These include carrying out a respiratory assessment that involves the following diagnostic activities.

- assessing and interpreting exhaled CO levels
- carrying out arterial +/- capillary blood gas tests
- carrying out appropriate exercise tests in a safe, valid, and reliable manner
- providing very brief advice on smoking cessation and understanding how and when to refer on to all appropriate onward services

Oxygen assessment should be undertaken by an appropriately trained health care professional(s). The HOS-AR should be led by at least a band 7 clinician with suitable clinical training and the service should have regular supervision and clinical input from a senior respiratory specialist who will normally be a respiratory physician, ideally an Integrated Respiratory Consultant.

The health care professional should have good knowledge of conditions causing hypoxaemia/hypoxia and extensive knowledge of the equipment provided by the local oxygen supplier and the documentation required by them. Clinical notes should be kept appropriately to enable sharing of information between team members or services as required to optimise patient care.

Location

The assessment should take place within premises that are in accordance with appropriate infection control, risk assessment and health and safety policy; and are spacious enough to allow for the patient's capacity for exercise to be assessed safely when assessment of ambulatory oxygen requirement is performed.

The assessment can also be carried out in the person's own place of residence, provided that the patient consents, infection control, risk assessment and health and safety policy are adhered to.

Equipment

The assessment will require measurement of exhaled CO, arterial and/or capillary blood gases as well as pulse oximetry, and therefore, this necessary equipment must be available and must be well maintained. The equipment should be portable to enable full assessment of both patients assessed in clinic and those assessed at home. In addition, a variety of oxygen equipment, both for long term and ambulatory use, must be available to assess the person and ensure they are given the most appropriate equipment for their needs.

Stage 1a Assessment for long-term oxygen therapy (LTOT)

The assessing clinician should explain the rationale for long-term oxygen therapy (LTOT) and its use and explain the assessment process and gain consent for assessment.

LTOT is indicated for a clinically stable person where the PaO_2 on air is at or below 7.3 kPa (or below 8kPa if complicated by pulmonary hypertension, polycythaemia (haematocrit >55%) or peripheral oedema) on a baseline arterial/capillary blood gas.

If LTOT is indicated, a 30-minute trial on the flow rate required to bring sats >92% (or above higher targets in some cases) must be undertaken. An arterial / capillary blood gas should be repeated to ensure PaO_2 has risen to above 8kPa on this flow rate, to determine the $PaCO_2$ and any change. An electronic home oxygen order form (HOOF) should then be completed. All patients will require an IHORM and consent form before home oxygen prescription.

If the $PaCO_2$ is >6kPa and there is >1kPa rise in $PaCO_2$ while on oxygen, oxygen should not be ordered before the person is discussed with a consultant respiratory physician as they may require referral to a sleep or home mechanical ventilation service before initiation. They should also be consented for a Coordinate My Care (CMC) record and a record written / updated which states they are at risk of type 2 respiratory failure.

If AOT is indicated to enable the person to leave their home in a wheelchair or scooter, then 2 standard cylinders (without a conserver) would usually be provided at the LTOT flow rate. If, however the patient mobilises or exercises outdoors or requires a different portable device, they should have a more detailed assessment for AOT (see below). This may be completed at the same appointment if the patient consents and time allows.

Stage 1b Assessment for ambulatory oxygen therapy (AOT)

Certain people may require ambulatory oxygen to maximise quality of life by supporting normal activities of daily living including undertaking exercise and trips out of the home and allowing a longer daily use of LTOT.

There are three levels of AOT prescription:

1. People on LTOT who do not mobilise outdoors. This group do not require exercise testing and they should be prescribed their LTOT flow rate through standard cylinders.
2. People on LTOT but who continue to walk/ exercise outdoors. This group are assumed to meet desaturation criteria, but they should still complete exercise testing on their LTOT setting as the extent / speed of desaturation will inform the flow rate used going forward.
3. People who do not meet criteria for LTOT. This group must perform a baseline exercise test on room air to determine if they meet the desaturation criteria for AOT i.e. a desaturation of 4% or more to <90% before AOT can be considered. BTS guidelines also stipulate secondary criteria for this group i.e. the person should demonstrate 2 out of 3 of: improved exercise desaturation, breathlessness or exercise tolerance while repeating the test on oxygen.

After the initial walking test (usually lasting 6 minutes) with group 2 or 3 (if initial criteria are met), the person should be given at least a 20-minute rest before repeating the test using the most appropriate oxygen device.

To determine the most appropriate device, all devices provided by the London oxygen supplier should be demonstrated to the person, their family / carer. Clinicians must be trained to explain the

benefits and limitations of each of the devices and to use the information provided in the subjective assessment to help them determine which device would best meet her needs.

For assessment services where there is no space to store all of the devices, or for assessments in the person's home, alternatives should be sought e.g. using a tablet device to demonstrate them to the patient via the oxygen portal. It is important that the clinician still has a good understanding of the different devices to answer people's questions and ensure their decision is fully rounded.

It is essential that patients are tested with the device to be provided to them as the weight of the device, whether they carry or wheel it and whether there is a conserver attached or built in will alter the effect on the patient. For assessment services with no space to store devices, this may involve the preferred device being ordered for the patient prior to their test on oxygen. This has limitations in that if the patient does not respond well to a device another order and assessment visit will be required.

The professional should be trained to estimate the flow rate required using the extent or speed of desaturation however more than one exercise test on oxygen may be required to determine the required flow rate for the device.

It should be noted that in some cases patients may choose not to have the device which best meets their needs. Demonstrating the difference between two devices on exercise testing may be sufficient to explain why one device would suit them best however, they may not change their mind. Equally, patients may not tolerate the flow rate required to prevent desaturation. In these cases, a pragmatic approach should be taken. It may be of benefit to the patient to use their preferred device or flow rate rather than not using any device/ flow rate at all. In these cases, it should be documented what information the patient was given and what they chose to do in the end. This is also the case for patients who decline to have AOT prescribed.

This exercise test may need to be repeated a couple of times at increasing flow rates to prevent desaturation <90% or until the patient no longer tolerates increased flow rates.

The clinician should have confidence that the person will make sufficient use of any ambulatory equipment provided, and ensure that he/she has the capacity, with adequate training, to operate it effectively (if necessary with the help of a carer). An electronic home oxygen order form should then be completed.

Stage 1c Assessment for short burst oxygen therapy (SBOT) for cluster headaches

For SBOT for cluster headaches, the patient must have been reviewed by a specialist neurology service and be optimised medically. All patients will require an IHORM and consent form before prescription. This type of oxygen is usually provided through large static cylinders which would be at risk of exploding during a fire. Current smokers should be offered very brief advice and onward referral for smoking cessation treatment and support. Smokers/ ex-smokers over 35 with respiratory symptoms should have a possible underlying diagnosis of COPD considered and be referred on for appropriate quality assured diagnostic tests.

Oxygen assessment should include a trial on 15 litres per minute oxygen with an arterial / capillary blood gas after 30 minutes to ensure $PaCO_2$ has not risen above 6 kPa. An electronic HOOF should then be completed. If $PaCO_2$ does rise above 6 kPa, this should be discussed with a consultant physician to determine if referral to a sleep / home ventilation service is required.

Prior to home oxygen being ordered, the need for people with cluster headaches to engage in annual assessment or risk withdrawal of their oxygen should be explained to them. Careful discussion is required to ensure patients are fully informed of the likelihood of benefit and how this will be assessed.

Written information should be provided to them about how to use equipment. Information for prescribers and patients is available, please see London Clinical Oxygen Network guidance https://www.networks.nhs.uk/nhs-networks/london-lungs/london-clinical-oxygen-network-lcon

Stage 1d Assessment for Palliative Oxygen Therapy (POT)

HOS-AR services should have an agreed pathway for management of oxygen in the palliative phase of illness with local palliative care teams. There should be a process for referral and assessment in place which has been agreed by relevant referrers, specialist respiratory MDT, HOS-AR team, and palliative care services. Oxygen is a treatment for hypoxia / hypoxaemia and not breathlessness alone and therefore some evidence of hypoxia / hypoxaemia is generally required, although when all other treatments for refractory breathlessness have been exhausted (including pharmacological management) palliative oxygen may be considered with agreement from a respiratory physician.

The IHORM and consent form must still be completed; palliative oxygen therapy is not recommended for smokers on safety grounds. The patient's Co-ordinate My Care record should also be updated as required.

For patients with COVID-19 who are in the last days or hours of life, oxygen therapy is unlikely to be more effective than opioids and sedatives for the symptomatic management of breathlessness and associated distress[9]. Oxygen therapy is likely to be burdensome in this situation, a barrier between family members and the patient, and a cause of additional anxiety related to equipment and deliveries. Measuring oxygen saturations in this setting is unlikely to be helpful. The focus of care should be on palliation using evidence-based pharmacological and non-pharmacological interventions, and individualised support to the person and those important to them.

Stage 2 Follow up/Review home visit schedules

When home oxygen therapy has been started during acute illness a follow up visit should occur within 4 weeks for LTOT and 4 to 6 weeks for AOT. This specialist and holistic review should be provided by suitably competent staff.

For people starting LTOT, the initial review should be undertaken at home within four weeks to enable re-assessment of the person's clinical status, adherence to the oxygen therapy regime (including the appropriateness of the equipment), safety review to reduce risks including fire and falls and whether further action is necessary (e.g. referral back to a specialist clinician – whether respiratory or the person's main specialty – or social services or MDT discussion). The review should be undertaken by a healthcare professional who is competent to assess and advise the person.

Review of ambulatory oxygen usage should be made, to ensure the prescription is suitable and equipment is being using as prescribed.

If any adjustment of the oxygen therapy is required, an amended HOOF will need to be completed.

The supplier will be required to comply with the new HOOF provided it is clinically safe, e.g. compliant with BTS Guidelines.

People who are stable should then be reviewed annually including monitoring of oxygen saturations and enquiry about household smoking habits. People whose condition is less stable will require more frequent review and follow up, including blood gas measurement. They may need referral for specialist physician review.

[9] Alsop M, Ziegler L, Fu Y, Rudd S, Bennett MI; Oxford COVID-19 Evidence Service Team. Is oxygen an effective treatment option to alleviate the symptoms of breathlessness for patients dying with COVID-19 and what are the potential harms? CEBM, 2020. https://www.cebm.net/covid-19/is-oxygen-an-effective-treatment-option-to-alleviate-the-symptoms-of-breathlessness-forpatients-dying-with-covid-19-and-what-are-the-potential-harms/

People in receipt of home oxygen should be reviewed after any acute hospital admission or severe exacerbation treated at home.

Stage 3 Withdrawal of oxygen therapy

If at review people are found to no longer meet the criteria for home oxygen, this should be explained, the oxygen provision discontinued (with a removal request submitted to the supplier) and other prescribed treatments reviewed. Oxygen removal requests should be submitted directly to the home oxygen supplier by way of email or on the electronic portal, detailing all equipment that should be removed. If ambulatory oxygen is not being used, this should be removed, and the HOOF amended accordingly.

Where the person continues to meet the criteria but is not using the oxygen as prescribed, he or she should be counselled on the merits of the therapy and encouraged to increase usage to the recommended level. Barriers to use should be explored and mitigated where possible.

In the case of continued smoking, (by the patient or other members of the household), very brief advice and expert tobacco dependence treatment and support should be offered. Use of electronic cigarettes in an oxygen enriched environment is also hazardous and should be discouraged. In the persistent smoker a risk/benefit analysis should be undertaken with medical review and this should be discussed in a specialist MDT. It may be appropriate to withhold or withdraw oxygen because of safety concerns and risk to others, after ensuring that the patient, their carers, primary care clinician and specialist team understand the reasons for this decision. This process should be documented.

Where people refuse to return equipment, there should be ongoing engagement and re-education of the patient and/or their relatives/carer on the reasons for removal. A multidisciplinary meeting with the person, HOS-AR, GP, and other stakeholders may assist with this.

Documenting results and Oxygen Register

The Provider will have access to the local oxygen concordance and bespoke reports on the supplier's electronic portal. The provider will be required to review the reports, make patient interventions, and update as required monthly. This includes all patients in the HOS-AR catchment area. The HOS-AR should liaise with relevant services e.g. paediatric or palliative care teams to ensure all patients are reviewed by an appropriate healthcare professional.

The Provider shall employ a comprehensive and rigorous system of data collection, storage, retrieval and transmission in order to verify the information provided by the oxygen supplier and to keep the oxygen register accurate and up to date, including:

- a comprehensive record of the identities and numbers of people who have been referred for an HOS-AR assessment and who have been provided with HOS therapy
- appropriate records of the HOS-AR assessments, follow up home visits, adjustments to HOS treatment and review and details of when HOS therapy is withdrawn

The Provider will report all the above information to [the Commissioners or other appropriate counterpart] in an agreed format [at a time to be agreed] or otherwise have it available online on a real-time basis.

Patient confidentiality and data protection requirements should always be observed in this process.

Patient Care Plan

The Provider shall ensure that the records of all referrals for HOS-AR assessment and those patients who receive HOS therapy are made available to GPs so that this information is recorded in care plans. '*Co-ordinate my care*' plans should also be updated for those patients who have them.

Review and Audit

The Provider agrees to allow the [Commissioner]:

- To review and audit the provision of the Service at least annually and to provide a summary of the overall results and its performance of the Service to confirm compliance with the Indicators; and

- To have reasonable rights of audit and access to any of the Provider's premises, personnel, the Provider's systems, sub-contractors and their facilities and premises and the relevant records (including the right to copy) and other reasonable support as the [Commissioner] may require whilst the Service is being provided [and for twenty four (24) months following the end of [the Contract]] in order to verify any aspect of the Service or Provider's performance.

D: Patient outcomes

There is evidence that through effective provision of HOS-AR services to patients who require home oxygen therapy following outcomes can be achieved for patients:

- Increased activity levels[10]
- Increased patient involvement in their own care
- Improved patient experience
- Annual renewal of HOOF as evidence of ongoing clinical care
- Provision of the right modalities based on oxygen needs and lifestyle
- Reduction in oxygen related patient admissions
- Reduction in oxygen related adverse events (including smoking related incidents)
- Increased patient and/or carer/relative knowledge of oxygen management
- Increased Health-Related Quality of Life[11]

[10] Cochrane Systematic Review - Intervention Version published: 20 April 2005 see what's new https://doi.org/10.1002/14651858.CD004356.pub2

[11] T Eaton 1 , J E Garrett, P Young, W Fergusson, J Kolbe, S Rudkin, K Whyte (2002) Aug;20(2):306-12.Ambulatory oxygen improves quality of life of COPD patients: a randomised controlled study.

E: Performance Indicators

When reporting progress against outcomes the Provider may wish to consider measures and calculations like those set out below. Data should be obtained from local audit, unless otherwise stated.

The Commissioner may wish to consider Remedial Action Plans to ensure compliance with the required threshold for certain measures if selected.

#	Outcome	Expected outcomes			Indicator description	Indicator threshold	Measurement
		Yr 1	Yr 2	Yr 3			
1	Eligible people are referred for a HOS assessment	*[TBA]*	*[TBA]*	*[TBA]*	The percentage of eligible people referred for a HOS assessment	*[95%]*	(x) The number of eligible people* referred for a HOS assessment (y) The number of eligible people* [x/y] x 100 = percentage of eligible people* referred for a HOS assessment *'eligible people' defined as: those with oxygen saturation less than or equal to 92% when clinically stable
2	Eligible people booked for their HOS assessment attend their appointment	*[50]*	*[60]*	*[70]*	The percentage of eligible people booked for their HOS assessment who attend their appointment	*[80%]*	(x) The number of eligible people* booked for their HOS assessment who attend their appointment (y) The number of eligible people* booked for their HOS assessment [x/y] x 100 = percentage of eligible people* booked for their HOS assessment who attend their appointment *'eligible people' defined as: those with oxygen saturation less than or equal to 92% when clinically stable
3	Eligible people requiring ambulatory oxygen are assessed	*[60%]*	*[70%]*	*[80%]*	The percentage of eligible people requiring ambulatory oxygen who are assessed	*[90%]*	(x) The number of eligible people requiring ambulatory oxygen* who are assessed (y) The number of eligible people requiring ambulatory oxygen* [x/y] x 100 = percentage of eligible people requiring ambulatory oxygen who are assessed *'eligible people requiring ambulatory oxygen' defined as: those where the SpO2 reading falls by 4% or more and to less than 90% and the person demonstrates improved exercise tolerance or comfort with oxygen

#	Outcome	Expected outcomes			Indicator description	Indicator threshold	Measurement
		Yr 1	Yr 2	Yr 3			
4	People requiring ambulatory oxygen have the preferred modality	[TBA]	[TBA]	[TBA]	The percentage of people requiring ambulatory oxygen who have the preferred modality	*[90%]*	(x) The number of people requiring ambulatory oxygen who have the preferred modality (y) The number of people requiring ambulatory oxygen [x/y] x 100 = percentage of people requiring ambulatory oxygen who have the preferred modality
5	Patients who have been assessed and are deemed appropriate for oxygen therapy receive it	*[90]*	*[95]*	*[100]*	The percentage of eligible patients who receive home oxygen therapy	*[100]*	(x) The number of eligible patients* who receive home oxygen therapy (y) The number of eligible patients* [x/y] x 100 = percentage of eligible patients* who receive home oxygen therapy *'eligible patients' defined as: those who are clinically stable person where the arterial blood oxygen measurement is at or below 7.3 kPa (or under 8kPa if complicated by pulmonary hypertension)
6	People prescribed elective LTOT or those at risk on assessment have a follow up home visit within 4 weeks	*[TBA]*	*[TBA]*	*[TBA]*	The percentage of people prescribed oxygen therapy who have a follow up home visit within 4 weeks	*[95%]*	(x) The number of people prescribed oxygen therapy who have a follow up home visit within 4 weeks (y) The number of people prescribed oxygen therapy [x/y] x 100 = percentage of people who have a follow up home visit within 4 weeks
7	Patients who are current smokers referred for home oxygen who are offered very brief advice and treatment, and referred to local smoking cessation service	*[TBA]*	*[TBA]*	*[TBA]*	The percentage of people using the HOS-AR service who are smokers who are offered stop smoking support and pharmacotherapy	*[95%]*	(x) The number of people using the HOS-AR service who are smokers who are offered stop smoking support and pharmacotherapy and quit smoking (y) The number of people using the HOS-AR service who are smokers [x/y] x 100 = percentage of people using the HOS-AR service who are smokers who are offered stop smoking support and pharmacotherapy

#	Outcome	Expected outcomes			Indicator description	Indicator threshold	Measurement
		Yr 1	Yr 2	Yr 3			
8	People on long-term oxygen therapy have a review every 6 months and people on ambulatory oxygen have a review every 12 months	*[TBA]*	*[TBA]*	*[TBA]*	The percentage of people on long-term oxygen therapy who have had a review in the last 9 months	*[95%]*	(x) The number of people on long-term oxygen therapy who have had a review in the last 9 months (y) The number of people on long-term oxygen therapy [x/y] x 100 = percentage of people on long-term oxygen therapy who have had a review in the last 9 months
9	Oxygen is withdrawn in cases where people not hypoxaemic and/or not deriving benefit from home oxygen, and withdrawal is recommended	*[TBA]*	*[TBA]*	*[TBA]*	The percentage of people not hypoxaemic and/or deriving no benefit from home oxygen where oxygen is withdrawn if recommended	*[95%]*	(x) The number of people not hypoxaemic and/or deriving no benefit from home oxygen where oxygen is withdrawn (y) The number of people not hypoxaemic and/or deriving no benefit from home oxygen where withdrawal is recommended [x/y] x 100 = percentage of people not hypoxaemic and/or deriving no benefit from home oxygen where oxygen is withdrawn if recommended
10	Patients who are current smokers referred for home oxygen who are offered very brief advice and treatment, and referred to local smoking cessation service	*[TBA]*	*[TBA]*	*[TBA]*	The percentage of people using the HOS-AR service who are smokers who are offered stop smoking support and pharmacotherapy	*[95%]*	(x) The number of people using the HOS-AR service who are smokers who are offered stop smoking support and pharmacotherapy and quit smoking (y) The number of people using the HOS-AR service who are smokers [x/y] x 100 = percentage of people using the HOS-AR service who are smokers who are offered stop smoking support and pharmacotherapy

#	Outcome	Expected outcomes			Indicator description	Indicator threshold	Measurement
		Yr 1	Yr 2	Yr 3			
11	Patients who are current smokers are not treated with home oxygen due to the clinical risk	*[TBA]*	*[TBA]*	*[TBA]*	The percentage of people using the HOS-AR service who are smokers	*0%*	(x) The number of people using the HOS-AR service who are smokers (y) The number of people using the HOS-AR service [x/y] x 100 = percentage of people using the HOS-AR service who are smokers
12	People using the HOS-AR service are referred to pulmonary rehabilitation services as appropriate	*[TBA]*	*[TBA]*	*[TBA]*	The percentage of people using the HOS-AR service who are referred to pulmonary rehabilitation services	*[TBA]*	(x) The number of people using the HOS-AR service who are referred to pulmonary rehabilitation services (y) The number of people using the HOS-AR service [x/y] x 100 = percentage of people using the HOS-AR service who are referred to pulmonary rehabilitation services
13	Patients with documented type 2 respiratory failure have an electronic oxygen alert through CMC as well as a hand-held alert card	*[TBA]*	*[TBA]*	*[TBA]*	The percentage of people receiving home oxygen who have oxygen alert cards	*[TBA]*	(x) The number of people receiving home oxygen who have an electronic and written oxygen alert (CMC and card) (y) The number of people receiving home oxygen [x/y] x 100 = percentage of people receiving home oxygen have an electronic and written oxygen alert (CMC and card)
14	People using the service and their carers are satisfied with the service	*[TBA]*	*[TBA]*	*[TBA]*	The percentage of people and carers surveyed who are satisfied with the service	*[95%]*	(x) The number of surveys received with a satisfactory score (y) The number of people and carers surveyed [x/y] x 100 = percentage of people and carers surveyed who are satisfied with the service
15	Reduction in the number of HOS accounts with a cylinder usage variance to their current HOOF	*[TBA]*	*[TBA]*	*[TBA]*	The number of accounts where the cylinders in the patient's possession is not being used as prescribed on the HOOF		(X)The number of accounts where variance has been resolved (y) The number of accounts with a variance at start of the year (x/y) x100 = percentage improvement in variance accounts

F: Logic Model

A logic model is a representation of how an activity is intended to deliver results. The model shows the logical relationships between the resources that are invested, the activities that take place and the benefits or change that can result. The model is another way of showing indicators and can be used by commissioners when considering their approach to developing services locally. Attached is a suggested logic model for HOS AR.

Impact	Reduction in respiratory mortality Reduction in inappropriate prescribing and costs Reduction in home oxygen related harm and waste Reduction in variation in prescribing
Outcome	Increase the number of patients concordant with LTOT Increase the number of patients concordant with ambulatory oxygen Increase number of patients with annual reviews Reduction in number of smokers on home oxygen therapy Reduction in oxygen related adverse events Reduction in hospital admissions Reduction in payments for unused oxygen equipment
Output	% of people prescribed oxygen who had a follow-up home visit within 4 weeks % of patients requiring adjustment of treatment % of patients not hypoxaemic and/or deriving no benefit where withdrawal recommended % of patients on oxygen after withdrawal recommended % of patients and carers who are satisfied with the service % of patients accurately prescribed oxygen % of patients with zero concordance who have equipment in place
Intervention	Full and comprehensive service [including home visits] delivered as per British Thoracic Society Guidelines and in line with recommendations from Primary Care Commissioning GPG. Conducted by suitably qualified and trained health professionals with appropriate premises and equipment. HOS-AR service should be integrated within a comprehensive patient pathway.
Input	Patients that have a clinical condition requiring home oxygen therapy where there is a clear identified need for home oxygen

Appendix 1 – LCON oxygen guidance

The London Clinical Oxygen Network has produced some best practice guidance to support the same and appropriate prescribing of home oxygen. Links are below.

Guidance Title	Link to guidance
Oxygen risk assessment	
Cluster headache guidance for GPs	
Cluster headache guidance for respiratory teams	
LCON responsible prescribing messages	
Getting oxygen right for discharge	

Appendix 2 – List of clinical indications for the use of home oxygen therapy

Clinical Indications*	
1 Chronic Obstructive Pulmonary Disease	11 Obstructive Sleep Apnoea Syndrome
2 Chronic Asthma	12 Heart Failure
3 Interstitial Lung Disease	13 Paediatric Interstitial Lung Disease
4 Cystic Fibrosis	14 Chronic Neonatal Lung Disease
5 Bronchiectasis	15 Paediatric cardiac disease
6 Pulmonary malignancy	16 Cluster Headache
7 Palliative phases of illness	17 Sickle Cell Disease
8 Chest Wall Disease	18 Other primary respiratory disease
9 Neuromuscular Disease	19 COVID-19
10 Neuro-disability	*this list is not exhaustive

Appendix 3 – Contributors to this document

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Appendix 4 - References

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