Public – To be published on the Trust external website

Oxygen & other medical gases – administration, prescribing, storage and safety

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Status: Approved
Document type: Procedure
Overarching Policy: Medicines Overarching Framework

Contents

1 Introduction

Oxygen is one of the most common medicines used in hospital settings and, although potentially lifesaving, if administered and managed inappropriately it can cause serious harm. The NPSA (2009) received 281 reports of serious incidents with oxygen and the most common themes from a review of these incidents include:

- **Prescribing**: failure to or wrongly prescribed
- **Monitoring**: Patients not monitored; abnormal oxygen saturations levels not acted upon.
- **Administration**: Confusion of oxygen with medical compressed air, incorrect flow rates, inadvertent disconnection of supply
- **Equipment**: Empty cylinders, faulty and missing equipment

This procedure supports Our Journey to Change as set out in the Medicines Overarching Policy.

2 Purpose

Following this procedure will help the Trust to:

- set standards in practice to ensure that oxygen is administered, prescribed, and stored safely. The principles apply to all medical gases, but for ease the term “oxygen” will be used throughout most of the document;
- guide staff through the process and procedure of oxygen administration, prescribing and storage ensuring quality standards are maintained.

3 Who this procedure applies to

This procedure applies to all staff handling, prescribing, administering, or otherwise associated with the use and handling of oxygen (or other medical gases)

4 Related documents

This procedure describes what you need to do to implement the Oxygen & other medical gases – administration, prescribing, storage and safety section of the Medicines Overarching Framework Policy.

This procedure also refers to:

- Decontamination of Equipment
- Medical Devices Policy
- MSS 10: Oxygen - Administration in an emergency

- Manual Handling of Objects / Loads
- Procedure for Using the National Early Warning Score (NEWS) 2 for the Early Detection and Management of the Deteriorating Patient in Adults (aged 16 and above)
- Resuscitation Policy
- Physiological Assessment Guidelines
- Patient_Safety_Alert_-_Failure_to_open_oxygen_cylinders.pdf (england.nhs.uk)

5 Oxygen Procedures

5.1 Trust Oxygen Cylinders

Oxygen cylinders in the Trust are standardised to one supplier – BOC Medical. The range of cylinder sizes available is limited. The cylinders all have integrated regulators and are easy to use and to maintain. All cylinders within the Trust should operate via an on/off hand wheel and flow regulator

All Cylinders must be capable of administering high-flow rates of oxygen (0 -15 litres per minute). For guidance on how to use CD and HX oxygen cylinders refer to Appendix 1.

Every cylinder has a batch label, identifying the batch number, filling date and expiry date. It also identifies the cylinder size and type of contents.

5.1.1 CD Cylinders

(See Appendix 2)

All Emergency Response Bags must have a CD oxygen cylinder. These are the small portable cylinders for the use of emergency oxygen. They hold 460 Litres of Oxygen, which if running at a rate of 15 litres per minute (LPM), will provide approximately 30 minutes of oxygen.

A spare oxygen cylinder must be available on site or nearby, to ensure adequate oxygen supplies.

5.1.2 HX Cylinders

(See Appendix 2)

These are the large oxygen cylinders that hold 2300 litres of oxygen. These cylinders are suitable for clinical areas that use oxygen more frequently and are for patients requiring regular oxygen therapy.

All oxygen cylinders must be checked daily to ensure an adequate supply is always available; the content of cylinders can be checked via the 'live gauge' at the top of the cylinder. The expiry date on all cylinders must also be checked.

These checks should be recorded on the Emergency Response Bags Daily Checklist located within the Trust Resuscitation Policy. This checklist has an additional area to highlight checks of any back-up or other oxygen cylinders.

5.1.3 How to Order Oxygen Cylinders

- All clinical areas in the Trust have their own delivery point as part of the trust account with BOC medical. This should be cited when arranging any returns and replacements. Orders can be placed by contacting the BOC Customer Service Centre / Helpline – Tel: 0800 111 333 (available 24hrs).
- If you have an individual delivery point (often referred to as an account), ensure this information is accessible to the staff who order oxygen. Please note deliveries may take 24-48 hours.
- For clinical areas within the Trust who need to open a new account and set-up a new contract for oxygen cylinders, it must be ordered via Cardea. Add your request for type and quantity of oxygen cylinder via the non catalogue item (NCI) section.
- If you have an individual account with BOC Medical and the service closes, the ward manager must inform BOC Medical, that the cylinder is no longer needed, and the contract is terminated. Collection of any oxygen cylinders needs to be arranged.
- There is a small central oxygen store at Roseberry Park and Lanchester Road Hospital. Returns and replacements at these sites may be arranged by contacting Estates Staff (0191 3336222)

5.2 Medical Gas Storage & Safety

5.2.1 Clinical Environment

- All Trust locations where medical gas cylinders are stored must have gas cylinder signs displayed (including temporary signs if someone is receiving oxygen in their room).
- Cylinders must be in a safe and secure environment.
- Cylinders must be identified as part of the COSHH and fire risk assessments.
- All spare and in-use cylinders must be adequately restrained; stored and secured in an upright position. They should not be free standing as they risk falling over injuring staff or patients, and this could also cause damage to the cylinders.
- Ensure cylinders are used in strict rotation, so that cylinders with the earliest filling date are used first.
- Empty cylinders must be clearly separated and quarantined from full / in-use cylinders
- Cylinders must be kept clean, dry, and stored away from sources of heat or ignition.
- Cylinders should also be handled with care, never knocked violently, or allowed to fall over. Never roll cylinders along the ground.
- CD cylinders may be stored in Emergency Response Bags; if additional CD cylinders are held, these should be restrained to the wall by a safety chain or CD holder.
- HX cylinders must be stored vertically and transported on an appropriate type and size of oxygen trolley.
- Additional HX cylinders should be restrained to the wall by a safety chain or on an oxygen trolley when not in use.
- HX cylinders in use in the ECT department may be stored horizontally in the designated oxygen cradles underneath Patient trolleys. See appendix 3, for some storage options available from Cardea.
- When using medical gas cylinders it is important that no part of the cylinder valve or equipment is either lubricated or contaminated with oil or grease.
- Take care if using oil or petroleum-based hand creams as these could provide sufficient contamination to the medical cylinder valve surface when handling the cylinder to cause an ignition when the valve is turned on.
- The application of paraffin-based skin products to patients, e.g., Diprobase ointment, emulsifying ointment, white soft paraffin causes an additional potential fire hazard when administering oxygen to them.
- For patients who need home visits, arrangements need to be made with the ambulance patient transport service to enable transport of the patient and oxygen.
- All equipment must be handled in line with the Manual Handling of Objects / Loads Procedure

Staff must NEVER transport oxygen cylinders in their own motor vehicles.

In the rare event that an oxygen valve fails to open an alternative cylinder should be sought immediately (all areas have a spare cylinder).

A replacement must be ordered from BOC and an email sent to inboundsales.admin@boc.com – an TEWV incident report must also be completed

5.2.2 Designated Trust Oxygen Storage facilities

Storage Facilities managed by Estates staff should ensure

- Oxygen cylinders are stored:
  - in a purpose-built cylinder store that allows cylinders to be kept dry and clean, not subject to extremes of heat or cold;
  - away from stocks of combustible material;
  - separately from industrial and other non-medical cylinders;
  - to maintain separation between full and empty cylinders
- Unauthorised entry is prevented to protect cylinders from theft.
- Oxygen cylinders are used in strict rotation so that cylinders with the earliest filling date are used first.
- HX oxygen cylinders are stored vertically on concrete floored pens; CD oxygen cylinders can be stored horizontally on shelves.
- Warning notices prohibiting smoking and naked lights are posted clearly in the cylinder storage area.
- The Fire Services are aware of the location of any cylinder storage area within the Trust.
- Safety shoes and protective gloves are worn when moving and handling oxygen cylinders.
- All equipment is handled in line with the Trust Manual Handling of Objects / Loads Procedure.
- That staff receive the necessary training to manage an oxygen storage facility and handle and transport oxygen.

5.3 Medical Gas Administration

5.3.1 Prescribing

Medical gases (including oxygen) are licensed medicines and, as such, are subject to the Medicines Act and must be treated in the same way as any other medicine.

- In an emergency situation oxygen can be administered without a prescription - see Medication Safety Series (MSS) 10
- Except for the emergency situation described above for oxygen, written authority from a prescriber must be obtained before a medical gas is administered to a patient. This authority must include the name, and concentration of the medical gas (where appropriate), the method

of administration, the percentage and/or rate of flow. This must be done on the oxygen prescription and administration chart (available on wards or to print if needed)

- Oxygen cannot be prescribed on the Electronic Prescribing and Medicines Administration (EPMA) system. A patient attribute must be in place on EPMA to indicate an oxygen chart is in use. The chart can be used on its own and does not need a full Kardex to be written.
- A designated Practitioner administering a medical gas to a patient must administer in accordance with the prescription and record administration on the chart with relevant monitoring on the reverse of the chart.
- The location where oxygen is administered must be risk-assessed to always ensure safety by the clinical staff.

The NPSA (2009) report the potential for serious harm if oxygen is not administered or handled properly. The main safety concerns relate to underuse and overuse of oxygen:

- Underuse of oxygen is extremely dangerous as it exposes critically ill patients to the risk of hypoxic organ damage.
- Overuse of oxygen can also be harmful, especially for patients with chronic obstructive pulmonary disease (COPD) who are at risk of hypercapnic respiratory failure (as are patients with cystic fibrosis, severe obesity, and bronchiectasis)
- The concentration of oxygen required depends on the condition being treated; the administration of an inappropriate concentration of oxygen can have serious or even fatal consequences.
- Current prescribing guidelines on oxygen therapy can be accessed via the current edition of the **British National Formulary**.

In an emergency situation oxygen may be administered without a prescription by any staff who have undertaken resuscitation training. See **MSS 10: Oxygen - Administration in an emergency**

5.3.2 Monitoring

Following guidance issued from a Rapid Response Report (NPSA/2009/RRR006: Oxygen Safety in Hospitals), all Ward/Unit Managers must ensure they have a pulse oximeter available in all locations where oxygen is used.

- Oxygen saturation levels should be monitored in all patients receiving oxygen therapy.
- A pulse oximeter is a medical device used to measure oxygen saturation (SpO2) levels within the body and to monitor the effectiveness of oxygen. For further guidance regarding Pulse oximetry refer to Royal Marsden Manual Online via the following link - **Physiological Assessment Guidelines**

5.3.3 Oxygen Administration Devices

There is a variety of devices available to administer regular oxygen therapy; these are all available via Cardea on Medical device template 32: General Oxygen Therapy. Oxygen face masks must not be confused with nebuliser masks.

5.3.4 Nasal Cannula

- A nasal cannula consists of two prongs that are inserted inside the nostrils. Giving oxygen by nasal cannula allows the patient to talk, eat, and drink; they can also be less claustrophobic than facemasks.

- A nasal cannula is usually preferred for long-term oxygen therapy. It can, however, produce dermatitis and mucosal drying in sensitive individuals. Can be given up to 6L/min (humidified), but generally flow rates must not exceed 4L/min or it will damage the mucosa.

5.3.5 Simple Oxygen Face mask

- Simple oxygen face masks are:
  - single patient use
  - low-flow masks which entrain the air from the atmosphere
  - able to deliver a variable oxygen percentage from 21-60%.
- The actual amount of oxygen the patient receives will depend on the rate and depth of respiration.
- Place the oxygen mask over the patient's nose and mouth with the elastic strap over the ears to the back of the head. Adjust the length of the strap to ensure the mask fits securely.

5.3.6 Rebreathing Oxygen Face mask

- These are often used when a percentage of oxygen has been prescribed.

- This special mask incorporates a rebreathing system which is colour-coded and specifies the flow of oxygen required to deliver 24%, 28%, 35%, 40% and 60% oxygen. These are therefore fixed performance masks where a known concentration can be achieved.

- First select the correct colour-coded rebreathing oxygen mask according to the prescribed percentage of oxygen. Place the facemask over the patient's nose and mouth with the elastic strap over the ears to the back of the head. Adjust the length of the strap to ensure the mask fits securely. Set the flow rate as indicated on the device.

5.3.7 Non-Rebreathing Oxygen Face Mask

The non-rebreathing mask provides a high concentration of oxygen, and the reservoir bag allows for adequate oxygen to be available to meet the unpredicted breathing pattern and tidal volumes. Features:

- Flexible plastic mask with elastic head strap
- Incorporated oxygen reservoir bag
- Oxygen tubing supplied and pre-connected
- Latex free
- Delivery of 99%-100% oxygen concentration
- High concentration at a flow rate of 15 litres per minute

5.4 Home Oxygen

- Contact the patient's GP to arrange the supply of oxygen to patients who need oxygen treatment at home.

5.5 Oxygen Concentrators

- VisionAire 5 Oxygen Concentrators are available across the trust. These can be used for flow rates of 1-5 litres per minute. Guidance on oxygen concentrators can be found here.
- An oxygen concentrator is a medical device that separates oxygen from other gases that are present in the surrounding air and can provide a supply of oxygen for administration. Oxygen concentrators are more economical for patients who need oxygen for long periods; a concentrator is recommended for a patient who needs oxygen for more than 8 hours a day (or 21 cylinders per month).
- Refer to the latest edition of the BNF for supplier information if the above criteria are met for an inpatient requiring oxygen therapy. Contact the patient's GP to arrange the supply of an oxygen concentrator to patients at home.

Patients may be admitted to wards/departments with oxygen concentrators. Many of the same principles regarding oxygen safety and storage apply with the use of oxygen concentrators and generally include:

- ✓ **Position the oxygen concentrator away from curtains or drapes, radiators, heaters, and fireplaces. Be certain to place the unit so all sides are at least 12 inches away from a wall or other obstruction.**
- ✓ **In the event of a fire, ensure the emergency operator is aware of an oxygen concentrator is on the premises.**

×	**Oxygen concentrators manufacture high purity oxygen, which promotes rapid burning. Do not allow smoking (including electronic cigarettes and use of charging devices) or open flames in the same vicinity of this device or any oxygen carrying accessory.**
×	**Do not use oil, grease, or petroleum-based products on or near the unit – (for e.g. E45 cream, Vaseline).**
×	**Do not use extension cords with concentrators.**
×	**Do not place the unit in a confined area, always use the device in a well-ventilated room.**
×	**Do not keep combustible materials stored near your medical oxygen supply.**
×	**Never leave the oxygen concentrator running when it is not in use.**

Always refer to the Operating Instructions/Manual supplied with specific concentrators for specific instructions.

If in doubt contact the supplier of the oxygen concentrator for further advice and to arrange any training that is required.

5.6 Ambulatory Oxygen Therapy

- ✓ If ambulatory oxygen therapy is to be considered, the patient must be assessed by a Consultant respiratory physician or specialist nurse who can:
  - perform a risk assessment;
  - ensure suitability; and
  - advise Trust staff accordingly regarding any specialist ambulatory equipment that is required.
- ✓ Patients who are admitted who already use equipment or ambulatory oxygen should be risk assessed prior to admission while still in the Acute Trust or at home by the clinical staff and ensure that the necessary equipment is available.

6 References

- BOC compressed medical oxygen (2019) data sheet
- British National Formulary - online
- Cylinder storage and handling | BOC Healthcare
- Download oxygen integral valve cylinder instruction_tcm409-54069.pdf (bochealthcare.co.uk). BOC Medical 2019.

- Patient_Safety_Alert_-_Failure_to_open_oxygen_cylinders.pdf (england.nhs.uk)

7 Definitions

All terms defined within document.

8 How this procedure will be implemented

- This procedure will be published on the Trust's intranet and external website.
- Line managers will disseminate this procedure to all Trust employees through a line management briefing.

8.1 Training needs analysis

Identified as part of the Resuscitation Policy

9 How the implementation of this procedure will be monitored

Storage and standards for safe use of oxygen will be subject to periodic assessment by the Pharmacy service.

10 Document control (external)

To be recorded on the policy register by Policy Coordinator

Required information type	Information
Date of approval	24 July 2025
Next review date	01 October 2027
This document replaces	v5.0
This document was approved by	Drug and Therapeutics Committee
This document was approved	24 July 2025

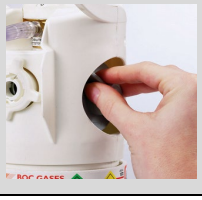
This document was ratified by	n/a
This document was ratified	n/a
An equality analysis was completed on this policy on	See generic EA for pharmacy documents
Document type	Public
FOI Clause (Private documents only)	n/a

Change record

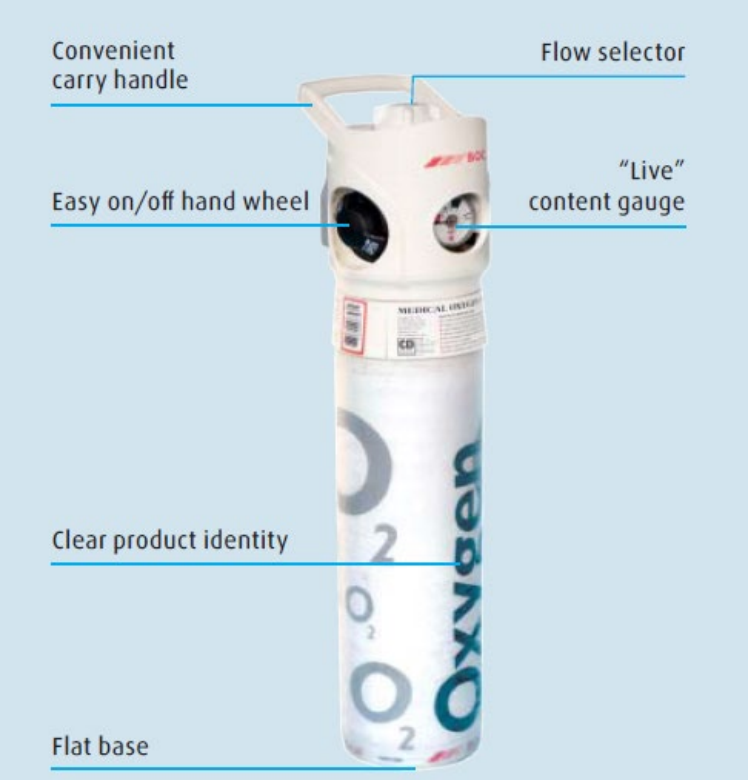
Version	Date	Amendment details	Status
3.0	25 Jan 2018	Medicines - Medical Gases (PHARM-0002-006) archived and incorporated into this document. Administration of oxygen in an emergency for adults and children (PHARM-0020) also archived. Minor changes to wording in section throughout. Updated hyperlinks throughout and updated cross-referenced documents.	Superseded
3.1	16 Aug 2018	Risks of eCigarettes added to page 9	Superseded
4.0	July 2021	Updated hyperlinks throughout. Reference to trust oxygen concentrators added to page 8 Minor updates throughout	Superseded
4.1	28 Sept 2023	3.1.3 updated to reflect that services don't have individual accounts but do have individual delivery points. 3.2.1 Removed: Where more than one cylinder is available, they must be clearly identified with the appropriate label: FULL, IN-USE or EMPTY. Replaced with Empty cylinders must be clearly separated and quarantined from full / in-use cylinders 3.2.1 New statement added re: what to do if a cylinder valve fails to open	Superseded
5.0	26 Sept 2024	Minor updates throughout including format	Superseded
5.1	24 July 2025	Updates re: prescribing processes in section 5.3.1	Published

Appendix 1 – Cylinder Operating Instructions

For more detailed instructions please see this leaflet
When your new CD cylinder is delivered, ensure any dust covers are removed which are protecting the:

On/Off Hand-wheel and/or 	Oxygen Outlet 
1. To commence cylinder use, first switch the HX or CD cylinder on by: Turning the on/off hand-wheel slowly anti-clockwise two revolutions 	**2.** Attach the oxygen tubing and required oxygen administration device to the oxygen flow outlet. 
3. Turn the oxygen flow controller clockwise to set the required flow rate; the correct flow rate setting must be fully visible in the window. Check for flow of oxygen gas prior to use. 	**4**. After cylinder use return the oxygen flow controller to '0' and remove and dispose of any used oxygen tubing and oxygen administration device. 
5. Switch the device off by turning the on/off hand-wheel clockwise. Check the 'live' gauge to ensure adequate supply for next administration. 	

Appendix 2 – Oxygen Cylinder Features



Appendix 3 – Oxygen Related Equipment

The table below highlights oxygen related equipment available on the Trust Medical Devices templates via CARDEA

Image	Oxygen Related Equipment	Medical Device Template:
	CD Cylinder Holder 706-0001 (This is suitable for areas that have a spare CD cylinder that may need securing, please note wall fixings are not included, staff would need to arrange this and assembly with the Estates dept.)	32. General Oxygen Therapy
	ZX Cylinder Trolley 10310980 (This is suitable for transporting or storing a HX cylinder)	32. General Oxygen Therapy
	Oxygen Gas Cylinder Sign W18 yellow, black & white	1. Emergency Resuscitation Equipment
	ACC445 Oximeter Finger BCI Digit	16. Pulse Oximetry

Appendix 4 – Administration of Oxygen in an Emergency situation

See the Medication Safety Series document: MSS10 - Oxygen - Administration in an emergency

Resuscitation training

- The Trust will ensure that appropriate training and education is available to implement this protocol.
- Training for emergency administration of oxygen is delivered as part of the basic / immediate life support training
- All training will reflect current Resuscitation Council (UK) and European Resuscitation Council guidelines.
- The Adult, Child and Infant First Response training is provided by specialist Clinical Skills Trainers in Resuscitation

Response to a patient who requires emergency oxygen

- In all instances the ambulance service must be called where a patient requires emergency oxygen. A member of staff should be dispatched to meet the emergency services and guide them to the clinical area
- Staff will administer emergency oxygen until the emergency services/acute resuscitation team arrive. The emergency services/acute resuscitation team will then take responsibility for the patient's continuing health care needs and transporting the patient to Accident and Emergency Department if required.

Initiation of the provision of emergency oxygen

- All employees that work directly with patients and have access to an emergency response bag, are expected to be able to recognise a deteriorating patient, call for help and initiate the administration of oxygen immediately. Basic Life Support and/or Immediate Life Support may also be required.

Following the provision of emergency oxygen

- Following administration of emergency oxygen a full account must be documented on the electronic patient record (EPR).

Equipment required for the delivery of emergency oxygen

- All inpatient/residential services will have an emergency response bag. Within the bag there will be a CD Oxygen cylinder that when full will provide thirty minutes of oxygen when delivered at 15 litres per minute via a Non-Rebreathing Oxygen mask, Pocket Mask, or a Bag Valve Mask with Reservoir Bag.

Appendix 5 – Approval checklist

To be completed by lead and attached to any document which guides practice when submitted to the appropriate committee/group for consideration and approval.

Title of document being reviewed:	Yes / No / Not applicable	Comments
1. Title		
Is the title clear and unambiguous?	Y	
Is it clear whether the document is a guideline, policy, protocol or standard?	Y	
2. Rationale		
Are reasons for development of the document stated?	Y	
3. Development Process		
Are people involved in the development identified?	Y	
Has relevant expertise has been sought/used?	Y	
Is there evidence of consultation with stakeholders and users?	Y	
Have any related documents or documents that are impacted by this change been identified and updated?	Y	
4. Content		
Is the objective of the document clear?	Y	
Is the target population clear and unambiguous?	Y	
Are the intended outcomes described?	Y	
Are the statements clear and unambiguous?	Y	
5. Evidence Base		
Is the type of evidence to support the document identified explicitly?	Y	
Are key references cited?	Y	

Are supporting documents referenced?	Y	
6. Training		
Have training needs been considered?	Y	
Are training needs included in the document?	Y	
7. Implementation and monitoring		
Does the document identify how it will be implemented and monitored?	Y	
8. Equality analysis		
Has an equality analysis been completed for the document?	Y	See generic EIA
Have Equality and Diversity reviewed and approved the equality analysis?	Y	
9. Approval		
Does the document identify which committee/group will approve it?	Y	
10. Publication		
Has the policy been reviewed for harm?	Y	
Does the document identify whether it is private or public?	Y	
If private, does the document identify which clause of the Freedom of Information Act 2000 applies?	N/A	
11. Accessibility (See intranet accessibility page for more information)		
Have you run the Microsoft Word Accessibility Checker? (Under the review tab, 'check accessibility'. You must remove all errors)	Y	
Do all pictures and tables have meaningful alternative text?	Y	
Do all hyperlinks have a meaningful description? (do not use something generic like 'click here')	Y	