

Pharmacy related FAQs linked to Medical Gases, Oxygen and the COVID-19 pandemic.

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As local leaders responsible for medicines supplies and use in hospitals, including medical gases, NHS Chief Pharmacists should keep themselves up to date with the current advice on [NHS England and NHS Improvement's website](#). Further information can be found within FutureNHS sites.

These FAQ's have been developed based on experiences during the initial stages of the COVID-19 pandemic escalation and requests made for information to UK Regional Pharmaceutical Quality Assurance and Control leads. Answers have been grouped into key topic areas:

- [Pharmacy responsibilities](#)
 - [Medical Gas Committee](#)
 - [Medical Gas Pipeline Systems \(MGPS\)](#)
 - [Gas delivery devices](#)
 - [Governance](#)
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Pharmacy responsibilities

1. Why does pharmacy have a remit to be involved with medical gases?

Medical gases are medicinal products. As organisational leads for medicines, the Chief Pharmacist within each Trust / Health Board is responsible for the safe supply, storage, prescribing and administration of medicines across their organisation.

For pharmacy teams, a key resource for information on responsibilities, is the NHS Pharmaceutical Quality Assurance committee, operating under the auspices of Specialist Pharmacy Services (SPS). The NHS Pharmaceutical Quality Assurance Committee Medical Gas Sub Group has developed guidance and collated information which can be found on the SPS website. <https://www.sps.nhs.uk/home/guidance/medical-gases/>

In particular guidance on Chief Pharmacist responsibilities for medical gases has been prepared and it is recommended that this document is accessed using the above link.

Due to the engineering elements associated with the safe supply of these medicines, medical gases also come under the remit of Estates departments. It is essential that the Chief Pharmacist develops strong & sustained working relationships with their Estates Directors & teams. Increased oxygen demand, resulting from the COVID-19 pandemic, presents significant challenges in terms of safety and continuity of supply to meet patient needs. EFA alert NHSE/I-2020/003 issued November 2020 describes actions to be taken to mitigate and manage risk to patient care. https://www.cas.mhra.gov.uk/ViewandAcknowledgment/ViewAttachment.aspx?Attachment_id=103712

2. How should the pharmacy team be supporting the management of cylinder stock?

Pharmacy procurement teams are responsible for, or should have a close involvement with, the ordering, stock management and safe use of medical gas cylinders.

Ensure that there are instructions for ordering, supply and return of cylinders from wards and departments in place. It may be necessary, if not already undertaken, to carry out a process mapping exercise for cylinder ordering, delivery, intra-site movement and return to the supplier. This should ensure that cylinder processes are efficient and do not create systems whereby cylinders stocks are excessive or not held in suitable locations.

A check for expired and empty cylinders is essential so that these cylinders are returned immediately to the supplier for re-filling. Efficient cylinder turnaround is good practice under normal working situations but is essential during the pandemic. As with other medicines, clinical areas should only hold the number and size of cylinders as absolutely necessary (in accordance with agreed stock list).

Appropriate staff training and/or refresher training on the management of medical gas cylinders will need to be provided.

3. Why would pharmacy be involved in trust Medical Gas pipeline systems? These are an estates/engineering issue.

Whilst the maintenance of physical pipelines is an estates/engineering responsibility, the contents of the pipework remain a medicinal product and come under the responsibility of the Chief Pharmacist. Whenever work is carried out on a medical gas pipeline system, there is a risk that the medical gas quality is compromised. This could be through contamination of the pipeline or cross-over of pipeline systems leading to contaminated or the wrong gas being delivered to patients. Therefore robust systems of quality control need to be in place to ensure medical gas quality is maintained. It is essential that there is a multidisciplinary approach taken to all aspects of medical gas provision. Chief Pharmacists (or a senior deputy) must ensure that the organisation's Medical Gas Committee and any additional pandemic response groups fully understand that medical gases are medicines and their safe procurement, storage, prescribing and administration comes under the responsibilities and accountability of the Chief Pharmacist.

4. During the pandemic what national arrangements are in place to escalate oxygen and other issues?

With the activation of the national Emergency preparedness, resilience and response (EPRR) structures an Oxygen and medical gases 'cell' has been established. This is accessed through your local EPRR process into the regional and then national systems. A national (English) COVID-19 oxygen information resource has been established on the FutureNHS platform that can be accessed by request. To register, email - nhsi.efmportalsubmissions@nhs.net and request access. Pharmacy and QA/QC colleagues can access these resources.

The Chief Pharmacist should be aware of current problems and should ensure that information and updates are accessed and actioned as required.

Appendix 1 includes the current escalation process and contact information for Regional, National and suppliers. The Chief Pharmacist should be aware of this.

Medical Gas Committee

5. We do not have a Medical Gas committee – do we have to have one?

Both HTM 02-01 and (s)HTM 02-01 recommend that a Medical Gas Committee be established to “oversee the general operation and management of the Medical Gas Pipeline System and all facets of the MGPS operational policy”. The requirement to have a multidisciplinary group (such as a Medical Gas Committee) responsible for reviewing oxygen-related incidents, developing a local oxygen policy and a training programme was reinforced within the National Patient Safety Agency Rapid Response Report (NPSA/2009/RRR006).

6. Setting up a Medical Gas Committee - who should be part of the Medical Gas Committee?

The Medical Gas Committee should include:

- Chief Pharmacist/Director of Pharmacy or senior deputy with appropriate knowledge and decision making authority
- Authorised Person (MGPS) (may be NHS Trust, Board or PFI)
- Authorising Engineer (MGPS, Co-ordinating).
- Head/Director of Estates or senior deputy.
- Other relevant Pharmacy Manager e.g. Procurement.
- QC (MGPS).
- Medical Physics/EBME.
- Facilities/Portering
- Clinical representation including Senior Nursing Staff / Anaesthetists / Clinicians.
- Primary medical gas supplier representative.

The Chair of this committee may be the Authorised Person (MGPS).
(ref HTM 02-01 para 7.78).

However, “The COVID-19 Pandemic and actions necessary to mitigate its effect on the performance of Healthcare Cryogenic Liquid Oxygen Systems” is specific in the recommendation that the Chair should be the Chief Pharmacist.

Committee members should have the appropriate knowledge and skills and have the authority to act. In addition membership should include those involved in planning and directing clinical pathways during periods of increased oxygen demand and usage.

7. Setting up a Medical Gas Committee – Terms of reference and accountability

Accountability and governance reporting lines for the Medical Gas Committee should be established to ensure actions are escalated as required to the appropriate level within the organisation. A “terms of reference” document should be developed and approved.

8. What is the role of the Medical Gas Committee in planning oxygen requirements for patients during a pandemic?

The Medical Gas Committee should co-ordinate all activity related to management of oxygen during and after a pandemic. It may also be appropriate to establish an oxygen resilience sub-group or equivalent to focus specifically on the challenges presented by a pandemic and link to wider emergency preparedness organisational structures.

Medical Gas Committees should also :-

- Prepare a site resilience/contingency plan and identify areas where high oxygen demand can be accommodated. Site plans illustrating this along with areas that have been closed may be helpful. A Standard Operating Procedure detailing action to be taken at strategic points of elevated demand should be prepared. Ensure roles and responsibilities have been identified. “Table top exercises” should be implemented to test the plan before it is needed and to identify risks and areas for improvement.
<https://www.sps.nhs.uk/articles/management-of-oxygen-during-periods-of-high-utilisation/>
- Develop and maintain organisational policies and procedures.
- Actively review cylinder management policies, cylinder stocks, processes for efficient stock movement. Processes to ensure that empty cylinders are returned to the cylinder store immediately to be returned to the supplier for re-filing are essential.
- Ensuring plans are in place to recover cylinders sitting unused, which may be utilised elsewhere on site to support patients with lower oxygen requirements, with the aim of pulling less gas from the piped system.
- Developing local ‘good housekeeping’ guides to support the provision of simple messages and approaches to preserve supplies and effectively manage medical gases. Turning off and removing oxygen flowmeters which are not in use is a simple but effective way of reducing wastage. Appendix 2 gives an example of such a guide that can be used in clinical areas by a multidisciplinary team including ward-based pharmacy teams, especially when considering oxygen saturation levels.
- Education and training – this is a significant risk within organisations which needs urgent attention.
- Ensure associated risks are recognised, documented and action taken to minimise them. Review incidents and promote staff engagement in incident prevention.

8. Role of the Medical Gas Committee (cont’d)

- Co-ordinate actions in response to Safety Action Notices, EFA alerts etc

- Provide assurance to (governance report), stakeholders and other governance groups that medical gases are effectively managed
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Medical Gas Pipeline Systems (MGPS)

9. Liquid oxygen supply resilience

Usage data should be available from the liquid oxygen supplier (Air Products / BOC e.g. in the form of a dashboard). This is an essential source of information and should be retained locally/centrally and compared against demand calculations.

In response to the increased demands for oxygen the national EPRR Oxygen cell and COVID-19 working group have developed guidance on “The COVID-19 Pandemic and actions necessary to mitigate its effect on the performance of Healthcare Cryogenic Liquid Oxygen Systems”.

<https://www.sps.nhs.uk/articles/the-covid-19-pandemic-and-actions-necessary-to-mitigate-its-effect-on-the-performance-of-healthcare-cryogenic-liquid-oxygen-systems/>

This important document has been produced by NHS England and Improvement, with input from the UK Registered Authorising Engineer (MGPS) COVID-19 Working Group, and other subject experts. It is intended for immediate use by Healthcare Estates and Clinical professionals. It examines not only all aspects of cryogenic oxygen supply and storage, and associated gas distribution system configuration but also provides guidance on oxygen system auditing and critical operational procedures intended to mitigate the effects of exceptional oxygen demands experienced during pandemic conditions. Highlighted tasks in the document prescribe actions intended to create an awareness of system parameters, audit, design and configuration, while also detailing practical measures designed to enable deficiencies to be identified.

Details of the site's oxygen system (Liquid oxygen VIE, cylinder manifold system); design parameters including flow rate of the evaporators (normal and with six-hourly changeover); realistic flow rate from manifold system and realistic time interval between cylinder replenishment should all be recorded. Note - site flow rates may be assessed as being sufficient for the projected number of patients but this may not be the case for individual wards/ areas due to pipeline size and therefore plans to accommodate a cohort of patients may not be possible. This may be sensible from an infection control perspective but may present engineering challenges in terms of assuring delivery of oxygen to meet demand.

Non-invasive ultrasonic telemetry may assist in establishing daily flow rates.

Gas delivery devices

10. What is the impact of clinical use of Non-invasive Ventilators (NIV) and/or High Flow Nasal Oxygen (HFNO) on medical gas pipeline capacity?

Clear clinical pathways for patients and modelling of patient needs should be developed. Areas where ventilators are to be sited and the flow rates required for patient care need to be identified. As above, because of pipework diameter, it may not be possible to locate all pandemic patients in the one area. It is suggested that load / stress testing (also referred to as “soak testing”) is carried out to assess capacity.

Generic usage models / calculation tools have been developed which are useful in monitoring current usage and forecasting demand. It is recommended that data is collated and reviewed on a daily basis (at least) with particular focus on CPAP, NIV and HFNO usage. This data may be difficult to source. EBME and Clinical Physics input will be useful here. Ensure that the oxygen requirements for non-pandemic patients are also assessed. Areas which can be isolated / closed during the pandemic to conserve oxygen and reduce demand should be identified.

A register should be retained of all ventilators and where they are located in the hospital. Consideration should be given to the possibility of changing operating gas from oxygen to medical air.

It is also important to note that consideration should be given to monitoring ambient oxygen levels especially in ITU areas where usage is significant. Estates would be responsible for / carry out this activity.

11. I have heard about W-size cylinders – what are they and how can they be used?

W size cylinders are the same physical dimensions as J size cylinders but are filled to 230Bar pressure. Therefore instead of providing 6,800 litres of oxygen, they provide 11,300 litres of oxygen.

These cylinders are primarily designed for use on manifolds but there have been occasions where they have been used on wards. Prior to use on wards, organisation Health and Safety / Fire safety must be consulted to provide advice e.g. securing cylinders firmly to the wall.

A cylinder regulator and trolley will need to be purchased – BOC can provide guidance.

<https://www.sps.nhs.uk/articles/using-medical-oxygen-101-w-cylinder/>

Governance

12. What is the key governance document for medical gas provision in NHS organisations?

The key governance document is HTM 02-01 or (s)HTM 02-01 in NHS Scotland. This Health Technical Memorandum is focussed around Medical Gas Pipeline Systems (MGPS) including the Design, Installation, Validation and Verification but also the operational management and link to medical gas cylinder storage and handling processes.

13. Additional reference sources / guidance

A “medical gases” resource has been established by the NHS Pharmaceutical QA committee on the SPS website. This contains information to assist Chief Pharmacists in fulfilling responsibilities and will be regularly updated. It is recommended that this is the first port of call for guidance.

1. Health Technical Memorandum 02-01 Medical Gas Pipeline Systems (Parts A & B)
Department of Health, May 2006
see <https://www.sps.nhs.uk/articles/medical-gases-health-technical-memorandum-02-01-medical-gas-pipeline-systems/>
2. (S) Health Technical Memorandum 02-01 Medical Gas Pipeline Systems (Parts A & B)
Health Facilities Scotland 2012
see <https://www.yumpu.com/en/document/read/33139260/health-technical-memorandum-02-01-medical-gas-pipeline-systems>
3. Estates and Facilities Alert, NHSE/I-2020/003 Covid-19 Response – Oxygen Supply and Fire Safety NHSI Estates and Facilities 19th November 2020
see <https://www.cas.mhra.gov.uk/ViewandAcknowledgment/ViewAlert.aspx?AlertID=103013>
4. NHS/PSA/W/2018/01
Risk of death or severe harm from failure to obtain and continue flow from oxygen cylinders
see https://improvement.nhs.uk/documents/2206/Patient_Safety_Alert_-_Failure_to_open_oxygen_cylinders.pdf
5. Estates and Facilities Alert, EFA2011/003 VIE (Vacuum insulated evaporator) Main storage vessel for bulk medical oxygen supply. Department of Health, 17th October 2011
see https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/215346/dh_130732.pdf
6. Estates and Facilities Alert, EFA/2010/008 Unsecured medical gas cylinders, including cylinders on trolleys Department of Health, 28th July 2010
see https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/216043/dh_118095.pdf
7. NPSA/2009/RRR006 Oxygen safety in hospitals
see <https://www.sps.nhs.uk/articles/archived-sept-2015-rrr006-oxygen-safety-in-hospitals-d-npsa-d-september-2009/>

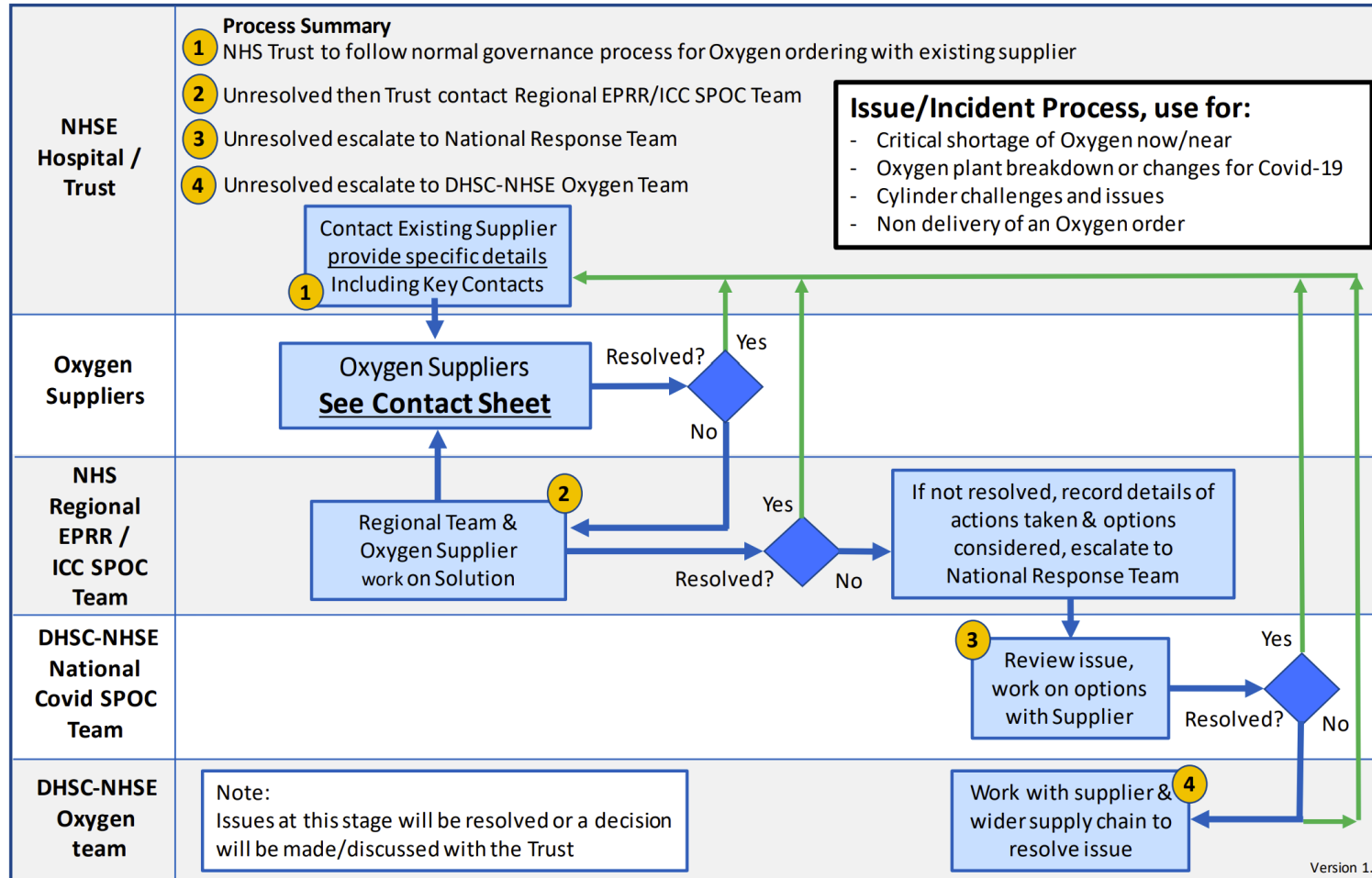
Appendix 1: National EPRR COVID-19 Oxygen support process

Covid-19 Oxygen Support Process

Process for NHS Trust - Oxygen Supply Issues or Incidents



Note: Before requesting Oxygen check your current O2 levels, flow rates/cylinder sizes and capacity






Oxygen Support Contact Details

Process for NHS Trust - Oxygen Supply Issues or Incidents



BOC
Customer Service 0800 111 333



A Member of The Linde Group

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Home Oxygen – England
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Claire Murphy (Clinical request) – Claire.murphy1@boc.com – 07990 089684

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Appendix 2: Example Oxygen good housekeeping guidance for ward areas

Oxygen 'good housekeeping'

- Ensure oxygen is prescribed (as any other drug is), along with target oxygen saturation and prescriptions are reviewed at least every 24 hours.
- Ensure the target oxygen saturation levels are being monitored and reviewed regularly and the amount of oxygen being delivered is adjusted accordingly.
- Ensure that oxygen is turned off when patients no longer require it (or are away from the bed space e.g. toileting or washing).
- Report **any** oxygen leaks to the estates team immediately.
- In all clinical areas, consider oxygen usage on a regular basis as part of safety huddles and handovers.