South Central Ambulance Service
NHS Foundation Trust

MEDICAL GAS POLICY

South Central Ambulance Service NHS Foundation Trust
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DOCUMENT INFORMATION

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1. Introduction

1.1. The term *medical gas c*overs a wide range of products used for diagnostic and treatment processes in primary and secondary care settings.

1.2. Medical gases are generally Prescription Only Medicines, however, can be supplied in an emergency under legal exemptions or Trust protocol.

1.3. They are supplied to patients either through the medical gas pipeline systems (MGPS) or direct via local cylinders.

1.4. To safeguard patients, the supply of medical gases must be uninterrupted and continuous, be adequate for the use and of agreed good quality.

1.5. In an emergency staff must understand how to respond to failure of supply through cylinder damage, leakage or another untoward incident.

1.6. Incorrect or inappropriate use of medical gases may lead to serious health and safety incidents for staff or patients.

1.7. Standards for better health require the Trust to have robust systems for the safe and secure supply of medicines, including medical gases.

1.8. Health Technical Memorandum (HTM) 02-01 requires the Trust to ensure all fixed medical gas pipelines systems and medical gas cylinders are managed in accordance with statutory requirements and British Standards (BS) EN 737.

1.9. In addition, the HTM states the need for a Medical Gas Operational Policy to operate within organisations providing medical gas to patients

2. Scope

2.1 his policy has been developed to ensure that supply and use of medical gases is safe and effective.

2.2 This policy applies to use of all medical gases.

2.3 This policy applies to all staff involved in the prescribing, administration or supply of medical gases, including those that work under a contract for services, and those supplied to do work by a third party, including agency staff.

2.4 This policy has been developed as a separate section of CSPP5 Medicines Management Policy, to acknowledge the importance of managing medical gases, as well as in line with HTM 02-01.

3. Equality statement

3.1 The Trust is committed to promoting positive measures that eliminate all forms of unlawful or unfair discrimination on the grounds of age, marriage and civil partnership, disability, race, gender, religion/belief, sexual orientation, gender reassignment and pregnancy/maternity or any other basis not justified by law or relevant to the requirements of the post. The Trust will therefore take every possible step to ensure that this procedure is applied fairly to all employees regardless of the

afore mentioned protected characteristics, whether full or part time or employed under a permanent or a fixed term contract or any other irrelevant factor.

3.2 By committing to a policy encouraging equality of opportunity and diversity, the Trust values differences between members of the community and within its existing workforce, and actively seeks to benefit from their differing skills, knowledge, and experiences in order to provide an exemplary healthcare service. The Trust is committed to promoting equality and diversity best practice both within the workforce and in any other area where it has influence.

3.3 Where there are barriers to understanding; for example, an employee has difficulty in reading or writing, or where English is not their first language, additional support will be put in place wherever necessary to ensure that the process to be followed is understood and that the employee is not disadvantaged at any stage in the procedure. Further information on the support available can be sought from the HR Department.

4. Aim

4.1 The aim of this policy is to define the roles and responsibilities of Trust staff in relation to the management of all medical gas issues

4.2 This policy combines the requirements of legislation and statutory instruments listed in Appendix 1 but is not a replication of these documents

4.3 This policy aims to ensure the safe and effective management of medical gases throughout the Trust in the interest of staff, patients and the public

5. Roles and responsibilities

5.1 Trust Board

5.1.1 The Trust Board will be responsible for ensuring that sufficient funds and resources are available for the safe and secure management of medical gases

5.2 Chief Executive

5.2.1 The Chief Executive has the overall responsibility for ensuring the safety of staff and other persons within the Trust for the safe use of medical gases. The Chief Executive delegates the responsibility to the Head of Pharmacy as the Officer Responsible for medical gases and the Director of Estates for ensuring facilities are maintained in accordance with HTM 02-01

5.3 Head of Pharmacy

5.3.1 The Head of Pharmacy is responsible for overseeing the administrative control of medical gases throughout the Trust. Responsibilities include

- Monitoring implementation of this policy and associated procedures in conjunction with the Medical Gas Committee
- Monitoring quality control checks for storage and delivery of medical gases as detailed in HTM 02-01 Part B
- Responsible for the **contents** of the pipework/cylinders
- Budget management for medical gases

5.4 Director of Estates and Facilities

5.4.1 The Director of Estates and Facilities is responsible for maintenance of facilities and estate in relation to the storage of medical gases. They are responsible for ensuring maintenance works are documented and that all estates staff are suitably trained in the maintenance of medical gases.

5.5 Director of Fleet

5.5.1 The Director of Fleet is responsible ensuring vehicles are maintained in accordance with the “National ambulance vehicle specification for English NHS ambulance Trust” and the vehicles are appropriately marked in accordance with the “Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations”

5.5 Head of Procurement

5.5.1 The Head of Procurement is responsible for the procurement of medical gases and maintenance of contractual obligations with medical gases and work with the Head of Pharmacy to ensure the continued supply of medical gases.

5.6 Medical Gas Committee

5.6.1 The Medical Gas Committee has the responsibility to ensure that risks from medical gases are minimised across the Trust and provide support for handling, storage and maintenance of medical gases. In addition, the group will endeavor to improve efficiency and compliance with the requirements of HTM 02-01. Terms of reference for the Medical Gas Committee can be found in Appendix 2.

5.7 All Managers

5.7.1 All managers will ensure that audits are carried out for medical gases as scheduled and as requested. They are also responsible for driving improvement because of audit. Managers should ensure that all staff involved in the handling and use of medical gases have received appropriate training for their role.

5.8 All Staff

5.8.1 All staff are responsible for the safe handling of medical gases in a way that does not cause harm to themselves or others. Staff should have training in handling and storage of medical gases. Responsibilities include:

- Using all appropriate manual handling equipment for moving medical gas cylinders
- Ensure safe fitting of valves and patient applied masks following safe practices
- Storing cylinders in a safe location within fixed storage systems and segregating full and empty cylinders
- Turning off cylinders at the valve or flow meter when not in use
- Reporting defects and failures promptly
- Ensure cylinders are stored safely

6. Definitions

6.1 Permanent gases: gases that remain in the gaseous state in the cylinders at normal temperatures. The volume of the contents of the cylinder is directly related to the pressure is directly related to the pressure of the gas

6.2 Liquefiable gases: gases that are supplied as a liquid at normal temperatures or gases supplied as a liquid at cryogenic temperature

6.3 Group 1 gas cylinders: cylinder contents are flammable

6.4 Group 2 gas cylinders: cylinder contents are oxidising

6.5 Group 3 gas cylinders: cylinder contents are toxic or corrosive (contents may also be flammable or oxidising)

6.6 Group 4 gas cylinders: the contents are not flammable, oxidising, toxic or corrosive, includes inert gases.

6.7 The most common gases in the groups listed in 6.3 – 6.6, likely to be used in healthcare settings, are shown in Appendix 3

7. Cylinder Safety

7.1 The main hazards associated with gas cylinders are careless storage, handling, dropping or impact can cause physical or personal injury.

7.2 These hazards should be minimised by the correct design, siting, and construction of storage areas, through the provision of suitable storage and handling equipment and by the adoption of safe operating practices

7.3 Leakage of gas where the cylinder contents may be flammable, oxidising, asphyxiant, anaesthetic, toxic or a combination of these characteristics also presents a hazard.

8. Fire Protection

8.1 All cylinder stores should be free from naked flames and all sources of ignition and must be no smoking areas, in line with the Trust Smoke Free Policy.

8.2 Appropriate fire-fighting equipment should be provided either within the store or at a convenient location nearby

8.3 Smoke/heat detectors should be installed in accordance with the Trust Fire Policy

8.4 Managing healthcare fire safety is detailed in HTM 05-01 which is further detailed in the Trusts Fire Policy

8.5 There is a risk of fire from adiabatic compression. In order to reduce this risk:

- 8.5.1 Ensure that any rotameter or ventilator is turned off prior to opening the main cylinder.
- 8.5.2 When opening the main cylinder using the wheel or opening key, open the valve slowly to ensure no sudden increase in pressure in the regulator mounted on the cylinder
- 8.5.3 If an equipment probe needs to be inserted into the Schrader outlet valve on the oxygen cylinder, do so AFTER the oxygen cylinder has been turned on. This will avoid damage to any downstream equipment in the unlikely event of a sudden fire as the oxygen cylinder is opened.

9. Cylinder Storage at Trust Sites

9.1 Storage facilities should be designed to comply with the recommendations of HTM 16,

HTM 02 or earlier editions of HTM 2022 as appropriate.

9.2 Where available cylinders should be tracked to sites and vehicles using a Trust approved electronic medicines tracking system.

9.3 Gas cylinders should be stored in an area used exclusively for medical gas cylinders. Stores must be adequately ventilated and where practicable have at least one external wall to facilitate natural ventilation

9.4 Decanting and/or filling of medical gas cylinders must not be carried out on Trust premises or by Trust staff.

9.5 The number of cylinders held should be kept to a minimum required for operational demand.

9.6 Storage rooms should be clearly labelled with the types of cylinders contained and “no smoking” warning signs

9.7 Cylinders should be stored in racks in accordance with BS EN ISO 407:2004

9.8 Sufficient space should be provided for maneuvering cylinders. Adequate means of securing large cylinders should be provided to prevent falling.

9.9 Small cylinders should be kept horizontal and placed away from ventilation openings where practicable. Valves must be closed when not in use.

9.10 A good stock of cylinder keys should be kept in/near the store

9.11 Different gas types and full and empty cylinders should be segregated as much as practicable and have a labelling system that clearly indicates the cylinder status.

9.12 Cylinders should be stored at ground level – not underground.

9.13 Cylinders should be stored in a location as close as possible to the delivery point. Wherever possible there should only be one delivery supply point for each site.

9.14 The location of cylinder store should be marked clearly on the site plan for ease of identification in the event of an emergency.

9.15 Stores should not be in close proximity to any installation that may prevent a fire risk or other hazard. BCGA’s (2005) Guidance Note GN2 “Guidance for the storage of transportable gas cylinders for industrial use” gives separation distances for a range of gas types.

9.16 The floor should be essentially level and constructed of concrete or other non-combustible, non-porous material. It should be laid to a fall to prevent the accumulation of water.

9.17 External and internal walls can be fabricated from wire mesh or brick, however, use of wire mesh for external walls will expose nitrous oxide/oxygen mixture (“Entonox”) to the risk of separation when cylinders are subjected to low atmospheric temperatures.

9.18 “Blow-out” panels should be fitted to the external wall of any ground level store constructed as part of, an under, another building. These panels should be sited at a minimum height of 2.3m above ground level.

9.19 Storage areas should be temperature monitored and breaches reported in accordance with the Safe and Secure Handling of Medicines Policy. A hazardous situation could arise if cylinders are subjected to extremes of temperatures.

9.20 The storage areas should be kept clean, dry and free from flammable material. Flammable chemicals should not be used in the storage area.

9.21 Gases should be stored to allow for adequate stock rotation to ensure gases are not allowed to expire.

9.22 The following signs should be posted in medical gas storage areas:

- A safety signage (Hazchem) in accordance with the Health & Safety Regulations 1996, BS 5499-5:2002 and the Health and Safety at Work Act 1974
- A store identification notice e.g., “Medical Gas Storage Area – smoking, vaping and naked lights prohibited”
- A store contents notice clearly indicating the contents of the store
- A medical gas cylinder identification chart (see Appendix 4)
- An emergency actions notice, giving details of emergency action procedures and location of contact numbers should be clearly posted at the front of the store.

10. Medical Gases on Vehicles

10.1 The medical gas pipeline system on a double crewed ambulance (DCA) must conform to applicable regulations and standards

10.2 All inlet fittings on regulators and equipment used for connection to medical gas cylinders should be in accordance with BS341 and ISO407

10.3 The supply systems and associated pipework should comply with the requirements of the Pressure Systems Safety Regulations 2000 and BS5682

10.4 Closed bottle storage is provided on DCAs to accommodate two HX or F size (or equivalent) oxygen cylinders and a further closed storage provision with three positions to secure CD size (or equivalent) cylinders.

10.5 Cylinders should be vertically mounted with the contents pressure gauges visible through clear windows in the door.

10.6 All closed bottle storage cabinetry must be vented directly to the outside of the vehicle in line with Dangerous Substances and Explosive Atmosphere Regulations.

10.7 All inlet fittings on regulators and equipment used to connect medical gas cylinders must be in accordance with BS341 and ISO407.

10.8 The exterior of the vehicle should be marked with the CLP regulation Hazchem sign for compressed gas

10.9 Cylinders must not be shared or swapped with other organisations

9. Access

9.1 Access to medical gases should be restricted to those authorised to handle medical gases.

9.2 Access to the store should be secure as per the Safe and Secure Handling of Medicines Policy, usually via swipe card access.

9.3 Access to stores should be clear and allow adequate space for cylinder loading/unloading.

9.4 Emergency access by the fire brigade in the event of an emergency must be facilitated at each site.

9.5 Doors to medical gas stores should open outwards

9.6 If the travel distance from the access doors to any part of the store exceeds 15m additional emergency exits should be provided. The advice of the local fire safety officer should be sought.

10. Electrical Lighting/Installations

10.1 Electrical installations in gas storage areas are addressed by BS EN 60079-10:2003 and BS EN 60079-14:2003.

10.2 Electrical installations in the Trust medical gas storage areas will not require gas-tight fittings. However, to ensure mechanical and environmental protection, electrical installations should be completed in “pyro” or steel wired armoured (SWA) cables with suitably glanded fittings

11. Cylinder Labelling

11.1 Cylinders should be colour coded and marked in accordance with BS EN ISO 407:2004, the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2004.

11.2 Each cylinder should have:

a. A batch label to include a unique batch number, filling branch code, cylinder code and product failing date
b. An expiry date
c. A product identification label which includes the product licence number, the name and chemical symbol of the gas or gas mixture. In the case of gas mixtures, the proportion of constituent gases should be shown
d. A hazard warning sign
e. A substance identification number

f. Specific product and cylinder handling precautions
g. Safety information
h. A serial number
i. Test mark, year, and quarter of test

11.3 Cylinders, regulators, and gauges should be conspicuously marked “use no oil, grease or hand creams etc.”

11.4 Yokes, regulators, and gauges should be clearly and indelibly marked with the designation of the gas or gas mixture for which they are intended.

11.5 Gauges should be in accordance with BS EN 837-1:1998 with the appropriate standard for the particular type of medical equipment or to BS 4272-3:1989 as appropriate.

11.6 Cylinder colour codes, sizing and naming are shown in Appendix 4

12. Handling of Cylinders

12.1 Cylinders can be heavy and bulky and should therefore be handled with care. Cylinders should therefore only be handled by those with appropriate training in both medical gases and manual handling. Also refer to the Trust Health and Safety Minimal Lifting Policy

12.2 Cylinders should not be dropped, knocked, used as “rollers”, or be permitted to strike each other violently.

12.3 Cylinders and valves should be kept free from oil, grease, and other debris. In particular oil and grease in the presence of high-pressure oxygen and nitrous oxide are liable to combustion.

12.4 Cylinders must not be marked with chalk, paint, marker, or other materials, or by the use of application of adhesive tapes etc. A tie-on label indicating the content state may be attached to the cylinder

12.5 Safety devices including pressure relief devices, valves and connectors should not be altered, dismantled, tampered with, or by-passed.

12.6 Repairs, alterations, or modifications should not be undertaken by Trust staff and must only be carried out by the approved external body

12.7 Markings used for identification of cylinder contents including the cylinder product label should not be defaced or removed.

12.8 See SOP MED402 for the preparation and operation of medical gas cylinders

13. Defective Cylinders

13.1 Any defective or damaged cylinders should be immediately withdrawn from service and returned to the cylinder store

13.2 Segregate the faulty cylinder from all other cylinders in the store (preferably in an area where quarantined cylinders can be securely stored) to ensure that no one will be able to mix the faulty cylinder with either full or empty cylinders

13.3 A Datix® should be completed and reported to the line manager/team leader.

13.4 Refer to SOP MED401 for the management of defective cylinders

14. Medical Gas Resilience

14.1 In the first instance medical gas shortages should be escalated to the SCAS Medicines Team and the Procurement Team, who will liaise with suppliers to identify and resolve supply issues.

14.2 With the activation of the national Emergency preparedness, resilience, and response (EPRR) structures an Oxygen and medical gases “cell” was established during the COVID-19 pandemic. This is accessed through the local EPRR process into the regional and then national systems.

14.3 Oxygen support contact details are available here

14.4 The COVID-19 Oxygen Support Process is available here

14.5 Any failures or defects in storage facilities should be reported through the Trust Incident Reporting System and the Medical Gas Committee will review any mitigating actions required.

15. Training

15.1 Staff should ensure they maintain their own relevant continuing professional development in line with the requirements of their professional body.

15.2 Training in the management of medical gases CDs should be given on induction

15.3 Following this, refresher training should be given annually whether this is done by e-learning or as part of face-to-face training to ensure staff are up to date

16. Equality and diversity

16.1 An initial screen equality and diversity impact assessment has been carried out on this policy and, as per appendix 5, is available on request.

17. Monitoring

17.1 The effectiveness of this policy will be monitored through Safe and Secure Handling of Medicines audits, which are reported to the Medical Gas Committee and subsequently the Medicines Optimisation and Governance Group.

18. Consultation and review

18.1 A consultation exercise on the policy will be carried out with the stakeholders every 3 years, or less if there are any relevant changes to legislation or best practice.

19. Implementation (including raising awareness)

19.1 The policy will be implemented and communicated to managers and staff within the Trust via the weekly newsletter, Staff Matters. Emails will also be sent to senior managers and area managers asking them to bring the existence of the policy to their staff.

20. References

20.1 BOC Fire Procedure 2020.

20.2 BOC Storage and Handling of Cylinders 2020.

20.3 NHS Double-crewed ambulance specification October 2021

20.4 DoH Health Technical Memorandum 02-01: Medical gas pipeline systems. Part A: Design, installation, validation and verification May 2006

20.5 DoH Health Technical Memorandum 02-01: Medical gas pipeline systems: Part B Operational Management May 2006

21. Associated documentation

21.1 There are also the following documents associated with this policy:

- Adverse Incident and Reporting Policy v10.0
- Fire and Emergency Response Policy v2.0
- Medicines Administration Policy v1.0
- Medicines Management Policy v8.0
- Minimal Lifting Policy v8.0
- Safe and Secure Handling of Medicines Policy v1.0

22. Appendix 1: Relevant Statutory and Legislative Instruments

- The Medicines Act 1968
- The Health and Safety at Work Act 1974
- The Management of Health and Safety at Work Regulations 1999
- The Workplace (Health, Safety and Welfare) Regulations 1992
- The Control of Substances Hazardous to Health (COSHH) Regulations 2002
- The Pressure Equipment Regulations 1999
- The Pressure Systems Safety Regulations (PSSR) 2000
- BS EN 737-1:1998
- BS EN 737-2:1998
- BS EN 737-3:1998
- BS EN 737-6:2003
- European Directive 93/42/EEC
- ISO 7396
- BS EN ISO 11197:1998
- BS EN 739:1998
- BS EN 738 -1:1997
- BS EN 738 - 2:1999
- BS EN 738 - 3:1999
- BS EN 738 - 4:1999
- ISO 7396-1:2002
- BS EN ISO 14114:1999
- Provision and Use of Work Equipment Regulations 1998
- Manual Handling Operations Regulations 1992
- Personal Protective Equipment at Work Regulations 1992
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 1995 Electromagnetic Compatibility Regulations 2005
- BSI Quality Assurance Schedule QAS 37320.1/206/A
- BS EN ISO 13485:200

23. Appendix 2: Medical Gas Committee Terms of Reference

Medical Gases subgroup TORs. V1.0.

24. Appendix 3: Classification of Gas Cylinders

For gases included in use in the Trust, refer to the Trust Formulary

Group Classification of gas cylinder contents	Medical gases	Non-medical gases
Group 1 Flammable *Red diamond on label* 		• Propane • Butane • Natural gas • Hydrogen
Group 2 Oxidising *Yellow diamond on label* 	• Oxygen • Nitrous oxide • Oxygen/nitrous oxide (Entonox®)	
Group 3 Toxic and/or corrosive		
3.1 Toxic and/or corrosive and flammable		• Carbon monoxide
3.2 Toxic and/or corrosive and oxidising		• Chlorine • Nitric oxide mixtures
3.3 Toxic and/or corrosive only		• Halocarbon mixtures
Group 4 Others including inert gases *Green diamond on label* 	• Helium • Carbon dioxide • Compressed air	

25. Appendix 4: Medical Gas Cylinder Identification

BOC Cylinder Identification

26. Appendix 5: Review Table

26.1 This policy is regularly reviewed and updated with information in line with relevant national guidance and legislation. A full 'Review Table of Contents' is available on request.

27. Appendix 6: Responsibility

27.1 The responsibility for this policy is shared between various Policy Groups, Lead Director/Officers, Working Groups and Committee members.

27.2 A full list of all responsible parties can be made available upon request.

28. Appendix 7: Equality impact assessment - Screening

28.1 An initial screening equality impact assessment has been carried out and has identified that the policy does not have an adverse or detrimental impact on any of the proscribed equality groups as the policy is designed to protect all staff who carry out work for or on behalf of the Trust.

28.2 The screening element of the initial 'Equality Impact Assessment' is available on request.

29. Appendix 8: Equality impact assessment form – Section Two – Full assessment

29.1 Due to the outcome of the initial screening equality impact assessment, it has not been necessary to carry out a full equality impact assessment.

20. Appendix 9: Ratification

Policy Title: Medical Gas Policy

Author's Name and Job Title: Victoria Bray, Consultant Pharmacist

Review Deadline: 31st March 2022

Consultation From – To (dates): 10th March – 31st March 2022

Comments Received? (Y/N): Y

All Comments Incorporated? (Y/N): N

If No, please list comments not included along with reasons:

- Request to include large Entonox® cylinders on flat ambulances – outside the scope of this policy

Equality Impact Assessment completed (date): 07.01.22

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Name of Accountable Group: Patient Safety Group

Date of Submission for Ratification: 10.02.2022

Template Policy Used (Y/N): Yes

All Sections Completed (Y/N): Yes

Monitoring Section Completed (Y/N): Yes

Date of Ratification: 17.02.2022

Date Policy is Active: 14.05.2022

Date Next Review Due: 14.05.2024

Signature of Accountable Group Chair (or Deputy):

Name of Accountable Group Chair (or Deputy): Jane Campbell