



Medical Gases Piped and Cylinder Training

2019





Aim

- Understand the reasons for medical gas training
- Define a medical gas
- To identify Medical gases in common use and their application
- To understand the hazard warning signs and safety information
- Understand how to safely move and store medical gas cylinders
- Have an understanding of the types and uses of Piped gases





Reasons for training

You are required to undertake this training under:

- The Health and Safety at Work etc Act 1974
- Control of Substances Hazardous to Health (COSHH)
- NHS estates guidance for medical gas pipeline systems HTM02-01; which state that to enable you to carry out your duties safely and effectively you must be trained in the safe use and hazards involved in all aspects of your job
- There have been a number of Patient Safety Alerts released related to Medical gas incidents





PatientRisk of death and severe harm from
failure to obtain and continue flow
from oxygen cylindersAlert9 January 2018

- Cylinders with integral valves are now in common use and require several steps typically removing a plastic cap, turning a valve and adjusting a dial to open the valve An unintended consequence of these changes is that staff may believe oxygen is flowing when it is not, and/or may be unable to turn the oxygen flow on in an emergency
- In a recent three-year period, over 400 incidents involving incorrect operation of oxygen cylinder controls were reported to the National Reporting and Learning System (NRLS)
- Ensure you know how to turn on an oxygen cylinder safely



NHS/PSA/W/2018/001





Reducing the risk of oxygen tubing being connected to air flowmeters

4 October 2016

- Severe harm or death can occur if medical air is accidentally administered to patients instead of oxygen
- Air and oxygen flowmeters can be difficult to tell apart and as they both have universal outlets, oxygen tubing can be attached to both
- Recommended barriers have been put in place but vigilance is still required

NHS/PSA/D/2016/009

Important information to keep our patients Safe! Most Poole wards <u>DO NOT</u> have Medical AIR outlets Those wards with AIR should be covered;







There should be NO AIR flowmeters ANYWHERE in the Trust

For further information, call Clinical Engineering on ext 2244



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 Estates and Facilities Alert

 Reference:
 Issued:
 Review Date:

 EFA/2018/007
 05 December 2018
 06 December 2021

 Fire risk from personal rechargeable electronic devices



There is an increased use of electrical points within the hospital to charge electrical items such as.

- Mobile phone
- I-pads
- Kindle reading devices
- E-cigarette chargers
- There have been several nationally reported incidents of charging devices overheating and catching fire
- > Please advise patients not to charge any devices near a medical gas
- The device should be checked and any associated cabling for damage and signs of heat marks on the plug section.
- > The device should have the CE mark of conformity.
- All oxygen outlets with an electrical point adjacent should have a warning sign, contact Health & Safety if missing (ext. 3311)







What is a medical gas?

Any gaseous substance that meets medical purity standards and has application in a medical environment

e.g. oxygen, nitrous oxide and air





Medical Gases at PHFT: What are they?

- Oxygen
- Entonox
- Air
- Heliox
- Nitrous Oxide
- Carbon Dioxide

What is their use?





Medical gas cylinders come in a variety of forms and connections; Valve types



Oxygen (O2) White shoulders







Cylinder colour

Standard valve

Integral valve





- Within the hospital environment oxygen is usually found in;
- Critical care areas
- Operating theatres
- Most wards, Emergency department and treatment therapy areas

In most areas the oxygen service is piped

- Cylinder oxygen is normally used as an emergency back up and for patient transport/transfer
- Oxygen therapy must be prescribed, or used as per local policy as oxygen is classified as a drug.
- On EPMA oxygen is available as a protocol, search for 'oxygen' under the protocol tab
- Remind patients oxygen is highly flammable and that they must not smoke near an oxygen point or cylinder

Entonox (50% N2O / 50% O2)Blue & White shoulder









Stand	ard	val	ve
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Integral valve

Entonox can be used for short term relief for procedures involving pain. Common areas who use Entonox are:

- Maternity
- Emergency Department

Doses may be self regulated in nearly all cases by the use of a mouthpiece connected through the demand valve to the Entonox cylinder

Air (21% O₂ /79% N₂) black & white shoulder





Cylinder colour

Standard valve



Medical air is used:

- In anaesthesia as a carrier gas for volatile anaesthetic agents
- For drug delivery through nebulisation
- In ventilators and incubators to provide uncontaminated and controlled air flows
- To drive tourniquets

Heliox(21%O₂ /79%He), Brown & white shoulder







Cylinder colour

Standard valve



Heliox is a mixture of helium and oxygen and is often used in emergency situations where upper or lower airways are partially obstructed, but may also be used within an intensive care setting for those patients receiving both invasive and non invasive ventilation

Heliox should be administered via appropriate equipment calibrated for the gas mixture

Nitrous Oxide (N2O) All Blue





Cylinder colour

Standard valve



Nitrous Oxide is used:

 As an inhalation anaesthetic as part of a balanced maintenance of a General Anaesthetic

Only medical personnel trained in the appropriate techniques should administer nitrous oxide

Carbon Dioxide (CO2) All grey



Cylinder colour



Carbon dioxide is insufflated into the abdominal cavity to distend it to allow investigation and treatment of intra abdominal disease and for laparoscopic surgery

Carbon dioxide should only be used under the direct supervision of a clinician

Common cylinders by size used in PHFT





In order from left to right:

- CD (Oxygen)
- E
- F
- G



How to Order Medical Gas Cylinders

- Contact Portering Help Desk on extension 2340
- You will need to provide them with the size and type of Medical Gas cylinder you require
- The system relies on an 'old' for 'new' basis, so when the Porters deliver they will expect to pick up any empty cylinders



Patient Transfers Around Hospital

- Contact Portering on extension 2340
- State if Oxygen is required for transfer
- The porters will bring a cylinder and on completion of transfer take the cylinder back
- Porters are not responsible for turning cylinders on or adjusting flow rates
- The approximate consumption rate of a CD cylinder at 5L per min is 1.5hrs





Hazard Warning Signs associated with Medical Gases







Temperature



Ability to asphyxiate



Oxidisation



Gases if released will Increase the levels of oxygen in the atmosphere and will support and increase the rate of combustion

Storage pressure



The stored pressure in a medical gas cylinder can be up to 300 bar, which is 150 times greater than your car tyre

It is essential that Cylinders are stored correctly in a well ventilated area and not exposed to extremes of temperature

Temperature



The storage temperature of certain gases can be below minus 180 degrees Celsius

Ability to asphyxiate



Gases stored in liquid form can expand up to 800 times its volume and cause oxygen deficient atmospheres







Cylinder collar labels give important safety and usage information, as well as confirming the identity of the cylinder contents. They should ALWAYS be checked before a cylinder is used and should NEVER be removed



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Cylinder collar



Safety information

The contents stated on the cylinder collar should correspond with the colour of the cylinder

It is NOT sufficient to assume that the colour coding of the cylinder accurately reflects the contents





Quality Control Batch Label



BOC Medical gases have a 3 year shelf life and should not be used after the expiry date





Safety

- Moving and Handling and
- Storage

Moving and Handling



- It is important to adhere to manual handling techniques when moving cylinders
- When moving cylinders with working equipment (and possibly patients) attached, particular care must be taken to ensure that cylinders and equipment are secured to the trolley, bed or wheelchair in order to prevent inadvertent disconnection and possible loss of supply. If the gas is not being used, the cylinder valve should be closed

Storage

- HTM 02-01 and HTM 05-03 set out storage requirements and these are summarised below
- Storage is divided into two types, a MAIN store and smaller units, situated in convenient locations around the hospital and known as READY TO USE stores
- In addition to this you will have areas on your ward where one to three cylinders will be held, ready for administration to a patient, this we would refer to as a cylinder parking area
- Wherever medical gases are stored, they should be on their own and away from any other flammable gases or other materials





Piped Gases:

The medical gases are delivered to localised delivery points which are gas specific and easily identified

The localised delivery point, referred to as the outlet point, or sometimes the 'terminal unit', are normally wall mounted. In places like theatres or critical care they can sometimes be installed within ceiling mounted pendant assemblies or beams

It should be possible to operate the outlet point (engage and release) with one hand. To prevent the wrong gas being given to the patient each gas type has a gas specific connection and therefore it cannot accept any probe for which it has not been designed

Under no circumstances should you attempt to force a wrong connection which could cause damage to the equipment and result in malfunction or leakage

FLOW METERS



- Before using a flow meter check for signs of damage, loose connections or dirt or grease visible
- New Flow meters can be obtained from Clinical Engineering and departments crossed charged
- To set flow: turn knob anti clockwise until ball rises to the flow rate required, watch for 2-3 seconds to ensure flow rate is maintained, the ball should sit in the middle of the required rate
- When not in use the flow of gas must be turned off by turning knob clockwise and the ball falls to zero
- Flow meters should only be operated by qualified nursing/medical staff





Types of piped gases

- Oxygen
- Air
- Entonox (Maternity only)
- Suction

Oxygen





- Oxygen therapy must be prescribed, or used as per local policy as oxygen is classified as a drug
- All bed spaces with access to piped oxygen should have a flow meter in situ so it can be used as necessary
- When oxygen is not in use flow meters should be switched off

Patient Transfer

Remember to re-connect patients to the prescribed flow of oxygen following a transfer. This must be a clinical member of staff, it is not the remit of a porter to do this







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- Air is used ONLY with anaesthesia and ventilation equipment
- AIR flow meters ARE NOT
 USED ANYWHERE in the
 Trust. Piped AIR outlets are
 capped or covered where
 not required for
 anaesthesia or Ventilation

Suction





- There are many different types of suction regulators, High suction, Low suction, and Thoracic suction and as many different manufacturers, and all have different methods of operation and clinical uses
- Suction regulators are designed to control the level of vacuum (suction) to the patient.
- It is essential the correct level of suction is used for each use





Suction

- Suction is used to clear retained or excessive lower respiratory tract secretions in patients who are unable to do so effectively themselves. This could be due to the presence of an artificial airway, such as an endotracheal or tracheostomy tube, or in patients who have a poor cough due to a variety of reasons such as excessive sedation or neurological involvement
- The portion of the airway that requires suctioning and whether or not the patient has an artificial airway determine the type of suctioning you should use. The most common types are oropharyngeal and nasopharyngeal suctioning, nasotracheal suctioning, and suctioning through an artificial airway
- Suctioning is a potential hazardous procedure and those performing suction should be aware of the harmful side effects





Summary

You will need to remember :

- The types and uses of both piped and cylinder medical gases
- How to safely move and store medical gas cylinders
- The process for ordering gas cylinders
- How to identify and find safety information for medical gases
- Safe Use of Oxygen flow meters and cylinders





- You must now undertake the assessment on the intranet page to complete your medical gas training
- If you haven't answered them all correctly read through the presentation again. If you score less than 100% you will need to retake the assessment
- It is important that you know and understand about the safe use of medical gases
- If you require further support please contact the Clinical

Educator on x8478

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August 2019