STANDARD OPERATING PROCEDURE PREPARATION OF EQUIPMENT AND ENVIRONMENT FOR ENTONOX®	
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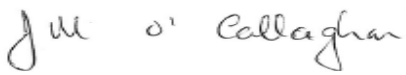
Sept 2019	JOC	

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1.0 Introduction

This document outlines the steps of preparation carried out by competent registered nursing staff for the set up for Entonox®. The set up for nitrous oxide use in the emergency department is not included in this document.

2.0 Definition of Standard Operating Procedure

This is a departmental wide SOP and applicable to all competent registered nurses who have completed education and training on the set up of Entonox®.

3.0 Applicable to

This SOP is applicable to all competent registered nurses in the hospital that have a responsibility for preparation, delivery and supervision of children self-administrating Entonox® for procedural pain and is applicable to any area of the hospital where Entonox® can be used.
It is the responsibility of all registered nursing staff who set up Entonox® to read and understand this SOP.
This step by step guide is non-exhaustive and is intended to facilitate the registered nursing staff undergoing training in the use of Entonox® and as a reference guide for established staff who set up Entonox®.

4.0 Objectives of Standard Operating Procedure

The objectives of this SOP is to ensure that preparation for Entonox® is carried out in a safe and organised manner, in accordance with local practice.

5.0 Definitions / Terms

Entonox® is a gaseous analgesic agent composed of nitrous oxide and oxygen in equal proportions of 50% Oxygen and 50% Nitrous Oxide (BOC Medical, 2010). Entonox® uses are varied and may include but are not limited to:-

Reduction of fractures	Repair of laceration Sutures	Insertion PICC lines Venous cannulation
Application and removal of traction, Plaster of Paris(POP), and cleaning of pin sites	Bone Marrow Aspirate Lumbar puncture	Urinary catheterisation (urologic imaging, urodynamics
Aspiration of synovial fluid and/or intra-articular administration of steroids.	Painful Wound Dressing	Nerve conduction studies
Botulinum (Botox) injection	Drain Removal	Gastrostomy change

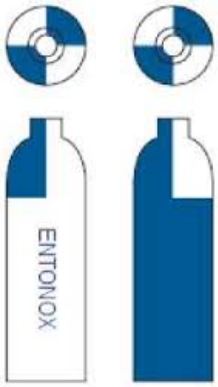
6.0 Procedures

6.1 Equipment

- Entonox cylinder®
- Entonox® cylinder regulator
- Entonox® delivery unit-input hose
- Carnet valve
- Mouth piece or oxygen mask with bacterial/viral filter.
- A suitable key to turn the cylinder on and off.

6.2 Storage and set up of Entonox® cylinder

- Locate the portable Entonox® cylinder **in the nitrous oxide gas room in PICU Floor 1** (between the entrance of Operating Theatre and PICU floor 1 area) or Store room St Annes ward, CHI at Crumlin, In a locked press in day ward CHI at Temple Street.
- Only remove the cylinder and regulator from the storage area immediately prior to use.
- A second cylinder is stored in a locked room on St Annes Ward.
- Details of where Entonox® is stored have been supplied to Technical Services and to the health and Safety Officer who have in turn informed the Fire Services.



Entonox® cylinders can be recognized by their blue cylinder and white collar or the clearly identifiable Entonox® cylinder with integrated valve which is white with blue Entonox® label.

These cylinders should be stored upright at a temperature above -6ºC. If Entonox® cylinders are allowed to get too cold (below -6ºC) the nitrous oxide component of the gas will start to separate out of the gas mixture, changing the concentration of the gas delivered to the patient. To prevent this it is recommended that cylinders should be stored above 10ºC for at least 24hours before use.

- If a cylinder is allowed to get too cold, it will automatically be remixed for use by storing it above 10ºC for at least 24 hours. Alternatively, for small ED size cylinders, the cylinder can be remixed by inverting it three times just prior to use, once it has been warmed to 10ºC.
- Entonox® supports combustion and must not be used near an ignition source (Bruce and Franck, 2000, BOC 2016) Refer to BOC Medical Gases –Safe handling and storage of medical gas cylinders –Information leaflet.
- **No smoking is permitted in the area where Entonox® is stored or used**.

6.3 Preparation of equipment

- Before handling cylinders ensure your hands are clean. If you have been using alcohol based gel or liquids to decontaminate your hands make sure the alcohol has totally evaporated to reduce the risk of accidental combustion (BOC, 2014)
- When selecting the cylinder for use, check that the cylinder is free from oil and grease, particularly around the Schrader outlet.
- Check that the cylinder is not damaged in any way, if it is damaged contact technical services.
- Ensure you have the correct medical gas by checking the cylinder label.
- Check that the Entonox® cylinder is in date. If not request replacement of the cylinder.
- Make sure the regulator is attached to the cylinder with gauge side up.
- Remove the tamper evident seal and cover fitted over the valve outlets if present.
- Connect the Entonox® Schrader probe to the Schrader outlet until you hear a click.

- Open the cylinder using the ratchet.
- Check the gauge to identify the level of Entonox® on the cylinder, if gauge is in the red zone request new cylinder.
- Ensure demand valve is clean and ready for use

- Connect new microbial filter to the demand valve (single patient use).
- **Valve test**: Press the purge/test button on the carnet demand valve and ensure you can hear the gas flowing.

- Ensure all connections are intact, and that there are no leaks.
- If you suspect that you have a leak, turn off the cylinder and check the equipment is properly connected. Turn on the cylinder and re-check for leaks. If the leak continues, turn off and quarantine the cylinder and contact technical services.
- Entonox® must be used in a well ventilated area (door open, window open or air conditioned room) to maintain the average occupational exposure level of the healthcare professional to less than 100ppm (over an 8 hour period),(BOC,2013)

- If Entonox® is to be used continuously for more than one hour a scavenging system must be used e.g. St Annes Ward has integrated scavenging system in the burn's bathroom.

6.4 After Use

- Remove the demand valve from the patient. If the treatment is finished safely dispose of the filter and mouthpiece or mask.
- Turn off the cylinder by rotating the spanner clockwise until it comes to a stop. Do not use excessive force.
- Vent any residual gas in the hose by pressing test button on the demand valve. Wait for the gas to stop venting.
- Disconnect the gas probe from the cylinder outlet. Holding the probe twist the capstan and withdraw it from the outlet.
- Check the cylinder gauge, for content level.
- Return the cylinder to a designated 'in use' or empty storage area.

7.0 Implementation Plan

This SOP will be implemented as part of the training undertaken for registered nursing staff who have agreed to undertake training to set up and deliver Entonox®. All staff who use Entonox® have a responsibility to familiarise themselves with and maintain a high standard in accordance with all departmental policies and protocols.

8.0 Evaluation and Audit

- Incident reports involving Entonox® equipment and set-up will be monitored and reports will be responded to when they occur.
- Required changes in practice will be identified and actioned within 1 month. A lead member of the pain service will be identified to take change forward where appropriate.
- Lessons will be shared with all the relevant stakeholders.

9.0 References

BNF for children Nitrous oxide. https://www.medicinescomplete.com/mc/bnfc/current/PHP8546-nitrous-oxide.htm. Accessed last 22/7/2019

BOC Entonox® the BOC Entonox® the essential Guide. Available at: https://www.bochealthcare.co.uk/en/images/entonox_essential_guide_hlc401955_Sep10_tcm409-64836.pdf/ Accessed 23/7/2019.

Our Lady's Hospital for Sick Children Crumlin (2017) Medication Policy. Available at http://olchcnet.hse.ie/Policies,_Guidelines,_Protocols_SOP's/Policies_A_-_Z/Medication_Policy_2017.pdf. Accessed 23/7/2019

CHI at Crumlin (2019) Guidelines on cleaning and disinfection. *Available at http://olchcnet.hse.ie/Policies,_Guidelines,_Protocols_SOP's/Infection_Control_Manual_A-Z/Cleaning_and_Disinfection_Guideline_2019.pdf Accessed 23/7/2019.*

Our Lady's Children's Hospital (2017) Guidelines on hand hygiene. *Our Lady's Children's Hospital, Crumlin Dublin.*

Appendix : Supplies

Product	Remarks	Order from	Order details
Replacement cylinders	Replace when ¼ full	Engineering Officer, **Technical Services** (6608)	2000litre Size Entonox® cylinder
Carnet valve	Multi-patient use	BOC Gases Ireland	Supplies
Entonox single patient use exhalation valve	Can be reused by the same patient once cleaned and decontaminated.	BOC Gases Ireland	828-0019 (AGSS) for use with Scavenging system in **St Annes** **50 units per box**
Entonox single patient use exhalation valve	Single patient use	BOC Gases Ireland	**828-0002** for general ward use (Non Scavenging) **100 units per box**
Corrugated tubing (Scavenging system St Annes ward)	Single patient use – change weekly or more frequently if contaminated	Materials Management	**Flexicare 22mm Corrugated Tubing 50meter roll** **Ref: 038-01-225**
Green connector (for corrugated tubing, St Annes)	Single patient use	Materials Management	**22M-30F, Ref**
Facemask (if required)	Single patient use	Materials management	**5INS2490 - size 2** **5INS2543 - size 3** **5INS2489 - size 4**
Green connector for use with a facemask	Single use only	Materials Management	**Ref. 1969**