Document Title:	**USE OF ENTONOX FOR PROCEDURAL PAIN**		
Document Reference/Register no:	06000	**Version Number:**	7.0
Document type: (Policy/ Guideline/ SOP)	Guideline	**To be followed by:** (Target Staff)	Medical and nursing staff involved in the administration of Entonox for the relief of Procedural Pain (other than in Maternity)
Ratification Issue Date: (Date document is uploaded onto the intranet)	14th January 2019	**Review Date:**	13th January 2022
Developed in response to:	Clinical requirements		
Contributes to HSC Act 2008 (Regulated Activities) Regulations 2014(Part 3); and CQC Regulations 2009 (Part 4) **CQC Fundamental Standards of Quality and Safety:**			11, 12
Issuing Division/Directorate:	Anaesthetics		
Author/Contact: (Asset Administrator)	Jayne Somerset Clinical Nurse Specialist, Pain Management		
Hospital Sites: (tick appropriate box/es to indicate status of policy review i.e. joint/ independent)	✓MEHT □ BTUH □ SUH		
Consultation:	(Refer to page 2)		
Approval Group / Committee(s):	n/a	**Date:**	n/a
Professionally Approved by: (Asset Owner)	Dr Mark Alexander-Williams	**Date:**	10th December 2018
Ratification Group(s):	Documents Ratification Approval Group Chair's Action	**Date:**	9th January 2019
Executive and Clinical Directors (Communication of minutes from Document Ratification Group	**Date:** January 2019	**Distribution Method:**	Intranet and Website

Consulted With:	**Post/ Approval Committee/ Group:**	**Date:**
Tom Durcan	Pain Consultants	10th December 2018
Lynne Mustard	Pain Service Manager	
Alison Bloor	Pain Pharmacist	

Related Trust Policies (to be read in conjunction with)	Policy for the Use of Medicines Trust PGD for Entonox administration Infection control policy Waste disposal policy (clinical) 06001 Advice on the management of Procedural Pain 10108 Administration of Entonox in Labour

Document Review History:			
Version No:	**Authored/Reviewer:**	**Summary of amendments/ Record documents superseded by:**	**Issue Date:**
1.0	L Mustard/K Tighe		August 2000
1.1	L Mustard/K Tighe		March 2002
1.2	L Mustard/ K Tighe		August 2002
2.0	L Mustard/K Tighe		October 2002
2.1	L Mustard/K Tighe		January 2004
2.2	L Mustard/K Tighe		August 2004
3.0	L Mustard/K Tighe		October 2004
3.1	L Mustard/M Finn		October 2007
4.0	L Mustard/M Finn		March 2008
5.0	Jayne Somerset		April 2012
6.0	Jayne Somerset		3 November 2015
7.0	Jayne Somerset	Full Review	14th January 2019

INDEX

1. Purpose

1.1 This guideline is designed to provide instruction and guidance in the safe administration of Entonox when used by medical and nursing staff within the Trust for Procedural Pain management. For the use of Entonox in labour please read guideline 10108, the Administration of Entonox in Labour.

2. Background

2.1 Entonox is a homogeneous gas. It contains a mix of 50% Oxygen and 50% Nitrous Oxide, compressed and contained in a cylinder. Entonox works by activating the release of noradrenergic substances within the pain pathway. These substances are thought to activate receptors in the dorsal horn of the spinal cord, which prevent the signal from reaching the brain where it would be perceived as pain. It is transported around the body via plasma and is eliminated completely unchanged by the lungs. This is why its administration must take place in a well ventilated area to prevent others inhaling it.

2.2 Entonox is administered through a hand held facemask or mouthpiece, which has an anti-bacterial / anti-viral filter incorporated into it. The face mask is connected to an Entonox supply through a demand valve system, which allows the Entonox to be self-regulated by the patient. The demand valve is operated by the act of inhalation by the patient, which closes when the patient ceases to actively inhale. If consciousness is lost, the patient will drop the hand held mask / mouthpiece so no further Entonox can be delivered, and consciousness is regained.

2.3 Entonox is a weak anaesthetic gas, and therefore has the potential to render the patient unconscious when using it. Generally a concentration of about 70% is needed to produce unconsciousness; therefore the risk of the patient becoming unconscious is low. See storage section 10, which outlines the risk of the gases separating when stored and what to do if potentially this has occurred.

2.4 It has a rapid on-set and off-set and therefore provides not only fast acting pain relief but also a rapid patient recovery, post administration. It is used for Procedural Pain relief only. It is not to be used for routine pain management.

3. Aim

3.1 To clarify what is expected of medical and nursing staff and their responsibility to the patient when using Entonox

- Before the procedure
- During the procedure
- After the procedure

4. Scope

4.1 Trained nurses, medical staff, therapy staff, and auxiliary staff involved in the care of patients requiring Entonox for procedural pain relief. For the use of Entonox in labour please refer to guideline 10108.

4.2 Types of procedures where Entonox can be used include

- Repositioning a patient
- Dressings
- Wound debridement
- Removal of staples and sutures
- Removal of drains
- Physiotherapy
- Applying traction
- Plastering
- Labour (see guideline 10108)

4.3 Contraindications

ENTONOX should not be used in any condition where gas is trapped within the body and where its expansion might be dangerous, such as:

- Artificial, traumatic or spontaneous pneumothorax
- Air embolism
- Decompression sickness
- Following a recent dive
- Following air encephalography
- Severe bullous emphysema
- Use during myringoplasty
- Gross abdominal distension
- Where intestinal obstruction is suspected
- In patients having received recent intraocular injection of gas (such as SF6)
- Head injuries with impairment of consciousness
- Alcohol and drug intoxication; consciousness maybe impaired and compliance maybe poor
- Maxillofacial injuries, if using a face mask there might not be an adequate enough seal to ensure proper use, however a mouthpiece maybe used
- Patient inability to comprehend / use apparatus
- Entonox is not to be used for routine pain management. It is for procedural pain control only

5. Equality and Diversity

5.1 The Trust is committed to the provision of a service that is fair, accessible and meets the needs of all individuals (refer to appendix D)

6 Staffing and Training

6.1 Medical and nursing staff administering Entonox must be trained in its use, side effects, and contraindications. They should also possess basic life support skills.

6.2 The IPMS (Integrated Pain Management Service) is available for advice and consultation via the pager system, and through the PAS referral system.

6.3 Training and education is provided by the IPMS, both formally and informally for all clinical staff.

6.4 The IPMS can administer Entonox in clinical areas where staff have not been trained, if it is required.

6.5 In areas where a PGD (Patient Group Directive) exists, staff will be expected to have undergone training and be fully competent in the use of Entonox.

7 Pre – Procedure

7.1 Assess appropriateness for Entonox

Assess the appropriateness of Entonox. Problems that may be encountered could be patient specific, procedure specific and / or be specific to the clinical environment. If any of these problems are identified, and cannot be overcome, an alternative to Entonox will need to be sought. Please read Policy for Procedural Pain (06001) for advice on alternatives to procedural pain relief.

7.2 Patient specific

7.2.1 **Contraindications** see Scope section 4.3.

7.2.2 **Side effects** may include; dry mouth, disorientation, dizziness, euphoria, loss of inhibition, blurred vision, and less commonly, nausea and vomiting, excessive sedation. Observe patient closely for these. Excess use may cause inactivation of vitamin B12 (see section 7.3.1.)

7.3 Procedure specific

Frequency of procedure

7.3.1 The nitrous oxide causes inactivation of vitamin B12, which is a co-factor of methionine synthase. Folate metabolism is consequently interfered with and DNA synthesis is impaired following prolonged administration of ENTONOX. Prolonged or frequent use of ENTONOX may result in megaloblastic marrow changes, myeloneuropathy and sub acute combined degeneration of the spinal cord.

7.3.2 Entonox should not be used for more than a total of 24 hours, or more frequently than every 4 days, without close clinical supervision and

haematological monitoring. Specialist advice should be sought from a haematologist in such cases. Haematological review should include an assessment for megaloblastic change in red cells and hypersegmentation of neutrophils through blood tests. Seek alternatives where Entonox is not appropriate.

7.3.3 **Pain associated with their procedure**

The patient may require additional analgesia to enhance procedural pain relief and to reduce pain and hypersensitivity post procedure. Concomitant administration of opioids or benzodiazepines with Entonox may result in increased sedation, and consequently have effects on respiration rate, circulation and protective reflexes. Observe patient closely. Consider whether the pain from the procedure may warrant general anaesthesia.

7.4 **Specific to clinical environment**

7.4.1 **Clinical setting**
Entonox is eliminated by the patient completely unchanged via the lung, therefore it needs to be used in a well ventilated area to ensure that others do not inhale it and experience its effects.

7.4.2 **Availability of staff**
You will need at least 2 members of staff; 1 to oversee patient self administration and to monitor effects, and 1 to carry out the procedure. Ensure you have enough staff before considering using Entonox.

7.4.3 **Accessibility to Entonox apparatus and equipment**
Entonox cylinders can be obtained from the porters. Some units have their own cylinders on the ward, e.g. Burns Units. Integrated anti-bacterial/anti-viral filter mouthpieces are available on the ward. They are single patient use only and can be stored in the patients' locker for future use.

7.5 **Equipment required;** an Entonox cylinder, an administration set with demand valve, a regulator, an anti-viral/bacterial filter and a mouthpiece.

7.6 Check the following equipment is in good working order prior to use. Check the following:

- Bodock seal to see that it is present and intact
- Key to turn the cylinder on / off attached to the equipment
- Regulator fits securely
- Test button is pressed to check it's working and no leaks are present
- Tubing between the patient and the equipment is clean and in date
- Equipment is clean
- Sufficient Entonox to last the procedure

7.7 Use the Patient Procedural Pain Checklist (taken from Procedural Pain Guideline 06001).
(Refer to Appendix 2)

7.8 Entonox must be prescribed by a medical practitioner before it can be administered unless a Trust-approved Patient Group Directive (PGD) has been set up in your clinical area.

7.9 Prior to using Entonox, staff should use self-assessment checklist. (Refer to Appendix 3)

8. During the Procedure

8.1 Before the procedure is to start, encourage the patient to breathe the Entonox gas for at least 1-2 minutes, breathing normally. Ensure patient fully comprehends what is required of them to optimise Entonox use, and they are able to use it effectively. Allow 1-2 minutes for the analgesic effect to begin.

8.2 Continually assess the patient during the procedure. The use of Entonox may make the patient feel drowsy and then the seal between the mouth and the demand valve will be lost. However the effects wear off quickly so encourage the patient to use again. Do not hold the mask for the patient.

8.3 Keep calm and confident. Give the patient reassurance throughout the procedure. Limit patient conversation as they will not be able to use the Entonox while they are talking.

8.4 Assess the patients' pain throughout the procedure.

8.5 Assess patients' anxiety levels throughout the procedure. Give reassurance where required.

8.6 If the patients' pain is inadequately controlled. Consider stopping the procedure if safe to do so. Reassess patient and reassess intervention. Check the following:

- Mask is firmly in place, gaps mean that the patient breathes air instead of Entonox
- Cylinder is not empty
- Equipment not faulty
- Patient technique
- Entonox is not always effective and an opioid or general anaesthetic may be indicated

8.7 Continue procedure only when pain control has been re-established.

9. Post Procedure

9.1 At the end of the procedure, observe the patient until the effects have worn off.

9.2 Close the cylinder valve in a clockwise direction. Depress the test button, if one is present, to exhaust the residual pressure in the system.

9.3 Remove the Entonox cylinder from the patients' bedside to prevent usage in between procedures.

9.4 The anti-bacterial / anti-viral mouthpiece and filter are for single patient use only. It can be stored in a clean bag in the patients' locker for subsequent use.

9.5 Document the use of Entonox in the nursing notes, along with the time duration it was used for. If a patient requires Entonox frequently, seek advice from IPMS.

9.6 Clinical areas where Entonox is used frequently should consider implementing the Trust-approved Patient Group Directive (PGD).

10. Storage of Entonox

10.1 Entonox is a mixture of two gases. Cylinders should be stored in a clean dry area above -6 ºC**.** Below this temperature the gases will separate. Cylinders come in small (E), and large (F) sizes. If the cylinders have been stored below -6 ^{0}C, to ensure adequate mixing of the two gases, the large cylinders need to be placed in temperatures above 10 degrees centigrade or more for 24 hours or if small, above 10 degrees centigrade for 2 hours and inverted several times prior to use.

11. Implementation and Communication

11.1 Approved guidelines are accessible from the staff intranet.

11.2 In addition the clinical guideline will be disseminated to the ward through Pain Link nurses within their ward setting.

12. Infection Control

12.1 Trust protocol for prevention of cross infection is to be adhered to prior to, during and after administration of Entonox: i.e. hand washing and alcohol rub.

12.2 Disposable equipment is to be disposed of appropriately according to waste segregation policy: i.e. clinical waste. If it is visibly contaminated it is to be changed immediately.

12.3 The anti-bacterial / anti-viral filter protects the administration set from internal contamination. This filter is attached to the mouthpiece. This is for single patient use only and can be used for subsequent procedures. It is to be thrown away once finished with.

13. Risk Management

13.1 A Datix should be completed and submitted to the Risk Management Department for non-compliance with this guideline.

13.2 Incidence of clinical risk or patient complaints resulting from non-compliance with this guideline are to be recorded via the central risk events database and PALS if involved.

14. Audit and Monitoring

14.1 Link nurses on the wards are to monitor Entonox use and report any adverse events or training needs to the IPMS. Clinical meetings for Link nurses are held three times a year. Potential audit discussion and problems can be evaluated in this meeting.

14.2 The IPMS manager and lead consultant will liaise at corporate level to put strategies in place to address issues.

15. References

Manufacturer's information available at: www.bocmedical.co.uk
http://www.bocsds.com/uk/sds/medical/entonox.pdf

Peate, I., Lancaster, J (2000) Clinical practice. Safe use of medical gases in the clinical setting: practical tips. British Journal of Nursing 9 (4): 231-6

Sealey, L. (2002) Nurse administration of Entonox to manage pain in ward settings. Nursing Times 98 (46): 28-29

Appendix 1: Preliminary Equality Analysis

This assessment relates to: (please tick all that apply)

A change in a service to patients		A change to an existing policy		A change to the way staff work	
A new policy		Something else (please give details)		Review and update	

Questions	Answers
1. What are you proposing to change?	No amendments
2. Why are you making this change? (What will the change achieve?)	Review of information to ensure current and evidenced based
3. Who benefits from this change and how?	Patients and administrators of Entonox
4. **Is anyone likely to suffer any negative impact as a result of this change?** If **no**, please record reasons here and sign and date this assessment. If **yes**, please complete a full EIA.	no
5. a) Will you be undertaking any consultation as part of this change? **b) If so, with whom?**	Review with list of consultees (pages 1& 2)

Preliminary analysis completed by:

Name	Jayne Somerset	**Job Title**	CNS Governance Pain	**Date**	10/12/18

Appendix 2 Patient Procedural Checklist

Patient Surname **First Name** **Hospital No.** **D.O.B**					
	Date				
Checklist					
Procedure					
Pharmacological intervention to be used **State type**					
Non-pharmacological intervention to be used **State type**					
Educate patient on techniques / intervention to be used (Yes / No)					
Time agreed for procedure to take place **State time**					
How many staff required for procedure and intervention **State number**					
Ensure analgesia is available on the ward / unit **(Yes / No)**					
Pain Score before procedure **(0-none, 1–mild, 2-moderate, 3-severe)**					
Pain Score during procedure **(0-none, 1–mild, 2-moderate, 3-severe)**					
Pain score post procedure **(0-none, 1–mild, 2-moderate, 3-severe)**					
Analgesia given to relieve post procedure pain / hypersensitivity **(Yes / No)**					
Patient satisfaction with procedural pain control **(Yes / No)**					

Appendix 3 **Competency Statement**
Self Assessment to check your own competency when using Entonox

High Risk Device – STOP. Do not use this item unless you are competent to do so	
Questions to ask yourself: *Do you know how to:*	
1. Ensure Entonox is appropriate	yes / no
2. Check there are no contraindications	yes / no
3. Ensure environment is safe and well ventilated	yes / no
4. Ensure patient comprehends how to use Entonox	yes / no
5. Check the equipment is present, intact, clean and ready for use	yes / no
6. Ensure adequate staff are available for procedure	yes / no
7. Give multi-modal analgesia to cover the hypersensitivity / pain that may be experienced after the procedure has finished	yes / no
8. Ensure there is sufficient Entonox in the cylinder to carry out the procedure	yes / no
9. Ensure that the patient is using the apparatus effectively	yes / no
10. Monitor the analgesic effectiveness of the gas	yes / no
11. Recognise and treat adverse effects or ineffectiveness of gas inhalation	yes / no
12. Disconnect equipment	yes / no
13. Document administration record, and evaluation	yes / no
14. Store equipment appropriately	yes / no

Appendix 4 Entonox BOC datasheet

http://www.bocsds.com/uk/sds/medical/entonox.pdf