University Hospitals of Derby and Burton
NHS Foundation Trust

Standard Operating Procedure

The operating procedure set out below must comply with the Data Quality Principles set out within Trust Data Quality Policy

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SOP Document Controls:

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1	**09/12/2024**	Eleanor Hewitt	Previously guideline PA EN 01

Contents

Entonox is a ready to use powerful inhalational analgesic – a medical gas mixture consisting of 50% nitrous oxide and 50% oxygen. Therefore, it is vital that health care professionals receive the correct training to safely supervise self- administration of Entonox by children who are undergoing painful procedures.

Following training and competency assessments, professionals should be able to:

- Anticipate all area and procedures where Entonox will be of value
- Describe pharmacological action of Entonox
- List the contra-indications / cautions to the use of Entonox
- Demonstrate an understanding of the equipment
- Understand the meaning of “self-administration”
- Be familiar with Health and Safety issues relating to the gas and its mode of administration
- Understand the professional accountability of the individual.

It is a safe and effective analgesic for situations where rapid onset and offset is sought. Entonox also provides pain relief and conscious sedation for short term procedures only. Its pain-relieving properties are similar to that of a standard dose of morphine. The onset of

action is fast – within 4 to 6 breaths and lasts as long as the gas is breathed. When the child stops breathing in the gas its action terminates after a few minutes with few aftereffects.

Entonox is presented in a blue cylinder with blue and white shoulders. The cylinder is connected to a demand valve via a blue and white striped delivery system, the demand valve leads to a mouthpiece or facemask. This apparatus enables the gas to be self-administered. The demand valve is opened by the patient's inspiratory effort. Gas then flows into the patients' lungs. Children should be old enough to understand how to operate the demand valve of the apparatus and the instructions given by the nurses. Children of 6 Years and above should be able to understand how to use the equipment, although this may vary according to the cognitive ability of the child. There is no necessity for formal pre-procedural starvation; however, it is inadvisable to administer Entonox within 1 hour of a full meal as its effects can induce nausea or vomiting in some people.

3. Scope

To be competent to supervise patients receiving Entonox staff must have:

- Attended an Entonox training session
- Completed their supervised practices.

COMPETENCE WILL BE RE-ASSESSED EVERY 2 YEARS

4. Abbreviations and Definitions

CED	Children's Emergency department
OPD	Outpatient Department
PAU	Paediatric assessment unit

5. Responsibilities

Entonox must be prescribed by medical staff on EPMA. However, nurses may also prescribe Entonox as a patient group directive.
Cylinders are available in the OPD, CED, Sunflower Puffin, PAU and Ward 1 (Burton). CED also has piped Entonox in all side rooms.

6. Procedure

Suggested indications for use:

- Change of dressings, packs or plaster of Paris
- Removal of drains, pin or K wires
- Suture removal
- Suturing wounds
- Minor surgical procedure
- Traumatic injuries
- Altering the position of the patient in pain
- Physiotherapy
- Venepuncture/ cannulation
- Immobilisation of fractures
- This list in not exhaustive. New indications may be added in the future

Contra-indications to use

Entonox should not be used in any condition where air is trapped within the body, where its expansion might cause dangerous pressure effects for example:

- Chest injuries
- Chronic pulmonary disease with bullae
- Head injuries
- Gross abdominal distension/ bowel obstruction
- Abnormal airway
- Congenital heart disease

Precautions

1. Entonox should be administered with care in patients who have received sedative and/or opiate drugs. This combined use may result in depression of conscious level and lead to a compromised airway. If Entonox is required and opiates have been administered within the previous hour observe closely for respiratory depression and airway obstruction. Saturation monitoring should be commenced.
2. Entonox must not be used for chronic pain patients as a break through strategy as this can result in dependence on it and regular use can cause bone marrow suppression and leucopoenia can occur.
3. Using Entonox often or for a long time can lead to impaired B12 which can lead to damaging red blood cells or nerve damage. If it is used 6-12 hours or used more often than every 4 days.
4. Patients must ALWAYS be constantly supervised when using Entonox and for 10-20 minutes after it is discontinued to ensure the patient has completely recovered. The nurse supervising the patient should be doing ONLY that and not doing another procedure at the same time.
5. If a cylinder of Entonox has been stored at a temperature below -6oC (at this temperature, the oxygen and nitrous oxide separate) a 24 hour warm-up period at room temperature must be allowed. The cylinder should be inverted a minimum of three times to ensure thorough mixing.

Procedure for paediatric self-administration of Entonox

- Prior to commencing the procedure check that the Entonox equipment is in working order and more than ¼ full
- The cylinder is opened and closed using the rotating knob situated at the top of the apparatus. Turn the knob anti-clockwise to open.
- Ensure that a disposable filter (single use only) is attached to the apparatus.
- Explain the sequence of events to the child and familiarise him/her with the mask and/or mouthpiece and the demand valve.
- If using a facemask ensure that it is a good fit. You will hear the noise of the demand valve opening when the apparatus is used correctly. The child must only breathe through the mouth when using the mouthpiece.
- Explain to the child that he/she may feel a little light-headed and drowsy whilst using the apparatus. If this occurs the child should remove the mask /mouthpiece and the feeling will soon pass.

- Ask the child to take deep breaths in and out and encourage the parent/carer, if present, to assist the child in his/her co-operation. However, only the child must operate the apparatus.
- The child's breathing should be supervised throughout the procedure to ensure they are making sufficient respiratory effort to open the valve and thus inhale the gas correctly.
- Observe for nausea, which can occur occasionally. Discontinue the Entonox should this happen.
- Routine physiological observations are not necessary; however, the effectiveness and quality of pain relief should be recorded on the pain chart and the audit form.

POST PROCEDURE

- Discontinue administration of the Entonox when the procedure is over
- Turn the rotating knob clockwise to close the cylinder
- Wash the facemask if used in soap and water

ENSURE THAT ALL FILTER AND MOUTHPIECES ARE SINGLE USE ONLY

- There is no need to limit the child's mobility once a 5-10 minute rest period has passed following removal of the mask/mouthpiece. The vast majority of the gas will have been excreted by this time. The child should be ready to resume normal activities within 30 minutes. (Not applicable for A&E patients)
- When the cylinder is ¼ full ring the facilities helpdesk to change the cylinder.
- Complete the audit form.

7. Information Governance

8. References and Associated Documents

References (including and links to NICE Guidance etc.)

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- (2012) Entonox® inhalation to reduce pain in common diagnostic and therapeutic outpatient urological procedures: a review of the evidence
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- midazolam for botulinum toxin A injections in children Developmental Medicine & Child Neurology Volume 51, Issue 10: (2009)
- Twycross A, Dowden SJ, Bruce E (eds) (2009) Managing Pain in Children: A clinical guide Pg's 210-212
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