

Guideline:**Continuous Nitrous Oxide Sedation in Paediatrics****Purpose**

This guideline applies to all nitrous oxide sedation of all children under 15 years of age

The aim of this guideline is to ensure the safe use of nitrous oxide sedation

It is applicable to Kidz First Emergency Department

Responsibility

This policy has been adopted by the Kidz First Operational Group.

We acknowledge that this Guideline has been adapted with permission from Starship Children's Health Clinical Guideline by Dr Tony Bell

Associated Documents

Other documents relevant to this guideline are listed below:

NZ Legislation	None
CMDHB Clinical Board Policies	None
NZ Standards	None
Organisational Procedures or Policies	None
Other related documents	Starship Hospital Continuous Nitrous oxide guidelines Sedation and analgesia guideline

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Nitrous Oxide Guideline

Background:

Nitrous Oxide (N₂O) is a colourless, odourless gas which has analgesic, sedative, and amnesic properties. It has a rapid onset (2-3 minutes, with maximum effect 5 minutes) and offset, which makes it ideal for use in CED for short mild to moderately painful or distressing procedures. Nitrous Oxide (50-70%) is very unlikely to cause cardiovascular or respiratory depression when used as per guideline. N₂O is not metabolised and is excreted unchanged primarily via the lungs. It is a highly diffusible gas, therefore it should be avoided in patients with potential "closed-space" diseases such as bowel obstruction, pneumothorax.

Nitrous oxide has been associated with an increased rate of spontaneous abortions, and is a teratogen, so **must not** be administered by pregnant staff. A scavenging system must be in place to prevent inhalation by staff administering the gas.

For patients, prolonged or repeated use inactivates B12 and affects folate metabolism, causing bone marrow suppression. If anticipating more than 4 treatments over 4 weeks consider prescribing B12 and folic acid (see appendix for doses).

General Principles:

1. Only Medical Officers and Registered Nurses who have completed teaching and training in the administration of continuous flow Nitrous Oxide are permitted to administer N₂O.
2. Nitrous Oxide must be prescribed by medical officer prior to administration.
3. To ensure suitability, patients must be assessed by a medical officer prior to the prescribing and administration of Nitrous Oxide.
4. Oxygen, suction, and resuscitation drugs/equipment must be available at all times when nitrous oxide is being used. Doses of resuscitation drugs should be readily available.
5. If Opiates or Benzodiazepines are concurrently administered, a senior medical officer (who is not performing the procedure) must be present throughout the procedure. In this situation consider fasting the patient, as depth of sedation can be unpredictable.

The Nitrous Oxide apparatus must be stored in a manner which precludes access by unauthorised personnel

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Nitrous Oxide Uses:

Unless contraindicated, any patient in pain is a potential patient for N₂O. It should be considered for any brief procedure (<15 minutes) where relief of anxiety, relief of mild to moderate pain, and amnesia are desirable. For procedures where a high level of pain is anticipated, or that may be prolonged, another form of sedation should be considered e.g. Ketamine.

Some suggestions for use:

- LP, cannulation
- Urinary catheter
- Local or regional anaesthesia
- Suturing
- Foreign body removal (incl. ear)
- Dressing changes
- Splinting/ POP application
- Molded cast
- Incision and drainage

Contraindications:

1. Closed head injury with LOC, altered conscious state, or raised ICP
2. LP with opening pressure - Nitrous will give false elevated pressure
3. Airway compromise
4. Chest trauma or suspicion of pneumothorax
5. Concern re other potential gas containing cavities e.g. bowel obstruction, pneumocephaly, sinusitis.
6. Acute asthma
7. Intoxication with alcohol or other drugs
8. Impaired level of consciousness prior to procedure
9. Pregnancy

Side effects:

Several minor adverse effects can occur including nausea, dizziness, voice change, euphoria, and laughter.

Vomiting is uncommon with 50% N₂O, but may occur in up to 10% of patients at concentrations of 70%.

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Guideline for Administration of Continuous Flow N₂O:

1. May be administered to any child over the age of 12 months unless contraindicated.
2. The prescription for N₂O must be written on the sedation record.
3. N₂O is administered via Matrx MDM Digital Mixer with the Nitrous Circuit.
4. Fasting is not required prior to the administration of N₂O alone, however it is advisable to keep patient NBM once the decision to use N₂O has been made.
5. A pulse oximeter should be attached to the patient and O₂ saturations and heart rate monitored throughout procedure. Oximetry can be removed once the patient is fully awake with O₂ saturation greater than or equal to 96%.
6. The administrator must be responsible for the administration and observation of the child only.
7. The procedure being performed on the child must be carried out by someone other than the person administering the N₂O.
8. Monitoring consists of constant observation of the patient's state of consciousness, respirations, airway, oxygen saturations, and inspired oxygen concentration. Where possible verbal contact with the patient should be maintained without removing the mask.
9. N₂O must be discontinued with the onset of any complications, and circuit purged with 100% O₂.

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Procedure:

1. Ensure oxygen piping (white) is securely connected to wall outlets.
2. Attach yellow piping to suction and turn on suction
3. Turn on Matrix MDM Digital Mixer
 - Default settings are **O₂ 100%** and **Flow 5L/min**
 - Adjust flow to 8L/min if <30kg, 9.9L/min if >30kg
 - Ensure O₂ concentration reads 100%
4. Circuit check:
 - The whole circuit must be changed once a week. Please refer to the checklist to ensure this has occurred before using the apparatus. However if contamination is a possibility (e.g. MRSA, PUO, URTI symptoms) then the circuit must be changed IMMEDIATELY after use.
5. Select appropriate face mask size. Most children will need a size 2 Mask which is the same size currently in use for spacer administration.
6. Allow child to select “flavouring” and add to mask as appropriate.
7. Explain to child/parent how the system works and allow child time to become familiar with equipment and the noise it makes.
8. Instruct the child about how to hold the facemask to ensure a good fit/seal. The child should self administer the N₂O whenever possible, if unable to do so then the person administering the N₂O should provide assistance.
9. Connect the pulse oximeter to the patient.
 - Adjust oxygen concentration to 50% (implies 50% N₂O). **Administer for at least 3 minutes** before commencing procedure.
10. If desired level of sedation/analgesia is not achieved, then reduce O₂ concentration in increments of 5-10% every 2 minutes until desired effect or reach 30% (implies 70% N₂O).
11. If patient develops side effects or over sedation, or desired conditions not achieved, then cease and consider alternate form of sedation.
12. The administrator should attempt to maintain verbal contact with the patient throughout the procedure.

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13. At the end of the procedure the mask should be removed and the patient encouraged to breathe deeply.

14. If at any point the oxygen saturation drops below 93%, N₂O should be ceased and 100% oxygen should be administered with stimulation of the patient.

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