

## 4 PAIN MANAGEMENT IN LABOUR

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4.6 Administration of Nitrous Oxide (N<sub>2</sub>O+O<sub>2</sub>)  
Section B  
Clinical Guidelines  
King Edward Memorial Hospital  
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### 4.6 ADMINISTRATION OF NITROUS OXIDE (N<sub>2</sub>O+O<sub>2</sub>)

#### AIMS

- To assist women to manage pain during established labour or during uncomfortable procedures.
- To provide women with a degree of self control in their pain management.

#### BACKGROUND INFORMATION

Nitrous oxide is an inorganic colourless, odourless inhalation agent. It is non-flammable but will support combustion.<sup>1</sup> Nitrous oxide is eliminated via the lungs, not the liver, so the effect is transient, it does not accumulate, and has no known adverse effects for the neonate.<sup>2</sup> The onset of full effect after inhalation of nitrous oxide and oxygen (N<sub>2</sub>O+O<sub>2</sub>) is approximately 50 seconds, therefore careful timing and noting intervals of contractions can assist in ensuring the woman commences inhalation of the gas approximately 30-50 seconds prior to the onset of contraction to provide the optimal benefit.<sup>3</sup>

#### KEY POINTS

1. Nitrous oxide is classified as a Schedule 4 (prescription) only medication therefore requires a doctor's order for use.  
Document use on the MR270 'Partogram' and the MR810.04 'Medication Administration for Labour and Birth'.  
Nitrous oxide is considered a safe agent<sup>12</sup> for women in labour and is administered by inhalation. Evidence indicates a high percentage of women are satisfied with this method of pain relief.<sup>13,14</sup>
2. Careful coaching of the woman is essential for successful use of self administered nitrous oxide.<sup>13</sup>
3. Prior to use of N<sub>2</sub>O+O<sub>2</sub> the woman should be advised of possible side-effects.
4. The woman should be advised that only she should self-administer the N<sub>2</sub>O+O<sub>2</sub> to prevent risk of loss of consciousness that can result from overdosage of the gas.
5. An 'Emergency Oxygen' button on the Mid-O-Gas machine releases 100% oxygen at a minimum of 30L/m.
6. Prolonged inhalation of nitrous oxide for more than 6 hours can inactivate vitamin B<sub>12</sub> interfering with DNA synthesis. This can cause adverse haematological and neurological effects.<sup>8</sup>
7. Nitrous oxide should not be used for more than a total of 24 hours, or more frequently than every 4 days unless under close medical supervision and haematological monitoring.<sup>11</sup>
8. The use of oil based lubricants should be avoided whilst nitrous oxide is in use. Ensure any alcohol based gels/substances have evaporated prior to using N<sub>2</sub>O+O<sub>2</sub>.<sup>11</sup>
9. Staff should ensure if a mask is used it is tightly fitted, the entonox circuit has no leaks, and the room well ventilated to decrease risk of excessive occupational exposure to staff.

## CONTRA-INDICATIONS TO USE

N<sub>2</sub>O+O<sub>2</sub> is contraindicated for women who:

- cannot hold a facemask or mouthpiece<sup>1, 15</sup> e.g. maxillofacial fracture
- have impaired consciousness or intoxication<sup>15</sup>
- have impaired oxygenation<sup>15</sup> e.g. upper respiratory tract infection or respiratory disease<sup>1</sup>, deviated nasal septum, nasal polyps, allergic rhinitis<sup>1</sup>, chronic obstructive pulmonary disease<sup>1</sup>
- have received excessive amounts of intravenous opioids<sup>15</sup>, or morphine derivatives and/or benzodiazepines as sedation may be increased.<sup>9</sup>
- are vitamin B<sub>12</sub> deficient or receiving vitamin B<sub>12</sub><sup>15</sup>
- recent ear surgery<sup>1</sup>
- have a compromised fetus<sup>15</sup>
- are haemodynamically unstable<sup>15</sup>

**Note:** N<sub>2</sub>O+O<sub>2</sub> should be used cautiously with patients diagnosed with schizophrenia or bipolar disorders.<sup>1</sup>

## SIDE-EFFECTS OF NITROUS OXIDE

May include:

- excessive drowsiness, dizziness or lightheadedness<sup>9, 16</sup>
- nausea and vomiting<sup>9, 15, 16</sup>
- dry mouth<sup>16</sup>
- buzzing in the ears<sup>16</sup>
- rarely, 'pins and needles' or numbness<sup>16</sup>
- dreams<sup>16</sup>
- hazy memory of labour<sup>16</sup>
- feelings of claustrophobia with use of a mask<sup>15</sup>

## EQUIPMENT

1. Mid-O-Gas machine with a maximum setting of 70% Nitrous oxide(N<sub>2</sub>O) and minimum setting of 30% (O<sub>2</sub>) **OR**
2. Portable Entonox apparatus 12 (blue cylinder with white quadrants on the shoulders) with a pre-regulated concentration of 50% nitrous oxide and 50% oxygen.
3. Disposable Inhalation Analgesia Circuit (filter with mouth piece)
4. Corrugated tubing (to be changed after every use)

| PROCEDURE  | ADDITIONAL INFORMATION   |
|--|--|
| <p><b>1 Prior to commencement</b></p> <p>Ensure that:</p> <ul style="list-style-type: none"> <li>there is no contra-indications to use</li> <li>a new filter (with mouthpiece) is attached correctly to clean corrugated tubing</li> <li>if a mask is preferred used ensure it has a correctly fitted seal</li> <li>the Mid-O-gas machine is turned on and that the gas delivery is set a 50% N<sub>2</sub>O and 50% O<sub>2</sub></li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>there is adequate gas remaining in the Entonox cylinder for required use. Spare cylinders should be available.</li> </ul> <p><b>2 Education</b></p> <ul style="list-style-type: none"> <li>Explain the effects, risks, benefits and restrictions of using N<sub>2</sub>O+O<sub>2</sub>.</li> <li>Explain the importance of the timing of commencement of inhalation.</li> <li>Demonstrate the importance of maintaining a seal around the mouthpiece and instruct the woman to inhale and exhale through the mouthpiece.</li> <li>Explain that it is imperative the woman self administers the N<sub>2</sub>O+O<sub>2</sub>.<sup>15, 17</sup> No one else is to hold the mouthpiece or mask.<sup>16</sup></li> </ul> | <p><b>Note:</b> the Mid-O-Gas / Entonox apparatus is serviced by a biomedical technician from KEMH every six months. This date should be evident on the machine.</p> <p>Entonox 50% N<sub>2</sub>O and 50% O<sub>2</sub> is supplied in a blue cylinder with white quadrants on the shoulder. Cylinders containing 100% N<sub>2</sub> are blue with no white shoulders.</p> <p>Ideally to receive the optimum benefit of the gas a woman should be encouraged to begin inhalation 30 to 50 seconds prior to commencement of the contraction.<sup>16</sup> This will require timing and monitoring of the contractions.</p> <p>Poorly fitted mask if used or use of the mouthpiece may lead to leakage of the gas which will decrease the concentration the patient receives<sup>1</sup>, and increase risk of contamination from the gas to staff.<sup>2</sup></p> <p>Self-administration is a safe guard in preventing overdose. As drowsiness increases, the mouth piece will fall away making loss of consciousness unlikely.<sup>2, 15</sup></p> |

| PROCEDURE   | ADDITIONAL INFORMATION  |
|---|---|
| <ul style="list-style-type: none"> <li>Instruct and supervise the woman until she is confident and proficient in the use of N<sub>2</sub>O+O<sub>2</sub>.</li> </ul> <p><b>3 During contractions</b></p> <ul style="list-style-type: none"> <li>Instruct the woman to begin breathing deeply at a normal rate on the mouthpiece at the onset of the contraction (or 30 seconds prior where possible) and cease when the contraction pain eases or abates.</li> <li>Palpate the contractions to assist the woman in recognizing early onset.</li> <li>Instruct the woman to remove the mouth piece between contractions and breathe normally.</li> <li>Continuously assess the woman's pain level and conscious state.</li> <li>Observe for signs of overdose e.g.               <ul style="list-style-type: none"> <li>➢ drowsiness</li> <li>➢ disorientation</li> <li>➢ lack of cooperation/aggressiveness</li> <li>➢ unconsciousness</li> </ul> </li> </ul> <p>If overdose occurs cease administration of N<sub>2</sub>O+O<sub>2</sub> and protect the woman's airway until she is recovered.</p> <p>Following recovery, recommence the N<sub>2</sub>O+O<sub>2</sub> but at a lower concentration.</p> <p><b>Note:</b> Administration of opioids prior to or with N<sub>2</sub>O must be undertaken with caution as the combination of these can more easily render a woman unconscious.<sup>16</sup></p> <p><b>4 Between contractions</b></p> <p>Ask the woman to remove the mouthpiece and encourage her to breathe normally.</p> | <p>A time lag of approximately 50 seconds after administration occurs before the full analgesic effect is felt.<sup>16</sup></p> <p>The delayed time lag can be shortened by high-inspired concentrations, and increased ventilation (deep, slow breaths).<sup>16</sup></p> <p>Nitrous oxide may be used at any time in labour as it does not effect uterine contractility.<sup>18</sup></p> <p>It is suggested that concentrations of nitrous oxide greater than 50% may depress consciousness.<sup>19</sup></p> <p>Overdosing is generally prevented by self-administration as the woman's mouthpiece or mask will fall away if she becomes drowsy.<sup>15</sup></p> <p>An 'Emergency Oxygen' button on the Mid-O-Gas machine releases 100% oxygen at a minimum of 30L/m.</p> |

## PROCEDURE

## ADDITIONAL INFORMATION

### 5 Documentation

- A written medical order for N<sub>2</sub>O+O<sub>2</sub> on the MR 810.04 'Medication Administration for Labour & Birth' form.
- Document the time of commencement, concentration, and ongoing assessments of pain in the woman's:
  - Medical record MR250
  - Partogram MR270

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