WOMEN’S AND NEWBORN HEALTH PROGRAM
Clinical Policy/Procedure

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<th>TITLE:</th>
<th>Nitrous Oxide Administration During Labour</th>
<th>NUMBER:</th>
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<td>Sponsor:</td>
<td>Jennifer West, Manager Birth Unit</td>
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<td>Approved by:</td>
<td>Childbirth Care Team</td>
<td>Approval Date: Nov. 14, 2016</td>
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<td>Effective Date: March 21, 2017</td>
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<td>Applies To:</td>
<td>Health care professionals in the Birth Unit of the IWK Health Centre</td>
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POLICY STATEMENTS

1. Nitrous oxide administered as Entonox® (50:50 oxygen: nitrous oxide mixture) is given via a face mask or mouthpiece. The inhaled self-administered blend of 50% nitrous oxide and 50% oxygen is a common form of labour analgesia and can be used during the first, second and third stages of labour, as well as during post delivery procedures such as laceration repair, manual removal of the placenta and uterine curettage.

2. Nitrous oxide is a pain relief option for labouring women in environments where epidural anesthesia is not readily available, when the patient does not prefer an epidural or narcotic analgesia or when the labour or the delivery is precipitous. This labour analgesic can be used safely for both term and preterm deliveries.

3. A registered nurse (RN) who has completed the education for the self-administration of nitrous oxide in oxygen may assist the women upon request and may supervise the labouring woman’s self-administration of nitrous oxide in oxygen as per Birth Unit Admission Orders (Form ID IWK BIUN).

GUIDING PRINCIPLES AND VALUES

The experience of labour pain differs among women, and the response to pain is highly individual. Women should have access to a variety of approaches to promote comfort and reduce pain throughout labour. Nitrous oxide may not be effective for every woman in labour but it is an inexpensive, simple, reasonably safe and effective analgesic.

The mechanism of action of nitrous oxide is not fully understood though it is believed to result from increasing the activity of inhibitory pain pathways in the brain. It undergoes minimal metabolism and is excreted mainly through expiration therefore it is not dependent upon renal or hepatic function for elimination. Due to its low solubility in blood it has a very rapid onset and offset and in healthy individuals has little effect on the cardiorespiratory system.
Research has supported the reasonable efficacy, safety and unique and beneficial qualities of nitrous oxide as an analgesic for labour and its use as a widely accepted component of quality maternity care. The safety of this technique is that the patient will be unable to hold the mask if she becomes too drowsy and thus will cease to inhale the anesthetic, because nitrous oxide is eliminated quickly it does not accumulate in the mother/fetus/neonate or cause newborn depression.

Women should be educated about the use of nitrous oxide as an option for pain relief in labour.

Nitrous oxide analgesia can be administered quickly, easily, and safely, and has a very rapid onset of action.

Nitrous oxide can be discontinued as quickly and easily as its started. The effects begin to dissipate immediately after the woman stops breathing NITROUS OXIDE and are completely gone in 5 minutes. It has no adverse effects on the progress of labour. Administration of nitrous oxide is not associated with increased risk of maternal or fetal complications and does not require more intensive or invasive monitoring.

After a brief period of explanation and supervision, nitrous oxide is self-administered through a mouth piece that the woman uses. Self-administration allows the woman to determine when and how much nitrous oxide to use. If a woman does not like it or tires of using nitrous oxide, she can stop using it and begin using another method without residual effects.

Effects of nitrous oxide most commonly described include:

- reduced pain sensation
- tingling
- numbness
- dizziness
- drowsiness

Effects most commonly observed include:

- apparent controlled concentration
- decreased physical movement
- decreased overt manifestations of pain
- immediately after use the woman may appear completely relaxed but in an awake state
- slight drowsiness

**NOTE:** Subjective and objective effects of nitrous oxide may vary between women.

Nitrous oxide can be used in moderate to severe pain management situations when immediate, short-term analgesia and anxiolysis (antipanic and antianxiety properties) with minimal sedation is required (e.g. labour pain, perineal repair following vaginal birth, manual removal of the placenta).

**BENEFITS**

- can be used at any stage of labour, for any duration, either alone or with other agents
- rapidity of onset and reversal of effect
- has no effect on uterine contractions and does not alter the progress of labour
- minimal depression of the cardiovascular and respiratory systems
- effects are non-cumulative and are eliminated quickly and efficiently when inhaled intermittently
- mental and muscular relaxation
- little to no neonatal effects
- does not require increased levels of monitoring
- does not trigger malignant hyperthermia
- offers personal control
- high degree of satisfaction

**CONTRAINDICATIONS**

Patients who:
- cannot hold a face-mask or mouthpiece
- have impairment of consciousness or intoxication
- have received excessive amounts of intravenous opioids (decreased LOC and/or respirations)
- are vitamin B₁₂ deficient or receiving vitamin B₁₂
- have impaired oxygenation (e.g. upper respiratory tract infection or respiratory disease)
- are hemodynamically unstable
- have a compromised fetus

**SIDE EFFECTS**
- Euphoria
- nausea and vomiting
- excessive drowsiness, dizziness or lightheadedness
- dry mouth
- generalized tingling
- buzzing in the ears
- disorientation or decreased level of consciousness
- poor recollection of labour
- feelings of claustrophobia with use of a mask
- additive effect if combined with other centrally acting depressant drugs (e.g. opioids and benzodiazepines)

**PROCEDURE**

**Equipment**
- Nitrous oxide administration unit (mobile stand unit) with disposable inhalation analgesia circuit (filter with mouthpiece) and single patient use corrugated tubing
- Electronic fetal monitor, doppler or fetoscope
- Blood pressure monitoring equipment
- Oxygen and suction equipment at bedside

1. Prior to commencement, ensure that:
• an order is obtained for nitrous oxide (see preprinted Birth unit Admission orders FORM IWKBIUN).
• there are no contraindications to use.
• a new filter with mouthpiece is attached correctly to corrugated tubing.
• equipment is available for IV access and pulse oximetry as they may be required if there is increased maternal sedation.

2. Explain the effects, risks, benefits and restrictions of using nitrous oxide as well as the procedure to the woman and her support person.

3. Obtain patient consent (verbal or written) as per policy #124.0 Consent to Treatment.

4. Assess maternal oxygen saturation (SPO2), vital signs, and level of consciousness, fetal heart rate and uterine activity prior to initiation.

5. Attach nitrous oxide mobile unit to appropriate wall gas source (oxygen and Nitrous oxide) at patient bedside and set up circuit and tubing with mouthpiece. Ensure all connections firmly attached with no leaking. Also attach tubing to scavenger system outlet on wall in patient room.

6. Instruct the woman and support persons on the technique:
   • Nitrous oxide is self-administered, therefore **only the woman should hold the mouthpiece**.
   • Insert mouthpiece into mouth.
   • At the onset of contraction breathe in and out deeply and fairly rapidly into the mouth piece. Approximately 30 seconds is needed before any pain relief is perceived and 45-60 seconds before maximal effect is achieved.
   • Continue to breathe deeply but less frequently throughout the remainder of the contraction.
   • Stop inhalation at the end of the contraction.
   • Remove the mouthpiece between contractions and breathe normally.
   • During second stage of labour, inhalations of NITROUS OXIDE can be taken before each push, however collaboration between the patient and health care team must occur to ensure pushing techniques are optimized, the patient is alert to her surroundings and is able to verbalize what is happening.

7. Remain with the woman constantly once nitrous oxide is in use.

8. Palpate the contractions to assist the woman in recognizing early onset of contractions.

9. Monitor maternal vital signs as per unit protocol and continuously assess the woman’s levels of pain and consciousness. If nitrous oxide is used continuously or in conjunction with intravenous or intramuscular narcotics, pulse oximetry should be used.

   **Note:** Use of a pulse oximeter may be required if there is increased maternal sedation or drowsiness.

10. Monitor fetal health surveillance as per labour protocol when using analgesia (Refer to IWK Policy #7070 Intrapartum Fetal Health Surveillance)

11. Discontinue NITROUS OXIDE administration if:
   • Side effects are observed i.e. nausea and/or vomiting

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• No longer required
• Evidence of fetal/maternal compromise

12. Document in the patient’s permanent health record (electronic Intellispace Perinatal system) the following:
• date and time of initiation
• respiratory effort and any alterations in respiratory status
• maternal vital signs
• patient’s subjective description of pain based on the numerical pain scale, zero being no pain and ten being the worst pain experienced (0-10 at rest and with contractions);
• level of sedation
• evidence of side effects/complications and actions taken to manage those;
• evaluation of patient response to interventions
• communication with health care providers
• patient teaching

Safety Considerations

1. In the case of nitrous oxide used as labor analgesia, the RN is not administering the nitrous oxide, it is the woman who administers to herself. The nurses role is to reinforce education provided by the health care team, perform and document appropriate nursing assessments, patient relief and side effects response and guard patient safety (Please refer to Appendix B for measures to undertake in order to maintain workplace safety.).

2. NITROUS OXIDE for labour should be administered using a scavenger device that eliminates exhaust gases in well ventilated rooms to minimize occupational exposure to health care workers.

3. All staff who work with or around nitrous oxide must complete the IWK Health Centre Learning Package: Nitrous oxide upon employment in the Birth Unit. The learning package reviews the risks associated with NITROUS OXIDE use and the safety consideration each person should be aware of.
REFERENCES


BC Perinatal Health Program (2010). Pain Management Options During Labour (Initiual version October 2007)


Champlain Maternal Newborn Regional Program (July 2011). Administration of Nitronox or Entonox During Labour.


RELATED DOCUMENTS

Policies
IWK Health Centre Policy 1519 Pain Management Policy
IWK Health Centre Policy 7070 Intrapartum Fetal Health Surveillance
IWK Health Centre Policy 124.0 Consent to Treatment

Forms
Birth Unit Admission Orders (Form ID IWK BIUN)

Appendix (ices)
Appendix A: Definitions
Appendix B: Measures for Maintaining Workplace safety
APPENDIX A

DEFINITIONS

**Nitrous oxide for labor analgesia** is 50% nitrous oxide in 50% oxygen and is known as Nitronox® or Entonox®

**Nitronox® or Entonox®** is a sweet smelling, colourless, 50/50 gas mixture of nitrous oxide and oxygen, commonly self-administered by the patient through a demand-valve mask or mouthpiece and supervised by certified practice nurses or midwives. It is a safe, easy to use, inexpensive, and reasonably effective labour analgesic that is available in many countries such as Australia, Canada, Finland, Sweden, and the United Kingdom. The precise mechanism of nitrous oxide remains uncertain, but the evidence suggests that it works by increasing the release of endorphins, corticotropins and dopamine that are produced in the mother’s brain.
Appendix B

Safe Practices when Working with Nitrous oxide

In addition to in-place engineering controls such as effective scavenging systems and general room ventilation, workers can protect themselves from exposure to nitrous oxide by following appropriate safe work practices. The key procedure is to inspect the nitrous oxide delivery system and all connections prior to use. Ensure that all hoses, clamps and connections are in place prior to turning on the nitrous oxide.

Other safe work practices should include:

- Ensure the scavenging tubing is connected to the wall scavenging connector. Check to see that the scavenging system is operational i.e. suction can be felt at the connector.
- Do not start gas flow until all connections have been checked and the patient is ready to have gas applied.
- Ensure gas supply is turned off when nitrous oxide administration is discontinued with the patient.

References:
# IWK Policies Being Replaced

Policy 7125 Pain Management in Labour

## Version History
(To Be Completed by the Policy Office)

<table>
<thead>
<tr>
<th>Major Revisions (e.g. Standard 4 year review)</th>
<th>Minor Revisions (e.g. spelling correction, wording changes, etc.)</th>
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