1.0 **DEFINITIONS:** Nitrous oxide has been found to be an effective analgesic by relieving pain, decreasing anxiety, inducing euphoria and/or reducing the awareness of pain. Nitrous oxide is an inhalation (in a 50-50 blend of nitrous oxide and oxygen) and is a form of labor analgesia that provides a reasonable alternative to narcotic analgesia, intrathecal or epidural anesthesia, or may be used as a first line of analgesia prior to receiving an intrathecal or epidural.

Patient administered inhalation nitrous oxide is easily administered. The patient is awake and alert with maintenance of motor and sensory function. Inhalation nitrous oxide acts quickly in approximately 30 seconds from inhalation, and clears rapidly from the patient in about 30-60 seconds.

**EQUIPMENT:** Nitrous Oxygen Delivery System:

a. The Nitronox unit is a portable gas blender device with scavenging capability delivering 50% nitrous oxide in combination with 50% oxygen. The unit is equipped with a demand valve, preventing flow of the gas mixture while the mask is not in use.

b. The unit is equipped with a scavenging system that attaches to a wall suction at the bedside. The scavenging system is connected to wall suction as part of machine set-up prior to use of the machine.

c. The unit uses standard E-size cylinders.

d. This device is equipped with disposable tubing and facemask which is changed each time the equipment is used by the patient.

e. Nitrous oxide administration equipment and tanks are stored in a locked and secured area when not in use.

f. The nitrous oxide regulator will be stored in the Pyxis when not in use.
2.0 **POLICY:** Nitrous oxide can be used for women during labor and/or women undergoing perineal repair or postpartum procedures where local anesthesia may not meet the patient’s analgesic needs.

2.1 **INDICATIONS:**

2.1.1 Patient in early or active labor
2.1.2 Patient undergoing perineal repair where local anesthesia may not meet the patient’s analgesic needs.
2.1.3 Patient requiring immediate postpartum procedures at the bedside who would benefit from rapid analgesia such as: manual removal of placenta, uterine exploration, dilation and curettage of the uterine cavity, extensive perineal repair.

2.2 **CONTRAINDICATIONS:**

2.2.1 Patients who cannot physically hold their own mask.
2.2.2 Patients who have impairment of consciousness or who are intoxicated with either drugs or alcohol (the patient needs to understand usage instructions and provide informed consent).
2.2.3 Patients with known vitamin B12 deficiency. Risk factors for B12 deficiency include but are not limited to: pernicious anemia, atrophic gastritis, history of gastric bypass or similar surgery, Crohn’s disease, celiac disease, Grave’s disease, lupus erythematosus, or history of alcohol abuse. Patients taking B12 as a nutritional supplement without a deficiency are not contraindicated from this therapy.
2.2.4 Patients with impaired oxygenation saturation, defined as oxygen saturation less than 92% on room air.
2.2.5 Patients who are hemodynamically unstable defined as a mean arterial pressure (MAP) less than 65 mm Hg.
2.2.6 Nitrous oxide should not be used in patients with diagnosis of abnormal air-containing cavities (e.g. pneumothorax, air embolism, bowel obstruction, increased intracranial pressure or intra-ocular surgery).
2.2.7 Patient receiving intravenous or intramuscular magnesium sulfate for preeclampsia or eclampsia.
2.2.8 Patient less than 35 weeks gestation.
2.2.9 Patients with a Category III fetal heart rate tracing, or a Category II fetal heart rate tracing requiring intrauterine resuscitation measures in the last 30 minutes. If the tracing improves to a Category I or Category II not requiring resuscitation measures, nitrous oxide may be resumed.

2.3 **PRECAUTIONS**

2.3.1 Pregnant staff in their first and second trimester should not care for patients receiving nitrous oxide
2.3.2 Fetal heart tones are assessed by the obstetric provider in accordance with the fetal heart rate monitoring policy to determine appropriateness of nitrous oxide analgesia.

2.3.3. Patients who have received intravenous (IV) opioids within the last 2 hours or intramuscular (IM) opioids within the last 4 hours. Nitrous oxide can be administered sooner in patients receiving opioids if the following criteria have been met:
   - Continuous oxygen saturation > 95% for at least 30 minutes
   - Mean arterial pressure (MAP) > 65 mm Hg as assessed by blood pressures taken q5min for 30 minutes

2.2.4 Patient who has taken Methadone or Suboxone within the last 5 days.

3.0 RELATED POLICIES: None

4.0 PROCEDURE:

4.1 Pre-treatment evaluation: The obstetrical care provider shall evaluate the patient (history and physical of the mother and fetus and prenatal record review) for clinical suitability and any contraindications pertaining to the use of nitrous oxide for pain control. Assessment includes maternal vital signs with oxygen saturation, fetal heart rate evaluation, and contraindications and precautions. Fetal Heart rate evaluation includes a 20 minute Category I strip or a Category II tracing not requiring resuscitation.

4.2 Patient Preparation:

4.2.1. If clinically appropriate, the obstetrical care provider shall review risks, benefits and alternatives for use of nitrous oxide for pain control with patient.

4.2.2 An order for administration of nitrous oxide shall be completed by the obstetrical care provider.

4.2.3 The obstetrical care provider will obtain the designated consent for the use of nitrous oxide to include education on the possible side effects of nitrous oxide which includes nausea, vomiting, fatigue and dizziness. Due to side effects of vertigo, the patient must not ambulate while nitrous oxide is being administered. A “fall precautions” per hospital policy should be initiated.

The completed consent shall be placed in the patient’s chart.

4.2.4 The obstetrical care provider will provide patient education on the following:

a. Patient holds mask over nose and mouth to create a sufficient seal to activate the flow of the nitrous blend.

b. Ongoing patient instruction and assistance with the timing of breaths to contractions to create maximum analgesic effect. Patient should begin
inhalation as soon as impending contraction is felt.
c. Only the patient is allowed to hold the mask.
d. Patient will not get out of bed while using nitrous oxide without assist
   of hospital staff.

4.2.5 The obstetrical care provider will ensure the following criteria of
eligibility is present within the patient’s medical record prior to the
initiation of nitrous oxide:
   a. Informed consent is documented
   b. Patient education has been performed
   c. A complete H&P has been performed and documented
   d. The patient’s prenatal record is available
   e. An order for nitrous oxide (50%)/oxygen 50% is present in the
      medical record

4.3 Set-up: Nursing staff will ensure equipment is properly connected and operating.
   N20 gauge should read 50% and 02 gauge should read 50%. Scavenging
   should be connected to the wall suction. For increased safety, the RN will
   sign the Nitrous Oxide unit out in a designated log book and sign it back in
   upon termination of use. The demand valve for nitrous will be kept locked
   in the Pyxis and will be signed out and returned by the RN under the
   patient’s name prior to use.

4.4 Procedure:
   4.4.1 Obtain baseline vitals: blood pressure, pulse, respirations, oxygen
         saturation, and pain level.
   4.4.2 Obtain at least a 20 minute fetal heart rate tracing to confirm a Category I
         tracing prior to initiation.
   4.4.3 Patient is in bed.
   4.4.4 Patient holds own mask over nose and mouth creating an adequate seal to
         initial the flow of the nitrous blend when inhalation is desired. The patient
         should be instructed to begin inhalation as soon as the impending
         contraction is felt. Unauthorized use of Nitrous Oxide by anyone other
         than the patient will result in immediate removal of the equipment from
         the room.
   4.4.5 The patient should be advised that using nitrous oxide may make her
         unsteady and should be advised not get out of bed without assistance by
         a hospital staff member.
   4.5.6 The nurse or trained provider should remain with the patient for the first
         15 minutes of nitrous oxide use to assess and document the patient
         response and proper use of the equipment. During this time continuous
         oxygen saturation monitoring is performed and blood pressure is taken
         every 5 minutes.
4.5.7 **Ongoing assessment and documentation** includes the time the nitrous oxide was initiated and the time it was discontinued, its efficacy, and any adverse reaction or side effects.

4.5.8 Assessment and documentation of vital signs: blood pressure, heart rate, respirations, oxygen saturation level, and pain level should be recorded every 60 minutes or more frequent per provider order while nitrous is in use.

**Discontinue** nitrous oxide if oxygen saturation falls below baseline during usage or the mean arterial pressure (MAP) is less than 65 mm Hg.

4.5.9 Discontinue nitrous oxide for Category II fetal heart rate tracing requiring resuscitation measures or for Category III fetal heart rate tracing.

4.5.10 Discontinue nitrous oxide if patient develops contraindications per policy.

4.5.11 Patients may receive narcotic analgesics 15 minutes after the discontinuation of nitrous oxide. A written discontinuation of the nitrous oxide order must be present before narcotic is administered.

4.5.12 Intrathecal or epidural anesthesia can be initiated 15 minutes after receiving the last documented inhalation of nitrous oxide. Nitrous oxide will not be initiated after an intrathecal or epidural has been given or placed without an order by the obstetrical care provider.

4.5.13 Nitrous oxide may be started with an order if the intrathecal is no longer effective and the patient’s oxygen saturation is at baseline or above and mean arterial pressure is > 65 mm Hg.

4.5.14 Use of nitrous oxide will be suspended from the time of birth to the cutting of the umbilical cord. It may be resumed for immediate post-partum repair procedures as deemed clinically necessary by the obstetrical care provider while on the OB unit.

4.5.15 **Exposure:** Equipment will function with an appropriate scavenging system per manufacturer’s and hospital guidelines.

5.0 **COMPETENCIES:**

5.1 **Initial Competency:**

a. All nursing staff, Obstetricians, Family Practice Attendings, Residents, Anesthesiologist and Midwives working in Labor and Delivery will participate in a Nitrous Oxide education session on the use of nitrous oxide in labor or in the immediate postpartum period.

b. Training will include instruction in:

   - Patient assessment (including indications and contraindications)
   - Benefits and risks of nitrous oxide in labor
   - Basic setup and use of the equipment
   - Protocol for machine checkout and log use
   - Patient monitoring and communication with obstetrical care provider and
anesthesia
- Potential side effects and their management
- Patient support and education to enhance effectiveness of the therapy

c. New hires to The Family Birth Place will attend a teaching session on nitrous oxide before being allowed to administer.
d. Completion of training shall be documented on the competency checklist.

5.2 Continued Proficiency

a. All nursing staff, Obstetricians, Family Practice Attendings, Residents, Anesthesiologist and Midwives working in Labor and Delivery will receive updates on the use of nitrous oxide as they become available.
b. Re-evaluation of competency on an annual basis will be required to ensure continued competence.

6.0 DOCUMENTATION:

6.1 Documentation will list nitrous oxide (50%)/oxygen(50%) and will include date, time initiated, time discontinued and route of administration.

6.2 Patient response (pain scale) and any side effects experienced (nausea, vomiting, dizziness, fatigue, other) will be documented every 15 minutes.

6.3 Vital signs and oxygen saturation will be documented per policy.
Consent for the Administration of Nitrous Oxide during Labor

I understand the risks and benefits of breathing nitrous oxide for labor and I wish to use this form of patient controlled analgesia (pain management) at this time. I understand that this form of pain management may not remove all sensation of discomfort.

I understand that some of the potential side effects of nitrous oxide include: dizziness, nausea, light-headedness, unsteadiness, dysphoria (feeling bad). If I wish to stop using nitrous oxide at any time during labor, I may voluntarily discontinue use immediately. I will then inform my nurse or provider of this decision and may select another form of pain management, if desired.

I understand that using nitrous oxide may make me feel unsteady for brief periods of time. If I need or want to get out of bed while using nitrous oxide, I will do so only with assistance from a hospital staff member.

I understand that nitrous oxide may cause dizziness and I will only be allowed to use nitrous oxide while in bed.

I agree to hold the mask on my own and will not allow others to hold the mask to my face or utilize any other form of external support (pillows, straps, etc.) to maintain the mask to my face.

I will not allow anyone other than me to use the mask and understand anyone observed attempting to or utilizing the masks will be asked to leave the room. Nitrous oxide will no longer be available for my use.

I understand there could be theoretical risks to nitrous oxide, as well as most other pain-relieving medications used during pregnancy. Some animal studies have shown effects on animal babies and it is not known, if in the future, there may be proven some negative effect on humans. I understand that nitrous oxide has been used throughout the world for labor pain control for many decades and is considered safe.

I understand and agree to the above and wish to use nitrous oxide for my labor pain at this time.

______________________________________________________________________________

Patient Signature

Date/Time

Witness to Signature

Date/Time

Second witness required for verbal consent from patient

Date/Time

Interpreter signature or Interpreter Service Name, if utilized

Date/Time

I have discussed the above information with the patient. I believe the patient or their representative fully understands what I have explained.

______________________________________________________________________________