NITROUS OXIDE ADMINISTRATION

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NITROUS OXIDE ADMINISTRATION

1. Clinical Indications:

A. Indications:

1) Moderate to severe pain
2) Patient must be able to self-administer the medication (i.e. be alert and oriented and capable of following instructions)

B. Contraindications:

1) Previous eye surgery, known allergy, significant head or chest trauma, high clinical suspicion for pneumothorax, or bowel obstruction
2) Patient unable to self administer.
3) Head injury with altered level of consciousness.
4) Severe chronic obstructive lung disease.
5) Inability to follow instructions (children, dementia).
6) Recent ingestion of alcohol or illicit drugs.
7) Major facial injuries or trauma.
8) Thoracic trauma.
9) Know or suspected bowel obstruction.
10) Known or suspected cardiac ischemic chest pain.
11) Patient developing cyanosis or respiratory distress with the use of nitrous oxide-oxygen.
12) Pulse oximetry reading indicating oxygen saturation is less than 90% prior to nitrous oxide-oxygen mixture use.

2. Drug Dose and Frequency

1) The concentration of nitrous oxide-oxygen mixture must be 50:50.
   a) No other mixture is permitted.
2) Nitrous oxide-oxygen is self administered by the patient with Paramedic assistance.

a) The negative pressure exerted by the patient's inhalation effort triggers gas flow.

b) A tight mask-face seal is necessary.

3) Cylinders must be positioned and secured in the upright position.

4) Cylinders must be stored at a temperature between 32-125 degrees Fahrenheit at all times.

a) Due to temperature restrictions, do not store cylinders in exterior compartments.

5) Pressure readings should be checked and documented at the beginning of each shift and after each use.

6) Turn cylinder end over end three times immediately prior to each use. This will ensure proper gas mixing.

7) The **ambulance exhaust fans must be in operation and at maximum setting for the duration of transport**.

3. Procedure:

1) Connect Nitrous Oxide cylinder to regulator and turn on valve. [See *Figure 2. Nitronox Cylinder (Blue) Attached to Regulator (Red Top)*]

2) Connect the green 02 tubing to 02 supply line. [See: *Figure 3. The Standard Oxygen Connector* and *Figure 4. Connection of the Oxygen Tube From Nitrous Oxide Regulator to Oxygen Cylinder* and *Figure 5. Preparation of the Ambulance Oxygen Supply. Remove attached Christmas Tree*. and *Figure 6. Preparation of the Ambulance Oxygen Supply. Attach Oxygen Line from NitroNox Regulator to Standard Oxygen Connector*]

3) Open cylinder and ensure there is sufficient gas pressure

4) There must be a functioning exhaust fan set on "Maximum" setting if this is used while on board an ambulance.

5) Explain the procedure to the patient

a) This is a self-administered inhaled pain medication

b) Instruct the patient to place the mask over their face and take several deep breaths [See: *Figure 8. Self Administration of NitroNox*].

c) Repeat as needed to achieve maximum pain relief

6) Monitor the patient's self-administration of Nitrous Oxide

a) Monitor patient's mental status and level of pain

b) Place waveform capnography on patient by nasal cannula

c) Patients may require transition to oxygen supplementation upon discontinuation

7) Repeat assessment, including vital signs, level of consciousness, oxygen saturation, and effect of nitrous oxide-oxygen.

a) Nitrous oxide-oxygen mixture use must be permanently discontinued if, at any point in time, the patient's oxygen saturation drops by 2% or more from baseline measurement.

b) If nitrous oxide-oxygen has been discontinued because of a drop in the patient's oxygen saturation, it may not be restarted and the cylinder that was used must be removed from service.

8) Document in patient care report (ePCR)

a) Document Nitrous Oxide pressure before and after administration

b) Document patient's pain before and after Nitrous Oxide administration

4. Certification Requirements:

1) Maintain knowledge of the indications, contraindications, technique and complications associated with the administration of Nitrous Oxide. Assessment of the knowledge and skill competency associated with this procedure may be accomplished via quality assurance, classroom demonstrations, skills competency stations or other mechanism as deemed appropriate.

2) Training Requirements

a) Attend in-service on acute pain relief and the role of nitrous oxide-oxygen administration.

b) Demonstrate an understanding of the pharmacology, mechanism of action, and potential adverse effects and complications from nitrous oxide-oxygen use.

c) Identify indications and contraindications for its use.

d) Demonstrate the correct method of instructing and administering nitrous oxide – oxygen.

e) Demonstrate the correct method of maintaining the nitrous oxide – oxygen delivery system.

f) Receive the approval of the EMS Medical Director.

5. Certification Level:

1) EMT and Higher Endorsements may perform this procedure if approved by Local Medical Director.

6. Quality Improvement

A. Key Documentation Elements

1) The following information must be documented on the patient care report form:

2) Patient's presenting signs and symptoms, including vital signs, level of consciousness and oxygen saturation.

3) Indications for protocol use

4) Time and tank regulator reading when nitrous oxide – oxygen use begins.

5) Results of treatment, including any complications.

6) Repeat assessment and vital signs, as indicated.

7) Time and tank regulator reading when nitrous oxide – oxygen use ends.

8) Changes from baseline, if any, that occur during treatment and transport.

B. Performance Improvement

1) Appropriateness of implementation

2) Adherence to guideline

3) Appropriate Documentation of Key Elements as listed in 7.A.

4) Any deviation from guideline

5) Patient response to treatment

7. Receipt, Maintenance, Storage

A. Initial Receipt of Nitrous Oxide Cylinders

1) A fully depleted nitrous oxide cylinder will weigh 250 grams less than a new cylinder. When a cylinder has 150 grams used on a call

it will be considered empty and retired from service for refilling. Each new cylinder will be tagged by a full time staff member (Director of Operations, Supply Officer or Training Officer) with the following information:

a) Tank #

b) Start weight in grams

c) Minimum weight to continue using

2) This information will also be listed on the log sheet.

B. Restocking of Nitrous Oxide on Ambulances

1) At the end of each call the nitrous oxide cylinder that was used will be weighed and the weight, date and signature will be documented on the attached tag. A witness signature will also be required in addition to the AEMT or paramedic.

a) If the new weight is below the minimum weight it will be marked as empty and returned to the used cylinder area of the secured storage area.

b) If the new weight is above the minimum weight documented on the tag, the cylinder may be placed back in the bag for use on another call.

C. Accountability, Control and Storage of Nitrous Oxide Cylinders

1) Each ambulance shall carry no more than three nitrous oxide bottles.

2) Used cylinders shall be returned to a designated locked cabinet in the supply room. The Director of Operations, or a person designated by the Director, shall be responsible for granting and removing access to the nitrous oxide cabinet.

3) A log sheet will be completed for any cylinder exchange. The log sheet will include at a minimum:

a) Date

b) Incident number

c) Provider administering nitrous oxide

d) Serial number of cylinder that was returned

e) Serial number of the full cylinder being returned to the ambulance

f) The initial weight of cylinder (g) measured on initial receipt of tank

g) The weight at which tank needs to be retired from use and returned to used section of secured storage (initial weight - 150g)

4) Cylinders will be appropriately tagged and segregated into full and used cylinders in the storage area.

5) Routine auditing and maintenance of records consistent with Controlled Substances protocols shall be maintained.

8. Helpful Internet Sites:

A. https://www.porterinstrument.com/pdf/datasheets/Porter-Nitronox-Field-Unit-Users-Manual-1023000.pdf

Figure 1. The NitroNox Setup

Figure 2. Nitronox Cylinder (Blue) Attached to Regulator (Red Top)

Figure 3. The Standard Oxygen Connector

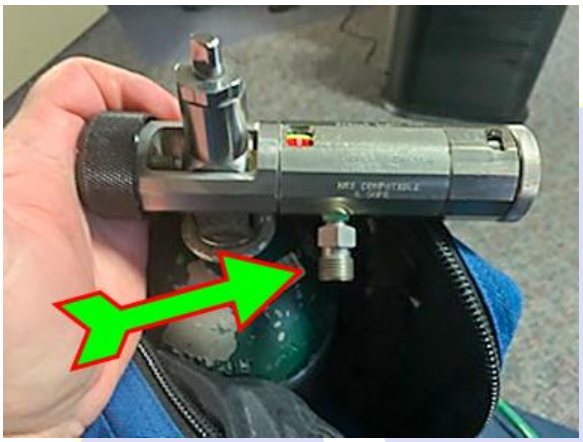

Figure 4. Connection of the Oxygen Tube From Nitrous Oxide Regulator to Oxygen Cylinder

Figure 5. Preparation of the Ambulance Oxygen Supply. Remove attached Christmas Tree.

Figure 6. Preparation of the Ambulance Oxygen Supply. Attach Oxygen Line from NitroNox Regulator to Standard Oxygen Connector

Figure 7. The NitroNox Self-Administration Mask

Figure 8. Self Administration of NitroNox