Nitrous Oxide Administration

NH EMT-Intermediates

nitrous oxide
Nitrous Oxide

- A colorless gas with a slightly sweet odor
- Non-explosive, nonflammable
  - Can serve as an accelerant
- Heavier than air

- Nitrous Oxide is NEVER to be used independently, it is ALWAYS used in a 50/50 ratio with oxygen.
Nitrous Oxide

EMS Providers may be most familiar with nitrous oxide at the dentist office, where is it also known as “laughing gas.”
Pharmacology

- A central nervous system depressant
- Dulls the sense, blunts perception of painful stimuli and produces a carefree attitude about one’s surroundings.
- Actual mechanism by which it produces this pain relief is unknown.
- Thought that it potentiates the release of endogenous endorphins, which react with opioid receptors in the central nervous system to elevate the pain threshold and create a feeling of relaxation and euphoria.
Pharmacology

• N2O has both an onset of action and duration of action of 2 – 5 minutes
• Both metabolized and excreted through lungs
Indications

- Isolated fractures, sprains, amputations
- Soft tissue injury, burns
- Lumbar pain
- Kidney stone-type pain
Contraindications (1 of 2)

- Pregnancy
- Pediatric patients not approved at the EMT-I level of care
- Any altered mental status
- Psychiatric or behavioral disorders
- Inability to comply with instructions regarding use of nitrous oxide/oxygen
- Head or facial trauma
- Recent ingestion of alcohol or illicit drugs
Contraindications  (2 of 2)

- Thoracic injuries
- Hypotension
- Known or suspected bowel obstruction
- Known or suspected cardiac ischemic chest pain
- Ear or sinus pain or decompression illness
- Conditions where there may be abnormal gas collection
  - COPD (blebs)
  - Pneumothorax
  - Bowel distention
Administration

- Personal safety – Use in well ventilated area
  - Turn on ventilation system in ambulance
  - Use scavenger
- Dose
  - Concentration must be 50% oxygen and 50% nitrous oxide
- Route
  - Self administered by patient-activated mouth piece
Administration (2 of 2)

- Onset: 2 – 5 minutes
- Duration: 2 – 5 minutes
- Adverse Effects
  - Dizziness/light headedness
  - Drowsiness
  - Apnea/cyanosis
  - Hypotension
  - Nausea/Vomiting (rare)
Adverse Effects – Diffusion Hypoxia

• Rapid diffusion of the gas from the bloodstream back into the lungs can causes alveolar hypoxia, is called diffusion hypoxia.
Adverse Effects – Diffusion Hypoxia continued

• Symptoms include nausea, lethargy, and dizziness. Some have described similar to a hangover from heavy alcohol consumption.

• Preventable by breathing 100% oxygen for several minutes following N2O administration.
Procedure

• Perform Patient Assessment
  – Level of consciousness
  – Vital signs including oxygen saturation
• Assess and manage injuries/medical complaints
• Assess for indication of pain management
• Ensure there are no contraindications
• If using prefilled cylinders
  – Turn pre-filled cylinders over 3 times prior to administration to ensure proper gas mixing
  – Assemble regulator/demand valve
  – Ensure and record pressure readings
Nitronox Pain Relief System

• The Nitronox PA system, is a 2 liter cylinder with a Pin Index Valve, a two stage Regulator
• Stage 1 regulates the cylinder pressure to a safe useable level, and the
• 2nd stage is the demand stage that allows the patient to take as much analgesia as is required.
• The unit comes complete with a 2 meter hose, mouth pieces and mask all inside a custom made shoulder bag, designed to hold the equipment safely and provide easy transportation.

At this time, this device is not available in the USA. It is only available in the UK.
• If using mixer valve
  – Assemble oxygen cylinder and nitrous oxide cylinder with mixer and demand valve according to manufacturer’s recommendation
  – Ensure and record pressure readings
• Instruct patient in self-administration method
  – Patient must self-administer the nitrous oxide-oxygen mixture without assistance
  – EMS providers must NOT assist patient in holding the mask or delivering the nitrous oxide-oxygen mixture

Although the photo shows a man holding a simple mask it is depicted to show his capability of self administering the medication.
• Assess closely for adverse effects
• Repeat assessment including level of consciousness, vital signs, oxygen saturation
  – Discontinue if oxygen saturation drops 2% or more below baseline measurement
• If discontinued due to drop in oxygen saturation, nitrous oxide-oxygen may not re restarted, and the cylinder is to be removed from service
Documentation

- Level of Consciousness, airway, breathing, and circulation status upon arrival
- Presenting signs and symptoms
- Vital signs including oxygen saturation
- Indications for use of the protocol
- Time and tank regulator reading with nitrous oxide-oxygen use begin
- Results of treatment, including complications
- Repeat vitals and oxygen saturations
- Time and tank regulator reading at end of use and report on accountability forms/logs
- Changes in baseline, if any, during treatment and transport
**BASIC/STANDING ORDERS**

- Routine Patient Care.
- Place the patient in a position of comfort, if possible.
- Give reassurance, psychological support, and distraction.
- Use ample padding for long and short spinal immobilization devices.
- Use ample padding when splinting possible fractures, dislocations, sprains, and strains. Elevate injured extremities, if possible. Consider the application of a cold pack for 30 minutes.
- Have the patient rate his/her pain from 0 to 10, or on another appropriate pain scale.
  - ♦ Avoid coaching the patient; simply ask him/her to rate his/her pain on a scale from 0 – 10, where 0 is no pain at all and 10 is the worst pain the patient has ever experienced.
- Reassess the patient’s pain level and vital signs every 5 minutes.

**INTERMEDIATE/STANDING ORDERS**

- **Nitronox***: The patient must be able to self-administer this medication. Nitronox is contraindicated in abdominal pain, pneumothorax, head-injured, or diving-emergency patients.
  - ♦ A NH Bureau of EMS approved training module must be completed before using this protocol.
  - ♦ **Note**: Nitronox may only be used if the patient has not received an opiate.

* A scavenger should be used and the ventilation fan should be running while administering Nitronox.
Security

- Contained in high pressure cylinders
  - Protect from sudden impact
  - Protect from extreme temperature changes
  - Secure from theft
- Permissible to keep 1 or 2 cylinders in rapid deployment kits
  - to be kept in a locked compartment of the ambulance
- Additional cylinders of nitronox or nitrous are to be kept secure in a locked cabinet in the apparatus bay or other appropriate location in the EMS Unit’s building
- Accountability logs