

## Nitrous Oxide/Oxygen Conscious Sedation in the Pediatric Patient

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## Indications

- Reduce anxiety
- Increase pain threshold
- Suppress gag reflex
- Increase tolerance for longer appointments
- Eliminate need for sedative premedication
- Potentiate effects of sedative premedication

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## Physical Properties of Nitrous Oxide

- A non-flammable, sweet-smelling gas
- Relatively insoluble
- Stable
- Stored in BLUE cylinders

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## Chemical Properties

- Nitrous oxide is inert
- Quickly absorbed from the alveoli of the lungs and physically dissolved in the blood
- Eliminated unchanged from the body
- Gas is rapidly excreted from the lungs when the concentration gradient is reversed

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## CNS Pharmacology

- CNS depressant
- Weak anesthetic potency- MAC >100%
- Relatively potent analgesic
- Response to suggestion enhanced
- Cough reflex moderately suppressed

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## Cardiovascular Effects

- Parallels inhaling 100% oxygen
- Slight decrease in heart rate
- No evidence of increased myocardial irritability
- No change to slight decrease in blood pressure

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## Respiratory Effects

- Slight stimulation-resulting in increased tidal volume
- Sense of smell decreased

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## Diffusion Hypoxia

- Upon termination of nitrous oxide administration, the outpouring of nitrous oxide into the lungs can dilute the amount of oxygen available to the patient
- This danger is probably insignificant in healthy patients
- However, it is recommended that the patient receive 100% oxygen for 3-5 minutes at the termination of N<sub>2</sub>O use to prevent possibility

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## Gastrointestinal Effects

- Nausea and Vomiting
  - Very low incidence
  - Usually, no special eating instructions prior to administration
  - Correlation with fluctuating concentrations of N<sub>2</sub>O?

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## Relative Contraindications

- COPD-bronchitis, emphysema
- URI
- Otitis Media
- Severe emotional disturbances
- Claustrophobia or irrational fear of "gas"
- Maxillofacial deformities or nasal obstructions
- Pregnant patients-especially in first trimester

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## Advantages

- Rapid onset and recovery
- Ease of dose control (titration)
- Limited physiologic effects
- Analgesic
- Suppression of gag reflex
- Potentiation

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## Disadvantages

- Weak agent
- Lack of patient acceptance
- Inconvenience-when working on maxillary anterior teeth
- Potential chronic toxicity
- Potential for abuse
- Necessary equipment
- Potentiation

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## Equipment

- Numerous types of machine available
- Fail-safe mechanism - minimum 20% O<sub>2</sub>
- Audible or visual alarm if O<sub>2</sub> interruption
- Flush lever
- Pin-indexed yoke system
- Gas cylinders color coded
  - Green-oxygen
  - Blue-nitrous oxide

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## Safety Issues for Dental Personnel

- Chronic exposure (>8 hrs. per week)
  - Increases in liver, kidney and neurologic diseases
  - Increase in spontaneous abortion
  - Increase in congenital abnormalities

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## Minimizing Risk

- Good scavenging system
- Adequate circulation of room air
- Limiting speech and mouth breathing of patient
- Proper size nasal hood
- ? Use in uncooperative child

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## Potential for Abuse

- A real concern in our profession
- Secure safely
- Common signs of abuse
  - Parasthesia or clumsiness of hands and legs
  - Loss of balance
  - Unsteady gait

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## Patient Selection

- Medical history and physical exam
- Parental consent
- Mild-moderate anxiety
- Strong gag reflex
- Capacity to be compliant and follow directions

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## Administration

- Prior to seating patient
  - Make sure equipment is set up and working properly
  - Select nasal hood of proper size
  - Have patient use restroom if necessary
  - Make sure you have an assistant!

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### Administration-continued

- Introduce child to equipment (slowly)-use tell, show, do
- Make adjustments to ensure mask fits snugly but comfortably
- Establish a total liter per minute of gases first with 100% O<sub>2</sub>
  - 3-7 liters per minute depending on size of patient

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### Administration-continued

- Encourage the patient to breathe through nose
  - Light finger pressure under lower lip
  - Tap on nosepiece
  - Keep reminding them verbally
- Slow vs. Rapid induction

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### Administration-continued

- During induction explain what the child might be feeling-use suggestion
  - Tingling feeling of hands and feet
  - Numbness of lips and tongue
  - Sensation of warmth
  - Sensation of floating
  - Feeling of heaviness
  - Droning sounds
  - Hearing distinct but distant

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## Administration-continued

- Watch patient for signs of proper level of sedation
- Therapeutic nitrous oxide levels usually between 30%-50%
- Do NOT exceed 50%
- Vomiting is rare but watch for signs of nausea
- If patient does vomit -
  - Don't panic
  - Turn head to side
  - Suction mouth
  - 100% O2 and complete procedure

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## Administration-continued

- Upon termination of procedure
  - Inhalation of 100% O2 for 3-5 minutes
  - Have child sit up in chair for several minutes

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## Remember!

- Nitrous oxide is not a substitute for traditional behavior management techniques
- It should be considered an adjunct to aid in the management of the mild to moderately anxious patient who is capable of cooperating in the dental chair

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