



Pediatric Dentistry of Sacramento

NITROUS-OXIDE / OXYGEN SEDATION

WHY DO WE USE NITROUS OXIDE IN PEDIATRIC DENTISTRY?

Dentists have expertise in providing anxiety and pain control for their patients. While anxiety and pain can be modified by psychological techniques, in many instances pharmacological approaches are required. Analgesia/anxiolysis is defined as diminution or elimination of pain and anxiety in a conscious patient. **The patient responds normally to verbal commands. All vital signs are stable, there is no significant risk of losing protective reflexes, and the patient is able to return to pre-procedure mobility.** In children, analgesia/anxiolysis may expedite the delivery of procedures that are not particularly uncomfortable, but require that the patient not move. It also may allow the patient to tolerate unpleasant procedures by reducing or relieving anxiety, discomfort, or pain. The outcome of pharmacological approaches is variable and depends upon each patient's response to various drugs. The clinical effect of nitrous oxide/oxygen inhalation, however, is more predictable among the majority of the population.

The objectives of nitrous oxide/oxygen inhalation include:

1. reduce or eliminate anxiety;
2. reduce untoward movement and reaction to dental treatment;
3. enhance communication and patient cooperation;
4. raise the pain reaction threshold;
5. increase tolerance for longer appointments;
6. aid in treatment of the mentally/physically disabled or medically compromised patient;
7. reduce gagging;
8. potentiate the effect of sedatives.

DETAILS / BACKGROUND

Nitrous oxide is a colorless and virtually odorless gas with a faint, sweet smell. It is an effective analgesic/anxiolytic agent causing central nervous system (CNS) depression and euphoria with little effect on the respiratory system. Nitrous oxide has multiple mechanisms of action. The analgesic effect of nitrous oxide appears to be initiated by neuronal release of endogenous opioid peptides with subsequent activation of opioid receptors and descending Gamma-aminobutyric acid type A (GABAA) receptors and noradrenergic pathways that modulate nociceptive processing at the spinal level. The anxiolytic effect involves activation of the GABAA receptor either directly or indirectly through the benzodiazepine binding site. Nitrous oxide has rapid uptake, being absorbed quickly from the alveoli and held in a simple solution in the serum. It is relatively insoluble, passing down a gradient into other tissues and cells in the body, such as the CNS. It is excreted quickly from the lungs.

Nitrous oxide is absorbed rapidly, allowing for both rapid onset and recovery (2-3 minutes). It causes minimal impairment of any reflexes, thus protecting the cough reflex. It generally is acceptable to children and can be titrated easily. Most children are enthusiastic about the administration of nitrous oxide/oxygen; many children report dreaming or being on a "space-ride". For some patients, however, the feeling of "losing

control” may be troubling and claustrophobic patients may find the nasal hood confining and unpleasant. The decision to use nitrous oxide/oxygen analgesia/anxiolysis must take into consideration alternative behavioral guidance modalities, the patient’s dental needs, the effect on the quality of dental care, the patient’s emotional development, and the patient’s physical considerations.

IS IT SAFE TO USE NITROUS OXIDE ON MY CHILD?

Yes. Nitrous oxide has an excellent safety record. In the dental setting nitrous oxide is only used to “lightly sedate” with the child fully awake. Your child can respond normally to verbal commands throughout the entire appointment. All vital signs are stable, there is no significant risk of losing protective reflexes, and your child is able to return to pre-procedure mobility rapidly.

During the entire appointment your child will be breathing a combination of oxygen and nitrous-oxide. At no time will they be receiving less than 50% oxygen in combination with the nitrous oxide. This is over double the natural concentration of oxygen in the air we breathe around us, which is only 21%. At the end of the appointment your child will be given 100% oxygen for no less than 5 minutes before they are dismissed.

***If your child is prone to motion sickness, please let the doctor or staff know before the appointment.**

ARE THERE ANY RISKS TO MY CHILD?

While we can never say there is “No Risk” when using a medicine, nitrous oxide/oxygen analgesia/anxiolysis has an excellent safety record. When administered by trained personnel on carefully selected patients with appropriate equipment and technique, nitrous oxide is a safe and effective agent for providing pharmacological guidance of behavior in children. Acute and chronic adverse effects of nitrous oxide on the patient are rare. Nausea and vomiting are the most common adverse effects, occurring in 0.5% of patients. A higher incidence is noted with longer administration of nitrous oxide/oxygen, fluctuations in nitrous oxide levels, and increased concentrations of nitrous oxide. Fasting is not required for patients undergoing nitrous oxide analgesia/anxiolysis. The practitioner, however, may recommend that only a light meal be consumed in the 2 hours prior to the administration of nitrous oxide.

WILL MY CHILD BE ABLE TO RETURN TO SCHOOL AFTER THEIR PROCEEDURE? CAN THEY PLAY SPORTS LATER?

Yes. It takes about 5-7 minutes for the nitrous-oxide to start taking effect and about the same time to fully dissipate out of the body. At the end of the appointment your child will be given 100% oxygen for no less than 5 minutes before they are dismissed. Most children have no lingering effects of the nitrous oxide. A small number of children will appear to still be a little lethargic, groggy, or “lazy” for a few minutes after they are dismissed from the chair. This effect can mostly likely be attributed to the child being in a VERY relaxed state along with resting horizontal watching a movie for 30-60 minutes. Most children would prefer they aren’t disturbed and allowed to continue relaxing. If your child is difficult to arouse in the morning or at the end of a nap, they may be irritable or cranky for a few minutes after their appointment.