



The “First Nitrous Oxide Visit” in a pediatric dental practice

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Abstract

The introduction of the technique of using nitrous oxide in children for anxiolysis is very different from that in adults where in it is extremely simple and straightforward. In children, anxiety, temperament, cognitive development, and behavior influence the acceptance of this technique. Therefore, the first nitrous oxide visit plays a decisive role in the success of nitrous oxide–oxygen anxiolysis in a pediatric dental patient. A parallel can be drawn between the role of the first nitrous oxide visit and the first dental visit.

Keywords Nitrous oxide–oxygen anxiolysis · Nitrous oxide inhalation sedation · Negative behavior · First dental visit

Quick reference/description

Nitrous oxide inhalational sedation or nitrous oxide–oxygen anxiolysis is considered an effective tool for behavior management in most of the pediatric patients. Nitrous oxide–oxygen gases are administered using a nasal hood and these gases have to be inhaled by a child throughout the procedure implying that the success of this technique in children depends on the acceptance of nasal hood by them.

In a pediatric dental practice, the first dental visit is critically important. The first dental visit helps a child, who may be anxious or fearful, to get acquainted with the dentist, staff present in the dental clinic and the environment of a dental clinic. The objective of this visit is to develop a rapport with the child which subsequently facilitates in acceptance of dental examination and treatment in a positive manner.

Similarly, first nitrous oxide visit carries a lot of importance. The objectives of the first nitrous oxide visit are to enhance the success of this technique by educating

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the parents about the purpose of using inhalational anxiolysis and also demonstrating as well as training the child patients to use the nasal hood effectively.

Indications for using nitrous oxide in children

- As an adjunct to conventional behavior management techniques in children.
- To reduce anxiety and increase cooperation in pediatric patients.
- Proper patient management, especially in children with special health care needs and those with negative behavior.

Materials/instruments

- Nasal mask or hood.
- Nitrous oxide/oxygen delivery system having Analog or digital flowmeter, breathing circuit, and scavenging pump.
- High-vacuum suction.
- Rubber dam.

Procedure

The first nitrous oxide visit is an extension of the first dental visit. This is crucial for a child patient because most of the children have varying degrees of anxiety because of which they may not communicate well with the dentist and perhaps, see this technique as a threat to them. As a result, it may become tough to make a child use a nasal hood for the administration of these gases or use it effectively throughout the dental treatment. In contrast, the technique can be easily explained to the adult patient, who can talk about their apprehensions, fear or any uncomfortable feeling which they may experience during the administration of nitrous oxide—oxygen gases. This explains why the first nitrous oxide visit is important for a child patient with enough time allocated for this process to educate, demonstrate and desensitize the child. Proper introduction of nitrous oxide and the nasal mask improves the chances of successful sedation in subsequent visits.

The first nitrous oxide visit comprises of the following:

- [a] The dentist's skill to judge a child's cooperative ability and communication skills.
- [b] Parents willingness to support the dentist during treatment.
- [c] Assessment of child's anxiety and behavior.
- [d] Pre-administration physical assessment.
- [e] Introduce nasal hood based on the behavior of the child.
- [f] Allow the child to understand the feelings experienced on inhaling the gases.

[A] Assessment of child's cooperative ability and communication skills

A dentist has a pivotal role in guiding the success of inhalation sedation in pediatric patients. Every child patient may not be suitable for use of this technique. Children who should be excluded from using nitrous oxide–oxygen inhalation are:

- Child's unwillingness to enter the clinic.
- Continuously crying child.
- Child aged less than 40 months.
- Child does not communicate with the dentist.
- Children with behavioral issues or on psychotropic drugs.

[B] Parents willingness to support the dentist during treatment

The technique should be introduced to the parents with its objectives spoken with clarity. If the objectives are not communicated well, the parents may not understand the benefits of using a new technique. For e.g.: The dentist says "In our practice we use nitrous oxide or the laughing gas while we perform any dental procedure. The gas is administered through a nasal hood and the child is required to inhale these gases throughout the procedure. The objective of using this gas is that it reduces fear/ anxiety thereby making the dental treatment more pleasant for the child. It also helps in reducing the pain sensations during the procedure" (Fig. 1). Following this, if the parents have any apprehensions, such as ones related to side effects, safety of using gas etc., the dentist can then allay those doubts. Pre-procedure instructions are also explained well to the parents. Effective communication via a detailed explanation of the technique, expectations, and treatment outcomes can help gain parents' confidence. A dentist should be able to talk to the parents with assurance to gain their trust.

[C] Assessment of child's anxiety and behavior

Assessment of a child's anxiety is crucial for the successful introduction of use of nitrous oxide–oxygen gases on the first dental visit. A child who is anxious or fearful would not accept the nasal hood easily. The dentist should try and address the cause of anxiety in these children and build rapport with the child. This would increase the



Fig. 1 First Nitrous oxide visit. **a** Introduction of nitrous oxide technique to parents. **b** Modeling of nitrous oxide technique on parent. **c** Tell-show-do for nitrous oxide technique on a child patient

chances of acceptance of nasal hood by the child. For e.g.: a child who begins to cry on seeing the dentist gives a clue to the dentist that the child has a high level of anxiety. The dentist then greets the child, tries to shake hands with the child, appreciates the dress/shoes of the child, talks about various games, toys which the child may be playing with, etc. This verbal communication with tenderness, love and care would help in reducing the anxiety level of the child. The dentist would then proceed to say “you do not look so happy today! Is there something which you do not like in this place? The child may then talk about the anxiety-provoking stimuli which may be addressed by the dentist.

[D] Pre-administration physical assessment

Reviewing the child’s medical history (Table 1) and performing a physical examination are crucial before administering nitrous oxide.

The child’s medical status should be evaluated with the following questions:

- Any history of severe emotional disturbances or drug-related dependencies?
- Is the child receiving treatment with bleomycin sulphate?
- Does the child have MTHFR gene mutation?
- Any history of recent eye or ear surgery?

[E] Introduce nasal hood based on behavior of the child

The basic steps of introducing the technique are as follows:

- Inform, demonstrate, and allow the child to experience (IDE) the nasal mask. Use euphemisms to familiarize the child with the nitrous oxide technique such as let’s do some breathing exercise or lets blow a balloon not through our mouth but through a funny nose. Thereafter, the use of nasal hood is demonstrated on the dentist or by use of modeling on parents or siblings. This is followed by letting the child experience use of a nasal hood (Fig. 1).
- Size of the nasal mask: the nostrils’ size and the length of the nose determine the size of the nasal mask. Commonly, small-sized masks are used for children <5 years and medium-sized masks are used for children aged 5–12 years. A smaller nasal hood can make the child feel claustrophobic while an oversized

Table 1 Pre-sedation assessment of medical history along with physical examination

Medical history	Physical assessment
Allergies or previous allergic/adverse drug reactions	Respiratory system
Current medications including dose, time, route, and site of administration	Airway patency (nasal)
Disease, disorders, or physical abnormalities	Breath sounds on inspiration and expiration
Details of previous hospital admissions	

mask will cover the upper lip and interfere with intraoral procedures. Oversized masks can also result in leakage from the upper border causing watering of eyes. A mask is considered to be appropriately positioned when its lower border rests on the philtrum.

- Positive reinforcement while the child inhales the gases.
- Proper examination of the child (records and radiographs).
- Not to begin dental treatment in the first nitrous oxide visit.

This sequence needs to be modified in children with higher levels of anxiety or in children who are not completely cooperative.

Introduction of nitrous oxide based on different behaviors

- Definitely positive child

In definitely positive children, the introduction of nitrous oxide is predictable, simple, and easy. It can be performed as mentioned above (Fig. 2). Collection of dental examination records and radiographs can be done before the introduction of nitrous oxide to these children.

- Positive child

In a positive child, the development of good personal rapport is crucial before introducing nitrous oxide. Occasionally, modeling can remove the child's initial inhibitions. The use of appropriate euphemisms is helpful in these children (Fig. 3). Nitrous oxide can be introduced, explained, and demonstrated to these children after an initial dental examination. Dental records and radiographs can be obtained under the effect of nitrous oxide.

Positioning the Child: depending on the child's comfort, he/she is positioned in a supine or semi-reclining position, as some children can get anxious in a supine position. In such cases, the child can be placed in the semi-recline position till he/she calms down under the effect of nitrous oxide and is then shifted into the supine position. If nitrous oxide is administered through a portable unit, it should be kept out of the child's sight to prevent anxiety.

Psychological reassurance: the success of the first nitrous oxide visit can be ensured with the meticulous use of conventional techniques of behavior



Fig. 2 Sequence of 'first nitrous oxide visit' for a definitely positive child

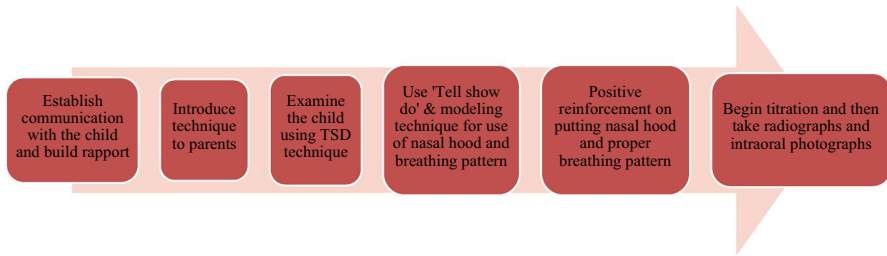


Fig. 3 Sequence of ‘first nitrous oxide visit’ in a positive child

modification or management (distraction, modeling, and tell-show-do) in conjunction with tender, loving care while introducing nitrous oxide inhalation to children. The acceptance of nitrous oxide by the child is largely governed by the dentist’s general behavior, gestures, use of appropriate words, tone of voice, and facial expressions.

- Negative child

Negative children can be fearful or anxious and will require more time for nitrous oxide introduction. Nitrous oxide should be introduced as follows (Figs. 4, 5):

- Effective communication is essential to comprehend the child’s anxiety. Explain the new technique to the child with euphemisms. Modeling on self, parents or older siblings can help them observe the movement of the reservoir bag. Let them experience the same in a comfortable position (standing away from the dental unit or sitting on parent’s lap in the dental chair). Audiovisual distraction can also be utilized during the introduction of the nasal mask.
- Rapid titration can cause a quick reduction of anxiety. During rapid titration, a high concentration of nitrous oxide gas (50–60%) is administered without any pre-oxygenation. In children, who do not like the smell of the mask or do not want the mask to be placed very close to them or feel claustrophobic, rapid titration with higher nitrous oxide flow can be used. For children who do not want the mask to be placed close to the nose, the child is placed in a supine position with a mask slightly away from the nose to allow the heavier nitrous oxide gas to settle around the nose.

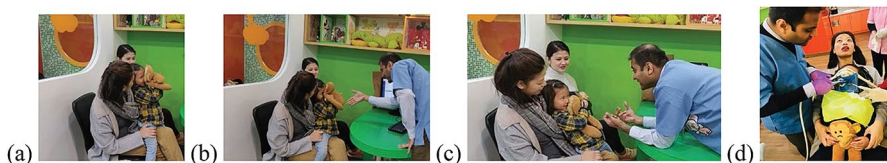


Fig. 4 **a** Child with negative behavior. **b** Child unwilling to communicate. **c** Child communicating after tender love and care by the dentist. **d** Child willing for treatment on parent’s lap.

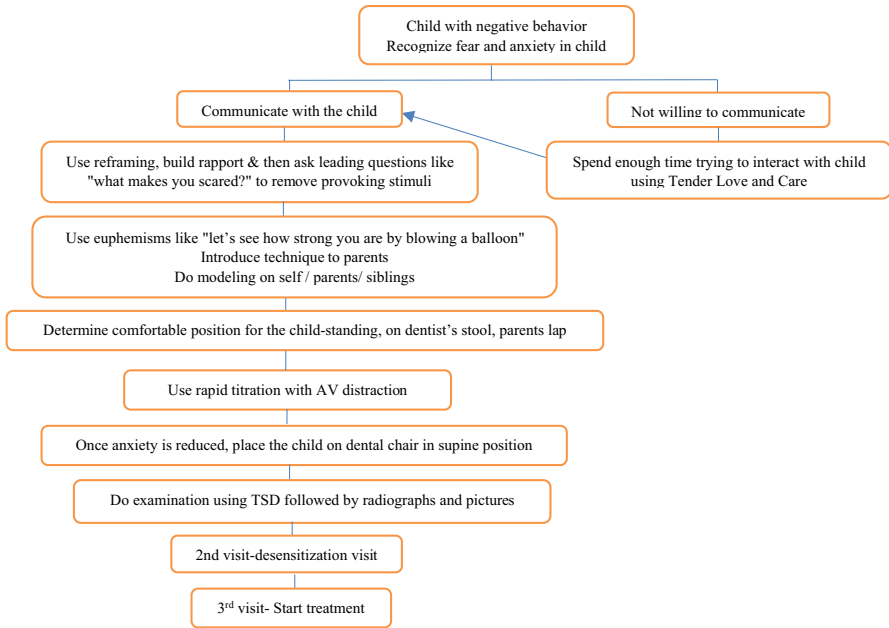


Fig. 5 Flowchart depicting sequence of first nitrous oxide visit for a child with negative behavior

- After the child has inhaled some amount of nitrous oxide, the hood can be brought closer to the child’s nose. Rapid titration via the use of a large-sized mask without resting it on the nose, and high concentration and flow rate of nitrous oxide can decrease the initial anxiety in a child with negative behavior. This method, however, poses a risk of nitrous oxide contaminating ambient air in the clinic.
- Dental examination, collection of records and radiographs are performed under the influence of nitrous oxide.

Desensitization visit is an additional visit required in negative or definitely negative children. The child is made to breathe in nitrous oxide for some time during this visit. Dental examination and taking of records including radiographs are performed using the tell-show-do approach after the child has calmed down. Compressed air and water from the three-way syringe and the suction tube are also introduced to the child. If the child is unwilling to accept the hood, unready for examination under nitrous oxide or uncomfortable with the air and suction, he/she should be considered for other sedation techniques.

- Definitely negative child

Since the anxiety level of a child with definitely negative behavior is very high, first nitrous oxide visit should be meant to only inform and educate them about the technique. The introduction of a new concept is a surprise for highly anxious

children, and they should be ‘sensitized’ towards it. The use of nitrous oxide can be performed in the next visit. The child’s parents can reinforce the use of the nasal mask at home prior to the subsequent visit. In the next visit, the child can be assumed as a negative child, and dental examination, taking records and radiographs can be performed under the influence of nitrous oxide.

Rapid titration with gentle physical restraint (parents holding arms of child) can be used until the child calms down. A large-sized mask that covers the mouth and nose with a proper seal should be used. It can ensure that the child inhales nitrous oxide even while crying. The large-sized mask should be replaced by a proper-sized mask after the child calms down. This method of restraint should only be used when a definitely negative child requires emergency treatment or when the child requires a single visit for an extraction. Parents’ separation or voice control can also be used in these cases with parents’ consent (Figs. 6, 7).

[f] Allow the child to understand the feelings experienced on inhaling the gases

While the gases are being administered the child should be informed about the feelings which he/she may experience. The dentist may tell them that it is normal to feel tingling in fingers and toes or even around the lips. They may feel light-headed or feel little sleepy. Sometimes they may even dream. Informing about these possible effects will prevent a child from reacting unfavorably.

Pitfalls and complications

Unpleasant experiences which can happen with the use of nitrous oxide in children are:

- Nausea.
- Vomiting.
- Headache.
- Pain in stomach.

Failure of nitrous oxide–oxygen anxiolysis can occur due to:

- Ineffective communication.



Fig. 6 **a** Child with definitely negative behavior. **b** Child willing to observe nitrous oxide being demonstrated on parent after persuasion. **c** Child agrees to accept nasal mask on parents’ lap. **d, e** Child cooperates for examination and records’ collection

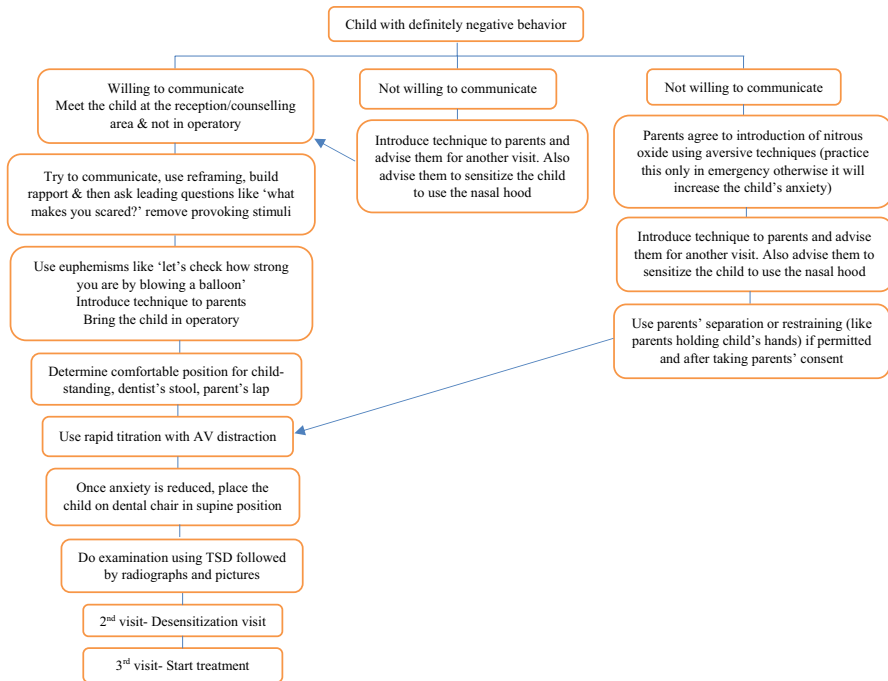


Fig. 7 Flowchart showing sequence of first nitrous oxide visit for a child with definitely negative behavior

- Failure in identifying anxiety in a child.
- Improper assessment of child's compliance.
- Poor behavior management skills.
- Excessive interference from parents.
- Failure in pain management or doing pharmacological pain management after the occurrence of pain.
- Not performing fragmented treatment for children with limited attention and cooperation.

Further reading

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