



**MAY 2012**

**// CED RESOLUTION**

# **THE USE OF NITROUS OXIDE INHALATION SEDATION IN DENTISTRY**

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## // INTRODUCTION

The main objective of the Council of European Dentists (CED), which represents over 330,000 dental practitioners across Europe, is to promote high standards in dentistry and oral healthcare for European citizens. It is therefore committed to continually reviewing and updating its strategic plan in order to ensure that the profession meets oral healthcare needs in Europe both now and in the future. The CED guiding vision regarding the future of dentistry is that every European has access to quality of oral health care given by well-educated, skilled and fully competent dental practitioners, in a comfortable and cost-effective manner, using the latest and most appropriate technology.

Pain and anxiety management is of paramount importance in dentistry. As many as 10 to 30% of adults and children may have some form of fear or anxiety related to dental treatment. There is substantial evidence that these patients will benefit from sedation with nitrous oxide (N<sub>2</sub>O) and that this form of sedation is extremely safe and efficient in the trained “dental practitioner’s hands.”

Based on the fact that the use of N<sub>2</sub>O conscious sedation by dental practitioners in the dental office has encountered some legal problems on its use in some European Countries, the CED decided with the help of some experts in the field, to develop this resolution aimed to support the benefits, the safety and the usefulness of the use of N<sub>2</sub>O in the dental office and that such a tool should be maintained in the dental practitioner’s armamentarium for use under certain conditions by trained and certified dental practitioners.

## // DEFINITION AND USAGE

Conscious Sedation can be defined as: *“A technique in which the use of a drug or drugs produces a state of depression of the central nervous system enabling treatment to be carried out, but during which verbal contact with the patient is maintained throughout the period of sedation. The drugs and techniques used to provide conscious sedation for dental treatment should carry a margin of safety wide enough to render loss of consciousness unlikely”<sup>1</sup>*

Nitrous oxide gas is no stranger to either anaesthesia or dentistry and its use links both sciences in history. The technique in which low concentrations of nitrous oxide gas is titrated with oxygen has been used for years (as early as 1889) in many countries (USA, Great Britain, Australia, and Scandinavia) and is recognised as clinically successful and cost effective compared to General Anaesthesia.

## // EFFICACY OF NITROUS OXIDE INHALATION SEDATION AS AN ADJUNCT TO BEHAVIOURAL MANAGEMENT

The European Academy of Paediatric Dentistry, the American Academy of Paediatric Dentistry and the British Society of Paediatric Dentistry all recommend a “titration” technique that involves increasing the dose of N<sub>2</sub>O in oxygen by 5 to 10% increments in the oxygen mix every 1 minute or so and according to the patient’s response until the desired sedative effect is achieved.

Nitrous oxide inhalation sedation, when it is supported by behaviour management techniques is efficacious for children and adults. A 2008 Cochrane review reported favourable changes in behaviour or anxiety when N<sub>2</sub>O was used. Furthermore, this has been described as the “standard technique” for paediatric dentistry (NICE 2010) and might be successful in up to 90% of cases provided the patients are carefully selected.

## // GENERAL INDICATIONS FOR N<sub>2</sub>O-OXYGEN SEDATION IN DENTISTRY

The patients in need of N<sub>2</sub>O conscious sedation belong to the following groups: 1) Anxious or fearful patients; 2) those with low coping ability, (e.g. behaviour management problems, dental fear, anxiety and needle phobic patients, prominent gag reflex; 3) special needs patients that communicate; 4) those with special treatment needs, (e.g. emergency treatment, complicated and prolonged treatment, minor oral surgery in conjunction with local anaesthesia, special procedures, etc).

## // MAIN CONTRA-INDICATIONS/CAUTIONS FOR N<sub>2</sub>O SEDATION IN PATIENTS WITH:

1) Inability to communicate; 2) inability to nose breath; 3) severe psychiatric or Behavioural/personality disorders; 4) B12 or folate deficiency/disorders; 5) chronic obstructive pulmonary disease (COPD); 6) neuromuscular disorders, e.g. multiple sclerosis; 7) cancer undergoing chemotherapy with Bleomycin drugs; and 8) in patients during the first trimester of pregnancy.

## // NITROUS OXIDE INHALATION SEDATION SAFETY

Nitrous oxide is non-irritant to the respiratory tract, has rapid onset and a fast recovery (both within minutes). The gas has low tissue solubility and the minimum alveolar concentration (MAC) is so high that it is a poor anaesthetic at normal atmospheric air pressure.

Dedicated, purpose-designed machines for the administration of inhalation sedation for dentistry must be used, capable of delivering N<sub>2</sub>O to an upper limit of 70% and never less than 30% oxygen by volume, although in most cases adequate relative analgesia is achieved with concentrations of nitrous oxide that do not exceed the 50% by volume. Such machines must conform to current European Standards and be maintained according to manufacturers' guidance with regular, documented servicing and must contain a fail-safe device (i.e. if the oxygen pressure falls, the supply of nitrous oxide automatically stops); flow-meter for individual set of gas flow and nitrous oxide concentration; emergency air-valve; non re-breathing tubes with low breathing resistance, and an effective scavenging system for exhaled and excess gas.

## // EDUCATIONAL & TRAINING STANDARDS

Nitrous oxide inhalation sedation should only be administered by accredited dental practitioners and assisted by other dental personnel who have been appropriately trained in theoretical, practical and clinical skills, and competent to meet any complication. Provided that these requirements are fulfilled, there is no contraindication for administration in the dental practice setting (Dental Sedation Teachers Group, 2000).

## // THEORY

A theoretical 2 days course (10-14 hours) must include: anxiety and behaviour management strategies, technical aspects of different sedation units, chemical, physiological and biological aspects of nitrous-oxide, emergency and basic life support. It is strongly recommended that anaesthesiologists or sedationists are involved in the teaching. A reading list is provided and an assessment (on the essential requested knowledge) must be taken.

## // PRACTICAL AND CLINICAL SKILLS

In addition to the theory, practical skills must be trained using “role-playing” as the educational model. After training, the trainee should be mentored and provide evidence of five assessments; five observations; and five treated cases.

## // AREAS FOR THE PROVISION OF EDUCATION AND TRAINING

Education and training must be given by accredited people in the best setting and depending on the Country, University or Hospital clinics may be ideal for this training.

Of key importance is that the students become certified at the end of the whole programme (theory-exam-practical skills-clinical skills) and understand the need to maintain and develop the skills through regular usage.

## // SUMMARY

- Inhalation sedation utilising nitrous oxide-oxygen has been a primary technique in the management of dental fears and anxieties for more than 150 years and remains so today.
- The technique is safe, valuable and effective for dental procedures and will allow the majority of apprehensive dental patients to be successfully sedated and treated in a much more comfortable and stress-free environment.
- Administered properly, by accredited dental practitioners with well-maintained equipment and appropriately trained assistants, the technique has an extremely high success rate and must be maintained in the armamentarium of dentistry as a fundamental tool for the pain and anxiety management of patients undergoing dental treatment in the Dental operator.
- The usage of inhalation sedation utilising nitrous oxide-oxygen has to comply with relevant national legislation.

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The Society for the Advancement of Anaesthesia in Dentistry (SAAD).

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