

Sedation for dental and other procedures

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Abstract

Conscious sedation is an anaesthetic technique which helps patients tolerate dental and other procedures. Safe sedation requires attention to patient selection, the clinical environment, appropriate intraoperative and recovery monitoring, sedation technique, and postoperative management. Various drugs can be used either singly or in combination. Low doses of short-acting anaesthetic agents allow fine control of sedation and a greater chance of success. Where anaesthetic agents are used, inadvertent overdosage is a risk, and these drugs must be administered by an anaesthetist. Entonox and oral and intravenous benzodiazepines can be safely administered by appropriately trained practitioners. Key definitions include 'sedation' and 'conscious sedation'.

Keywords Conscious sedation; dental

Royal College of Anaesthetists CPD Matrix: 1A02, 2A10, 2D06, 3A02, 3A06, 3A07

Why offer sedation for dentistry?

Dental anxiety and phobia are very common in the UK, with 36% of adults reporting moderate dental anxiety and 12% reporting extreme dental anxiety.¹ Young adults and those from poorer socioeconomic backgrounds are more at risk and often the consequence is avoidance of dental services and subsequent morbidity.

Intravenous conscious sedation is an effective technique for managing anxious patients and can be helpful in managing patients who cannot tolerate procedures for reasons other than anxiety. It is safe if performed by an appropriately trained practitioner in a monitored environment.

Sedation for other procedures

Anxiety is associated with many other medical procedures for which sedation is considered advantageous. The environmental and safety issues related to delivering conscious sedation safely are the same as those discussed in this article.

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Learning objectives

After reading this article, you should be able to:

- define conscious sedation and understand its role in dentistry
- be aware of the principles of selecting adults and children for sedation
- demonstrate the delivery of safe sedation including the management of common complications

Where sedation must be delivered outwith the theatre environment, consideration must be given to the choice of drug and the experience of the team.

Definitions (Table 1)

- *Sedation*: the deliberate drug-induced depression of consciousness used to reduce anxiety and awareness associated with unpleasant medical procedures.
- *Conscious sedation*: 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.²

Intravenous conscious sedation is achieved by titration of appropriate drugs in a clinically monitored environment. Patients will experience drowsiness and reduced anxiety but remain aware of their surroundings and able to respond to verbal commands. This level of sedation preserves protective airway reflexes. Post-procedure amnesia is common, particularly with deeper sedation.

Key components of a service providing sedation for dentistry include: patient selection and workup, establishing intravenous access, monitoring and managing sedation and recovery including supervision for the subsequent 24 hours. All of these must be provided to a consistently high standard to avoid patient harm including injury or death.

Patient selection

Pre-assessment information gathering requires a standardized checklist similar to those used for day-surgery. A medical and social history is taken including details of any negative dental experiences. The need for physical examination is guided by a thorough systemic enquiry and should include an airway examination. Medications and allergies along with any relevant anaesthetic history are recorded. Any ongoing medical conditions should be quantified and relevant investigations requested. Patients should be weighed.

American Society of Anesthesiology (ASA) 1–2 and stable ASA 3 patients are usually suitable candidates for conscious sedation. ASA 3–4 patients with severe or unstable cardiorespiratory disease are not precluded from having procedures under conscious sedation but must be managed by an anaesthetist in an appropriately monitored environment with specialized medical intervention immediately available.

Fasting is not required for uneventful conscious sedation and can often heighten anxiety particularly in children. However, it is

Sedation score

Sedation score	Clinical depth of sedation	
1	Awake	
2	Drowsy and relaxed, responds to speech	Conscious sedation
3	No response to speech, responds to stimulation (shaking)	Deep sedation
4	Unresponsive to stimulation	

Table 1

recognized that some complications may introduce a risk of regurgitation and aspiration. Patients can be told that it is normal to fast before sedation, but that they may have a light breakfast if they think it would help them cope. Patients should avoid alcohol the night before their procedure.

A written information sheet is given to all patients, where practicable, prior to their procedure. This advice includes the importance of wearing comfortable clothing, avoiding contact lenses, and instructions relating to topical local anaesthetic cream. For day-case procedures a responsible adult must accompany the patient to and from hospital and an adult must remain at home with the patient until the following morning.

Informed consent should be obtained by someone familiar with the sedation technique and who can answer questions while ensuring patient expectations are realistic.

Anxiety and dental phobia

Intravenous conscious sedation is particularly successful in anxious patients. Time should be taken to build rapport and to accurately explain the experience.

The Modified Child Dental Anxiety Scale is a validated score assessing anxiety in children with dental phobia.³ The patient is asked to choose the answer that best describes the way they feel relating to nine questions. The total score range is 5–45 with an increasing score indicating increasing anxiety (Box 1).

Autism spectrum disorders (ASD) and learning difficulties

Patients with ASD and children and adults with learning difficulties often have a reduced ability to cope with dental

procedures and may be referred for intravenous conscious sedation. Successful sedation can be difficult to achieve. While sedation will effectively remove any anxiety component, it may not improve the patient's ability to cooperate, and it is particularly important to have an alternative plan of management prepared prior to the procedure.

In this group of patients it is essential to take time to develop a rapport and as far as possible gain their trust. Some anaesthetists have reported success with low doses of ketamine as a component of the sedation regime for these patients.

Guidelines for safe sedation

The history of anaesthesia and sedation for dental treatment is infamous for its poor safety record. From the early 1800s with dentist Morton extracting teeth at the 'Ether Dome' in Massachusetts until the report led by Professor Poswillo in 1990, there were a small but regular number of deaths in healthy people having dental treatment under general anaesthesia. Dentists were urged to avoid general anaesthesia and consider sedation.

In 2000, the Department of Health produced the report 'A conscious decision', pointing out that standards aimed at protecting patients from serious complications were still not being rigorously applied. Between 1996 and 1999 eight deaths took place in dental surgeries (five children) and by 2002 the long history of general anaesthesia in UK dental surgeries came to an end.

More recently, 'Standards for Conscious Sedation in the Provision of Dental Care' was published in April 2015 by the Intercollegiate Advisory Committee for Sedation in Dentistry.

This report creates a new national standard for conscious sedation in dentistry and focuses on patient safety and optimal patient care. Recommendations are made about information for patients, robust continuing education and training for the entire dental team, sedation techniques and the appropriate environment for sedation delivery.

There are some significant changes to previous guidance. The report defines the age of a child (<12 years) and the requirements of the clinical team and facilities required for the dental treatment of younger patients under conscious sedation.

Sedation services must demonstrate a high level of safety and a continuing improvement in quality. The use of appropriate audit tools to review clinical outcomes is an essential component of good clinical practice. Careful and reflective use of such data

Sedative drugs and administration techniques

Sedation technique	Suitable for procedures lasting > 15 minutes	Fine control over depth of sedation	Causes central respiratory depression	Rapid recovery
IV midazolam boluses	Y	N	N	N
Inhaled nitrous oxide in oxygen	N	Y ^a	N	Y
TCI propofol and dental LA	Y	Y	N	Y
Remifentanil IV infusion and low-dose midazolam	Y	Y	Y	Y

IV, intravenous; LA, local anaesthesia; TCI, target controlled infusion.

^a May be unable to provide adequately deep sedation.

Table 2

will enhance patient safety and improve the quality of care. It is recommended that a system for reporting adverse events in the delivery of conscious sedation in dentistry be developed.²

Techniques and drug administration (Table 2)

Inhalational, oral and intravenous routes of administration are commonly used. The level of sedation that results from a given drug dose is unpredictable, therefore sedation should be established with a minimal initial dose, followed by further drug administration titrated to clinical effect.

Using short-acting drugs such as propofol or remifentanyl allows the level of sedation to be adjusted during the procedure – allowing deeper sedation for more unpleasant stages of treatment and lighter sedation for periods which are less stimulating. Profiling sedation in this way may result in selective memory for the more pleasant parts of the treatment and is particularly beneficial in the management of phobic patients requiring multiple procedures.

Some patients referred for intravenous sedation have failed with procedures attempted under inhalation sedation. For these patients, target controlled infusion (TCI) propofol combined with local anaesthesia is a flexible sedation technique. A typical initial target blood concentration of 2 µg/ml is appropriate, with subsequent target concentrations adjusted in response to the level of sedation and the stage of the procedure. The circulating half-life of adrenaline is around 2 minutes and an initial tachycardia settling over this time period suggests that the sedation level is adequate. The patient typically reports an awareness of the effects of the sedation long before the current pharmacokinetic models indicate significant blood or effect-site concentrations. For lighter sedation, a TCI target of 1.2 µg/ml may be appropriate.

Modified Child Dental Anxiety Scale

How do you feel about

- 1 Going to the dentist generally?
- 2 Having your teeth looked at (check-up)?
- 3 Having teeth scraped and polished?
- 4 Having an injection in the gum to freeze a tooth?
- 5 Having a tooth drilled?
- 6 Having a tooth taken out?
- 7 Being put to sleep to have treatment?
- 8 Having a mixture of gas and air to help you relax but which will not put you to sleep?



5 = extremely worried, 4 = worried a lot, 3 = fairly worried,

2 = worried a little, 1 = relaxed / not worried

Score ___ /45

Box 1

Delivering safe sedation

Environment and safety

Anxious patients are sensitive to the atmosphere in the clinical area. A comfortable room temperature, available background music, and the covering of surgical instruments until they are required are simple steps that can reduce anxiety. Allowing an accompanying adult to stay after the induction may occasionally be helpful.

Emergency equipment must be available to provide immediate life support if required. All staff should be practised and familiar with emergency protocols and equipment.

Each sedation session must start with a team safety brief including a review of each patient's clinical plan. Before each patient, all staff should pause briefly to confirm patient identity and consent for treatment including laterality.² Accurate documentation is part of safe practice and a standard anaesthetic record or specifically designed sedation record should be used.

Monitoring

Patients require cardiorespiratory monitoring throughout the procedure and during the recovery period. Pulse oximetry is mandatory. ECG and non-invasive blood pressure monitoring are normally used, but in particularly anxious patients may not be tolerated so should be kept immediately available.

The heart rate correlates strongly with acute (state) anxiety. On arrival at the clinical area, a rate of 100–120 beats per minute suggests moderate anxiety and greater than 120 severe anxiety.

Success rates

Children aged 11–16 can tolerate procedures under sedation up to an hour in length, but the younger end of this age-range displays a reduced ability to cope with even short periods of mild discomfort. While optimizing the sedation may allow successful treatment, persisting with the procedure under inadequate operating conditions may lead to failure to complete the procedure, a loss of trust, and poor patient compliance with future sedation. Recognize when a procedure is unlikely to succeed and offer an alternative plan of management.

Managing complications

The majority of procedures performed under conscious sedation are uneventful but the anaesthetist should be prepared to promptly manage complications.

- Infusion pain – reassure, stop infusion, give 1–2 ml intravenous 1% lidocaine and recommence the infusion slowly.
- Oversedation – ask the dentist to pause treatment, maintain the patient's upper airway and reduce sedation. Administer oxygen as required.
- Vasovagal and bradycardia – ask the dentist to pause treatment, give 600 µg intravenous atropine and lie the patient flat. Consider basic life support if severe or if the heart rate does not quickly recover.
- Tachycardia – consider: dental adrenaline; undersedation causing anxiety; oversedation causing hypopnoea and hypercarbia; anaphylaxis; or a primary arrhythmia. Treat accordingly.

- Patient non-compliance – consider how the situation has developed and ask the patient what the problem is. Increase sedation if the patient is anxious or reduce sedation if the patient is uncooperative. Address non-dental factors such as a full bladder, ambient temperature, or parental reassurance. If unable to restore adequate operating conditions the procedure may have to be abandoned and rescheduled possibly requiring general anaesthesia.

Discharge and postoperative instructions

When the TCI calculated blood level of propofol falls to 0.6 µg/ml or less, the patient is usually able to walk and turn without staggering. Standard day surgery discharge criteria should be applied.⁴ Written instructions can be referred to and include advice not to drive that day or return to work or school. Supervision of internet use is advised.

Summary

Modern conscious sedation for dentistry is safe and effective.

This is a result of the standardization of procedural practice and environmental factors such as staffing, patient monitoring and the management of complications. The standards apply to all who practise conscious sedation techniques, whether they are dentists, doctors, nurses or dental care professionals. This can only be achieved through robust, validated education and training of the entire dental team.²

Inhalation and intravenous bolus techniques provide adequate sedation for many patients; however the use of short-acting general anaesthetic agents provides fine control of the depth of sedation during the procedure allowing optimal operating conditions and rapid recovery.

Providing a safe sedation service involves careful patient selection, attention to written and verbal communication, and consideration given to the sedation environment and the management of potentially life-threatening complications. ◆

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