

An audit of patient assessment and treatment outcomes in anxious patients referred for conscious sedation

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Abstract

Aim and objectives: The aim of this study was to audit the success of treatment outcomes following assessment and treatment planning of anxious patients referred for conscious sedation. The outcome of treatment has a marked effect on ratings of its acceptability. Treatments associated with positive outcomes appear to be more acceptable than those associated with poor outcomes. **Design:** A standard was set following reference to the literature. At the examination and assessment visit the dentist decided, together with the patient, what modality should be used to carry out the treatment. The outcome was judged to be successful when the planned procedure was completed and the patient had been able to co-operate during the dental treatment without becoming distressed. One hundred consecutive adult patient treatments were included in the audit. **Results:** A total of 98 completed data collection sheets were analysed. The dental treatments planned at the assessment appointment were completed for 91 (92%) patients. In 8 (8%) patients it was not possible to complete the planned treatment. **Conclusion:** The standard set for the audit was met, with a successful outcome of 92% overall. No specific areas of weakness were identified. The need for staff training in the use of additional techniques was identified. This could provide a further conscious sedation option before referral for general anaesthesia was considered.

Key words: Audit, conscious sedation, patient assessment, treatment outcomes

Introduction

In 1998 the General Dental Council (GDC), the governing body for dentistry in the UK, introduced amended guidance in respect of the prescription of general anaesthesia for dental procedures, which brought a focus on the use of alternative methods of pain and anxiety control (General Dental Council 1998). In July 2000, *A Conscious Decision*, a report from a committee chaired by the Chief Medical and Dental Officers was published. The report recommended that when a general anaesthetic was considered necessary it should be provided in the safest way possible (Department of Health, 2000). This led to general anaesthesia for dentistry being confined to a hospital setting because of the requirement to have access to intensive care facilities. The change resulted in a reduction of the number of general anaesthetics provided and an increase in the use of conscious sedation, in both primary care and hospital settings.

The UK Standing Dental Advisory Committee recognised the need for appropriate standards for conscious sedation and established an expert group to look into the provision of conscious sedation. In 2003 this committee published its report, *Conscious Sedation in the Provision of Dental Care* (Department of Health, 2003).

The report made recommendations for all practitioners providing conscious sedation. It emphasised:

- The importance of considering alternative methods of pain and anxiety control and discussing these with the patient before deciding that conscious sedation was appropriate
- The need for theoretical, practical education and training as well as continuing updating
- Clinical audit for the whole dental team, as part of the clinical governance framework to ensure the delivery of a high quality of service
- The necessity of having appropriate equipment and drugs

and ensuring that the equipment was properly maintained.

The above recommendations and guidance were supported by the GDC in *Standards for Dental Professionals* in May 2005 (General Dental Council, 2005).

The Sedation Suite was established at University of Wales College of Medicine, Cardiff in 1999 and was the second UK Dental School to have such a dedicated facility. Its objectives were to provide a facility for the teaching of conscious sedation techniques to undergraduate and post-graduate students, and the infrastructure to care for patients with a dental anxiety or phobia under conscious sedation.

Patients referred to the Sedation Suite for treatment are assessed during their history taking and examination for:

- Their psychological ability to tolerate dental treatment
- Their need for sedation
- Any medical indications or contraindications for sedation
- Whether the dental treatment indicated is possible under sedation
- The type of sedation to be used, usually either inhalational sedation using nitrous oxide and oxygen or intravenous sedation using midazolam.

From the information gained during the assessment, the dentist together with the patient, decide on the appropriate option for treatment. A subsequent successful outcome of a planned treatment procedure may be considered to indicate that the correct assessment had been made.

The outcome of dental treatment has been shown to have a marked effect on ratings of its acceptability. Those treatments associated with positive outcomes were rated as more acceptable than those associated with poor outcomes (Newton *et al.*, 2003). A study carried out within the public dental service (Crawford, 1990) using local anaesthesia and inhalation sedation with nitrous oxide and oxygen for exodontia in children, reported success rates of 87%. A similar study carried out in a hospital dental service also using inhalational sedation, reported a 90% success rate (Shaw *et al.*, 1996). A further study undertaken in the public dental service (Bryan, 2002) using inhalation sedation with nitrous oxide and oxygen for various treatment procedures, reported successful outcomes in 83.9% of cases. Recently, a two-centre study (Girdler *et al.*, 2005) was undertaken at Newcastle Dental School and South Tyneside Community Dental Service and reported successful outcomes of 98% and 100% respectively, for patients treated under intravenous sedation and 88% for patients treated under inhalational sedation.

Patients requiring exodontia under conscious sedation and local anaesthesia were examined in a study at Glasgow Dental Hospital (Leitch *et al.*, 2003) with a successful treatment outcome reported in 95% of the patients. Another study undertaken at Birmingham Dental Hospital (Blayney *et al.*, 2003) examined 300 consecutive sedation episodes in adult phobic patients who required exodontia under local anaesthesia and reported a success rate of 99%. In both of

these studies propofol intravenous infusion was used. Outcomes were considered successful when the patient was able to co-operate with the dental treatment without becoming distressed (Robb *et al.*, 2003).

The primary aim of this audit was to produce observational evidence of the success of treatment outcomes following the patient assessment. The objectives of the audit were firstly to set a standard, secondly to collect data relating to the treatment outcomes, analyse the results and compare against the standard set. The final objective was to identify areas of weakness and consider ways in which changes could result in improvements to patient assessment and treatment outcomes.

Materials and methods

A literature search was carried out using PubMed. Relevant papers were selected for a review of the literature and were used as a basis for setting the standard of the audit.

Standard

The literature review was not conclusive with regard to setting a standard for the audit but studies reported successful outcomes for treatment of between 83% and 90% with inhalational sedation and over 95% with intravenous sedation. Staff experienced in conscious sedation techniques had carried out the treatment procedures in each of the studies reviewed. As the study audit involved all grades of staff, including the undergraduates, it was felt reasonable to set a self-standard of 85% as a baseline. After completing the literature review, the standard set was that 85% of the treatment outcomes should be successful irrespective of the method of conscious sedation used.

A questionnaire was produced and piloted. Comments and criticisms received were considered and the questionnaire modified. One hundred copies of the questionnaire were printed.

Sample

At the examination and assessment session the dentist, together with the patient, decided what modality should be used to carry out the treatment. The outcome was judged to be successful when the planned procedure was completed and the patient had been able to co-operate during the dental treatment without becoming distressed. The students were closely supervised during treatment sessions with a staff:student ratio of 1:2 for intravenous sedation and 1:3 for inhalation sedation as recommended by the *Undergraduate Training Guidelines for Teachers*, published by the UK Dental Sedation Teachers Group (Dental Sedation Teachers Group, 1999). One hundred consecutive adult patient treatments were included in the audit.

Techniques

Inhalation Sedation

A Quantiflex MDM machine in conjunction with a Porter-Brown soft nasal hood and harness were used to deliver a

mixture of nitrous oxide and oxygen. An active scavenging system was used to remove waste gases. The induction was commenced using 100% oxygen at a flow rate of 6 litres per minute. The flow rate was then adjusted according to the patient's requirement. Nitrous oxide was added in increments of 10% each minute for the first two increments and then at 5% per minute increments thereafter. The level of nitrous oxide was titrated individually for each patient. The end point was deemed to have been reached when the patient was able to maintain verbal communication and was sufficiently relaxed to allow the dental treatment to start. The dental procedures were carried out using local anaesthesia where necessary. On completion of the dental treatment, 100% oxygen was delivered for 2 minutes in order to avoid the potential complication of diffusion hypoxia. Patients were discharged once they had fully recovered.

Intravenous sedation

Standard pre-operative checks on changes in the patient's medical or social history, current medication, escort arrangements and blood pressure were undertaken and recorded. A 22 gauge venflon was sited in a vein either in the dorsum of the hand or in the ante-cubital fossa and, prior to the introduction of midazolam, baseline readings for the pulse and oxygen saturation were recorded. Midazolam was titrated at a rate of 1mg per minute to an end point where the patient was able to maintain verbal communication and was sufficiently relaxed to allow the commencement of dental treatment. The pulse rate and oxygen saturation were monitored throughout treatment. At the end of treatment the patient was kept until assessed by a clinician as fit for discharge into the care of an escort.

Oral sedation and/or combination of inhalation/intravenous sedation

This was used infrequently as an adjunct to the techniques outlined above.

Clinicians

The operator/sedationist comprised Year 4 dental students undertaking the Conscious Sedation/Special Care Dentistry course, senior house officers, postgraduate students, senior staff members and part-time general dental practitioners (GDPs) who provide clinical care within the sedation suite. Chairside assistance was provided by Year 4 dental students undertaking the course or experienced dental nurses in possession of the UK National Examining Board of Dental Nurse Certificate in Conscious Sedation. Supervision was provided by senior academic staff and part-time GDPs experienced in the use of conscious sedation.

Data collection

At the conclusion of the treatment session the clinician recorded on the data collection sheet details of the assessor, operator, type of sedation used, the procedure, the site, use of local anaesthesia and the outcome. The outcome was assessed by observational means. Treatment was deemed

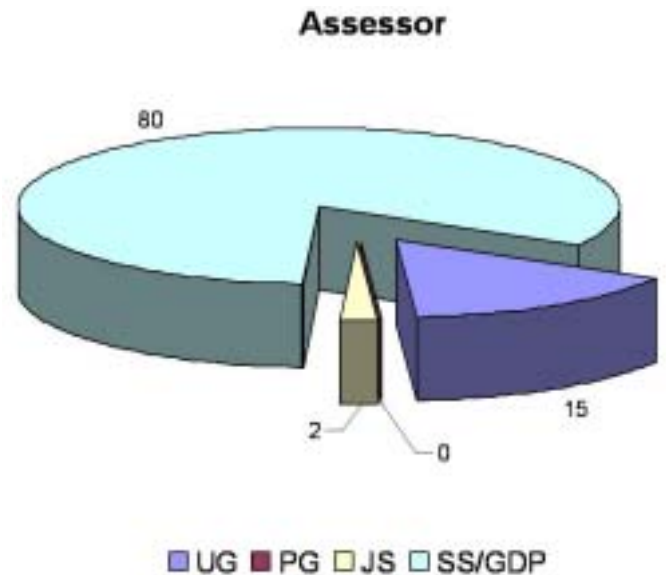


Figure 1. The number and the grade of staff undertaking the patient assessment. UG: Undergraduate Student; PG: Postgraduate Student; JS: Junior Staff; SS/GDP: Senior Staff/General Dental Practitioner

to have failed if any stage of the planned procedure could not be completed and the treatment discontinued. If the outcome was a failure the reason was recorded on the data collection sheet.

Data analysis

The results of the survey were transferred directly from the questionnaires into a data collection programme (Microsoft Excel).

Results

A total of 100 data collection sheets were completed. Two sheets however had insufficient information recorded and were excluded from the audit.

Assessments

Eighty (82%) of initial pre-operative assessments had been made by a senior staff member/ GDP; 15 (15%) by Year 4 undergraduates and 2 (2%) by junior staff members (Figure 1).

Operator

The operator/sedationist role was performed by senior staff/ GDP in 61 (62%) treatments, by Year 4 undergraduates in 35 (36%) treatments and by junior staff members in 2 (2%) cases (Figure 2).

Techniques

Fifty-one treatments were carried out using inhalation sedation; 44 using intravenous sedation, 1 using oral sedation alone, 1 using oral premedication then inhalation sedation for siting of the cannula prior to titration of intravenous midazolam and finally, one treatment using oral premedication prior to intravenous sedation (Figure 3).

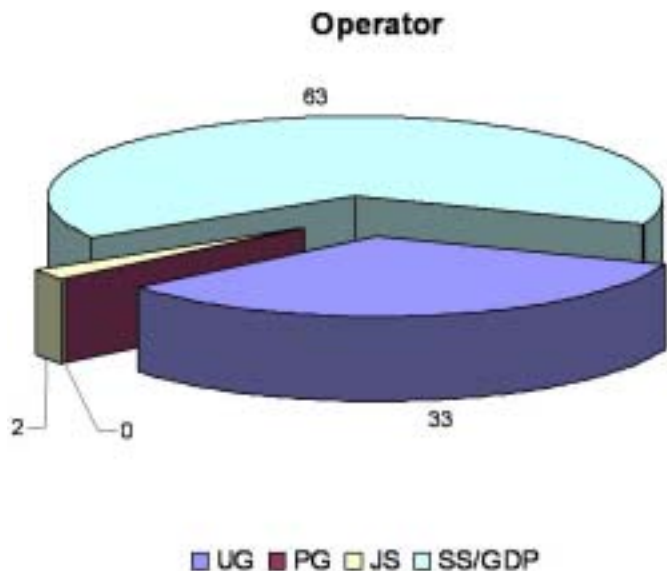


Figure 2. The number and the grade of the operator/sedationists. UG: Undergraduate Student; PG: Postgraduate Student; JS: Junior Staff; SS/GDP: Senior Staff/General Dental Practitioner

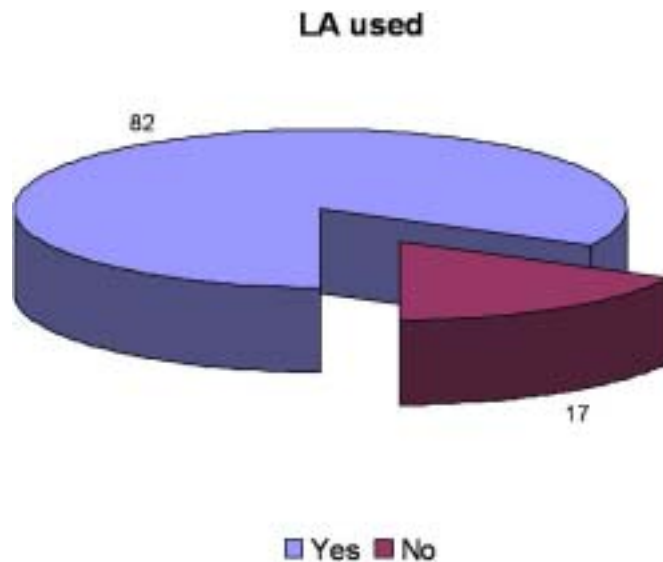


Figure 4. The use of local anaesthesia in patients assessed for conscious sedation

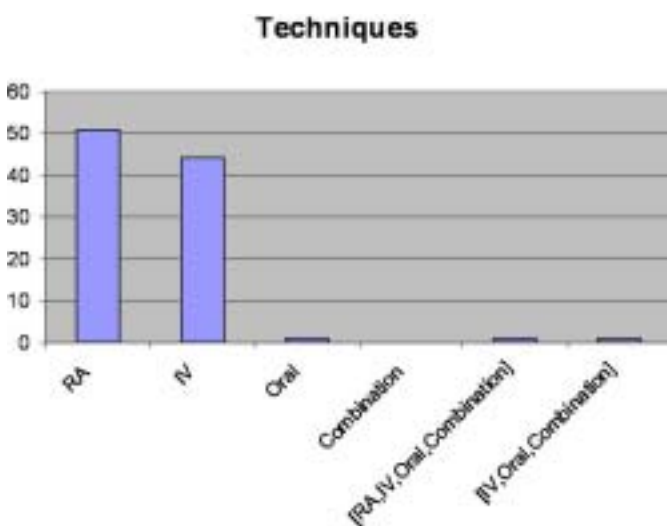


Figure 3. The percentage of conscious sedation techniques used

Procedures

Seventy-nine percent of the procedures included conservative treatment of which 17% were classed as advanced; endodontic treatment and crown and bridgework, which entail longer treatment times and good access, were deemed advanced procedures, while 21% included periodontal treatment, either scaling or sub-gingival debridement; 11% included a surgical treatment. Conservative and periodontal procedures were carried out at the same session on some patients.

Site

The majority of treatments (60%) were carried out in the upper dental arch. The lower dental arch was involved in 19% of treatments carried out, whilst 13% involved treatment in both upper and lower dental arches.

Use of local anaesthetic

Local anaesthesia was required in 78 (79%) of the treatments. Many of the patients receiving simple scaling and polishing did not require local anaesthesia (Figure 4).

Treatment outcomes

The dental treatment planned at the assessment appointment was completed for 91 (92%) patients, while in 8 patients (8%), it was not possible to complete the planned treatment. Five failures occurred when inhalation sedation was used. Three of these failures occurred because the level of sedation was insufficient to allow the patient to accept the treatment. One treatment failed because the patient had partial nasal obstruction and in the other the operator did not record the reason for failure on the data sheet.

Three failures occurred when intravenous sedation was used. Two of these failures occurred because there was insufficient patient co-operation to completed cavity preparation. The third failed because initial cannulation was unsuccessful and the patient refused to allow a second attempt.

Seven failed treatment outcomes had been initially assessed by senior staff/GDPs and one by a Year 4 undergraduate. Similarly, the operator/sedationist in seven cases with a failed treatment outcome was a senior staff/GDP, whilst one case had been treated by a Year 4 undergraduate. All treatment failures occurred when conservative treatment was being provided, six in the upper arch and two in the lower arch. The patients for whom the treatment outcome had been a failure were referred back to an Assessment Clinic for consideration of alternative means of pain and anxiety control, usually involving a different type of sedation technique or general anaesthesia.

Undergraduates

Undergraduate students carried out 33 of the treatments, 18 using intravenous conscious sedation and 15 using inhalational sedation. Twenty-six of the treatments involved conservation, 5 scaling and polishing and 2 exodontia. Successful outcomes were recorded for 32 treatments. In one treatment carried out under intravenous sedation the planned conservation was not completed and the outcome was deemed a failure.

Discussion

Conscious sedation is an important method of pain and anxiety control. The need for theoretical, practical and continuing updating and clinical audit have been stressed in the report of the Standing Dental Advisory Committee *Conscious Sedation in the Provision of Dental Care* (Department of Health, 2003). By undertaking the audit it was hoped to produce observational evidence of the success of treatment outcomes following patient assessment.

The literature review was not conclusive with regard to standard setting for the audit, however studies involving inhalational sedation reported success rates of between 83% (Bryan, 2002) and 90% (Shaw *et al.*, 1996). Studies involving intravenous sedation with midazolam reported successful outcomes of 98% and 100% (Girdler *et al.*, 2005). Success rates of 95% (Leitch *et al.*, 2003) and 99% (Blayney *et al.*, 2003) were reported in studies where propofol infusion was used for patients requiring exodontia under local anaesthesia. Staff experienced in conscious sedation techniques had carried out treatment in each of the studies reviewed. As the audit in the current study involved staff and undergraduate students, it was felt reasonable to set a self-standard as a baseline. The standard set was that 85% of all treatments using a conscious sedation technique should have a successful outcome.

During the audit, eight failed treatment outcomes were recorded of which five were with the use of inhalation sedation and three with intravenous sedation. Members of staff provided seven of the failed treatment outcomes. This may be explained by the fact that during patient assessment sessions, treatment of a 'routine treatment case' falling within an ASA I or II category would have been allocated to an undergraduate student whilst, the more 'difficult cases' with either concurrent medical problems in the ASA range III and/or with complex treatment needs would have been referred to staff members.

The GDC's document *The First Five Years: A Framework for Undergraduate Education* (GDC, 2002) states that, on qualification, the dental student should have knowledge of inhalational and intravenous sedation conscious sedation techniques and have knowledge of conscious sedation techniques in clinical practice.

The need to provide undergraduates with training in basic

sedation techniques has been highlighted by a recent paper (Morgan and Skelly 2005) that demonstrated what limited opportunity primary care practitioners have to refer patients for conscious sedation services in secondary care. The paper aimed to assess the views of consultants in restorative dentistry on sedation services in secondary care. It found that only 41 out of 144 consultants (28%) provided treatment under sedation within the NHS. However, only 8 of the 41, who provided treatment under conscious sedation, acted as operator/sedationist when providing treatment under intravenous sedation. If there was greater availability of treatment under conscious sedation in the primary care services, it could reduce the number of referrals to secondary care. This may ease the burden on the secondary care services and allow them more time to deal with the more complex cases.

Two studies (Leitch *et al.*, 2003, Blayney *et al.*, 2003) that reported successful outcomes of 95% and 99% respectively, both used propofol infusion techniques. In the management of failures where inhalational sedation has been the primary choice, then the option for intravenous sedation with midazolam can be considered. Where however, the outcome is unsuccessful with intravenous sedation with midazolam, the alternative currently in many services is to consider a general anaesthetic. Recent advances in conscious sedation (Leitch *et al.*, 2005) show that propofol is now emerging as an alternative to midazolam and may be preferable in certain clinical situations, for example, for procedures of short duration. If protocols could be agreed with the local management and anaesthetic colleagues, then consideration could be given to providing staff members with appropriate training in the use of propofol infusion techniques. This would provide, in a specialist setting, a further option before general anaesthesia would need to be considered.

Conclusions

The standard set for the audit was achieved with an overall successful outcome in 92% of cases. No specific areas of weakness were identified, however, there needs to be continued efforts made to maintain and if possible, improve treatment outcomes using the standard conscious sedation techniques. The need to implement appropriate training of members of staff in the use of propofol infusion techniques was identified as providing a further option in conscious sedation, before referral for general anaesthesia needed to be considered.

As well as being necessary to meet the requirements of the UK GDC's *The First Five Years* (GDC, 2002), the introductory 'hands-on' basic course in conscious sedation techniques for undergraduates is essential, if, in future, the number of both primary and secondary care practitioners providing these services is to be increased.

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