



## SAAD DIGEST

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OF ANAESTHESIA IN DENTISTRY

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Celebrating 60 years of dedication to the advancement of  
knowledge in pain and anxiety control for dentistry

# STORY BEHIND THE COVER



2017 marks 60 years since the formation of SAAD and so we are celebrating 60 years of dedication to the advancement of knowledge in pain and anxiety control for dentistry.

To celebrate the Diamond Jubilee, 2017 will be a year for not only reflecting on the last 60 years, but looking ahead to what the future holds. This will be the theme of this year's SAAD Symposium and Essay Prizes.

The cover of this issue of the SAAD Digest is a departure from our usual format, and shows the development of the SAAD Digest over the last 60 years.





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In 1957 SAAD was founded, thus 2017 marks our Diamond Jubilee. The occasion is a landmark in the history of our Society, which continues to play a hugely active role in dentistry in the UK. This edition of SAAD Digest has broken with the tradition of having a photomicrograph of a drug on its cover, instead we feature examples of the various cover styles that have been used for SAAD Digest over the years, and our 60th Anniversary logo. Along with your copy of the Digest you will all be sent a Diamond Jubilee badge as a memento of our Anniversary!

At times like this, there is a great temptation to look back to the past, rest on previous glories, and to become introspective. We are, however, at an important point in the history of sedation in the United Kingdom, and at time when the future of sedation in dentistry has once again become a point of political debate. In preparation for the 2015 Digest, the 10th in this format, I looked back at the previous Digests and it was amazing to see how many times different debates have been a feature of SAAD's history.

A year after the publication of the Intercollegiate Advisory Committee for Sedation in Dentistry's (IACSD) Standards, in April 2015, many of us were disappointed and dismayed to see a letter sent by the Chief Dental Officers of the four devolved nations advising us to revert to the previous standards until such time as the Scottish Dental Clinical Effectiveness Programme (SDCEP) has come up with further recommendations. This work is still not complete, but there is a document which is at the consultation stage as I write this Editorial. Many of you will have seen this document, and I hope will have commented.

The SDCEP document makes frequent reference to the IACSD Standards, which continue to be accepted as the standards for sedation in dentistry recommended by SAAD and the Dental Sedation Teachers' Group. Informal advice obtained from Officers of defence organisations has been that once published, the standards could not be retracted unless they were found to be significantly deficient or were superseded by another document.

Working towards the implantation of the standards for training, SAAD has achieved IACSD Accreditation for new starter schemes for both Dentists and Dental Nurses, and Pilot schemes for both programmes were launched in November 2017. The Dental Hygienist and Therapists' course had been accredited in 2015, and the schemes for Dentists and Dental Nurses were based on the processes that were already in place for the Hygienists and Therapists' course. Further details of the schemes are available on the SAAD Website. A subcommittee, led by the Course Director David Craig, has developed these schemes. The other subcommittee members were Carole Boyle,

Paul Howlett, Steve Jones, Emma Lee, Nigel Robb and Fiona Trimmingham.

The successful application for accreditation for these schemes keeps SAAD at the forefront of postgraduate sedation education for the whole of the dental team. We look forward to the second cohort joining the schemes in March.

This issue of Digest contains a wide range of articles of interest to those practising all forms of pain and anxiety control in dentistry. Looking to the future, we have an article on the use of Capnography in sedation. The Academy of Medical Royal Colleges' overarching document on Safe Sedation referred to capnography as a "Developmental Standard". It is my view that within a few years these monitors are likely to replace pulse oximeters as the way of monitoring respiratory depression in sedated patients.

Amongst the five refereed papers, we have an article from Joe Hulin, whose PhD was funded by SAAD, in which we can see the results of the SAAD-funded research into how to improve the process by which paediatric patients can decide on the options for their anxiety management.

The SAAD Essay prizes continue to attract high quality submissions, and there are four examples of prize-winning entries and runners up included in this issue. The Drummond- Jackson prize for 2017 will have a different format, in that it will require submission of an essay on a given rather than freely chosen title. Further details can be found on page 81 of this issue.

The online CPD will again be available for this issue. Since the IACSD endorsed the recommendations of the Independent Expert Group on Training and Standards for Sedation in Dentistry, all involved in the practice of sedation are required to complete 12 hours of verifiable CPD in each five-year cycle. The CPD available in Digest can make a significant contribution to achieving this target. I would encourage you all to take advantage of this benefit of your membership.

I would also like to thank the members of the Editorial Board for their continued hard work in ensuring that Digest appears each year and that we are able to produce a publication that I firmly believe can stand proud amongst dental journals.

Whilst I do not want to single out particular individuals, I would like to thank Mike Sury, who has been a great asset to the Editorial Board during the two years he has been with us for his hard work, insight and providing an anaesthetic point of view to our deliberations. We are sorry that he has decided to leave the Board, but wish him well for the future.

We have welcomed Rosie Whatling to our number this year. Rosie is a Consultant Paediatric Dentist from Bart's and The London. We are very pleased to be able to add her paediatric view to our number and hope to encourage more contributions on paediatric pain and anxiety control to the Digest.

I hope you enjoy this Digest, as well as finding it educationally useful and informative. Happy reading!

*Nigel Robb*

# What's new in... Capnography Monitoring for Dental Conscious Sedation: A Clinical Review

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## Abstract

Capnography monitoring during conscious sedation is not currently required for dentistry in Britain and Ireland. Other countries have introduced guidelines and standards requiring capnography monitoring for procedural sedation. This review highlights the variability of procedural sedation including the setting, the position on the sedation continuum, and the routine use of supplemental oxygen. Specific research is required for conscious sedation in a dental setting to support standards and guidelines with regard to capnography monitoring.

The Academy of Medical Royal Colleges and their Faculties emphasise that each specialty must produce its own guidance for the use of sedative techniques.<sup>1</sup> Clinical practice guidelines for the monitoring and safe practice of sedation vary by specialty and institution. Standards are generally set from the best available evidence based research. There is a growing body of literature that recognises the potential additional value of capnography (ETCO<sub>2</sub>)

monitoring during procedural sedation in different settings and for different sedation techniques.<sup>2,5</sup> In these studies, capnography reduced the incidence of hypoxaemia during procedural sedation. A meta-analysis published by Waugh et al. (2010) concluded that end-tidal carbon dioxide monitoring is an important addition in detecting respiratory depression during procedural sedation.<sup>6</sup> A more recent systematic review by Conway et al. (2016) concluded that patients monitored with capnography in addition to standard monitoring had a reduced risk of hypoxaemia compared to those with only standard monitoring.<sup>7</sup> However, it has to be noted that both the Waugh and Conway reviews contained substantial statistical heterogeneity which is likely to affect the quality of the evidence.

As research evidence for capnography monitoring from the medical settings studied became available, new standards for capnography monitoring were introduced in several countries (Table 1).

**Table 1: Sedation Guidelines and Standards**

	<b>American Society of Anesthesiologists</b>	<b>Royal College of Surgeons and Royal College of Anaesthetists</b>	<b>Canadian Anesthesiologists Society</b>	<b>Australian Dental Association</b>
Level of statement	Standards	Standards	Guidelines	Guidelines
Year written/updated	2015	2015	2012	2014
Assessment of depth of sedation	Required	Required	Required	Required
Pulse oximetry	Required	Required	Required	Required
Capnography	Moderate and deep sedation required unless precluded or invalidated by the nature of the patient, procedure, or equipment	Not required for conscious sedation in ASA I & II May be recommended ASA III & IV and with supplemental oxygen	Required for conscious sedation	Required for conscious sedation

The American Society of Anesthesiologists amended its standards for basic monitoring, in October 2010, to include the capnographic assessment of ventilation during moderate or deep sedation.<sup>8</sup> Following suit, in 2012 the Canadian Anesthesiologists Society published "Guidelines to the Practice of Anesthesia – Revised Edition 2012" which included an important amendment in the section regarding required monitors – CO<sub>2</sub> monitoring (capnography) during conscious sedation.<sup>9</sup> The Australian Dental Association in its policy statement in 2010, regarding conscious sedation stated: "All patients undergoing sedation must be monitored continuously with pulse oximetry, blood pressure and ETCO<sub>2</sub>."<sup>10</sup> This may have been prompted by a widely publicised death of a patient under dental intravenous sedation in New South Wales, Australia, in 2002 while being treated by a dentist with appropriate training in intravenous conscious sedation, (Graduate Diploma in Clinical Dentistry; Conscious Sedation and Pain Control, University of Sydney) which brought into question the safety of Intravenous sedation. The cause of death was irreversible cerebral hypoxia following a cardiac arrest, which was precipitated by numerous periods of ever-deepening hypoxaemia.<sup>11</sup>

Despite growing pressure for capnography to be used universally in the U.K., it is not currently required for conscious sedation in dentistry. The U.K. issued new guidance on Standards for conscious sedation in the provision of dental care which were published in April 2015 by the dental faculties of the Royal Colleges of Surgeons and the Royal College of Anaesthetists.<sup>12</sup> The report stated the following with regard to capnography: "its routine use for ASA grade I and II dental patients lacks high level scientific validation and cannot be recommended."

Dental sedation in the U.K. and Ireland lies in the mild to moderate range of the sedation continuum (conscious sedation), in contrast to the U.S.A. and Canada where deep sedation is possible in a dental setting. According to the Standing Dental Advisory Committee: "Any technique resulting in the loss of consciousness is defined as general anaesthesia and in the UK "deep sedation" is considered within this category. The practice of general anaesthesia under the guise of Conscious Sedation is totally unacceptable and must be strongly deprecated in view of the risk of jeopardising patient safety."<sup>13</sup>

Previous capnography studies are difficult to summarise, due to variations in sedation techniques, settings and varying patient populations. When we set out to conduct this review, it was with the intention of performing a meta-analysis looking at capnography monitoring specifically for conscious sedation. However, we found that the diversity of the study settings and variability of the sedation techniques of published research studies were not easily comparable and therefore not suitable for meta-analysis. We present here three studies which demonstrate the variability and difference of the procedural sedations from that of conscious dental sedation.

Beitz et al (2012): The primary goal of this randomised, controlled study was to determine whether intervention based on additional capnography monitoring reduces the incidence of arterial oxygen desaturation during sedation for colonoscopy. A total of 760 patients were enrolled at three German endoscopic centres. Patients received 2L/min of supplemental oxygen. The intention-to-treat analysis revealed a significant reduction in the incidence of oxygen desaturation in the capnography arm in comparison with the conventional arm (38.9% vs. 53.2%). The study conclusion was

that additional capnography monitoring reduces the incidence of oxygen desaturation and hypoxemia during propofol sedation for colonoscopy.<sup>2</sup>

Deitch et al (2010): This randomised, controlled trial took place in an emergency room setting. A total of 132 patients took part in the study. Hypoxia was defined as an SpO<sub>2</sub> < 93% for 15 sec. The incidence of oxygen desaturation in the capnography arm in comparison with the conventional arm was 25% vs. 42%. All patients received supplemental oxygen (3L/min). The study conclusion was that the addition of capnography to standard monitoring in this setting reduced the incidence of hypoxia and provided advanced warning for all hypoxic events.<sup>3</sup>

Qadeer et al (2009): This randomised trial sought to determine whether intervention, based on microstream capnography would decrease hypoxemia during endoscopy. A total of 247 patients took part in the study. They showed a significantly reduced rate of hypoxia (46% vs 69%), defined as an oximetry reading < 90% for 15 sec. Significant risk factors for hypoxemia in multivariate analysis were higher age, female gender and blinded arm of capnography. The level of sedation in this study was not quantified and there was a relatively large cohort of ASA 3 patients in the study with comorbidities. 147 patients received supplemental oxygen during the procedure. The study conclusion was that capnography monitoring of respiratory activity improves patient safety during procedural sedation for elective endoscopy.<sup>5</sup>

Conscious Sedation in a dental setting differs significantly from other procedural sedation settings with respect to the following;

### Different patient populations

In the standard dental sedation technique, ASA 1 & 2 adult patients up to 65 years of age receive sedation. The reviewed studies contain many elderly patients. Elderly patients are known to be more sensitive to sedative drugs and more likely to have significant co – morbidities (ASA3).

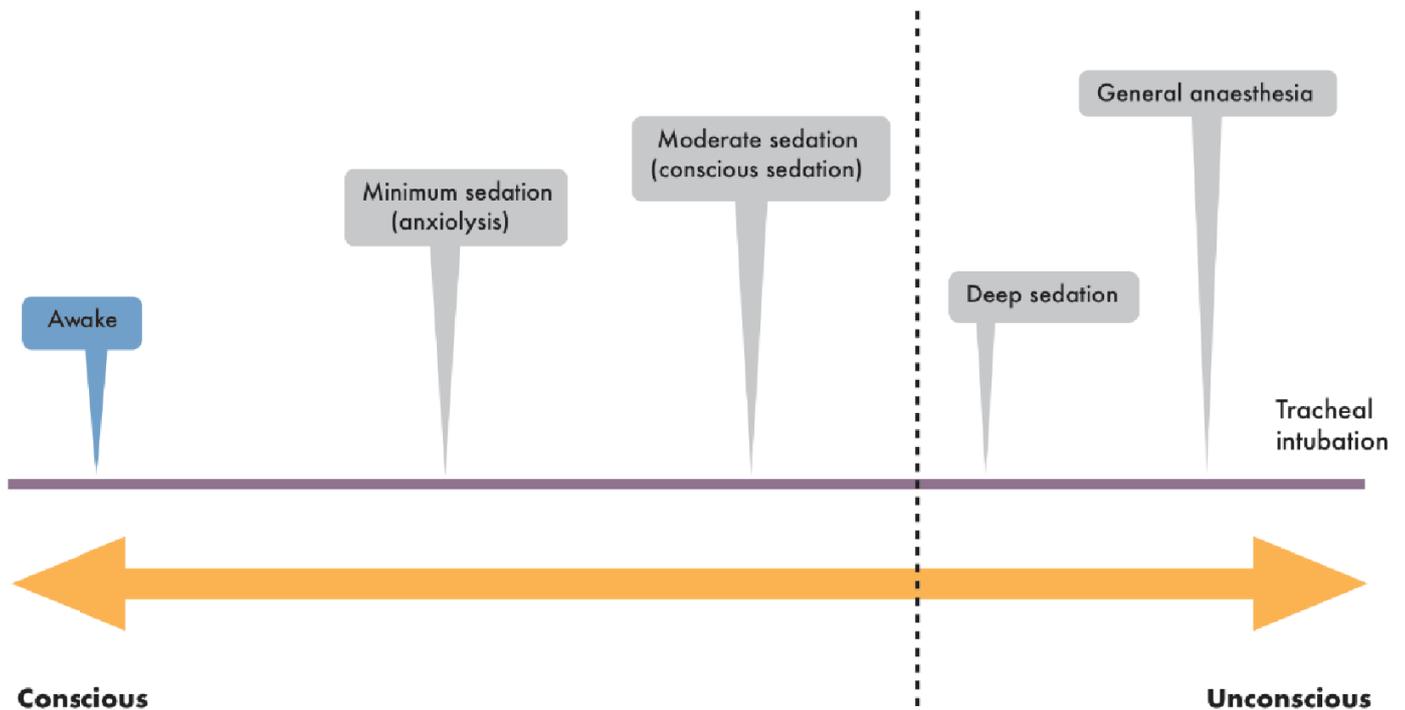
### Supplemental oxygen

For the standard dental sedation technique most patients breathe room air. Supplemental oxygen is not routinely administered unless indicated to correct hypoxia. In the reviewed studies most of the patients received supplemental oxygen during the procedure (2–3 L/min). Supplemental oxygen is likely to have resulted in a decreased sensitivity of the pulse oximeter as a surrogate monitor of hypoxia due to respiratory depression. There are only a few studies where supplemental oxygen is not administered and patients are administered sedatives breathing room air. Van Loon et al (2014) in a relatively large clinical trial with 427 patients enrolled for gynaecological procedures, concluded that they were unable to confirm an additive role for capnography in preventing hypoxaemia during elective propofol sedation in healthy women in whom supplemental oxygen is not routinely administered.<sup>14</sup> This is in agreement with the study by Sivilotti et al (2010) with 63 patients enrolled in an emergency room setting.<sup>15</sup> Therefore, in studies where patients were breathing room air during their sedations and not routinely receiving supplemental oxygen, the addition of capnography did not decrease the rate of oxygen desaturation.

### Depth of sedation

The publication from the Academy of Medical Royal Colleges, Safe

## Procedural Sedation Continuum



**Figure 1: Sedation Continuum**

Sedation Practice for Healthcare Procedures, gives the definitions of sedation and describes clearly the continuum from minimal sedation through to general anaesthesia, which is accompanied by increased depression of the physiological systems.<sup>1</sup> This increases the likelihood of adverse events

For the standard dental sedation technique, conscious or moderate sedation is the target state on the sedation continuum. However, it is recognised that sedated patients have the potential to progress to deeper levels of sedation and it has been suggested that the ability to recognise early warning signs may provide a critical opportunity to intervene and prevent sedation-related morbidity and mortality.<sup>16</sup> There remains, a relative paucity of research in the conscious sedation (minimum to moderate) end of the sedation spectrum. The few studies that exist in dentistry are of a low evidence base and there are no reported randomized controlled studies in this setting.<sup>17-19</sup> The reliability of extrapolating findings from other sedation settings and applying them to dental sedation is unknown.

### Drugs

A titrated intravenous dose of midazolam is usually the first choice intravenous sedation technique for dentistry. A range of other sedative drugs were used in the reviewed studies e.g. propofol and ketamine. Drugs used in combination have the potential to act synergistically to produce significant respiratory depression. When combined with other drugs and in particular opioids, the possibility of respiratory depression is increased.

### Analgesia

Local anaesthetic is given in dentistry to provide analgesia during

sedation. In the reviewed studies, analgesia was often achieved with the use of intravenous agents such as opioids.<sup>20</sup>

### Desaturation (SpO<sub>2</sub>)

For the standard dental sedation technique an SpO<sub>2</sub> < 95% is regarded as the threshold for early desaturation. This is a reasonable threshold in this setting where sedation is administered by a non-anaesthetist outside of the operating room setting. In some more medically supported environments the significance of this threshold is likely to be of less importance. Studies from other settings used varying thresholds for desaturation as the study outcome measure. For example, Deitch et al. (2010) used a threshold < 93% and Qadeer et al. (2009) <90%.<sup>3-5</sup>

The guidelines and recommendations that have been made requiring capnography for procedural sedation in North America are perhaps understandable as dental sedation in those countries may be practised by any dentist meeting appropriate training and permit requirements. Thus, sedation levels may encompass the entire anaesthesia continuum using a variety of drug classes. Since it is possible that patients may slip to a level of sedation beyond the desired intent, capnography serves as an early warning system for ventilatory compromise and aids in the early "rescue" of an obtunded patient. Additionally, sedation and anaesthesia is often practised by dentist anesthesiologists and oral and maxillofacial surgeons. The scope of practice of these clinicians is much broader than that of a dentist practising conscious sedation in the U.K. and Ireland. They often provide deep sedation and general anaesthesia in non-hospital settings e.g. dentist's office. Therefore, it is likely that many patients will receive sedations in North America in the deep sedation end of the sedation continuum. In the dental conscious sedation setting as practised in the U.K and Ireland,

additional monitoring which may be of limited clinical benefit could potentially hinder attention to other important monitoring parameters.

In conclusion, a one size fits all approach to requiring capnography for procedural sedation is perhaps erroneous. There is emerging evidence in the literature that for patients receiving conscious sedation on room air, capnography is of little additional benefit in preventing hypoxaemia. Factors which make dental sedation as practised in the U.K. and Ireland significantly different to that of other procedural sedations include the position on the sedation continuum and the fact that patients do not routinely receive supplemental oxygen.

The benefits of capnography must be quantified in the target population, before its routine incorporation into practice. There is a need for dentistry specific research into capnography monitoring during conscious sedation.

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## Online CPD from the SAAD Website

Log-on to the membership area and follow the link

'Online CPD'

Answer the multiple-choice questions relating  
to the refereed papers section of this issue

of the SAAD Digest

CPD certificate provided as a download

# Bispectral Index Guided Target Controlled Midazolam Sedation: a new advanced technique for dental procedures

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## Abstract

**Objectives:** To assess the efficacy and safety of Bispectral Index (BIS) guided Target Controlled Infusion (TCI) of midazolam for anxiolysis or minimal sedation during extensive periodontal or implant surgery in a single operator/sedationist model.

**Methods:** Retrospective analysis of thirty adult ASA 1 or ASA 2 patients undergoing periodontal surgery or dental implant surgery under local anaesthesia were included.

The calculated effect site concentration (Ce) of midazolam applied by TCI, BIS, heart rate (HR), and peripheral oxygen saturation (SpO<sub>2</sub>) were monitored continuously. Non-invasive blood pressure (NIBP) and mean arterial pressure (MAP) were measured every 10 minutes. All peri-operative parameters were recorded every 10 minutes. All patients were interviewed 1 week after the procedure to explore their experience of sedation and the periodontal or implant surgery procedure.

**Results:** Extensive periodontal or implant surgery treatment in all 30 patients was completed in a mean time of 120 min (range 50-180 min). The calculated mean effect site concentration for midazolam was 50 ng/ml (range 24-80). The mean BIS was 85 (74-100) during induction and was maintained between 80 and 90 during the oral surgical procedure by adjusting TCI Ce. There were no clinically significant cardiopulmonary changes during midazolam infusion with regard to SpO<sub>2</sub>, NIBP, MAP and heart rate. Patients experienced profound anterograde amnesia and were very satisfied with the sedation and the surgical procedure.

**Conclusions:** BIS guided TCI sedation with midazolam facilitates predictable minimal sedation enabling long periodontal or implant surgery procedures by a single operator/sedationist within safe physiological limits.

## Clinical Relevance

**Scientific rationale for study:** Anxiety for dental treatment might jeopardise successful periodontal / implant therapy. Although psychological/behavioural management of anxiety is the gold

standard, sedation is sometimes especially needed during invasive or long procedures. Intravenous sedation allows the most predictable control over the depth and duration of calming the mental excitement. Up till now intravenous midazolam has been manually injected. We analysed the routinely obtained clinical data of patients monitored by Bispectral index (BIS) guided target controlled infusion (TCI) to control the dosage of intravenous midazolam during periodontal or implant surgery.

**Principal findings:** TCI enables titration of an adequate initial effect site concentration of midazolam resulting in a predictable minimal sedation. Minimal sedation could be continued predictably during up to three hours of surgery. No significant cardiopulmonary complications were observed.

**Practical implications:** BIS guided TCI Midazolam minimal sedation seems a predictable option for providing sedation during periodontal or implant surgery by a single operator/sedationist to control anxiety.

**Statement of sources of funding for the study:**

Our institution employs us. We have not received any external funding for this study.

**Disclosure of any conflicts of interests if applicable:**

We have no conflicts of interest

## Introduction

The main goal of sedation is to relieve anxiety, discomfort, and in facilitating dental care. Currently, several techniques for anxiolysis or minimal sedation are used in dentistry and consist of oral administration of benzodiazepines, inhalation of nitrous oxide, intranasal administration of midazolam, intravenous infusion of midazolam, or advanced techniques using intravenous propofol or multidrug therapy.<sup>1,2</sup> Besides psychotherapeutic techniques and excellent local anaesthesia, prescribing oral benzodiazepines is the easiest technique for pharmacotherapeutic anxiety relief. However, it is rather difficult to prescribe the most suitable dose of a selected drug for the individual patient. In addition, it is difficult to provide a stable level of sedation for longer dental procedures with oral drugs.<sup>3</sup> The intravenous route for administration of

benzodiazepines surpasses this disadvantage of the oral route and facilitates better dosing by titrating the medication. Titration is a technique in which incremental small doses of drugs are injected until the patient is comfortable and without fear. The intravenous route also facilitates repeated injection of the drug during long treatment sessions. However, the manual nature of bolus injection gives variation of concentration of the drug, leading possibly to severe side effects compromising patient safety. Hence, intravenous bolus administration is not recommended for long dental surgery procedures. However, the intravenous technique can be improved by using continuous infusion of very low dosages of benzodiazepines.<sup>4</sup> The aim of this study is to present a new technique of TCI midazolam minimal sedation with adjunctive BIS monitoring for long dental procedures by a single operator/sedationist.

### Target Controlled Infusion (TCI) pumps

Drugs being used for sedation have to meet several conditions. The respective dosage needs to have a distinctive and predictable anxiolytic effect. The pharmacokinetic properties should facilitate titration of a wide range of sedation levels and the duration of action should be appropriate for the entire procedure. Sedation with manually titrated midazolam is used and is comfortable for procedures lasting up to 40-50 minutes. It is, however, suggested that alternative techniques, such as propofol used by anaesthesiologists or specially trained sedation practitioners, are used for extensive procedures.<sup>5</sup>

During manual titration of midazolam, the patient receives incremental numbers of low-dose bolus administration until the desired level of sedation is met. To compensate for pharmacokinetic changes during long treatment sessions, the patient will need incremental doses to provide a constant sedation level so manual titration may result in yo-yo type midazolam concentration and consequently sedation levels. Continuous administration of midazolam with a constant flow syringe pump might compensate for elimination and redistribution; resulting in a more stable plasma concentration. However, the redistribution from the central compartment is not a linear process. At the beginning, peripheral tissues do not contain any medication, so transfer of midazolam to these tissues will be much higher than after a period of time, when they are already filled with redistributed medication. Continuous syringe pumps will give a continuous infusion, but will not take into account the non-linearity of the transfer, resulting in high concentrations in the brain and thus deeper levels of sedation after longer periods of infusion. Because of a high risk of loss of consciousness, constant flow syringe pumps should never be employed in dental sedation practice to administer midazolam.

In 1996, the first TCI pump for propofol was introduced in anaesthetic practice.<sup>6</sup> TCI means 'Target Controlled Infusion', in which a microprocessor automatically and variably controls the rate of infusion of a drug to attain a user defined target level in a (theoretical) effect site in the patient (usually blood or brain). The TCI pump will calculate:

- an initial bolus dose to fill the central (blood) compartment;
- a constant-rate infusion equal to the elimination rate from the blood compartment;
- a variable infusion that compensates for transfer from the central compartment to the peripheral tissues with an exponentially decreasing infusion rate.

Although, theoretically, the TCI technology based on pharmacokinetic models is available for almost any drug, the practical application of TCI is limited to drugs with a fast onset of the desired effect and short acting, like propofol or remifentanyl.<sup>7,8</sup> In general, these potent anaesthetic drugs are not considered suitable for the operator/sedationist in dentistry hence the TCI technique is not yet widely known in dentistry. In the current retrospective observational study we report our experience in the Netherlands with very low dose midazolam TCI guided by BIS, which we routinely use in our practice.

### Monitoring the level of sedation

Sedation is a depression of a patient's awareness to the environment and reduction of responsiveness to external stimulation. According to the American Society of Anesthesiologists (ASA), the depth of sedation is a continuum of three sedation levels, followed by general anaesthesia (table 1).

**Table 1 Continuum depth of sedation American Society of Anesthesiologists**

- Minimal sedation is equivalent to anxiolysis, that is, a drug-induced relief of apprehension with minimal effect on sensorium.
- Moderate sedation is a depression of consciousness in which the patient can respond to external stimuli (verbal or tactile). Airway reflexes, spontaneous ventilation, and cardiovascular function are maintained.
- Deep sedation is a depression of consciousness in which the patient cannot be aroused but responds purposefully to repeated or painful stimuli. The patient may not be able to maintain airway reflexes or spontaneous ventilation, but cardiovascular function is preserved.
- General anaesthesia is a state of unconsciousness; the autonomic nervous system is unable to respond to surgical or procedural stimuli

An older, but probably clinically more applicable measure of level of sedation is the Ramsay Scale (table 2).

**Table 2 Ramsay Sedation Scale**

- 1 Patient is anxious and agitated or restless, or both
- 2 Patient is co-operative, oriented, and tranquil
- 3 Patient responds to commands only
- 4 Patient exhibits brisk response to light glabellar tap or loud auditory stimulus
- 5 Patient exhibits a sluggish response to light glabellar tap or loud auditory stimulus
- 6 Patient exhibits no response

The level of sedation is determined by clinical observation. Preferably, the patient should stay at a pre-set sedation level during the entire treatment. Keeping patients in a conscious state is required to avoid airway and breathing problems or haemodynamic complications. In dentistry, intact protective airway reflexes are of even greater importance than in general medicine because cooling water is used and/or blood from wounds may

flow into the oropharynx. Thus, maintaining swallowing and coughing reflexes are of vital importance during dental surgery. Dentists have to monitor the level of sedation on a continuous basis and the ability to communicate with the patient needs to be maintained. During long treatment sessions, clinicians are challenged providing incremental doses of medication or in case of TCI continuous effect site concentration to keep the patient as comfortable as possible but also keeping the patient awake. In the case of minimal sedation, a well-trained assistant should assist the dentist by monitoring the patient. We would clearly like to emphasise that during moderate and deep sedation the dentist cannot be responsible for providing sedation as well as the dental treatment, and that a separate well trained sedationist or anaesthetist is needed.

A BIS monitor can be used to monitor depression of the cerebral cortex. It measures electrical activity in the brain using an electroencephalogram (EEG). These EEG data are analysed and used to rank a patient's level of brain activity on a Bispectral Index (BIS) of zero to 100, from coma to fully awake.<sup>9</sup> In sedation practice with midazolam, the BIS monitor shows a very good correlation with level of sedation.<sup>10,11</sup>

#### Pharmacology and pharmacokinetics of midazolam

Midazolam is water-soluble because the imidazole ring opens at a pH lower than 4. Injected into the circulation (pH about 7.4), this imidazole ring closes and midazolam becomes more fat-soluble, facilitating faster saturation into the nervous system and thereby resulting in a fast onset time (1.5-2 min). The redistribution half-time ( $T_{\alpha} \frac{1}{2}$ ) after the first injection is 7-8 min. However, this time will increase when more midazolam is being injected for longer periods.<sup>4</sup> In the liver, midazolam is hydrolysed into 1-hydroxy-midazolam by cytochrome P450 enzyme 3A3/3A4. Subsequently, the metabolites are glucuronidised and eliminated through the kidneys. The elimination half-time of midazolam (elimination from the body  $T_{\beta} \frac{1}{2}$ ) is 1.8 to 2.5 hr and is influenced by drug interactions, older age, and liver or kidney dysfunction. As antidote, Flumazenil is available, a benzodiazepine missing any sedative effects which has a stronger affinity to benzodiazepine receptors on the cell surface than midazolam.

## Material and Methods

#### Sample

We retrospectively analysed the initial 30 adult patients undergoing TCI midazolam sedation monitored by BIS during dental periodontal surgery or dental implant surgery lasting 50 min or longer. All patients were ASA 1 or ASA 2, older than 18 years and were informed in written form about conscious sedation and the operator/sedationist model. All patients were treated with the described TCI-BIS-guided midazolam minimal sedation technique; local anaesthetic articaine or lidocaine was used for infiltration in the upper jaw or mandibular block for pain prevention.

#### BIS Monitor

After cleaning the forehead, a sensor comprising 4 connectors was applied to the forehead and connected to the BIS monitor (Aspect BIS View monitor, Aspect Medical Systems Inc., U.S.A.). We used the BIS analysis to monitor changes of sedation levels, targeting BIS values between 80 and 90.<sup>12</sup> We used an upper alarm set to 90 to

prevent under-sedation, and a lower alarm set to 70 to prevent sliding slowly into moderate / deep sedation.

#### Perioperative Parameters

The effect site concentration (Ce), BIS, heart rate (HR) and peripheral oxygen saturation (SpO<sub>2</sub>) were monitored continuously, and non-invasive blood pressure (NIBP) was measured every 10 min. All measured variables and the calculated mean arterial pressure (MAP) were recorded every 10 min. When the saturation of a patient fell below 93%, the patient was stimulated to increase the frequency and depth of breathing. No patient received routinely supplemental oxygen because this can mask inadequate ventilation.<sup>13</sup> However, oxygen was readily available to adequately treat the patient in case of oxygen desaturation.

#### Target controlled infusion pump and infusion scheme

A TCI-III pump (VERYARK Technology, China) was programmed with the pharmacokinetic model of midazolam.<sup>14</sup> The use of the TCI pump was in accordance with a strict protocol. A 20 ml syringe was filled with 3 ml of 5 mg/ml midazolam which is commercially available in a 3 ml vial and diluted with 17 ml injectable 0.9% NaCl resulting in 20 ml of 0.75 mg/ml midazolam solution and the catheter was purged. The catheter was connected to a Venflon™ inserted into a vein of the antecubital fossa. The initial calculated target concentration in the brain was set to 30ng/ml and evaluated after 90 sec; after which the calculated effect site concentration was raised by 10 ng/ml every 60 sec, until the desired sedation level 2 of the Ramsay Sedation Scale (table 2) was reached. If patients intra-operatively showed deepening of sedation, tending towards moderate sedation, the pump was paused until the patient was again at the desired level of minimal sedation. Thereafter, the pump could be continued with a reprogrammed lower effect site concentration estimated by the pump itself. Usually 40 min before finishing dental treatment, the pump was stopped to allow for fast recovery.

#### Experience of treatment

After 1 week during consultation for suture removal, all patients were routinely interviewed regarding the experience of sedation and dental procedure. This was a non-structured open-ended interview about recollection of the treatment and satisfaction with the level of sedation.

#### Statistical analysis

Data analysis was performed with IBM SPSS statistics version 20. All continuous dependent variables were analysed by descriptive statistics with mean, and minimum/maximum.

## Results

#### Patient sample and treatment time

A total of 30 patients (11 males and 19 females) were treated with BIS guided TCI midazolam minimal sedation (Ramsay 2) allowing extensive periodontal surgery or implant surgery with more patient comfort. Mean age was 53 years (28-73) and the mean treatment time was 120 min (50-180) (table 3).

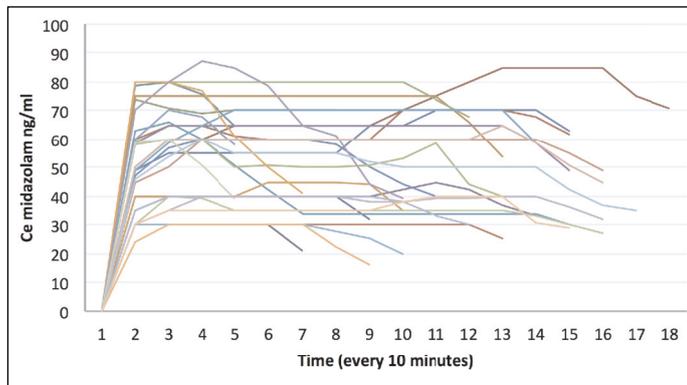
#### Target effect site concentration and bispectral index

Mean target effect site concentration of 50 ng/ml (24-80) was required for inducing adequate anxiolysis or minimal sedation (table 3 and figure 1). The BIS generally decreased to a mean

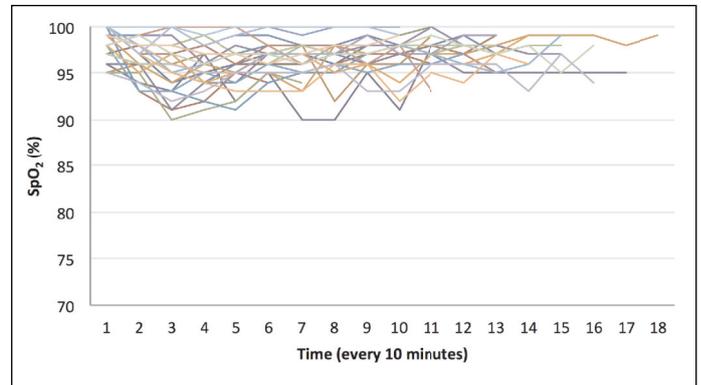
**Table 3 Descriptive of sample and perioperative parameters**

Descriptive Variables	N	Mean (SD)	Minimum	Maximum
Age (yr)	30	53 (11)	28	73
Duration procedure (min)	30	120 (38)	50	180
Ce (ng/ml) (10 min after induction)	30	50 (17)	24	80
First initial bolus dosage (mg)	30	2.9 (0.5)	2.1	3.8
Adequate initial bolus dosage (mg)	30	5.3 (2.1)	2.3	9.9
Total procedure dosage (mg)	30	13.7 (5.7)	6	27.2
BIS (10 min after induction)	30	86 (10)	74	100
SpO <sub>2</sub> (%) (before induction)	30	97 (0.4)	91	100
SpO <sub>2</sub> (%) (10 min after induction)	30	96 (0.4)	90	100
Heart rate (bpm) (before induction)	30	75 (15)	47	112
Heart rate (bpm) (10 min after induction)	30	82 (12)	59	109
MAP (mmHg) (before induction)	30	101 (3)	76	132
MAP (mmHg) (10 min after induction)	30	94 (2)	76	122

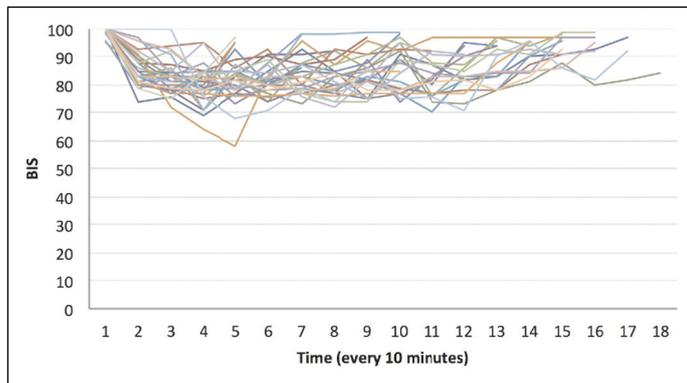
**Figure 1: Effect site concentration of midazolam (ng/ml) recorded every 10 min**



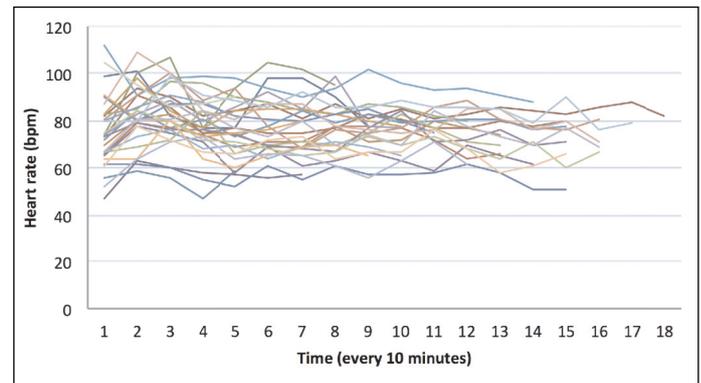
**Figure 3: Peripheral arterial oxygen saturation SpO<sub>2</sub> (%) measured continuously and recorded every 10 min**



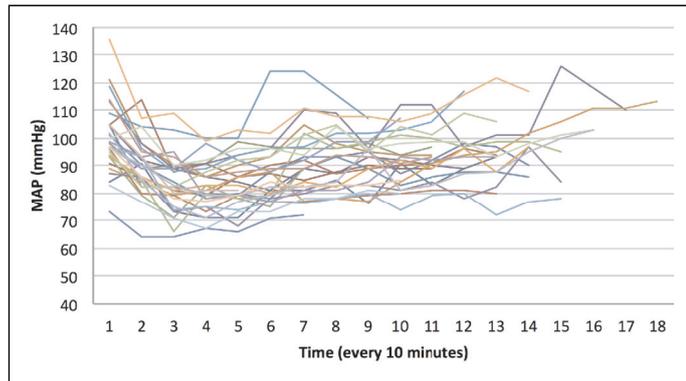
**Figure 2: Bispectral index (BIS) measured continuously and recorded every 10 min**



**Figure 4: Heart rate (bpm) measured continuously and recorded every 10 min**



**Figure 5: Mean arterial pressure (MAP, mmHg) measured every 10 min**



of 85 (74-100) within the first 10 min. In most patients, the initial effect site concentration could be continued for the entire procedure and the BIS stayed between 70 and 90 for the rest of the treatment period (table 3 and figure 2).

### Perioperative Parameters

The SpO<sub>2</sub> data are shown in figure 3. This group of patients show an initial decrease of SpO<sub>2</sub> to 96% during start of sedation, after which stable conditions were obtained (table 3). As shown in figure 3, the lowest value of SpO<sub>2</sub> in all 30 patients was 90%.

Heart rate slightly increased at the start of sedation from 75 to 82 bpm and was from then on stable during the procedure (table 3 and figure 4). Mean arterial pressure decreased from 101 to 94 mmHg and a blood pressure increase was noted during periods of discomfort or pain (table 3 and figure 5).

### Recovery

All patients were fit to leave the dental office after completion of the treatment and a minimum of 60 minutes after stopping midazolam injection. They were discharged into the care of a responsible adult escort.

### Experience of treatment

A routine open-ended interview after one week, revealed that almost all patients experienced strong anterograde amnesia and did not have any specific memories regarding the procedure. Patients were very satisfied with the sedation as a comfortable way of treatment.

### Complications

No significant cardiopulmonary complications were observed with regard to SpO<sub>2</sub>, NIBP, MAP and heart rate.

Noteworthy is one patient (age 73) who became deeply sedated with BIS of 58. After pausing the infusion pump and waking the patient, the pump was continued at the respective effect site concentration of 24 ng/ml. Subsequently, the sedation of this patient was stable and uneventful. No flumazenil was used in any patient.

It was noted that a sudden increase of BIS values was correlated with pain or increasing levels of noise, e.g. the use of an ultrasonic scaler. Where pain was experienced we improved the local anaesthesia, resulting in relaxation of the patient and dropping BIS values.

## Discussion

We here report our first 30 patients treated using BIS-guided TCI minimal intravenous sedation by midazolam alone during long periodontal surgery and/or long implant surgery, extending from 50 min up to 3 hr. The main finding in this retrospective observational study is that all patients were effectively minimally sedated with adequate anterograde amnesia and no significant disturbances of cardio-pulmonary vital parameters. All patients were very satisfied with the sedation and the surgical procedure.

In the past, several authors have claimed that short dental treatments lasting up to 40 min can be treated with intermittent boluses of midazolam. However, during longer procedures, midazolam alone was believed to be inadequate and several alternative techniques like propofol continuous infusion or multidrug regimens are being used successfully in dentistry by specially trained personnel (anaesthesia nurses, sedation specialists, anaesthesiologists).

In a study by Craig et al.<sup>5</sup>, 20 patients received incremental titrated initial boluses of midazolam to an ideal conscious sedation endpoint, followed after 30 min by adjusted infusion rates of 200 mg/h propofol by a sedationist. All implant surgeries lasting between 55 and 160 min were carried out successfully. Total midazolam dosage for adequate initial sedation varied between 5 and 14 mg. In comparison with our observed cohort, our mean initial bolus was 2.9 mg (range 2.1-3.8 mg) and was titrated up to a mean 5.3 mg (range 2.3-9.9 mg) for adequate initial sedation. Continuing target-controlled infusion of midazolam reached a mean total dose of midazolam 13.7 mg (range 6.0-27.2 mg) for surgery lasting between 50 and 180 min. Craig et al.<sup>5</sup>, used a supplemental dosage of propofol between 25 mg and 375 mg. Throughout the surgery, arterial oxygen saturation was between 92% and 100% (without supplementary oxygen being administered), comparable to our cohort. All patients were fit for discharge within 20 min of termination of the propofol infusion.<sup>5</sup>

The group of Chrisp et al.<sup>15</sup> utilised a dedicated registered nurse-anaesthetist for controlling TCI propofol/remifentanyl and monitoring the patients. In their observational study, 150 patients were treated for oral surgery procedures. They found a high level of patient satisfaction and consistently good to excellent operating conditions. In their cohort, a higher BMI and male sex were associated with Oxygen Desaturation Events (ODEs), defined as a drop in peripheral oxygen saturation below 94%. However, oxygen was administered continuously via a nasal cannula running at two litres/min in all patients.<sup>15</sup> Because oxygen inhalation might mask ventilation disorders, we did not give oxygen on a routine basis.

We strongly believe and advise that dentists should avoid using potent anaesthetics or multiple drugs for minimal sedation when only a trained dental assistant is available for monitoring. Therefore, in the current investigation, our aim was to optimise the operator/sedationist model with midazolam alone for longer procedures. Midazolam is a well-documented benzodiazepine with a wide margin of safety and it has the advantage of the availability of a reversal agent, Flumazenil. Lastly, midazolam seems to have better anterograde amnesia properties for pain than propofol during minimal sedation.<sup>12</sup>

As with any medical procedure, periodontal or implant surgery under sedation involves a certain amount of patient risk. A large

part of this risk stems from the potential of sedation-related complications. However, patient selection, slow induction of sedation and careful monitoring of the sedation level can significantly reduce these risks. Cardiopulmonary events related to sedation and analgesia are the most frequent cause of dental sedation related morbidity and mortality. These complications range in severity from transient, minor oxygen desaturation, to life threatening events such as apnoea, shock/hypotension and myocardial infarction. Severe complications are extremely rare in dental minimal sedation and we therefore focus in our study on surrogate endpoints of morbidity: oxygen saturation, non-invasive blood pressure and heart rate. For measuring oxygen saturation we used a pulse oximeter with the lower alarm level set to 93%. Because affinity and dissociation of oxygen to haemoglobin is described by a sigmoid curve and not linear, oxygen saturation declines slowly from 100% to 90%. However, below 90% desaturation deteriorates much more rapidly. Setting a lower alarm to 93% gives the clinician time to correct the underlying cause of hypoventilation. We did not routinely administer supplemental oxygen. Besides preventing oxygen desaturation, supplemental oxygen also delays recognition of hypoventilation or apnoea.<sup>13</sup> In our study early detection of hypoventilation and/or apnoea prevented, in all patients, oxygen saturation from falling below 90%. In future studies it would be advisable to also include capnography for early detection of a reduced respiratory rate.

Bispectral Index correlates well with several sedation scales.<sup>10</sup> We used an upper alarm set to 90 to prevent under-sedation, and a lower alarm set to 70 in order to prevent sliding slowly into moderate /deep sedation. Especially during long procedures, downward and upward trends in BIS assisted our team in observing sedation levels even more closely and therefore a more consistent level of sedation could be maintained due to a more satisfactory titration of target effect-site concentration. In future research it would be interesting to test the clinical value of the upper and lower alarm value settings.

Compared to manual bolus titration of midazolam, the described TCI-BIS technique is quite complicated to learn. Also, utilising more equipment increases the chance for human error as well as functional failure of equipment. So, the practitioner should always have a backup plan.<sup>16</sup> Hence, the described method is not a technique for the novice. An initial set of prerequisites would be an adequately trained team in sedation and training in advanced life support (ALS) by the dentist, and training in basic life support (BLS) by the dental assistant. Also, the dental assistant who is responsible for monitoring vital signs of the patient must only carry out small additional tasks.<sup>17,18</sup> This training level is according to the Dutch guidelines and we are aware that the guidelines in the UK require immediate life support (ILS) for both the dentist and the dental assistant. Probably, a more advanced training of our dental assistants would improve our safety standards even more. In the Netherlands, there is currently debate about ILS training for the dentist, which is an easier training compared to the ALS requirement at the moment. It would be interesting to have more scientific proof rather than expert opinion regarding the appropriate training levels of the team.

Before commencing training in TCI with a mentor who is fully qualified, the clinician should be confident in providing stable minimal sedation for longer than one hour with manual repeated bolus midazolam.

The described TCI-BIS minimal sedation technique with midazolam has advantages and enables dentists treating anxious patients with extensive long invasive procedures in an equable comfortable state of mind. Possibly, the technique can be included in future UK guidance as a suitable alternative technique for single operator/sedationist.

## Conclusion

This study shows proof of the principle that in this small series of 30 patients, BIS guided TCI sedation with midazolam facilitated predictable minimal sedation so enabling long periodontal or implant surgery procedures to be carried out by a single operator/sedationist within safe physiological limits.

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# A Review of the use of Flumazenil for the Reversal of Midazolam Conscious Sedation in Dentistry.

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## Abstract

The practice of midazolam conscious sedation is well established in dentistry. The drug flumazenil is a specific benzodiazepine antagonist and is an essential requirement in settings where midazolam is used.

A literature review has been carried out, examining the available information regarding flumazenil's safety, administration, potential complications and the regulatory documentation which governs its use.

Flumazenil is a safe drug to use for the reversal of midazolam induced conscious sedation although the evidence surrounding its use is limited.

## Introduction

Dental phobia is one of the main reasons why patients avoid seeking routine dental treatment, and present sporadically when they are in pain. In 2009 the Adult Dental Health Survey<sup>1</sup> reported that 36% of the adult population in the United Kingdom had a moderate dental anxiety, and a further 12% an extreme dental anxiety. Conscious sedation can be a very useful adjunct to local anaesthesia to enable to these patients to undergo dental procedures.

The use of midazolam for conscious sedation is well established, as it has good anxiolytic, sedative and amnesic properties. Midazolam, like all benzodiazepines, has disadvantages which include paradoxical reactions and respiratory depression.<sup>2</sup> The added benefit of midazolam is that there is a pharmacological reversal agent called flumazenil (Anexate™). Flumazenil is an essential requirement in all settings where midazolam conscious sedation is practiced.

## Pharmacology of Flumazenil

Midazolam and flumazenil are both benzodiazepines and exhibit the same ring system.<sup>3</sup> Flumazenil is water soluble at low pH and is presented as an aqueous solution at a concentration of 0.1mg/ml in 5ml ampoules.<sup>4</sup> Plasma protein binding is low at less than 50%,

resulting in sufficient unbound drug for rapid distribution.<sup>5</sup> It is metabolised by the liver into inactive metabolites which are then excreted via the kidneys.<sup>6</sup>

Both midazolam and flumazenil rapidly diffuse across the blood-brain barrier into the central nervous system and exert their activity at the benzodiazepine receptor site. This receptor site is an essential part of the gamma-amino-butyric acid (GABA) receptor complex.<sup>3</sup> GABA's action causes the opening of chloride channels at the postsynaptic membrane and thus the influx of chloride ions. This movement of ions causes hyperpolarisation of the nerve cell membrane in turn reducing or preventing an impulse conduction. Midazolam acts by enhancing the effect of GABA on the chloride channels by increasing its opening frequency, further diminishing the response. Flumazenil, although binding to the same benzodiazepine receptor site, has no effect on the chloride channel activity and thus normal signal function returns.<sup>3</sup> Flumazenil has a stronger affinity for binding than the agonist and will competitively displace the agonist, midazolam, from the receptor site.<sup>4,6</sup>

Flumazenil, when administered in low doses, antagonises the hypnotic and sedative effects of midazolam. When given in high doses flumazenil can antagonise the anticonvulsant and anxiolytic effects of midazolam.<sup>3</sup> Rosenbaum and Hooper<sup>7</sup> showed that the use of flumazenil did not affect the anterograde amnesic properties of the midazolam sedation.

## Indications for Flumazenil Administration

The indications for the use of flumazenil are different depending on the location: general anaesthesia, intensive care, emergency services or in outpatient conscious sedation, for example, in dentistry. The following list demonstrates the different clinical uses of flumazenil:

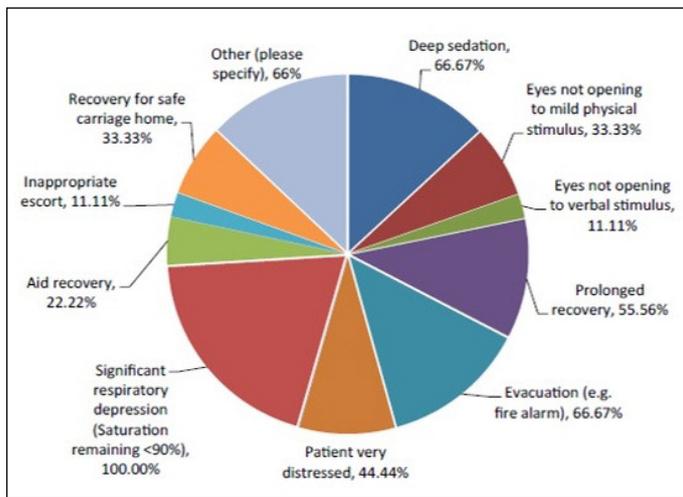
- General anaesthesia: termination of general anaesthesia induced and/ or maintained with benzodiazepines.
- Intensive care: specific reversal of the central effects of benzodiazepines thus allowing a patient to return to spontaneous respiration and consciousness.
- The reversal of benzodiazepine sedation in short diagnostic and

therapeutic procedures.

- Emergency settings e.g. A&E: flumazenil administration to manage benzodiazepine overdose.
- Conscious sedation in dentistry:
  - Over sedation
  - Difficult journey home, including mobility issues
  - Patient with learning difficulties
  - Escort/patient difficulties<sup>8</sup>

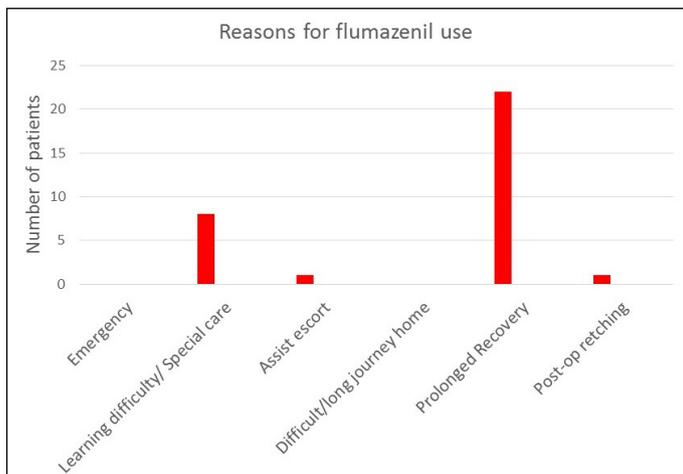
Yonel et al.<sup>9</sup> asked sedation lead clinicians at various dental institutes about flumazenil use. 77% responded that flumazenil use was recorded in a drugs book. A broad range of reasons were given for the administration of flumazenil see figure 1.

**Figure 1. Pie chart showing sedation leads justifications for flumazenil usage. % = % of responding sedation leads.<sup>9</sup>**



In 2009 Henthorn and Dickinson<sup>8</sup> audited flumazenil use in the Department of Sedation and Special Care Dentistry at Guy's Hospital, London, over a twelve week period. A total of 453 patients were given midazolam sedation for dental treatment, of which 32 were administered flumazenil. The results are presented in figure 2 below.

**Figure 2. Reasons for flumazenil use in the Department of Sedation and Special Care Dentistry at Guy's Hospital, London.<sup>8</sup> Reprinted by permission from Macmillan Publishers Ltd: British Dental Journal,<sup>8</sup> copyright 2010.**



## Clinical flumazenil administration

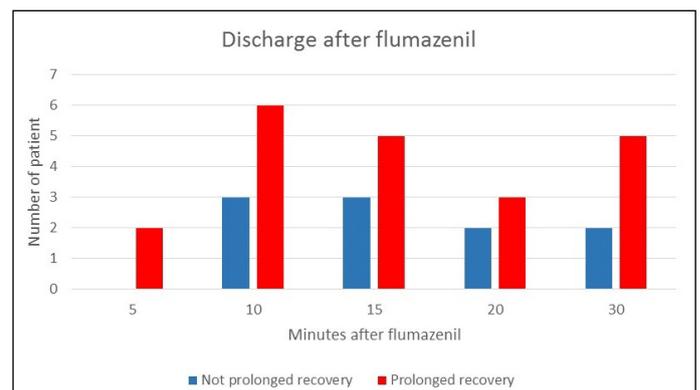
Ochs et al.<sup>10</sup> demonstrated that flumazenil administered after midazolam induced conscious sedation resulted in patients being more alert and physically orientated compared to the non-reversed placebo group. These findings were also confirmed by other studies by Rodrigo et al.<sup>11</sup> and Coulthard et al.,<sup>12</sup> where patients who had received flumazenil were deemed to have recovered quicker both subjectively and objectively following conscious sedation with intravenous midazolam. Thompson and colleagues<sup>13</sup> showed important differences between subjective evaluation of recovery and objective measurement of psychomotor function. Patients who had been reversed with flumazenil, despite being more alert and subjectively deemed to have recovered, were shown to still perform poorly in the psychomotor testing.

Rodrigo and Rosenquist<sup>14</sup> found that 2ml (0.2mg) of flumazenil adequately reversed sedation in only 32% of patients. As flumazenil use is most commonly indicated in an emergency situation a standard dose of 0.5mg of flumazenil should be administered as a slow bolus and repeated once if necessary. Following intravenous administration of flumazenil it takes usually between 1 to 5 minutes before a clinically apparent reversal can be seen.

The following reversal regime has been generally accepted for a titrated elective reversal of midazolam: an initial dose of 0.2mg intravenous flumazenil over 15 to 30 seconds, followed by 0.1mg doses at 1 minute intervals.<sup>3</sup>

Following administration of flumazenil the patient should be continually monitored until deemed fit for discharge. Thompson et al.<sup>13</sup> recommended retaining patients for at least 1 hour postoperatively, even following flumazenil administration, as although appearing awake the patient may have poor psychomotor performance. In the audit by Henthorn and Dickinson<sup>8</sup>, they also looked at the discharge time period following administration of flumazenil, seen in Figure 3. Results showed that discharge time varied between 5 minutes and 30 minutes, with an average time of 17.75 minutes post flumazenil administration. This indicates that discharge should be assessed on an individual patient basis and it cannot be assumed that just because flumazenil has been given a patient will be ready for discharge.

**Figure 3. Time to discharge following flumazenil administration.<sup>8</sup> Reprinted by permission from Macmillan Publishers Ltd: British Dental Journal,<sup>8</sup> copyright 2010.**



## Re-sedation or residual sedation

The elimination half-life for flumazenil is about 1 hour,<sup>3</sup> whereas for midazolam it is approximately 1.5 to 3 hours.<sup>15</sup> The elimination half-life may be prolonged in elderly patients. The concern of re-sedation following flumazenil administration is due to its shorter half-life compared to midazolam. When the plasma levels of flumazenil start to fall, due to its elimination, it is competitively displaced by the remaining midazolam which re-binds to the receptors. At this point the patient would return to the same level of sedation they would be at, for the time period elapsed, had flumazenil not been given.<sup>11</sup> The term 'residual sedation' has been deemed more of an appropriate term than 're-sedation'.<sup>12</sup> When flumazenil is administered at the end of the midazolam conscious sedation procedure, either due to delayed recovery or to assist the patient's mobility, then the recovery is usually immediate and complete. Even with the shorter half-life of the antagonist, by the time its effects have declined, the effects of the midazolam would also have declined to the point the patient would normally be regarded as ready for discharge.<sup>16</sup>

There have been no reports of serious re-sedation when a carefully titrated delivery of midazolam has been used and flumazenil administered appropriately having allowed for some normal sedation recovery.<sup>17</sup> Some mild re-sedation was seen in a trial of children undergoing midazolam sedation and then flumazenil reversal, however, the author attributed this to a too high dose of midazolam administered for the age group (age 1 to 5).<sup>18</sup>

## Complications and contraindications

Anxiety has been reported in patients who have been reversed with flumazenil. Most of these reactions have resulted from a too rapid reversal in a patient who is heavily sedated, causing a sudden awakening, so is unlikely to be a symptom seen when used with conscious sedation in dentistry.<sup>19</sup> Other side effects following flumazenil reversal that have been reported are nausea, crying, involuntary movements and dizziness, more commonly in the severely benzodiazepine overdosed patient.<sup>20</sup>

As flumazenil is a benzodiazepine, it should not be administered in a patient who is hypersensitive or allergic to benzodiazepines. Caution needs to be applied when reversing a patient who routinely takes benzodiazepines as a control medication for epilepsy, as reversal can result in seizures.<sup>21</sup>

Flumazenil has an important use in cases of suspected benzodiazepine overdose within the emergency medicine setting. Caution in its use is required if a multidrug overdose involving a combination of benzodiazepines and tricyclic antidepressants is suspected. An overdose of tricyclic antidepressants alone can cause seizures, cardiac arrhythmias and mortality. When the overdose also involves benzodiazepines these adverse events may not be seen due to the benzodiazepine having a protective concealing effect. However, if flumazenil is used to reverse the benzodiazepine element of the overdose, these concerning effects of the tricyclic antidepressant overdose may become apparent.<sup>22</sup>

## Regulatory guidance for the use of flumazenil

There are several published documents providing guidance on

midazolam usage in conscious sedation in dentistry, of which the relevant sections are outlined below. There is no specific document relating to the use of flumazenil alone or the governance issues surrounding this.

## Rapid Response Report

The National Patient Safety Agency published the Rapid Response Report titled 'Reducing risk of overdose with midazolam injection in adults' in 2008.<sup>23</sup> The report highlighted concerns about the strength of midazolam being used, dosage errors, drug labelling issues and the frequent use and reliance of the reversal drug flumazenil. The report outlined recommendations and actions to be implemented. These included reducing the concentration of midazolam to 1mg in 1ml in all clinical areas except where anaesthesia or intensive care sedation took place, and to audit and seek to minimise the use of flumazenil.

## Report of the Intercollegiate Advisory Committee for Sedation in Dentistry (IACSD)

In 2015 the IACSD produced a comprehensive set of standards for conscious sedation provision in dentistry.<sup>24</sup> They stated that the term 'rescue' is used to describe the management of adverse events that may occur during the delivery of dental treatment under conscious sedation. The team delivering care must be able to recognise such adverse events and manage them appropriately and safely.<sup>24</sup> These standards do not specify when flumazenil should be used or whether its use requires reporting upon. IACSD states that midazolam over-sedation and failure to monitor oxygen saturation during sedation (other than during inhalation sedation with nitrous oxide/oxygen) are defined as 'never events' by the Department of Health in England and must be reported.<sup>24</sup>

## Academy of Medical Royal Colleges

The Academy of Medical Royal Colleges produced a document of standards and guidance titled 'Safe sedation practice for healthcare procedures' in 2013.<sup>25</sup> The document looks at all aspects of sedation provision in all care settings. A section termed 'Use of antagonist drugs' describes that flumazenil is often used for sedation overdose with no account taken for the shorter half-life of flumazenil, compared to midazolam, leading to residual re-sedation. Similar to the Rapid Response Report the document states that the use of flumazenil should be regularly audited as a marker of excessive dosage of midazolam.<sup>25</sup>

## NHS England Patient Safety Domain- Never Events List

A never event is defined as a 'serious, largely preventable patient safety incident that should not occur if the available preventative measures have been implemented by healthcare providers'.<sup>26</sup> Until 2015 there were twenty-five types of incident that met the never event criteria. Out of these twenty-five, two were of significant interest in conscious sedation in dentistry. One was entitled 'Overdose of midazolam during conscious sedation' and the other 'Failure to monitor and respond to oxygen saturation'.<sup>26</sup> The IACSD guidelines of 2015 discussed the need to report over

sedation as a 'never event' according to the Department of Health in England.<sup>24</sup>

In 2015 these two never events, amongst others, were removed from the never events list. A new never event relating to midazolam was added:

## **'Mis-selection of high strength midazolam during conscious sedation**

*Mis-selection refers to*

- *When a patient receives an overdose due to the selection of a high strength midazolam preparation (5mg/ml or 2mg/ml) rather than the 1mg/ml preparation, in a clinical area performing conscious sedation.*
- *Excludes clinical areas where the use of high strength midazolam is appropriate. These are generally only in general anaesthesia, intensive care, palliative care, or where its use has been formally risk assessed within an organisation.*<sup>127</sup>

## Discussion

Flumazenil is a relatively safe benzodiazepine antagonist. It has enhanced the safety when providing sedation with midazolam. Neave et al.<sup>28</sup> showed that flumazenil administration alone can cause a reduction in mean arterial pressure and a drop in heart rate, but had no apparent effect on the respiratory system. These slight negative side effects to the cardiovascular system are still out-weighted by the beneficial ability to reverse midazolam induced sedation.

Another clinical finding was that flumazenil had some effects on long term memory processing.<sup>28</sup> This is of potential importance for flumazenil's use in conscious sedation because this can affect the way a patient retains the post-operative information following recovery from sedation. This finding reiterates the need for a suitable escort to be present for midazolam induced sedation.

An initial concern with the use of flumazenil for the reversal of midazolam induced sedation was the potential complication of re-sedation, often attributed to the differing elimination half-lives of midazolam and flumazenil, 1.5 to 3 hours and 1 hour respectively. However, this does not take into account the re-distribution half-lives of the drugs or the time elapsed following midazolam delivery before administration of flumazenil. Clinical trials by Birch and Miller<sup>29</sup> were unable to provide any evidence of re-sedation when flumazenil was administered as a 0.5mg intravenous bolus to reverse the acute effects of intravenous midazolam.

Currently there are no specific guidelines for the use of flumazenil. Several of the relevant documents relating to conscious sedation in dentistry only touch upon its use. The IACSD guidelines which were published in 2015 are the most up to date standards for conscious sedation in dentistry. These standards would have been printed around the same time, or before the date at which the NHS England Patient Safety Domain changed its list on what classified as never events. The IACSD standards state that over-sedation and failure to monitor oxygen saturation during sedation are never events, however, since its publication these two conditions have been removed from the list. The only classified never event now relating to conscious sedation in dentistry is mis-selection of midazolam strength. This is also in accordance with the Rapid Response Report of 2008.

Another factor to take into consideration is the financial implication of flumazenil use. Currently an ampoule of flumazenil costs £16.39 compared to an ampoule of midazolam which costs just £1.37.<sup>30</sup> This may mean that for non-emergency situations, flumazenil is more widely used within the hospital setting, rather than in general practice where the clinician would be more aware of the cost involved. Further research would be useful to compare the usage within the different locations.

## Conclusion

Flumazenil is an essential requirement in settings where midazolam based conscious sedation is being practised. Its use is considered safe and effective as a benzodiazepine antagonist, reversing the untoward effects of midazolam. Guidance on its use is limited, although all available documentation recommends its use should be audited, as high degree of usage may be a marker of excessive midazolam dosage and over-sedation. This auditing process may highlight a problem with the midazolam sedation technique or procedural knowledge.

## Conflict of interest

The authors declare that there is no conflict of interest in this paper.

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## The Decisional Needs of Young Patients Faced with the Decision to Undergo Dental Treatment with Sedation or GA

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### Abstract

**Aim:** To explore the decisional needs of young patients faced with the choice of dental treatment with either sedation or general anaesthetic (GA).

**Design:** Twelve qualitative interviews were conducted with patients, aged 10-16 yr (n=12), who had prior experience of dental treatment with sedation or GA, together with their parents/guardians (n=13).

**Results:** A number of themes were identified as being important in the decision-making process including: the method of administration; waiting and treatment times; perceived side effects and risks; treatment type; control and communication, and the long term impact of sedation or GA.

**Conclusion:** The decision to undergo dental treatment with sedation or GA is a complex healthcare decision and warrants additional decisional support for both patients and their parents/guardians.

### Introduction

The relative effectiveness of general anaesthesia (GA) and conscious sedation used to manage pain and anxiety in young dental patients has yet to be determined.<sup>1-3</sup> The decision to undergo dental treatment with either sedation or GA is therefore often dependent upon the patient's individual values. Such healthcare decisions are often defined as preference sensitive decisions, as each option carries varying benefits and risks to each patient.<sup>4</sup> When a patient is faced with difficult healthcare decisions, it has been recommended that a shared decision-making model should be applied.<sup>5</sup> This model of decision-making refers to a process in which the patient, the clinician and others involved work together to select the option that most benefits the patient. In reference to medical decision-making in people under the age of 16, others who are likely to have significant influence in the decision-making process include parents or guardians. The most frequently cited shared decision-making

model divides the process into three stages, defined as 'information exchange', 'deliberation' and 'deciding on treatment to implement'.<sup>5</sup> Information exchange describes the bi-directional sharing of all information relevant to the decision, both medical and personal. Following this, it is proposed that the patient, clinician and others involved in the decision should all be involved in deliberating the options available and in deciding on the treatment option which is most suited to the patient's needs.

To encourage a shared decision-making process, tools known as decision aids have been developed for use in a range of healthcare decisions.<sup>6</sup> These tools aim actively to involve patients in the decision-making process through firstly providing further information regarding the decision being made, the options available and the associated costs, benefits and uncertainties. Secondly, they seek to support the patient in identifying their values attached to the options available and the related risks, benefits and uncertainties. Finally, they facilitate the sharing of these values with clinicians and others involved in the decision-making process. Recently, a systematic review reported that decision aids significantly reduce decisional conflict, increase knowledge and increase involvement in the decision-making process for a number of healthcare decisions.<sup>6</sup>

Taking these findings into account, a decision aid has recently been developed by the authors to enable young patients to make more informed decisions when faced with the decision to undergo dental treatment with either inhalation sedation, IV sedation or GA.<sup>7,8</sup> An example of one of the exercises included in the decision aid is displayed in Figure 1.

It was proposed that through facilitating involvement in the decision-making process, young patients would be able to make decisions consistent with their own needs, leading to improved attendance, treatment completion and, ultimately, better oral health. The decision aid development process included four stages proposed by the International Patient Decision Aids Standards (IPDAS).<sup>9</sup> The first stage involved the use of qualitative interviews to assess the decisional needs of young patients faced with the decision to undergo dental treatment with sedation or GA.

Figure 1 - The values clarification exercise included in step 2 of the decision aid

Step 2: Which option suits you best?							
<p>Below are some common reasons why you may choose one of the options. For each question, circle how much each reason matters to you on a scale from 0 to 5. '0' means it is not important to you, '5' means it is very important to you. If you decide a reason is important to you, the option(s) that might suit you best are shown on the right hand side. You should discuss these with your dentist.</p>							
	Not Important		Very Important		Your 'best' option(s) to consider if this reason is important to you are shown below		
How important to you is it?	0	1	2	3	4	5	
To be awake when you have treatment?	0	1	2	3	4	5	<b>Gas and air or IV sedation</b> <i>(Because you will be awake for both gas and air and IV sedation, but you may feel like you've been asleep after IV sedation)</i>
To remember what happened?	0	1	2	3	4	5	<b>Gas and air</b> <i>(Because you will remember everything that happened)</i>
To avoid having a needle in your hand or arm?	0	1	2	3	4	5	<b>Gas and air</b> <i>(Because you don't need a needle in your arm or hand)</i>
To avoid feeling the needle in the gum?	0	1	2	3	4	5	<b>General anaesthetic</b> <i>(Because if you do need a needle in your gum you won't notice it as you will already be asleep)</i>
To avoid having a mask on my nose?	0	1	2	3	4	5	<b>IV sedation</b> <i>(Because you won't have to wear a mask)</i>
To be able to eat or drink before your treatment?	0	1	2	3	4	5	<b>Gas and air</b> <i>(Because you can eat and drink normally, but don't have a big meal just before your appointment)</i>
To avoid being at the hospital or dentist for a long time?	0	1	2	3	4	5	<b>Gas and air or IV sedation</b> <i>(Because with GA you may have to spend time on the ward before and after treatment. You may also have to stay at the dentist for around 30-60 mins after treatment if you choose IV sedation)</i>
To avoid side effects?	0	1	2	3	4	5	<b>Gas and air or IV sedation</b> <i>(Because you are more likely to avoid side effects if you choose gas and air or IV sedation)</i>
To be able to go straight back to school afterwards?	0	1	2	3	4	5	<b>Gas and air</b> <i>(Because you will usually be able to go straight back to school after having treatment with gas and air if you feel ok)</i>
To have your treatment at the dental hospital?	0	1	2	3	4	5	<b>Gas and air or IV sedation</b> <i>(Because these are done at the dental hospital but you may have to go to the children's hospital for a GA)</i>
To have your parent/carer with you while you're having treatment?	0	1	2	3	4	5	<b>Gas and air or IV sedation</b> <i>(Because your parent or carer will be able to stay with you while you are having treatment)</i>
To have fewer appointments?	0	1	2	3	4	5	<b>General anaesthetic</b> <i>(Because all your treatment will usually be done at the same time under GA)</i>



This article focuses on the findings from the qualitative interviews that informed the initial stage of the development process, and further explores the complexities of the decision faced by young dental patients and their parents/guardians in this clinical context.

## Methods

Ethical approval for the study was obtained from the NRES Committee for Yorkshire and The Humber – Sheffield (13/YH/0142). Participants, aged 10-16 years, who had already undergone dental treatment with sedation or GA, and their parents/guardians, were recruited from the Charles Clifford Dental Hospital, Sheffield, and Liverpool University Dental Hospital. Potentially suitable participants were identified by their direct care team at their routine clinic visit and given an age-appropriate information sheet providing more details of the study. Participants were then contacted by telephone, following a period of at least 24 hours, to confirm whether they were willing to take part in the study. Non-English speaking children and parents/guardians, patients who required urgent treatment, and patients with severe learning disabilities who lacked verbal articulation were deemed ineligible to take part in the study. Joint, semi-structured, qualitative interviews were undertaken with a purposive sample of patients and their parent/guardian. Data were analysed using Framework analysis.<sup>10</sup>

## Results

Data saturation occurred following 12 joint interviews with patients (n=12) and parents/guardians (n=13). The majority of patients were female, White British and had previous experience of dental treatment with inhalation sedation (see table 1).

**Table 1: Participant characteristics**

Age	Gender	Previous treatment
14	Female	Inhalation sedation
15	Female	IV sedation
15	Female	Inhalation sedation
13	Female	Inhalation sedation
12	Female	Inhalation sedation
14	Female	Inhalation sedation
15	Male	Inhalation sedation
13	Female	Inhalation sedation and GA
14	Female	Inhalation sedation
10	Female	GA
15	Male	IV sedation
15	Male	IV sedation and inhalation sedation

Nine themes emerged from the data relating to the decision-making process associated with undergoing dental treatment with sedation or GA. These themes are presented below with illustrative quotes from participants.

### 1. Method of administration

The means by which the sedatives or general anaesthetic were delivered to the patient was identified as an influence on the decision-making process, with many participants stating a fear of needles as a key factor.

*The thing that brings the whole thing to a crashing halt is the needle*

*(Father of GL, a 16 year old female who had previously undergone treatment with inhalation sedation)*

Contrasting views were noted towards the administration of the local anaesthetic (LA) injected into the gum and the administration of sedatives or general anaesthetic through the hand or arm. For example, some patients who stated the reason for their referral centred on a fear of receiving a needle in the gum were reportedly happy to accept treatment with IV sedation or GA. The explanation given below, demonstrates how patients may make a distinction between the use of a cannula in the delivery of IV sedation or GA based on a misconception about the size of the intra-oral injection.

*The needle that they put in my gum is bigger. But that needle is only about dead small and it comes in like the little pink slot so it just goes straight in.*

*(LK, a 15 year old male who had previously undergone treatment with IV sedation)*

Comfort and hygiene factors were also highlighted as influencing the decision-making process, with participants citing issues around having a mask placed on their nose as one of the main reasons for opting against treatment under sedation.

*He just didn't like it [the mask], he wasn't comfortable at all.*

*(Mother of WL, a 15 year old male who had previously undergone treatment with IV sedation and Inhalation sedation)*

*The thought of someone else's mouth being on that [the mask].*

*(WJL, a 15 year old female who had previously undergone treatment with IV sedation)*

### 2. Time

The time patients would have to wait for appointments and the number of visits required to complete treatment were also cited as contributing to the decision-making process. This was a particular concern of parents/guardians and related to the multiple appointments usually associated with conscious sedation.

*The length of time is a bit out of line when you're talking about young children's teeth... because obviously a lot of more decay can happen in, you know, sort of 6, 8 months then what it can if they would have quicker appointments.*

*(Mother of 13 year old female, MA, who had previously undergone treatment with inhalation sedation)*

The time required to complete treatment often related to concerns over prolonged absence from school, particularly if treatment disrupted crucial stages of the patient's education. This is demonstrated in the quote below, which describes the impact of the recovery period on the decision-making process.

*That was a major part, the time he'd have to take off school. Because for the general (GA) they're saying it'd have to be an extra 2 days, he could take up to a week off. Which is not good because he's about to do his GCSE's.*

*(Mother of LK, a 15 year male who had previously undergone treatment with IV sedation)*

In this instance the parent appears to focus on the immediate impact the recovery period associated with GA would have on her child's education, despite the fact that future appointments are more likely to be required when undergoing conscious sedation.

### 3. Perceived side effects and risks

A significant issue, particularly of concern to parents/guardians, was the level of risk associated with the treatment options available. These concerns related mainly to the perceived risks associated with the use of GA and the nature of the dental treatment required.

*There's too many dangers. I think it has to be an emergency to be put to sleep. Something a bit more serious than just having a tooth out...*

*(Mother of WK, a 14 year old female, who opted to undergo treatment with inhalation sedation)*

Nausea, vomiting and drowsiness were also mentioned on numerous occasions throughout the interviews, with these side effects being related to more practical issues such as travelling to and from the hospital.

*It's (IV sedation) easier for me because I'm on my own so trying to get him home after the general (GA) would be horrendous. It's bad enough... because the taxi driver takes one look and says 'better not be sick'*

*(Mother of LK, a 15 years old male who had previously undergone treatment with IV sedation)*

### 4. Treatment type

The increased likelihood of extraction associated with undergoing treatment with GA, in comparison to conscious sedation, and the subsequent effects this could have on the patient's appearance was discussed as an important theme in the decision-making process.

*She'd have had the front teeth extracted. Which would have been a very traumatic sort of thing for her.*

*(Mother of MA, a 13 year old female who had previously undergone treatment with inhalation sedation)*

Considerable differences in individual's treatment plans made it difficult to include specific information on this subject in the decision aid. However, the tool did highlight potential differences in the treatment plan to patients and directed the patients and their parents/guardians to their practitioner if they required further information.

### 5. Control and communication

The level of control the patient experienced while undergoing treatment was discussed as influencing the decision-making process. This perception of control was often related to the level of consciousness associated with the different sedation and GA

options offered, with participants welcoming the ability to communicate with the dentist during treatment inhalation sedation and IV sedation.

*I think that it was important that I still had the sort of means to stop anything if I don't feel comfortable. I think that was a nice thing as well because you know I'm still making decisions.*

*(GL, a 16 year old female who had previously undergone treatment with inhalation sedation)*

In contrast, the loss of control associated with undergoing treatment with GA was on occasions viewed as distressing.

*And when you're asleep you can't see what they're telling you. What you've done to your teeth.*

*(LJ, 12 year old female who opted for treatment under inhalation sedation)*

### 6. Experience of sedation

Related to the above theme, the data suggested that the experience of undergoing treatment with sedation or GA itself may also play a role in the decision-making process. The following extract is taken from one patient's account of undergoing treatment with inhalation sedation.

*It just makes me a lot more relaxed and I think it does kind of help me through the experience. Because, like I am aware of what's going on but it's just kind of, just overall you feel a lot better.*

*(WA, a 13 year old male)*

Exploring how patients described treatment under sedation or GA in their own words also highlighted the importance of using appropriate language when presenting information to patients regarding sedation or GA.

### 7. Long-term impact

The potential long-term impact undergoing treatment with sedation could have on the experience of dental anxiety was also discussed as a decisive factor. The following discussion describes how this issue influenced one participant's decision to undergo dental treatment with inhalation sedation.

*GL: In hindsight I think it's (inhalation sedation) better because it's helped me get over some things that if you know, I'd have just had the general anaesthetic, then you know.*

*Father of GL: You'd still have had the phobia.*

*GL: I'd still have had the phobia.*

*Father of GL: And I think you're right this (inhalation sedation) has actually moved you forward with that problem as well as getting the work done. So it's had like a double effect hasn't it?*

*GL: Yeah.*

*(Exchange between GL, 16 year old female, and her father)*

In contrast, some participants believed that treatment under sedation had little impact on the experience of dental fear, with the main long-term benefits relating to enabling the regular completion of treatment.

*I don't think it's got her over her fear of dentists but at least she's relaxed enough that she's getting the work done.*

*(Mother of WK, a 14 year old female who had previous experience of treatment with inhalation sedation)*

## 8. Information received

The amount of decisional support provided to patients and parents/guardians was also discussed in relation to the decision making process, with evidence of contrasting experiences from the data:

*They gave us plenty of information.*

*(Father of LJ, 12 year old female)*

*I think for me personally that would have been nice if I had some sort of leaflet or something.*

*(GL, a 16 year old female)*

This data raises questions over the uniformity in which information is provided to patients and supports the notion that further opportunities to discuss the treatment options with healthcare professionals would be beneficial.

## 9. Format

Finally, the format in which it is presented was also discussed as having an influence on the decision making process, with it being proposed that the availability of web-based information could be beneficial. This is demonstrated in the following exchange.

*JH: So would you prefer more internet based information?*

*Mother of VL: Yeah I would... That would be a good idea when we don't know... he was having general anaesthetic and there was no discussion about you know how long you could be under and things like that.*

*(Exchange between JH, the interviewer, and mother of VL, a 14 year old female)*

## Discussion

The results have highlighted the complexity and preference sensitive nature of the decision for young patients requiring dental treatment with sedation or GA, providing further evidence for the need of decisional support for those faced with this difficult healthcare decision.

One of the key themes highlighted as important in the decision-making process was the method of administration associated with each treatment option with patients citing a fear of needles as a reason for requiring treatment with sedation or GA. Interestingly, a distinction was made between the delivery of IV sedatives or general anaesthetic via a cannula in the hand or arm and the delivery of LA via the gum. For example some patients displaying a fear of an injection in the gum stated they were still willing to undergo treatment with IV sedation or GA. It may be that patients did not categorise a cannula as a needle per se, or may not even have been aware that IV or GA drugs are administered through a cannula. Nonetheless, when viewing the wider literature on needle phobia in dentistry, reports tend to focus on the fear of dental

injections, with this cited as one of the most prevalent reasons for experiencing dental anxiety.<sup>11</sup> There is also further evidence from a cross sectional study of patients aged 4-11 years, in which results suggest needle phobia should be defined as a separate concept to dental anxiety.<sup>12</sup>

The side effects and risk associated with each treatment option also appeared to have an impact on the decision-making process. One of the greatest concerns in this instance related to the mortality rates associated with GA. It was apparent that parents/guardians were often unwilling to discuss such risks openly in the presence of their child and also held reservations about the inclusion of such information in a decision aid. The exclusion of such information in decisional support tools raises wider questions relating to the concept of informed consent and whether a failure to provide all relevant information to patients is detrimental to this process. However, it could be argued that, as decision support tools are viewed as supplementary to the decision-making process, they should not be seen as a replacement to the processes of informed consent already in place. Further focus on such issues is clearly warranted when considering recent findings which suggest that there is often a failure to obtain informed consent. For example, it was recently reported that 30% of pre-anaesthesia consultations with paediatric patients failed to discuss the related risks of the procedure.<sup>13</sup>

How the different options impacted upon the type of treatment received by the patients also appeared to influence the decision-making process. More specifically, this related to concerns by patients and parents/guardians that they were more likely to have teeth extracted, rather than restored, when undergoing treatment with GA. The main concerns here appeared to centre on dental aesthetics, with the wider literature also suggesting that this is a prominent issue in younger people.<sup>14-16</sup> For example, it has been demonstrated that dental appearance can affect perceptions of intelligence, social abilities, popularity and athleticism.<sup>14-16</sup> Due to variations in treatment plans across patients it is clearly difficult to portray specific information via decisional support tools, however, the issue was raised as a point to consider and patients were directed to discuss the matter further with their dentist.

Finally, the long-term impacts of undergoing dental treatment with sedation or GA on subsequent anxiety was also discussed. Previous reports have proposed that inhalation sedation may lead to a long-term reduction in the experience of dental anxiety.<sup>17</sup> Furthermore, in line with patients' and parents' assumptions, there is also some evidence that undergoing dental treatment with GA can actually heighten dental fear at subsequent appointments.<sup>18</sup> However, further longitudinal research is required in this area to explore the potential dual role of undergoing dental treatment with sedation or GA in terms of the short-term and long-term effects on patient outcomes, particularly dental anxiety.

The current study holds a number of acknowledged limitations. Firstly, there was an under-representation of ethnic minority groups and an over-representation of female participants in the sample, consequently diminishing the generalisability of the findings to larger populations. The under-representation of participants under the age of 13 years also suggests that the decisional needs of younger patients may not have been fully explored. It should also be acknowledged that the majority of participants had no prior experience of treatment with GA and therefore the decisional needs of these patients may not have been fully addressed. It could

be suggested that data saturation would occur at a later stage if a more representative sample was included in the study. Finally, the impact of parental presence on the interviews also warrants discussion, with reports suggesting that the presence of parents/guardians could inhibit child responses, having a negative impact on the richness of the data obtained.<sup>19</sup> Findings from the current study suggest that the child may also inhibit the expression of views from parents/guardians in certain circumstances. For example, adult participants were often unwilling to discuss distressing topics relating to mortality and morbidity in the presence of their child.

In conclusion, this study provided some valuable insights into the decisional needs of young patients and family members faced with the decision to undergo dental treatment with sedation or GA. These patient-centred perspectives were essential to inform the content of a decision-aid for this patient group.<sup>7</sup> Furthermore, the study highlighted some of the challenges in portraying this information to patients through such resources as decision aids, which have not previously been addressed in the literature. As this was the first decision aid developed within paediatric dentistry and within paediatric healthcare as a whole it is clear that further research is required to explore these issues further in order to improve the patient experience of the decision-making process. In terms of paediatric dental sedation it is proposed that such improvements could lead to more informed decisions being made, which in turn could improve rates of attendance, treatment completion and subsequent oral health.

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## Declaration of interests

The authors declare no conflict of interest.

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## PRACTICE EVALUATIONS

**Have your Practice evaluated in accordance with the SAAD Safe Sedation Practice Scheme: A Quality Assurance Programme for Implementing National Standards in Conscious Sedation for Dentistry in the UK.**

**The Evaluation document may be downloaded from the Documents section of the SAAD website [www.saad.org.uk](http://www.saad.org.uk)**

**For further details or to arrange an evaluation  
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## Application of the Mental Capacity Act (2005) and Consenting for Treatment under Concious Sedation

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### Abstract

The Mental Capacity Act 2005 (MCA) is one piece of legislation with which all clinicians should be familiar. As treating clinicians, a capacity assessment is carried out each time a patient is seen, in order to obtain informed consent. When clinicians question the capacity of their patients, they should ensure steps are taken to provide relevant adjuncts to aid understanding, from visual aids to alternative time and environment. If a patient is deemed to lack capacity, it should be determined if this is temporary, fluctuating or permanent, as well as the severity. For those who lack capacity a best interest assessment should be undertaken with all relevant parties involved, with the overall decision being made in the patient's best interest and in the least restrictive manner. Considerations of sedation technique, clinical holding, or any other procedures should be included in the consent form, with periodic review of the best interest decision as a patient's circumstances may change over time.

### Introduction

Patients have sedation for dental treatment in a variety of settings, including general practice, hospital and community clinics. It is vital that clinicians are able to make a capacity assessment and take appropriate steps to ensure they are adhering to the legal principles covered under the Mental Capacity Act 2005 (MCA) in order to take informed consent prior to carrying out treatment.

This paper will discuss the MCA (of those living in England & Wales) in relation to patients with cognitive impairment, such as learning disabilities and dental anxiety, how a clinician would assess capacity and achieve a best interest decision. It will discuss fluctuating capacity and address the least restrictive option, with how a decision should be recorded.

### What does Lack of Capacity Mean?

Capacity is 'the ability to make decisions. Everybody is presumed to have capacity unless it can be shown that they lack capacity to make a decision for themselves at the time the decision needs to be made.'<sup>1</sup> The lack of capacity could be due to an impairment of, or a disturbance in, the functioning of the mind or brain.

The impairment or disturbance can be permanent or temporary, however, a person cannot be deemed to lack capacity based on their age, appearance or behaviour.<sup>2</sup>

### Why is 'Mental Capacity' relevant in dentistry?

Determining capacity is essential in decision making as part of the consent process for patients. It allows clinicians to respect patient values and choices. It also ensures that clinicians are legally 'signposted' when a patient lacks capacity and requires treatment. Examples include congenital or acquired disabilities such as cerebral palsy, Down's syndrome, traumatic brain injury, dementia or when patients are under the influence of alcohol and drugs.<sup>3</sup> Unfortunately these conditions can be complicated by communication and literacy problems, as well as unsubstantiated assumptions by professionals that this cohort of patients are not competent to make some decisions.<sup>3</sup>

Dental anxiety and phobia 'is a psychological phenomenon that dentists meet on a daily basis, for those with and without intellectual disabilities'.<sup>4</sup> It has been shown that over a third of adults have moderate dental anxiety and 12% have extreme dental anxiety.<sup>5</sup>

Holden & Holden<sup>6</sup> suggest that a person who attends with a severe dental phobia may have considerable impairment with regards to decision making for dental treatment, and by law may not have the capacity to consent due to an 'irrationality in perception [where] the functioning of the mind is impaired'.<sup>6</sup>

### Informed Consent

Informed consent is based on free will, capacity and knowledge. This knowledge has to be disseminated into language which enables the person to come to a decision to refuse or accept treatment. This includes weighing up the risks and benefits in a non-pressurised situation.<sup>7</sup> However, informed consent is limited by the patient's perception of the information provided, as 'it cannot completely be ascertained that the information, with its implications, has been understood and comprehended'.<sup>7</sup>

Treating patients without consent in a non-emergency situation, for those with or without capacity, risks an allegation of assault for the health professional and possible complaints to professional bodies.<sup>8</sup>

### Dental Management of Patients Who Lack Capacity

Dentally anxious and phobic patients and those with intellectual

disability often present with challenging behaviour, limited co-operation and cognitive impairment.<sup>9,10</sup>

In 2013/14 in primary care alone, there were 136,263 NHS courses of [sedation] for approximately 120,468 patients.<sup>11</sup> Wanyoni et al highlight that 'anxiety levels are a major influence in relation to sedation need'.

The 2015 IACSD guidelines advise 'assessing capacity and obtaining consent where appropriate', and to 'work with other agencies to obtain a 'best interest' decision and agreement to treat in circumstances where there is lack of capacity',<sup>12</sup> hence the use of the Mental Capacity Act 2005 (MCA).

## Mental Capacity Act 2005 & the Code of Practice

The MCA was developed because it was identified 'that English law [did not have a] procedure whereby any other person or court [could] take a medical decision on behalf of an adult patient without capacity to [make] that decision'.<sup>13</sup>

One of the key legal cases - *Re:F*<sup>14</sup> involved a declaration being granted in relation to sterilisation of a mentally disabled woman, who could not comprehend the implications of the operation and thus was incapable of giving valid consent. As a consequence, the House of Lords was advised by the then Lord Chancellor about the inadequacy of mental capacity law pre-2005. He identified that there was little protection for mentally incapacitated adults [and their carers], no legal authority of how decisions were made, and that the law had let down these [vulnerable] people.<sup>15</sup>

## MCA Legal Framework

The aim of the MCA is to protect vulnerable people over the age of 16 in decision making. It covers people in England and Wales who cannot make some or all decisions for themselves.<sup>1</sup> It sets out the legal requirements for assessing whether or not a person lacks the capacity to make a decision, and sets the framework for making decisions for those who lack capacity and who can make them and when. The purpose of the Act is shown in Box 1, with the principles of the Act in Box 2.<sup>1,16</sup>

### Box 1: Purpose of the Mental Capacity Act

1. Assist and support people who lack capacity
2. Discourage anyone who is involved in the person's care from being overly restrictive or controlling
3. Balances an individual's right to make their own decisions with the right to be protected from harm
4. Introduces a criminal offence of ill treatment or wilful neglect of people who lack capacity, as long as an individual complies with MCA and acts in person's best interest they will be protected from liability

### Box 2: Principles of the Mental Capacity Act 2005<sup>1</sup>

1. Every adult has the right to make their own decisions and must be assumed to have capacity to make them unless it is proved otherwise.

### Box 2 (continued)

2. A person must be given all practicable help before anyone treats them as not being able to make their own decisions.
3. Just because an individual makes what might be seen as an unwise decision, they should not be treated as lacking capacity to make that decision.
4. Anything done or any decision made on behalf of a person who lacks capacity must be done in their best interests.
5. Anything done for or on behalf of a person who lacks capacity should be the least restrictive of their basic rights and freedoms.

An assessing clinician needs to have reasonable belief<sup>1</sup> that the person lacks capacity to make the decision about their care, and prove that on the balance of probabilities, the person lacked capacity when the decision needed to be made. The first step is to determine if there is an impairment of the brain (Threshold Test), and then determine whether they have the (in)ability to make the decision (Functional Test) see Box 3. The questions to be considered are in Box 4.

### Box 3: Functional Test Considerations<sup>1</sup>

1. Can the person understand the information given to them that is relevant to the decision?
2. Can the person retain that information long enough to be able to make the decision?
3. Can the person use or weigh up the information as part of the decision-making process?
4. Can the person communicate their decision?

### Box 4: Questions to consider when assessing lack of capacity<sup>1</sup>

1. Does the person have all the relevant information they need to make the decision?
2. If they are making a decision that involves choosing between alternatives, do they have information on all the different options?
3. Would the person have a better understanding if information was explained or presented in another way?
4. Are there times of day when the person's understanding is better?
5. Are there locations where they may feel more at ease?
6. Can the decision be put off until the circumstances are different and the person concerned may be able to make the decision?
7. Can anyone else help the person to make choices or express a view (for example, a family member or carer, an advocate or someone to help with communication)?

The act encourages decision-making by specifying that a person is not to be regarded as unable to understand the information relevant to a decision if he is able to understand an explanation of it given to him in a way that is appropriate to his circumstances such as using simple language, visual aids or any other means.<sup>2</sup> Dougall & Fiske highlight issues surrounding literacy, dyslexia and learning disability and that unless appropriate measures are taken,

such as the communication aids outlined in Box 5, capacity cannot be properly assessed and may not therefore be evident.<sup>7</sup>

## Box 5: Forms of Communication<sup>7</sup>

1. Printing information on coloured paper makes it easier to read for some people with dyslexia or use a coloured acetate overlay to achieve the same effect
2. Fonts should be rounded to allow for space between the letters, with Arial and Trebuchet MS in Size 14
3. Picture cards
4. Makaton or Signalong - uses signing and symbols
5. Widgit software - which uses symbols for writing;
6. Talking Mats

## Best Interest (BI) Decisions

Under principle 4, any decision(s) relating to a lack of capacity has to be done in the patient's best interest(s). As each case is different, a best interest checklist allows consideration of relevant circumstances, including the patient's personal values, beliefs, past and present wishes and feelings, as well as any relevant written statement when they had capacity. Box 6 lists the factors to consider.<sup>1</sup>

## Box 6: Considerations when Determining Best Interest<sup>1</sup>

1. Whether it is likely that the person will at some time have capacity in relation to the matter in question
2. If it appears likely that he will, when that is likely to be
3. As far as reasonably practicable, permit and encourage the person to participate, or to improve his ability to participate, as fully as possible in any act done for him and any decision affecting him
4. Where the determination relates to life-sustaining treatment he must not, in considering whether the treatment is in the BI of the person concerned, be motivated by a desire to bring about his death.

However, decision making is limited by any advanced directives or decisions refusing medical treatment or by anyone who has decision making power in the BI of the patient, such as a Lasting Power of Attorney (LPA) or Court Appointed Deputies (CAD).

An LPA is a legal document that allows a person to appoint one or more people known as attorneys to help make decisions with or on their behalf when they lack mental capacity. (Scotland & Northern Ireland have a different process). The Office of the Public Guardian (OPG) are responsible for registering and maintaining the public register of deputies and LPAs in England and Wales.<sup>17</sup> If a person has an LPA, verification of its legality should be checked by either requesting to see the complete unaltered document or contacting the OPG, with a copy kept in the patient's notes. The document should be checked for how attorneys are allowed to act, the types of matters they can make decisions on, any restrictions placed and any applicable advanced directives or decisions to refuse specific treatment.<sup>17</sup> Any decisions must be in the BI of the person lacking capacity, and if there are concerns about the motivation of the LPA this should be raised, and if necessary advocacy sought (e.g. safeguarding teams), or if required, an application to the Court of Protection.

The term 'Next of Kin' has no legal status when a person is alive, and family or relatives cannot be used to sign or give consent to a medical intervention, unless they have a legal basis as described above.<sup>18</sup> Where a patient's representative is a paid member of staff, an Independent Mental Capacity Advocate (IMCA) should be appointed.<sup>19</sup> Their role is to safeguard a patient's rights (including serious medical treatment) when capacity is lacking. The benefit for clinicians working with IMCAs, are that they are 'assisted in the decision-making processes by a person with a good knowledge of the act, enabling complex decisions to be made with more confidence and in many cases more quickly'.<sup>20</sup> As the patient has a right to confidentiality and privacy, only as much information should be disclosed to those whose views are relevant to the decision.<sup>20</sup>

## Disagreements about Best Interest

Disagreements about a patient's BI should be managed by reviewing the elements of the checklist with everyone involved, and trying to balance any concerns. As the assessing clinician is the ultimate decision-maker responsible for working out the BI. Advocacy support may be required if there are disagreements between family/carers and health care professionals.<sup>21</sup> In serious cases, the DoH advises an application to the Court of Protection.<sup>20,21</sup> Any valid and applicable advance decision to refuse treatment cannot be ignored and if the decision departs from this, then the reason should be recorded clearly.<sup>19</sup>

## Fluctuating Capacity

As the act describes, the assessment is based on the balance of probabilities. However, this is a grey area, as a patient's capacity might fluctuate depending on their circumstances and condition. Dougall & Fiske explain that some people can make decisions on some issues, such as an exam and simple dental scaling, but may not on others, depending on the complexity and implications of the decision,<sup>7</sup> such as having teeth extracted or treatment under general anaesthesia.<sup>22</sup> For anxious and phobic patients who seek emergency treatment, Holden & Holden consider whether a decision made in a state of anxiety in the clinical situation would be the same as when the patient is away from the dental setting<sup>6</sup>, as it has been shown in case law *Re: MB*<sup>23</sup>, that capacity can be temporarily affected by factors such as needle phobia, pain, fear, confusion or medication.<sup>19</sup> Another consideration, is whether the decision can be postponed if the patient is likely to regain capacity in time. Edwards et al discussed dementia patients exhibiting fluctuating capacity depending on the time of day, but also phases of reduced capacity improving so that non urgent decisions could be delayed to allow for when individuals could consent for themselves.<sup>22</sup>

## The Caveat?

The DoH suggest that it is good practice to establish and record a patient's views about any clinical intervention that may be necessary during a period of anticipated incapacity.<sup>5</sup> Patients undergoing sedation results in a temporary loss of capacity to consent due to the influence of drugs, thus any request for treatment whilst sedated would be invalid unless it was agreed prior to administration of the drug.<sup>10</sup>

However, should there be a caveat in the consent process to include the taking of a blood sample in the event where a body

fluid exposure has arisen during the sedation period, such as a after a needle-stick injury?

The difficulties involved in this situation include patient's lack of capacity to consent, often logistics are difficult enough to get the patients to the clinic, especially those patients managed in high risk clinics with HIV, Hepatitis B, and Hepatitis C. Needle phobic patients are less likely to volunteer to have a blood test especially when it is of no clinical benefit to themselves. Under non-sedation settings, a conscious non-phobic, co-operative patient would be involved in the discussion and have the ability to consent. The clinician concerned would be able to get reassurance and avoid long drawn out reviews and the need for prophylactic medication which may not have been required.

## The Least Restrictive Option

Principle 5 relates to provision of care in the least restrictive manner. For patients who lack capacity, behaviour management may not be sufficient alone and pharmacological techniques, including sedation and general anaesthesia (GA), should be considered. A benefit of sedation is that it reduces the need for a GA and can be provided in primary and secondary care, hence widening treatment options.<sup>9</sup>

The decision is based on the patient's individual need and not for the convenience or values of the clinician, carers or relatives. The MCA protects patients from the undue influence of others as seen in the legal case of *Re T*<sup>24</sup>, relating to refusal of medical treatment based on a relative's personal beliefs.

The chosen technique and drug(s) has to be appropriate for the patient and the procedure being carried out and balanced with other co-morbidities, such conditions as dementia can worsen following a GA<sup>25</sup>, and patients with LD have shown to have undiagnosed disease which may put them at risk.<sup>26</sup> The technique(s) proposed should be discussed with patients and carers and included in the consent process. For example, a single drug technique, can be administered via intravenous (IV), oral and transmucosal routes, reducing the risk of multiple pharmacological effects<sup>27</sup>, this can allow assessment of co-operation and treatment need which will determine if further or advanced sedation techniques are required or move to treatment under GA.<sup>28</sup> A combined technique may be more favourable to gain co-operation<sup>29</sup>, such as for needle phobic patients who cannot tolerate cannulation alone.<sup>30</sup> All treatment being undertaken during the dental sedation appointment should be consented for, including any other planned medical procedures by the relevant health professional. It has been shown that a multidisciplinary medical approach results in avoidance of GA and multiple sedation appointments for the patient needing simple routine procedures.<sup>31</sup>

## Clinical Holding

Any form of clinical holding should also be considered and discussed as part of patient management during the BI assessment. The British Society of Disability and Oral Health guidance rationale is where 'treatment cannot be carried out safely or effectively as a result of behaviour presented by the patient',<sup>32</sup> and 'may be acceptable for single short interventions rather than extreme alternatives such as GA'.<sup>7</sup> Emmett explains that physical restraint may be needed. However, 'this should not exceed what is

necessary in order to carry out the proposed treatment, and should be weighed against any potential mental or physical harm to the patient'.<sup>33</sup> As long as the clinician reasonably believes that it is necessary to restrain in order to prevent harm, and is proportionate to the likelihood of harm, then the clinician is allowed to undertake appropriate clinical holding under the MCA sections 5 & 6.<sup>2</sup>

## The Decision & Record Keeping

Once all the facts have been investigated and weighed up, the outcome should be clearly recorded on a Consent Form 4.<sup>34</sup> (Department of Health guidance for adults who lack capacity). Box 7 lists the decision making information required by the assessing clinician.

### Box 7: Decision Making Information

1. What the proposed treatment is
2. Why they believe the patients lacks capacity
3. Why it is in the best interest of the patient
4. Who the clinician has consulted
5. Anyone acting on behalf of the patient (e.g. LPA, CAD)

This also acts as 'written evidence if the decision is challenged in the future'.<sup>20</sup> The consent form can only be signed by authorised person (an LPA or CAD) otherwise it should be noted as 'patient unable to consent' and why the treatment was decided to be in the patient's BI.<sup>35</sup> Organisations should have a protocol in place for reviewing BI. This could be a periodic date or a change in the patient's circumstances 'as what is in a person's BI may well change over time'.<sup>35</sup> This is especially relevant when 'similar actions need to be taken repeatedly in connection with the person's care'.<sup>35</sup> In such instances the BI should be reviewed to determine if the proposed care is suitable to their changing needs.<sup>35</sup>

## Conclusion

In conclusion, familiarity with the MCA and its code of practice is essential to determine capacity and to allow the appropriate management of patients who lack it in any dental setting. The Best Interest assessment should be based on an individual patient's circumstances and wishes, including consideration of any appropriate pharmacological intervention. Finally the decision should be clearly recorded and reviewed periodically to ensure care is provided in the best interest of the patient in order to adhere to correct legal and clinical practice.

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## Combining Sedation and Cognitive Behavioural Therapy (CBT) to Overcome Dental Phobia: a Case Report

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### Abstract

This case report presents a Cognitive Behavioural Therapy (CBT) intervention provided for a 63-year-old male, who had experienced dental phobia for over 50-years. This gentleman initially received intravenous sedation (IVS) for 5-years within a Specialist Sedation and Special Care dental department, before being referred for the long-term management of his dental phobia, within the embedded specialist Dental Health Psychology Service in a London Dental Hospital. This brief report will consider aspects of the CBT intervention delivered in relation to assessment, case conceptualisation, course of treatment and outcomes; reflecting on the complementary aspects of sedation and CBT. Learning points will be identified for the role of CBT or CBT-based techniques within dental anxiety management settings.

### Introduction

#### Patient: referral information

Mr H is a 63-year-old white male, married with adult children and works full-time in a family business. In addition to dental anxiety, Mr H had a significant gag-reflex. He had no significant medical conditions.

Mr H was internally referred by a speciality dentist within the Sedation and Special Care Dental department, when it became apparent that his co-operation under intravenous sedation (IVS) with either midazolam or propofol was becoming inadequate. After 5 years of sedation use, the medication appeared to have reduced efficacy, with a limited time-frame in which treatment could be completed successfully. His remaining dentition consisted of 16 moderately restored teeth with several restorations needed. He had chronic periodontitis, compounded by ineffective tooth brushing because of gagging.

An apparent inability to stabilise his deteriorating dentition or effectively manage chronic periodontitis, combined with his lack of co-operation under IVS, lead to reassessment of treatment options. General anaesthesia (GA) was considered as a potentially more appropriate treatment modality (however, access to GA services without special care needs are uncommon in most areas). However, to avoid repeated GA sessions for dental care in future, a dental clearance was discussed along with provision of complete dentures. Cognitive Behavioural Therapy (CBT) was recommended as another option, to explore if Mr H could potentially receive treatment with local anaesthetic (LA) alone.

### CBT Assessment

Mr H attended for CBT assessment with a psychologist, where he articulated a history of his childhood dental experiences including a specific traumatic dental memory and subsequent avoidance of treatment. After his 45 year gap of avoidance, Mr H reported the onset of a significant gag-reflex when he attended a General Dental Practitioner (GDP); this was increasingly being triggered during tooth-brushing, further impacting his oral health (see timeline, figure 1).

**Figure 1. Timeline: Dental Treatment History**

Age 1-12:	Attended school dentist: no specific memory, but "generally unpleasant"
Aged 13:	Attended GDP with step-parent: recalled painful treatment, no sense of control when requested to stop, memories of being held down and told to be quiet
Aged 58:	Attended GDP, prompted by pain and difficulty eating; supported and encouraged by family. Experienced gag-reflex for first time during dental examination and referred to SSCD for treatment under IV-sedation
Aged 58-63	All dental treatment completed under IV-sedation (Midazolam and Propofol)
Aged 63	Referred for CBT for dental phobia

Mr H completed a number of standardised outcome measures (table 1)<sup>1,2,3</sup> to assess dental anxiety, oral health and general psychological well-being. These demonstrated clinically significant scores on the disorder specific measure (MDAS 23/25) and a moderate level of anxiety seen in the HADS (table 2).

Overall, the assessment indicated a diagnosis of specific phobia of dentistry, according to both criteria outlined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5)<sup>4</sup> and the International Classification of Disease (ICD-10)<sup>5,6</sup> (Table 3). No other concerns or risks were identified and Mr H was deemed suitable for CBT.

### Case Conceptualisation

Consistent with classical conditioning,<sup>7</sup> Mr H demonstrated associations of pain, discomfort and loss of control with dental treatment. The idea of attending a dental appointment would

# CASE STUDY

**Table 1. Outcome measures**

*General mood assessment and oral health questionnaires routinely used within service*

<b>Modified Dental Anxiety Scale (MDAS)</b> (Humphris et al. <sup>1</sup> )	5-item self-report questionnaire assessing anxiety of specific aspects of dentistry: 5-point Likert-scale response ranging from 'not anxious' to 'extremely anxious'. Highly validated and reliable measure used in research and clinical settings. Cut-off scores: Score range 5-25; >19 dental phobia/extreme dental anxiety
<b>Oral Health Impact Profile-14 (OHIP)</b> (Slade, <sup>2</sup> )	14-item self-report questionnaire to measure functional limitation, discomfort and disability attributed to oral conditions. 5-point Likert-scale to measure each impact's frequency. No cut-offs: higher scores indicate more impacts/frequency
<b>Hospital Anxiety &amp; Depression Scale (HADS)</b> (Zigmond & Snaith, <sup>3</sup> )	14-item self-report questionnaire measuring anxiety and depression: 7-anxiety-specific and 7-depression-specific questions scored separately. Cut-off scores indicate: 0-7 normal, 8-10 moderate, 11-21 clinically significant (or "caseness")

**Table 2. Assessment and Follow-up scores**

	<b>MDAS</b>	<b>OHIP (Impact / Frequency)</b>	<b>HADS Anxiety</b>	<b>HADS Depression</b>
Assessment	23	12 / 44	8	3
Follow-up	10	2 / 26	6	1

**Table 3. Diagnostic Criteria for Specific Phobia**

<b>DSM-5 300.29 Specific Phobia</b>	(APA, <sup>4</sup> )
<p><b>A.</b> Marked and persistent fear that is excessive or unreasonable, cued by the presence or anticipation of a specific object or situation (e.g.: flying, heights, animals, receiving an injection, seeing blood).</p> <p><b>B.</b> Exposure to the phobic stimulus almost invariably provokes an immediate anxiety response, which may take the form of a situationally bound or situationally predisposed panic attack. Note: In children, the anxiety may be expressed by crying, tantrums, freezing, or clinging.</p> <p><b>C.</b> The person recognises that the fear is excessive or unreasonable. Note: In children, this feature may be absent.</p> <p><b>D.</b> The phobic situation(s) is avoided or else is endured with intense anxiety or distress.</p> <p><b>E.</b> The avoidance, anxious anticipation, or distress in the feared situation(s) interferes significantly with the person's normal routine, occupational (or academic) functioning, or social activities or relationships, or there is marked distress about having the phobia.</p> <p><b>F.</b> In individuals under age 18 years, the duration is at least 6 months.</p> <p><b>G.</b> The anxiety, panic attacks or phobic avoidance associated with the specific object or situation are not better accounted for by another mental disorder...</p>	
<b>ICD-10: F40.2 Specific (isolated) phobias</b>	(WHO, <sup>5,6</sup> )
<p><b>A.</b> Either (1) or (2): (1) marked fear of a specific object or situation not included in agoraphobia (F40.0) or social phobia (F40.1); (2) marked avoidance of such objects or situations.</p> <p><b>B.</b> Symptoms of anxiety in the feared situation at some time since the onset of the disorder, as defined in criterion B for F40.0 (Agoraphobia).</p> <p><b>C.</b> Significant emotional distress due to the symptoms or the avoidance, and a recognition that these are excessive or unreasonable.</p> <p><b>D.</b> Symptoms are restricted to the feared situation, or when thinking about it.</p>	

trigger Mr H's catastrophic thoughts, such as "it will be unbearably painful", "I won't be able to cope with the pain and they won't stop if it hurts", "I have no control", "dentists don't listen", which triggered anxiety and associated physiological sensations (palpitations, perspiration, increased respiration), so he avoided any reminders, taking numerous analgesics to reduce intermittent pain. While this reduced the sensations of anxiety, providing temporary relief, it did not alleviate the fear - supporting the role of operant conditioning.<sup>8</sup>

IVS provided an essential anxiolytic method for Mr H to receive vital and long-required dental treatment; opening the door to dental treatment from 45-years of total avoidance. However, whilst effective for 5 years, ultimately the amnesic properties of sedation are likely to have maintained Mr H's conscious avoidance (i.e. whilst experiencing dental treatment, he had no conscious awareness of what was involved); thus preventing new learning and disconfirmation of his catastrophic cognitions and predictions.

These processes are consistent with Mowrer's<sup>9</sup> two-factor theory; in which dental appointments were initially avoided or later completed with IVS to reduce feelings of fear. However, this fear reduction served to reinforce and maintain future avoidance.

## CBT Treatment: an Overview

While interested in CBT, Mr H was initially doubtful as to how he could overcome his phobia after a lifetime of fear. Therefore, Mr H's stated CBT goals were: 1) to better understand his phobia development to strengthen his interest in committing to CBT, 2) to gain better control of his gag-reflex and 3) to receive dental treatment without IVS.

The course of CBT and interventions provided were individually tailored to Mr H and were consistent with the standardised treatment approach to dental phobia used in the department (see Newton et al.<sup>10</sup>); these methods are also supported by treatment recommendations from Lundgren & Boman<sup>11</sup> and Öst<sup>12</sup>.

The course of therapy focussed on graded exposure, with elements of psycho-education and relaxation (progressive muscle relaxation [PMR]). Cognitive reframing (via discussion/exposure/behavioural experiments) was incorporated throughout therapy; with written thought records to note belief changes, following education and exposure treatment elements. Behavioural interventions of graded exposure<sup>13</sup> and systematic desensitisation,<sup>14</sup> are terms commonly interchanged. The essential difference being that desensitisation includes relaxation to enhance anxiety reduction during the exposure phase, whereas graded exposure focuses solely on being in the situation long enough to recognise that anxiety will drop on its own accord (i.e. habituation). Mr H found relaxation helpful both to manage his anxiety and his gag-reflex, therefore this was supported and encouraged during his CBT.

The initial assessment and formulation sessions were conducted in a non-clinical room. Subsequent sessions were conducted in a dental surgery, initially with the psychologist alone; a hygienist joined later appointments when active elements of exposure and treatment were provided.

Alongside CBT methods, a combination of desensitisation techniques (using a dental mirror) and physiological relaxation exercises were utilised to reduce gag-reflex sensitivity. An overview of the sequence of therapy is provided in Table 4.

## Treatment Outcomes

Following assessment, Mr H received 8 CBT treatment sessions of 1 hour each, before his care was transferred to a departmental dentist to complete his identified treatment. A final follow-up was provided when his dental treatment was near completion.

At 9 month follow-up, Mr H had achieved all of his stated goals and received all planned dental treatment with local anaesthetic only. This included extensive dental scaling, three restorations (UL4, LL4,5), radiographs, impressions and provision of partial dentures. No extractions were necessary. He managed to regularly attend a hygienist for maintenance of oral hygiene. He also reported no longer experiencing a gag-reflex during tooth-brushing, with only one episode during treatment in which his gag-reflex was triggered (this involved a rubber dam); otherwise he said this was now well-managed. Furthermore, his scores on the MDAS no longer met the threshold for clinical significance, falling to 10/25 and dropped further to a reported score of 6/25, if he was using his relaxation exercises (table 2). Mr H's generalised anxiety (HADS) had also fallen within the "normal" range. Mr H had made plans to attend his wife's GDP for ongoing dental appointments, following discharge from the service.

## Discussion and Learning Points

This brief case report demonstrates how dental phobia developed from a reported traumatic event and was maintained by long-term avoidance of dental treatment. It highlights the invaluable role of sedation methods in restoring dental health among a patient with a 45-year treatment absence, with holistic benefits to his health and wellbeing. However, when IVS methods became less effective to complete his treatment and with a reluctance to offer repeated GA for simple dental procedures, CBT provided an alternative option for long-term management. Indeed, access to GA for adults without special care needs is unlikely to be provided in most areas. Therefore, this report illustrates the complementary approach to anxiety management that sedation and CBT can offer; in order to rehabilitate a patient to maintained oral health with anxiety reduction.

In addition to IVS providing a means to complete initially effective treatment (which were mostly extractions), the process of attending for IVS treatment will have undoubtedly provided learning opportunities and indirect exposure to dentistry with rehabilitative benefits. Indeed, this transition in care had enabled Mr H to become more accustomed to enter the dental department and dental surgery in the first place – reducing the focus on exposure to the dental environment required for 'total-avoiders' (coined by Milgrom<sup>15</sup>). This transition from receiving dental treatment with IVS to local anaesthetic alone, also supports recommendations by the IASCD<sup>16</sup> for minimally effective intervention and treating dental anxiety proportionately.<sup>17</sup> In addition to the health benefits, transitioning patients to non-pharmacological management, in order to overcome fear and access primary care dental services, allows a better flow of new patient referrals and reduced waiting-time for patients requiring treatment with sedation.

While this is a single case report without long-term follow-up, the lasting benefits of CBT for dental anxiety are well-documented in systematic reviews<sup>18</sup> and meta-analyses.<sup>19</sup> This patient was also treated within a department where effective outcomes for CBT have been evidenced.<sup>20</sup>

**Table 4. CBT Intervention Summary**

<p><b>Assessment</b> <i>(Non-clinical room)</i></p>	<ul style="list-style-type: none"> <li>- Assessment and outcome measures</li> <li>- CBT rationale <i>Including brief psycho-education on anxiety and concept of homework</i></li> <li>- Goal setting</li> <li>- Introduction to relaxation techniques <i>i.e. Diaphragmatic breathing and PMR</i></li> </ul>
<p><b>Session 1</b> <i>(Non-clinical room)</i></p>	<ul style="list-style-type: none"> <li>- Formulation <i>i.e. a collaboratively drawn diagram to identify problem development, maintenance and other relevant factors (for more information see Kirk &amp; Rouf's<sup>21</sup> model of specific phobia, outlined by Westbrook et al.<sup>22</sup></i></li> <li>- Psycho-education <i>i.e. explanation of anxiety and fight/flight response – impacting physical sensations, thoughts and behaviours</i></li> <li>- Introduced role of graded exposure</li> <li>- Dental mirror provided for exposure and gag-desensitisation</li> </ul>
<p><b>Session 2</b> <i>(Non-clinical room)</i></p>	<ul style="list-style-type: none"> <li>- Graded exposure in non-clinical room <i>Introduction to check-up kit, education and exposure to dental tools</i></li> <li>- Desensitisation exercises for gag-reflex <i>Using dental mirror, distraction methods and diaphragmatic breathing exercise (and Mr H's own relaxation methods)</i></li> </ul>
<p><b>Session 3</b> <i>(Dental surgery)</i></p>	<ul style="list-style-type: none"> <li>- Graded exposure to dental examination <i>Dental examination steps → brief examination (mirror-only) with dentist</i></li> <li>- Practice with impression tray <i>Testing predictions and feared catastrophe (i.e. behavioural experiments)</i> <i>Desensitisation exercises with impression tray for gag-reflex management</i></li> </ul>
<p><b>Session 4</b> <i>(Dental surgery)</i></p>	<ul style="list-style-type: none"> <li>- Graded exposure to dental examination <i>Full dental examination received with tooth and periodontal probe</i></li> <li>- Practice with impression tray</li> </ul>
<p><b>Session 5</b> <i>(Dental surgery)</i></p>	<ul style="list-style-type: none"> <li>- Graded exposure to scale and polish <i>Built-up to 5-minutes of hand-scaling</i></li> <li>- Gag-reflex management (no gag triggered)</li> </ul>
<p><b>Session 6</b> <i>(Dental surgery)</i></p>	<ul style="list-style-type: none"> <li>- Graded exposure to ultrasonic scaling and slow-speed hand-piece <i>Completed hand-scaling and ultrasonic scaling &gt;15mins</i> <i>Completed polish using slow-speed hand-piece</i></li> <li>- Graded exposure started to local anaesthetic <i>Photos of local anaesthetic components introduced</i></li> </ul>
<p><b>Session 7</b> <i>(Dental surgery)</i></p>	<ul style="list-style-type: none"> <li>- Graded exposure to local anaesthetic <i>Completed dental injection in session</i></li> <li>- Graded exposure started to drilling (sounds and photos of drills)</li> </ul>
<p><b>Session 8</b> <i>(Dental surgery)</i></p>	<ul style="list-style-type: none"> <li>- Graded exposure to drilling <i>Completed local anaesthetic and simulation of filling using slow and high-speed hand-pieces</i></li> </ul> <p><b>CBT complete:</b> Dental treatment agreed to commence with dentist</p>
<p><b>Follow-up</b> <i>(Non-clinical room)</i></p>	<ul style="list-style-type: none"> <li>- Final review of goals and progress</li> <li>- Dental treatment plan in final stages: awaiting lower-denture</li> <li>- Planned discharge to GDP for long-term dental care</li> </ul>

To conclude, this case report demonstrates the complementary roles pharmacological and CBT techniques offer in services established for the management of dental anxiety. It also highlights the utility of combining both interventions in a planned care pathway to rehabilitate patients to primary care dental services and avoid repeated sedations; with benefits to patient health, service delivery, waiting-times, with likely cost-savings.

For a more detailed description of CBT and the elements of intervention outlined in this brief case report, please see key texts from: Newton *et al.*,<sup>10</sup> Öst & Skaret<sup>12</sup> or Westbrook *et al.*<sup>22</sup>

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## Study Day in General Anaesthesia for Special Care Dentistry



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New Hunt's House, London SE1 1UL

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## A Synopsis of articles of interest from the last twelve months to inspire further reading



Fareed Ahmad



Mike Sury



Jennifer Hare

### Service evaluation of a nurse-led dental anxiety management service for adult patients

Porritt J, Jones K, & Marshman Z.  
*Br Dent J* 2016; 220: 515 - 520

#### Objective:

Evaluate patients' and professionals' experiences of a nurse-led dental anxiety management service (NDAMS).

#### Design

Service evaluation.

#### Setting

The NDAMS operates as part of the Sheffield Salaried Primary Dental Care Service.

#### Subjects and methods

Questionnaire survey of anxious patients and qualitative interviews with patients and professionals.

#### Interventions

Dental nurses delivered low-level psychological interventions as part of an integrated care pathway (ICP) for dental anxiety.

#### Main outcome measures

Dental anxiety and oral health-related quality of life (OHRQoL) questionnaires were completed by patients before and following NDAM.

#### Results

A total of 187 patients were assessed as suitable for NDAM (mean age = 33.7, 77% female) and 33 had completed it at the time of the service evaluation. Of those patients who had completed the intervention, significant improvements in dental anxiety and OHRQoL were reported. Professionals highlighted the importance of integrated working, adequate support and training, and assessing the suitability of patients for NDAM.

#### Conclusion

ICPs that combine pharmacological and psychological

management approaches can help meet the needs of dentally anxious patients; however, early identification of patients most likely to benefit from psychological intervention should be a priority.

#### Reviewer's evaluation, opinion and points of interest

Given the interest and growing demand for Cognitive Behavioural Therapy (CBT) provision within dental anxiety management services, this service evaluation provides an insight into the benefits and challenges of such integrated care pathways with nurse-led CBT-based intervention.

Having implemented a stepped care model of delivering CBT techniques within a community dental service, the authors report on the service outcomes and patient feedback of a 2-year and 5-month period. In addition to a review of referrals and flow of patients through their 'Integrated care pathway', the review focuses on the experience of the 33-patients who completed treatment with the nurses. Objective measures are reported on pre/post scores of anxiety (using the MDAS) and oral health related quality of life (using the OHIP-14); both demonstrating significant reductions as a result of nurse-led CBT-based intervention. Details on the CBT-based intervention are not included in this review, however the authors report sessions lasting between 30-minutes and 1-hour, with a mean of 5.7 appointments attended (ranging between 1-18 sessions). Interestingly, they report an average waiting time of 12-months, which demonstrates a demand for the service, and may imply a need for greater staffing resource to meet the referral intake. It is unclear whether the nurses providing the intervention are employed full-time to provide the NDAMS, or whether this work sits alongside their other dental nursing duties.

An interesting addition to this service evaluation is the qualitative interviews undertaken with a selection of patients (n=7) who had completed treatment with the NDAMS, and the healthcare professionals (n=16) involved, so to ascertain their experiences and perspectives. These findings make useful reading on the self-reported benefits for patients, as well as the benefits and challenges experienced by those providing the service. These aspects would be of particular interest to dental professionals interested in establishing their own services.

This review highlights the need for a stepped-care model in the behavioural management of dental anxiety; particularly demonstrating the value of multi-disciplinary team (MDT) working, with access to psychology and psychotherapy services for more complex patients; the importance of training and supervision of involved staff – so to increase confidence and skills, and necessity to have well-defined care pathways in place.

JH

### Additional comments from Fareed Ahmad

Dental phobia prevents patients from seeking treatment which negatively impacts their quality of life in diverse ways. For those with severe dental anxiety, dental services need to develop care pathways that combine the use of pharmacological approaches with psychological interventions to help patients better manage their condition in the long term.

Cognitive behavioural therapy (CBT) is an evidence-based treatment for a number of anxiety-based conditions and effective at reducing dental fear in adults. However, the demand for CBT practitioners and psychological services often outweighs the resources available. Dental nurses are particularly well placed to deliver low level psychological interventions because they are based in dental clinics and have access to dental equipment used in behavioural exposure interventions.

The study is based on the experience of a team of 2 dental nurses who were trained in the delivery of cognitive and behavioural techniques and were provided with access to regular supervision with a CBT therapist. Between July 2011 and December 2013, 253 patients were referred into the service of whom 187 patients were assessed as suitable. However, at the time of the service evaluation only 33 patients had completed the therapy and the waiting list for newcomers was approximately 12 months.

The study provides support for the role dental nurses can play in the psychological management of dental anxiety and confirms previous research which found that brief psychological interventions for anxiety can be effectively delivered by trained nurses, although it has to be taken into account that dental anxiety is different to many other anxiety conditions in that patients may need to accept complex surgical interventions on completion of the psychological intervention.

The main recommendations which arose from this service evaluation included: i) that psychological support continues to be made available for dentally anxious patients; ii) that more efficient ways of assessing suitability for NDAM be examined and developed; iii) that there be increased flexibility in the referral process and care pathway in order to allow the services fully to meet the needs of a variety of patients who are referred into the system; and or iv) that effective communication between the patients, referring practitioners and professionals working within the integrated care pathway be maximised.

The necessity for CBT professionals to work closely with the dental team means strain on limited resources and future research needs to examine the clinical and cost effectiveness of this particular method of management of dental anxiety.

FA

## Review of never and serious events related to dentistry 2005–2014

Renton T & Sabbah W

*Br Dent J* 2016; 221: 71 - 79

Published online: 22 July 2016 | doi:10.1038/sj.bdj.2016.526

- Identifies where, when and why patient safety is compromised.
- Identifies limitations of the reporting system of iatrogenic incidents.
- Provides recommendations to avoid limitations of incident reporting system.
- Provides recommendations to avoid patients compromising incidents.

### Abstract

#### Aims:

To review never and serious events related to dentistry between 2005-2014 in England.

#### Methods:

Data from the National Reporting and Learning System (NRLS) using the timeframe January 2005 to May 2014. The Strategic Executive Information System (STEIS) database was reported separately for 2012–2013 and 2013–2014. Elements from the database were reclassified according to the nature of the patient safety incident (PSI).

#### Results:

From the NRLS dataset, 32,263 patient safety events were reported between 1 January 2005 and 30 May 2014. Never events (NEs) from STEIS files were all wrong site extractions (WSS), reported separately for 2012-2013 and 2013-2014. The total number was 43.36 of the 43 PSIs were WSS involving: multiple extractions and bimodal age distribution (very young or over 60 years). Forty-seven percent of never events resulted in no harm, 20% low harm, 7% moderate harm, less than 1% severe harm and 23 deaths over this period (five of which were not related to dentistry). Serious harm and death risk factors included: care in an acute trust ward, peri oncological, reconstructive surgery (OMFS), patient age over 67 years with concurrent medical complexity (Ischaemic heart disease). Sixty percent of PSIs occurred in OS/OMFS in acute trust inpatients and 20% in primary care. From STEIS 2012-2013, 21 WSS were reported of which 50% occurred in oral surgery (OS) or oral and maxillofacial surgery (OMFS). The reported sites were 45% in operating theatre and 42% in dental surgery.

#### Conclusion:

Incidences of iatrogenic harm to dental patients do occur but their reporting is not widely carried out. Improved awareness and training, simplifying the reporting systems improved non-punitive support by regulators would allow the improvement of patient safety in dental practice.

#### Discussions

The recording and reporting of mistakes and errors in any industry is essential in improving standards, and dentistry is no exception. Dentists who treat their patients under sedation have to comply with additional standards to provide safe care. Although the only 'never event' mentioned in the paper relating to sedation is 'overdose (mis-selection of high strength) of midazolam,

sedationists need to recognise the extra risks of sedation activity in general and constantly reinforce their safety protocols to prevent adverse events.

In this regard, the article confirms that there is no single cause underlying the occurrence of the never events which were reviewed. Never events are almost always the result of multiple sources of error including human factors, working environment and practice, systems and supportive structures, training in learning from PSIs, poor professional behaviour and team building. This review highlights the need for improving the reporting of patient safety incidents in dentistry which is even more pertinent to the practice of sedation in dentistry. It offers guidelines for national directives and standards to 'reach' dentistry and for dental regulators to develop a more proactive and aligned role in promoting mandatory training in PS, especially in developing a supportive and non-punitive culture for reporting and learning. A cultural and systematic change in dentistry is required, as has happened with primary care medicine, to improve patient safety incident reporting with resultant visible improvement in patient safety.

Interestingly, one of the harm events which is considered to have been inappropriately reported, is 'change of anaesthesia from sedation to LA'. Could this refer to a dentophobic patient who suffered an episode of extreme panic and mental distress on being informed that for whatever reason, sedation could not be offered? If so, it is not unheard of.

FA

## Postoperative sore throat: a systematic review

*El-Boghdadly K, Bailey C R, Wiles M D  
Anaesthesia 2016;71:706-17.*

### Summary and Reviewer's comments

Sore throat (ST) after anaesthesia is surprisingly common (up to 60% in some series) and this article is a useful systematic review (quoting 134 references) of its associations, its possible causes and the methods of prevention. I have picked out some of the more interesting and important facts. First, the term covers pharyngitis, laryngitis, tracheitis, cough, hoarseness or dysphagia and, obviously, the causes of these may be varied and multiple. ST is almost always self-limiting and no intervention is completely effective. I am not aware that ST after a technique NOT using any airway device has been studied and this is an area that dental sedationists could explore.

### Tracheal tubes in adults

#### Risk factors

Tracheal tubes (TTs) cause more pain than supraglottic devices. ST is more common in women although this rate drops if the TT size is reduced to a size 6 (mm, internal diameter). In a very large study of over 21k patients the seniority of the anaesthetist had no effect on the incidence of ST. Modern video laryngoscopes may reduce ST. Neuromuscular blockade reduces the incidence, perhaps because laryngeal visualisation is improved or trauma of insertion is less.

### Prevention

- Lidocaine. A Cochrane meta-analysis showed that topical and systemic lidocaine therapy reduces the chance of ST (relative risk 0.64) but, because of the wide variation in methods, doses and routes of administration, the evidence is not strong and no method can be recommended.
- Steroids. Many steroids have been studied and the overall impression is that they all reduce ST modestly (relative risk ~0.6).
- NSAIDs. Benzylamine, a mouthwash or spray, has been investigated more than any other NSAID and has a modest effect. Old fashioned aspirin gargle also works but only for about 2 hours. Diclofenac, intravenously, has no measurable effect but does if given topically.
- Tracheal cuff pressure (CP) should be important but, in a large study controlling the CP, the incidence of ST reduced from 44% to only 34%.
- Liquorice, by gargling before anaesthesia, has a beneficial effect for 4h but ST returns at 24h.
- NMDA receptor antagonists have anti-inflammatory effects. A magnesium lozenge has an appreciable effect for a few hours but, again, ST returns at 24h. A ketamine gargle is more effective than an intravenous dose.
- Over-the-counter proprietary lozenges also can be effective but have not been tested by large studies.

### Supraglottic airway device (SAD) in adults

ST can occur in approximately 50% of patients after a SAD. The choice of SAD seems to have little bearing on ST. Second generation SADs seem to have the same ST effect except for the i-gel which may be better because it doesn't have an inflatable cuff. The insertion technique itself has a role: insertion with the cuff fully inflated rather than deflated reduces ST. In another study, the rotational method of insertion improved the insertion success rate and reduced ST. High SAD cuff pressures (CP) cause ST but only, it seems, for the "Classic LMA". Lubricants or humidification do not have an obvious effect (but in one study, beclamethasone gel was better than 2% lidocaine). A lozenge of flurbiprofen cuts the severity but not the rate of early ST. Propofol is associated with less ST than a sevoflurane based technique.

### Children

Children may have a higher incidence of ST than adults depending on how the child can express their symptoms and how the parents are questioned. An ST is usually worst at 4h and can last for 4d. One meta-analysis compared SADs with TTs and found that the ST rate was 9.8% and 15.3% respectively. A nasal TT (relevant for dental anaesthesia) causes more ST than an oral TT especially if the insertion was classed as traumatic. The use of a cuffed TT, provided the CP is low, reduces the chance of TT compared with an uncuffed TT. For SADs, if the CP is <40 mmHg the incidence is negligible. Nitrous oxide (N<sub>2</sub>O) increases CP and ST (in one study N<sub>2</sub>O use caused a ST rate of 36% compared with 5% using air). A polyvinyl chloride SAD causes more ST than a silicone surface device.

MS

## Paediatric procedural sedation using ketamine in a UK emergency department: a 7 year review of practice

Kidd L R, Lyons S C, and Lloyd G.  
*Br. J. Anaesth.* 2016; 116: 518-523

### Background

This paper is a retrospective survey of 7 years of practice and outcomes of ketamine sedation in a single emergency department (Exeter) in the UK.

### Methods

The data came from a database and then further details were sought from written clinical records. Adverse events were classified according to the World SIVA adverse event reporting tool.

### Results

There were 243 sedations of which 215 were by ketamine alone. The need was wound care in most cases: 3 needed a dental procedure. The age range was 14m to 15y (median 4y). The median doses of IV and IM ketamine were 1.65 mg kg<sup>-1</sup> and 4.63 mg kg<sup>-1</sup> respectively. Most (76.7%) were discharged home within a few hours. One patient had paradoxical excitement and could only be managed with general anaesthesia. Thirty patients had a mixture of techniques; 5 had a propofol based technique. Approximately 10% had an adverse event (mostly agitation or apnoea) and these were classed as minor or minimal risk (i.e. they were brief and did no harm). No patient had a major complication (classified as a sentinel risk). All patients were attended by a Consultant.

### Conclusions

This series is further evidence that ketamine does not necessarily require the presence of an anaesthetist. Emergency physicians, if resourced, can deliver an effective and safe service.

### Reviewer's comments

This is a small study but reinforces the view that ED physicians can be trusted to use ketamine. However, they need to be trained and the sedation itself requires the use of a resuscitation bay, equipment and extra staff. For large EDs a sedation suite could be built. For small departments, sending the patient to the operating theatre might be a better use of resources. In this paper it was notable that during the time period of data capture, the attendance rate in the ED increased yet the number of sedations decreased by 10% each year. If this continues it will be more difficult for ED staff to maintain their skills.

MS

## Ketamine and propofol sedation by emergency medicine specialists: mainstream or menace?

Green S M, Mason K P and Krauss B S  
*Br J Anaesth.* 2016;116:449-51.

### Summary:

In the same edition of the BJA as the previous paper, there is an editorial by three sedation experts from the USA. They describe how the UK specialty of emergency medicine has developed along

the lines of the specialty in the USA, Canada and Australasia. The UK training curriculum now involves advanced airway management, resuscitation, critical care, vascular access, monitoring, pharmacology and, specifically, moderate, deep, and dissociative sedation. Emergency medicine sedation practice has "caught-up" with modern practice elsewhere.

### Reviewer's comments:

The business of an ED is try to "fix-it" hopefully without admitting the patient to the main hospital. Ketamine is an invaluable drug because it is an effective analgesic and sedative and it is reasonably safe in responsible hands working in adequate facilities. Propofol also has a role. Anaesthetists have not been supportive of modern ED sedation practice (ketamine and propofol in particular) but the authors finish by encouraging anaesthetists to help the expansion of the capacity of EDs to deliver sedation. If there is more sedation it may be easier to ensure safety – with less sedation, the challenges multiply.

MS

## Capnography monitoring during dental conscious sedation

Brady P, Gallagher C, McCarthy C, O'Halloran K, McCreary C and Ioham G.  
*Oral Surgery* 2016; doi:10.1111/ors.12239

### Background

The latest recommendations on conscious sedation include that capnography may be "appropriate for some 'at risk' ASA grade III/IV dental patients, particularly those receiving supplemental oxygen during sedation." This paper explores the rationale behind capnography and how it could be used.

### Methods

The authors have experience of capnography for conscious sedation in many patients (230) in the Cork University Dental Hospital. Their sedation technique was intravenous midazolam and all patients were monitored with both capnography and pulse oximetry: there was also a clinical observer. The capnography "patient end" attachment fitted on the upper lip and could extract expired gas from the nostrils and the mouth at the same time. Oxygen can be administered via tubing integral to the capnography tubing.

### Results

The main findings were that most patients tolerated it well (six didn't) and as they became sedated they noticed it less. The observation, interpretation and reaction to the numeric capnography changes were challenging to the dentist. Yet limiting the dentists' attention only to the shape of the waveform made the tool more practical. The authors were able to make four recommendations about how to use capnography in the setting of conscious sedation

- 1: changes in waveform shape were easy to recognise and could detect partial airway obstruction,
- 2: respiratory rate was also easy to detect (low rate indicates respiratory depression),
- 3: an increase in end-tidal CO<sub>2</sub>, which is harder to react to, but could be due to hypoventilation, and

4: a decrease in end-tidal CO<sub>2</sub> is more complicated but suggests hyperventilation and/or partial airway obstruction.

They also found that when the pulse oximetry probe failed to pick up a signal (often, simply, misplaced) the dentists were reassured by the presence of a capnographic waveform as clear evidence of unobstructed breathing.

In their experience the most likely time for any respiratory depression was after the last increment of midazolam and before operating began and at this time the dentists learned to pause and watch the capnographic signal for reassurance that all was well. Wisdom teeth extractions were a good example of this.

## Conclusions

The authors' experience promotes the use of capnography in sedated patients.

## Reviewer's comments

The two main messages of this paper are that the waveform and respiratory rate are useful to dentists and that any numeric value is much less important and indeed is difficult to follow. All these thoughts, however, are in respect of sedation. In anaesthesia, by contrast, ventilation and cardiovascular function can be suppressed and capnography is the essential monitor. In anaesthesia, if possible, capnography should be the first monitor applied – it should be the first that the anaesthetist looks for reassurance that the patient is breathing and that there is pulmonary blood flow. Indeed it is the monitor that detects a clear Airway, effective Breathing and adequate Cardiac output – all detected, breath by breath, within a few seconds. Modern advanced resuscitation is now guided by capnography. I predict that capnography will be a standard monitor in modern sedation practice.

MS

## Lidocaine Pretreatment Reduces the Discomfort of Intranasal Midazolam Administration: A randomized, double-blind, placebo-controlled trial

Smith D, Cheek H, Denson B and Pruitt C M. *Acad Emerg Med*. 2016; doi: 10.1111/acem.13115

## Background

Intranasal (IN) administration is effective for sedation and anxiolysis, almost as fast as an intravenous dose of midazolam, but it hurts. Does lidocaine pre-treatment make it hurt less?

## Methods

This was a formal clinical trial, double-blinded, randomised and placebo-controlled in Birmingham (Alabama). The patients were 6-12 years old and received IN midazolam either with 4% lidocaine or 0.9% saline: all delivered via a mucosal atomiser. The pre-treatment was 0.25 ml delivered in to each nostril (0.5 ml 4% lidocaine = 20mg). Five minutes later the midazolam was delivered (0.25mg/kg of 5mg/ml i.e. maximum volume delivered was 2ml (one ml per nostril)). The childrens' discomfort was assessed with the Wong-Baker FACES Pain Rating Scale (WBS; a scale of 0 to 10, 0 = no pain, 10 = maximum pain).

## Results

Over 8 months, 76 children were studied. The 2 groups were similar in age and other factors. The IN lidocaine patients reported less nasal pain with IN midazolam (median WBS 3, interquartile range [IQR] 0-6) than those who received saline pre-treatment (median WBS 8, IQR 2-9) (P=0.006).

## Conclusions

Pre-treatment with topical lidocaine makes IN midazolam less painful.

## Reviewer's comments

What the authors don't say is whether pre-treatment itself was irritating or not. That they do not mention it in an otherwise good standard of report encourages one to assume that lidocaine spray in the nose is easily tolerated. I have used intranasal midazolam in co-operative children who were terrified and venous access was consequently very difficult. In unco-operative children IN midazolam alone is effective (up to a point) but remembered for its pain. IN lidocaine could help – but we should be careful with the dose. Children in this study would have been exposed to a maximum dose of approximately 1 mg/kg. Everyone should be aware that 4% IN lidocaine may not be so safe in smaller children.

MS

## Depression: patients and dentists.

Feinmann C.

*Faculty Dental Journal (RCS Eng)* 2015; 6: 24-27

<http://dx.doi.org/10.1308/204268515X1416311540441>

*"the challenge is for dentists to recognise that facial pain is just one of many physical symptoms of depression, and to resist the temptation to carry out unnecessary and often harmful treatment"*

## Reviewer's evaluation, opinion and points of interest

This article poses some interesting considerations, briefly exploring the dentist's role in recognising depression and suicidal ideation among their patients. While the article focuses predominantly on the manifestation of pain and medically unexplained symptoms, the role of dentists in identifying potential issues in psychological wellbeing among individuals cannot be underestimated. Indeed, among health professionals, dentists are in a unique position to regularly meet with patients to provide on-going preventative care and may therefore recognise changes in patient's psychological presentations in clinic – not solely in their oral health change.

It does not take extensive training in psychology, psychiatry or counselling skills to recognise depression, merely, notable changes to the way someone communicates with you and appears (compared to their "usual" presentation) which could indicate that there might be wider mood-related concerns under the surface. Sadly, the number of deaths caused by suicide continues to rise in the UK and there is widespread recognition of the importance in early detection; to quote the Samaritans, *"suicide is not inevitable, it is preventable"*. However, the only tool we have at our disposal is to ask and identify those individuals at risk. In recognising the increase in depression, particularly among individuals living with a

chronic illness, the National Institute of Clinical Excellence created a set of clinical guidelines in 2009, to provide health professionals with questions to explore just this area.

On identifying concerns, it is important for dentists to be aware of local support services available – however, the most important thing is to communicate any mood-related concerns with an individual's General Medical Practitioner (GMP); from whom, appropriate onward referrals can be arranged. As the author identifies, closer working relationships between GMPs and dental practitioners could be a step forward in reducing dentists' anxiety in exploring the issue. Also of note and recommendation, is to identify those local support services in place for individuals – or to contact your local services for guidance or further training. National organisations such as the Samaritans are also a great resource to which to guide individuals.

As the author concludes, identifying stress, depression or other mood-related concerns among ourselves, is just as important as among the patients we treat... and self-care for our own emotional wellbeing is essential, in order for us to effectively treat the patients we see.

#### Additional references/information:

National Institute for Health and Care Excellence. (2009) Depression in Adults with a Chronic Physical Health Problem. London: NICE; 2009.

For more information from the Samaritans see:

<http://www.samaritans.org/>

And for the Samaritan's latest suicide statistic report for 2016, please see:

<http://www.samaritans.org/sites/default/files/kcfinder/files/Samaritan%20suicide%20statistics%20report%202016.pdf>

JH

#### Adult dental anxiety: recent assessment approaches and psychological management in a dental practice setting.

*Humphris G M, Splyt J, Herbison A and Kelsey T. Dental Update 2016; 43: 388-394*

**Abstract:** Patients suffering from anxiety is a common feature of the everyday experience of dental practice. This article advocates the use of regular assessment of this psychological construct to assist in patient management. Various tools, such as the Modified Dental Anxiety Scale (MDAS), are available to monitor dental anxiety and are quick to complete and easy to interpret. Patient burden is low. A new mobile phone assessment system (DENTANX) is being developed for distribution. This application and other psychological interventions are being investigated to assist anxious patients to receive dental care routinely.

#### Reviewer's evaluation, opinion and points of interest

This is an interesting review of the role and benefit of formally assessing dental anxiety, as an essential feature in anxiety management. Not only does it remind us of the benefits of using

quick and simple measures to assess a patient's dental anxiety, which alone has been shown to improve communication and anxiety management, it also excitingly introduces the latest utility of a mobile phone application to assess dental anxiety.

Created and designed by the authors, the paper introduces DENTANX, a new mobile phone app which has translated the MDAS (Modified Dental Anxiety Scale) onto an electronic platform for regular use among patients, using their own mobile phone devices. The facility is hoped to provide further insight into the dynamics of dental anxiety as a psychological construct, based on time, pain levels and treatment experiences at appointments - which are all collected via the app. While it remains in the early phases of clinical validation, the authors allude to its wider distribution in time.

Although brief in its explanation and detail, this paper provides an exciting taster into the development of e-health applications for dentistry, specifically ones measuring dental anxiety. In addition to the app development, the paper's key take-home message reiterates the importance of dentists' communication and recognition of an individual's dental fears; reducing anxiety when it is done well and increasing distress when ignored.

JH

## SAAD Symposium & AGM 2017



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## Anaesthesia and Sedation for the Autistic Patient

Sarah Sacoor BDS

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### Abstract

Autism is a disability that affects how a person communicates and relates to the world around them. Patients on the autistic spectrum may be referred to a Special Care Dentistry service to be managed under sedation or general anaesthetic, as their visit to the dentist can be stressful and disruptive to their routine. As it is a spectrum disorder, each patient needs to be assessed individually in order to determine whether sedation or general anaesthetic would be appropriate for them. Some autistic patients may have good verbal communication and mild learning difficulties, and may be able to tolerate treatment under local anaesthetic with behavioural management alone. On the other end of the spectrum, patients with severe autism and learning difficulties may not permit the dentist to even examine them and will require a general anaesthetic. There will also be patients on the autistic spectrum who are suitable for conscious sedation depending on their level of learning difficulty and cooperation. Oral and transmucosal sedation can also be useful for providing pre-sedation to a patient to facilitate venous access. In order to minimise distress to the patient, it is important that adequate sedation, anaesthesia and analgesia are achieved both pre-operatively and post-operatively.

### Introduction

'Special Care Dentistry is concerned with providing and enabling the delivery of oral care for people with an impairment or disability, where this terminology is defined in the broadest of terms.<sup>1</sup> In the United Kingdom, over 985,000 people are registered as having a learning disability.<sup>2</sup> Autism is a disability which falls under this specialty, defined by the National Autistic Society as 'a lifelong, developmental disability that affects how a person communicates and relates to other people, and how they experience the world around them.'<sup>3</sup> As autism is a spectrum disorder, patients may present with different levels of ability, varying needs, and will all require different management. 70% of people on the autistic spectrum function intellectually in the same way as a person without autism but may find it difficult to make sense of the world.<sup>4</sup> A patient with Asperger's syndrome may be able to communicate easily and not be reliant on a carer, yet at the other end of the spectrum, a patient with severe autism may be fully dependent on a carer and have no verbal communication. Therefore, it is very important to assess each patient individually and discuss their requirements with them, their families or carers.

Visiting the dentist may be a difficult task for the autistic patient. This may be due to a change in routine, unfamiliar environment, and hypersensitivity to touch, smells, tastes, light and sound.<sup>5</sup>

Adequate anaesthesia or sedation is important in order to provide dental treatment successfully and to prevent distress and

discomfort to the patient. Furthermore, due to a hypersensitivity to touch, this group of patients may experience pain differently to the average patient.

### Patient Assessment

If the patient is non-verbal, it may be difficult to obtain a history and the parents or carers will need to be involved in the history taking. It may also be difficult to examine a patient with severe autism and the clinician may consider carrying out the examination under sedation or general anaesthetic. These patients may find other invasive investigations difficult so it may be useful to undertake any necessary blood tests or MRI scans while the patient is under sedation or general anaesthetic and this should be discussed with the General Practitioner, parents and carers. The appointment should be planned in advance so the patient can be prepared in order to cause minimal disruption to their routine. Long waiting times and busy environments may also cause distress to the patient so this should be avoided if possible.<sup>6</sup> Everything should be explained to the patient in literal, concise language as people with autism are often unable to comprehend sarcasm, jokes and metaphors.<sup>7</sup>

In addition, the medical history of the patient should be considered. Individuals with autism can have many associated conditions such as epilepsy, ADHD, dyspraxia, dyslexia and gastrointestinal problems<sup>4</sup> which may influence the clinician's decision on the method of anaesthesia or sedation.

### Local Anaesthetic

For patients who are cooperative, have limited behavioural problems and are able to understand verbal instructions, local anaesthetic alone may be sufficient. This can be carried out with appropriate communication, explaining each step to the patient. A topical anaesthetic agent such as benzocaine can be used to reduce anxiety and may reduce pain caused by insertion of the needle.<sup>8</sup>

### Conscious Sedation

Conscious sedation is 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>9</sup>

Conscious sedation may be delivered via inhalation, intravenous, transmucosal or oral methods. It is important to assess the

individual patient and whether conscious sedation would be appropriate for their treatment, and which type of sedation would work best. Conscious sedation relies on adequate behaviour management; in the case of a difficult patient with severe behavioural problems, sedation may not be enough to manage the patient effectively. On the other end of the spectrum, a patient with good cooperation who responds positively to effective behavioural management would be suitable to have treatment under sedation and a general anaesthetic can be avoided.<sup>10</sup>

When deciding whether to provide sedation for an autistic patient, it would be useful to obtain a history from the patient and/or the patient's carer. If the patient has successfully had treatment under sedation previously, it is likely that further treatment under sedation would be successful. The medical history may also influence the decision of the clinician to provide sedation and the age of the patient will also influence the decision of which type of sedation can be administered. For patients under the age of twelve, use of benzodiazepines must be carried out under a team with appropriate training in paediatric dentistry and anaesthesia in the correct environment.<sup>22</sup> It is also important to assess the type of treatment the patient requires; if treatment needs to be carried out in stages, sedation may be more appropriate than general anaesthetic.<sup>4,10</sup>

During the pre-assessment, as with any patient undergoing sedation, it must be ascertained whether the patient has an escort and someone who can take care of them for the rest of the day. There are also resources available to prepare the patient for the day of the procedure. It is particularly important to do this in advance for an autistic patient as any change in routine could cause distress. There is an example of a pictorial sequence for young children in the Standards for Conscious Sedation<sup>9</sup> and various other pictorial resources which may be of use to some autistic patients if keeping to a routine is important, and also because many people with autism find communication through pictures easier than words.<sup>11</sup>

## Inhalation Sedation

Inhalation sedation involves the administration of titrated nitrous oxide and oxygen. It is rapidly absorbed with a rapid onset, and has rapid elimination and recovery. Sevoflurane is another agent which can be titrated with oxygen or with nitrous oxide but requires a sedationist for its administration.<sup>12</sup>

It is a non-invasive method of sedation with no post-operative drowsiness. However, this type of sedation relies on having a cooperative patient with a potential for good behaviour management. The patient must also be able to understand and follow instructions to ensure that they breathe through their nose. Furthermore, due to hypersensitivity of the senses in autistic patients,<sup>5</sup> some patients may feel uncomfortable wearing a nasal hood. Inhalation sedation is suitable for both adults and young children provided that the patient is cooperative. Therefore, inhalation sedation is mainly used for patients with mild to moderate learning difficulties.<sup>4</sup>

Another use for inhalation sedation is to induce sedation before

inserting a cannula for intravenous sedation or general anaesthetic.<sup>6</sup>

## Intravenous Sedation

Intravenous sedation is administered with a titrated dose of midazolam. If midazolam alone does not achieve adequate anxiolysis, it may be combined with an opioid such as fentanyl. Ketamine may also be used, however, its use is still being researched. It has been suggested that ketamine, or ketamine used with midazolam is effective in patients with severe behavioural problems.<sup>13</sup> Propofol may be used for sedation but only under the care of a sedationist; it can be used for short procedures, long procedures and for patients who have become tolerant to benzodiazepines. Propofol may also be used in conjunction with midazolam.<sup>9</sup>

An advantage of intravenous sedation is that there is a satisfactory level of pharmacological sedation so patient cooperation is not as important as with inhalation sedation.

One disadvantage of intravenous sedation is that determining the level of sedation may be difficult with a non-verbal patient. Therefore, the patient must be closely observed by the dental team. Another disadvantage of intravenous sedation is that venous access is required to administer the drug.<sup>4</sup> Topical local anaesthetics such as EMLA cream can be used on the area of cannulation and have been shown to aid anxiolysis in anxious patients with no learning difficulties.<sup>14</sup> However, the time spent waiting for the topical anaesthetic to work may cause the patient to become distressed. If the patient is very uncooperative pre-medication with oral sedation or inhalation sedation induction may be preferable.

A study carried out at King's College Hospital investigated the effectiveness and acceptability of intravenous sedation in children and adolescents having dental treatment.<sup>15</sup> 564 patients, some of whom had autism or Asperger's syndrome, were given sedation. Although many patients were reluctant to be cannulated, only 1.3% of treatment sessions failed due to an uncooperative patient. This study proved intravenous sedation with midazolam to be a safe and effective way of administering sedation, provided that a cannula can be inserted successfully.

It is known that there is a high prevalence of epilepsy in people with autism.<sup>16</sup> Approximately 30% of people with a learning disability have epilepsy and the more severe the disability, the higher the chance the person has epilepsy.<sup>4</sup> Conscious sedation may be a useful way of preventing a seizure through anxiety, however, care should be taken if the patient is already taking a benzodiazepine to manage their epilepsy; the midazolam should be titrated slowly to ensure the patient is not under or over-sedated. Should the sedation require reversal, flumazenil should not be used as this would also reverse the effects of their anti-epileptic medication. With epileptic patients, sedation with propofol should not be carried out as it has a neuro-excitatory effect and could cause a seizure.<sup>17</sup>

For the autistic patient, it will be important to assess the patient to determine whether cannulation will be possible and whether

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sedation will be satisfactory to carry out treatment. If the patient has severe behavioural problems, general anaesthetic may be more appropriate. However, if the patient is likely to tolerate treatment under sedation, pre-medication with oral or transmucosal sedation could be considered in order to facilitate insertion of a cannula.

## Oral Sedation

Oral sedation can be used as an alternative to intravenous sedation with an oral benzodiazepine such as midazolam, diazepam or temazepam.<sup>9</sup> Patients may experience anxiety before even entering the dental environment; this may be due to a change in routine, entering an unfamiliar environment or associating the place with a negative experience. In some circumstances, oral sedation may be given to the patient before arriving at the hospital. Temazepam has a relatively slow onset as it takes two to three hours to reach peak plasma levels. After administration of 10-30mg temazepam, the clinician has to wait at least 40 minutes which can be upsetting for the patient. Therefore, midazolam is the preferred oral sedative as it has a more rapid onset, reaching peak plasma levels after 30 minutes.<sup>4</sup> If appropriate for the patient, it can deliver effective sedation and can allow treatment to be carried out over a number of appointments.<sup>18</sup> However, in patients with autism the effects are unpredictable and they may experience a feeling of dysphoria rather than sedation.<sup>6</sup> Furthermore, the absorption of oral sedatives is uncertain due to variable gastric contents and emptying and can occasionally cause gastric irritation; as many patients with autism suffer from gastrointestinal disorders, this may not be favourable.<sup>4</sup>

Oral sedation may also be used in small doses as a pre-medication for intravenous sedation or general anaesthetic where cannulation may prove to be a difficult task or the patient is needle phobic. A study was carried out at King's College Hospital on oral sedation for dental treatment in young children. The study investigated oral sedation as an alternative to general anaesthetic and a small proportion of the patients had learning difficulties such as autism, Asperger's, and Down's syndrome. The results proved the use of oral midazolam to be valuable, however, some children were reluctant to drink the midazolam in syrup form which had a bitter taste. Due to hypersensitivity of taste in autistic individuals, midazolam in a syrup form may not be appropriate, although the effects of oral sedation were successful. This was an initial case study and further research is yet to be carried out.<sup>19</sup>

## Transmucosal Sedation

Transmucosal sedation involves the delivery of the sedative agent through the oral, buccal, nasal or rectal mucosa. Midazolam administered intranasally is a popular technique in special care dentistry and may be used as a pre-medication for intravenous sedation or general anaesthetic. It is absorbed rapidly through the mucosa, has a quick onset and requires little cooperation from the patient.<sup>4</sup>

Usually, the dose is 10mg for an adult which can be given in a concentrated form of 10mg/2ml.<sup>4</sup> This is a large volume to deliver to the nostrils and can be uncomfortable for patients already

hypersensitive to sensation and taste but is generally well accepted.

A study carried out on the efficacy of intranasal midazolam as a pre-medication for intravenous midazolam showed that the technique was safe and effective for use on patients with special needs. A 40mg/ml preparation of midazolam was used with lidocaine to reduce the stinging effect, delivered in a mucosal atomisation device. Care was impossible for just 8.55% of patients and for a small number of patients the intranasal sedation alone provided adequate sedation to carry out treatment.<sup>20</sup>

## General Anaesthetic

In some cases, general anaesthetic may be a more suitable option. Approximately 20% of patients with a severe disability require general anaesthesia for their dental treatment. Patients who may require a general anaesthetic includes those where sedation has been previously unsuccessful, patients who will not permit even an examination when awake, patients who have allowed an examination under sedation but not operative treatment and patients who require extensive or complex dental treatment. For some of these patients, initial examinations and review appointments may be carried out under sedation.

General anaesthetic can be administered with gaseous agents or intravenous agents. If administering intravenous general anaesthetic agents, pre-sedation with oral or transmucosal sedation may be required, or induction with a gaseous agent.

Due to restrictions to access to treatment under general anaesthetic in secondary care, this is likely to be an option only for patients with severe behavioural difficulties or complex treatment. Some limitations of general anaesthesia are that there is limited time for treatment and there is only one appointment for all treatment to be carried out. Furthermore, if the general anaesthetic is being used just to examine the patient, the patient is undergoing the risk of a general anaesthetic without necessarily needing treatment. If the patient requires frequent treatment such as scaling, a general anaesthetic cannot be justified each time.<sup>4</sup>

## Post-operative Care

To avoid distress to the patient, the clinician should not hesitate to give anti-emetics and sufficient analgesia to the patient. They may also be discharged earlier than most patients as long as appropriate advice has been given to their carer.<sup>6</sup> Regarding the management of post-operative pain at home, the clinician should have a discussion with the parents or carers; as the patient may find it difficult to communicate whether they are in pain, it is often the carers who can identify when they are in pain and require pain relief.<sup>21</sup>

## Conclusion

In conclusion, autism is a spectrum disorder and each patient will have different needs, different behaviour and a different level of cooperation. It is important to assess each patient individually before making the decision to administer sedation or general anaesthetic. Furthermore, good behaviour management should be

maintained throughout, and sufficient sedation, anaesthesia and analgesia should be provided in order to limit distress to the patient.

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*Details on page 81*

## The Clinical Management of the Gagging Patient

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### Abstract

A pronounced gag reflex can be a burden for patients and dentists alike. It can limit the capability of a patient to undergo dental treatment and complicate the dentist's ability to provide treatment. Understanding the somatic and psychological basis of an overactive gag reflex is key to providing treatment. The first techniques involved should be local measures to reduce anxiety. Further techniques can be used if this proves fruitless. Local anaesthetic, conscious sedation, acupuncture, hypnosis and TENS are techniques that have been suggested in the literature to overcome a pronounced gag reflex. This paper will explore the aetiology of the gag reflex and the many suggested approaches to the management of a patient with a pronounced gag reflex. Understanding the causes and having a working knowledge of the management approaches will help dentists overcome gag reflexes in the treatment of these patients.

### Introduction

All clinicians will have had, or will have, a patient with a pronounced gag reflex (pharyngeal reflex). Whilst gagging is a normal protective reflex, the degree of presentation in patients is vast, some may demonstrate no gag reflex, but serious issues may arise when a patient presents with a pronounced gag reflex.<sup>1</sup>

A severe reflex can affect our ability to carry out any dental procedure. Examination becomes more difficult in posterior regions of the mouth and radiography can be difficult to tolerate. Restorative treatment is difficult as effective isolation may be harder to achieve. Impression taking is markedly more difficult in a patient with a pronounced gag reflex. Even extractions gain an added level of difficulty.

This review will explore the aetiology of the gag reflex and the many suggested approaches to the management of a patient with a pronounced gag reflex.

### Gag reflex: the Background

Mosby's Dental Dictionary<sup>2</sup> describes gagging as "an involuntary retching reflex that may be stimulated by something touching the posterior palate or throat region". Other definitions agree that gagging is an involuntary and ineffective attempt to vomit. Gagging and retching are terms that are often used interchangeably, however, retching is seen as "the initial process of attempting to eliminate noxious substances from the stomach" whereas gagging is "a protective reflex to stop unwanted entry to the mouth and oropharynx".<sup>3</sup>

The gag reflex is an example of a reflex arc. A stimulus is felt,

typically in the soft palate, posterior tongue, and tonsillar area or back of the throat. A combination of the trigeminal, glossopharyngeal and vagus nerves transmit sensory impulses through afferent nerves from the receptors in the brain. These nerve impulses can be modulated by the olfactory, auditory and optic nerves; examples of conditioned behaviour.<sup>4</sup> Impulses are then sent through efferent nerves to produce a bilateral contraction of the pharyngeal muscles and contraction of the tongue, GI tract, stomach and diaphragm leading to the "gag".

Gagging can be produced by a somatic and/or psychological stimulus. The somatic response is seen in the majority of cases and is a response to a physical stimulus, whereas a psychological response is less common and is primarily due to a psychological stimulus.<sup>5</sup> As discussed, sensory feedback is produced when certain areas of the mouth are touched leading to gagging. However, for some patients the thought of dental treatment alone is enough to initiate a gag reflex, and that combined with even the slightest intraoral sensation, can lead to a much exaggerated gag reflex.<sup>6</sup> Whilst the patient is able to eat and brush their teeth normally at home, the placement of a dental instrument in their mouth can cause a gag reflex.

Anatomy and medical history have been found to have no statistically proven contributions, except in rare cases such as motor neurone disease and Gilles de la Tourette syndrome.<sup>7,8,9</sup> It has been found that the most important factors leading to a pronounced gag reflex are past dental experiences.<sup>10</sup> Past dental experiences of gagging can lead to patients subconsciously expecting to gag again. The severity of the fear is directly linked to whether or not a patient will gag.

There is no one management technique for a patient with a pronounced gag reflex. There should be a crescendo of management options applied, starting with the least invasive, and assessed for success, until the patient and clinician are happy with the level of control they have achieved. Over time it may be possible to reduce the level of management if the patient is able to overcome the psychological barriers predisposing them to gag.

### Assessment and anxiety control

As with all dentistry, a full understanding of the problem is vital in treatment planning and is gained through a thorough assessment of the patient's history of their gag reflex. For some patients their gag reflex is embarrassing and they will feel less anxious once their clinician has explored the issue. For others, the assessment will build a rapport and confidence.

Through the use of empathetic, specific, open questions, the clinician can gain insight into the root causes of the pronounced gag reflex, previous management failures or successes and

perceived severity of the gag reflex.<sup>11</sup> Depending on the responses, it may become apparent that it will not be possible to undertake certain dental procedures. From these responses the clinician can begin to consider different treatment strategies. This should be discussed with the patient so they are aware of potential limitations of treatment. Treatment should be carried out with increasing levels of difficulty, for example, at the first appointment a simple anterior restoration or scaling only may be appropriate.

Whilst most patients have a combined somatic and psychological response, those with only an exaggerated somatic response may be able to identify specific areas in their mouth that precipitate a gag reflex, and these can be avoided during treatment. If necessary these areas can be mapped out in the notes, allowing the practitioner to carefully avoid, retract or explore the area.

Similarly, for patients with only an exaggerated psychological response, removal or masking of the stimulating factor may be appropriate. This causes decreased perception of the stimulus and averts the relative response<sup>12</sup>. Music played through earphones may mask unpleasant sounds of drills, and strong perfumes or aftershaves can mask the smell of certain dental materials. Simply having the patient close their eyes may be enough to avoid visual stimulus.

The most important technique is correct patient management. Clinicians should present themselves in a confident, sympathetic, calm and 'in control' manner. Time should be taken to build a relationship with the patient and communication is key. Hand signals should be agreed if the patient feels close to gagging or needs a rest.<sup>13</sup>

## Behavioural approaches

Patients can be relaxed by a number of methods. A calm atmosphere before and whilst in the surgery using techniques such as tell-show-do, avoids inducing anxiety in patients.<sup>12</sup> Breathing control has also been shown to reduce anxiety. Patients with a gag reflex often subconsciously hold their breath during treatment, an action that actually worsens the tendency to gag. Slow deep inhalations and exhalations while the patient concentrates on the movement of their abdomen, relaxes the patient and takes their attention from their gag reflex.<sup>14</sup>

By taking the patient's concentration away from the gag reflex the psychological aspect of the gag reflex is lessened. As well as the breathing methods mentioned earlier many authors have suggested unique distraction techniques. Many ask the patient to concentrate on a particular thought such as a pleasant recent holiday or a relaxing situation. Others distract the patient by having them perform somatic tasks such as breathing control or wiggling their toes. Studies have found that a combination of audio and visual distraction showed a decrease in patients' anxiety levels, although this was not measured against gag reflexes.<sup>15</sup> Clinicians should find a method of distraction that is effective for the patient and themselves.

Desensitisation is a progressive approach that allows the gradual permanent reduction of a gag reflex. It requires a number of appointments rather than the immediate effect of other techniques, but produces a long term effect. Many approaches

have been described, each with the patient concentrating on increasingly invasive actions that almost stimulate the gag reflex.<sup>16</sup> It is important not to rush these methods, as if pushed too far, the gag reflex may be initiated and vomiting may occur, which has the potential to demotivate the patient. Common dental items, such as dental mirrors, impression trays and radiography equipment, can be used at home allowing the patient to acclimatise to them.<sup>17</sup>

## Local anaesthetic

In patients where behavioural methods alone do not reduce the gag reflex, additional avenues can be explored. A fairly non-invasive method of gag reflex suppression is the use of local anaesthetics. These can be applied using topical gel, a spray or injection. The effects of the anaesthetic blocks sensory afferent impulses and therefore removes the somatic aspect of the gag reflex. With prior knowledge of the patients trigger areas anaesthetic can be applied to certain areas to prevent the reflex.

This is particularly useful when taking a maxillary impression. In such cases the trigger areas are often the posterior or soft palate. Blocking of the lesser palatine nerves has shown a decrease in the activation of the gag reflex.<sup>18</sup> The same effect can be achieved through a spray or topical gel but there is a longer time of activation and there is decreased diffusion through the thicker keratinised epithelium of the palate.

## Inhalation sedation

The goals of conscious sedation are fear and anxiety relief, stress reduction, increased patient safety, improved pain control and enhanced patient co-operation. A patient with a pronounced gag reflex or an anxious patient is an indication for treatment with sedation if other methods prove fruitless.

Inhalation sedation or relative analgesia (RA) is a safe, non-invasive method of sedation. It has a fast onset of action, with a quick peak clinical effect. The depth of sedation and duration of action are easily controlled. There is also a fast recovery time.

Successful RA is a combination of the nitrous oxide/oxygen gases and behavioural management of the patient. Positive reinforcement and encouragement should be given to the patient throughout.<sup>19</sup> There is a marked decrease in the gag reflex of patients and a decrease in anxiety which can affect the gag reflex.<sup>20</sup> The levels of nitrous oxide will alter from patient to patient and cannot be predicted. Visual signs of relaxation should be used to assess the correct level. In patients who require multiple appointments a decrease in the level of nitrous oxide can be used at subsequent appointments if the patient has reacted well at a previous appointment.

RA should be avoided in patients with blocked airways, tonsillar or adenoidal enlargement, pulmonary disease, patients undergoing treatment for psychiatric disorders, neuromuscular disorders, myasthenia gravis and patients in the first trimester of pregnancy. In cases such as these, communication with the patient's GP is recommended.

## Intravenous sedation

Intravenous sedation is a further pharmacological agent that can be used to overcome a pronounced gag reflex. Historically, IV sedation has been used to sedate patients and control gagging during gastrointestinal endoscopy.<sup>21</sup> More recently, the use of midazolam for IV conscious sedation has become a treatment modality in general dental practice.<sup>22</sup> It has a wide margin of safety, good level of sedation, anxiolysis, muscle relaxation and anterograde amnesia. However, there is need for cannulation and the effects of the amnesia mean that patients will not learn to overcome their anxiety.

Studies have found that the use of propofol for IV sedation produced an increased tolerance to oral treatment and allowed management of a pronounced gag reflex.<sup>23</sup> Similarly the use of midazolam has shown beneficial effects, with the advantage that IV sedation is accessible in many areas as the training is more widely available.

## Acupuncture and acupressure

Acupuncture is the practice of inserting fine needles into the body at specific anatomical landmarks to reduce pain or induce anaesthesia. Similarly, acupressure is the use of somatic pressure at these same acupuncture points to the point of distension and discomfort, to produce a similar effect.

Acupuncture has been suggested as an inexpensive, quick and relatively non-invasive alternative to pharmacological agents.<sup>24</sup> Needles are used out of the patient's vision and in a place where access to the mouth is not disturbed. One fine needle is placed in the anti-gagging point of each ear to a depth of 3mm. This is removed after treatment. A study by Fiske<sup>25</sup> found an improvement in treatment tolerance. The study, however, identified a strong placebo effect.

Acupressure also has been shown to control the gag reflex.<sup>26</sup> Studies have found that acupressure with gentle finger pressure 5 min before maxillary impressions until the impression has been removed, at the site "Chengjiang (REN-24)" is an effective method for controlling the gag reflex. "Chengjiang (REN-24)" is in the horizontal mentolabial groove approximately midway between chin and lower lip.<sup>27</sup> Acupuncture has also been suggested at this same point, as well as at PC 6, located on the forearm. There is suggested to be a synergistic effect between the two points.<sup>28</sup>

## Hypnosis

Hypnosis may be defined as inducing a state of altered awareness in which the critical faculty of the conscious mind is partially or totally suppressed and selective thinking is established.<sup>29</sup> Hypnotic suggestions can be made directing the soft palate or other specific trigger areas to lose their excessive sensitivity and allow dental treatment, such as impressions, to be undertaken.

There have been a number of cases where the use of hypnosis has been effective in reduction of a gag reflex. Permissive hypnosis may be used to make the patient more susceptible to suggestions, home practice of hypnotic techniques and repeated rehearsal of planned procedures also allow the patient to become accepting of the treatment.<sup>30</sup>

Hypnosis is a very time-consuming approach and cannot be used as an immediate solution. Any clinicians considering hypnosis in practice should undergo appropriate training.

Patients with pre-existing strong doubts of the treatment's effectiveness will have a lower chance of success. It is suggested within the hypnosis community that further research is needed to increase the technique's awareness and credibility within the field.<sup>31</sup>

## Hypnopuncture

Hypnopuncture, as the name suggests, is the combination of hypnosis and acupuncture. In cases of a pronounced gag reflex the intended goal is a lasting long term control of the gag reflex.<sup>32</sup> As before, the dentist will need to be trained in these advanced patient management techniques. Acupuncture gives an immediate effect for the patient. The hypnosis portion concentrates on hypnos sedation as well as positive suppression of negative experiences linked to the gag reflex. Oral stereognosis enables the patient to perceive their own oral cavity in 3 dimensions.

Although its effects have been produced faster than hypnosis alone, a number of appointments may be required before the patient is able to overcome their gag reflex. As with hypnosis, successful treatment can lead to long term suppression of a gag reflex. This can be important in patients that are likely to need impressions for future dentures.<sup>32</sup>

## Trans-cutaneous electrical nerve stimulation (TENS)

Transcutaneous electrical nerve stimulation (TENS) is the use of electric current produced by a device to stimulate the nerves for therapeutic purposes.<sup>33</sup> It has been suggested that the gag reflex can be suppressed using this non-invasive nerve stimulation. There is little research on the subject but one study found that stimulation of the cranial nerves belonging to the superior laryngeal nerve branch (cranial nerve IX, pharyngeal branch of X, cranial nerve V, and cranial nerve X) would block the physiological response of gagging.<sup>34</sup>

This was achieved using a nerve stimulation device attached to the wrist. This maintained contact of an electrode with the ventral aspect of the wrist and generated a stimulating signal which indirectly stimulated the cranial nerves associated with gagging.

## General anaesthetic

Only when all other treatment modalities have been explored should general anaesthetic (GA) be considered. There should be a clinical need for treatment that cannot be achieved any other way.

## Other useful Techniques

There are a number of additional techniques which may help a patient temporarily overcome their gag reflex:

- Placing salt on the anterior portion of the tongue has been suggested. This is said to stimulate the taste buds located there

which subsequently activates the chorda tympani nerve leading to suppression of the gag reflex.<sup>20</sup>

- The use of a rubber dam is often proposed. The basis of this is the physical blocking of anything getting close enough to trigger points in the mouth. This may work in some patients with somatic based gag reflexes, however, patients with a psychological basis to their gag reflex often find a rubber dam particularly difficult to tolerate. Furthermore, rubber dam cannot be used during those impressions which commonly activate the gag reflex.
- Impression technique can be adapted to accommodate patients with a pronounced gag reflex. In maxillary impressions, the posterior of the tray should be seated first to direct any excess material to flow anteriorly and not towards the soft palate. The tray should not be overloaded with material to prevent additional overflow and the material should be fast setting so the experience is quickly over.
- Impression trays should also be well adapted. The trays should always be checked for a close fit as this will prevent impression material from flowing out of the tray incorrectly. It has been suggested that for patients with a pronounced gag reflex trays should contain no perforations as the material extruded through these perforations can cause somatic initiation of the gag reflex. Impression trays can be designed to contain a posterior dam to prevent material exuding at the back.
- Patients with a pronounced gag reflex may have trouble with dentures. Palateless dentures and dentures with reduced extensions may be more tolerable.<sup>35,36</sup> Any post dams should be correctly placed on the denture and correctly sized.
- Earplugs may act as an external auditory meatus stimulator and suppress the gag reflex.<sup>37</sup>
- Closed mouth ID blocks may prove a successful alternative in patients with a pronounced gag reflex.

## Conclusion

It is likely during treatment that some patients will present with a pronounced gag reflex. It is important to appreciate that an overactive gag reflex will likely be somatic and psychological in nature. The management of these patients should be individualised as there is no one miracle cure for a pronounced gag reflex. It may be necessary to include multiple patient management strategies during treatment.

Dental treatment is necessary and overcoming the problems involved is key. Patients should be managed using behavioural management techniques to reduce anxiety. Troublesome procedures such as impression taking may not initially be possible but with an adjunctive measure such as conscious sedation, acupuncture, hypnosis or a combination of such, the problem can be overcome. More research is needed into the efficacy of particular techniques but currently there are a number of potential options for the management of a patient with a pronounced gag reflex.

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## The Role of General Anaesthesia in Special Care & Paediatric Dentistry; Inclusion Criteria and Clinical Indications.

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### Abstract

Dental practitioners dealing with children and individuals with special needs can be supported by the provision of general anaesthesia for the most challenging patients in situations where other options are insufficient. The availability of general anaesthesia will further the aim of extending access to the widest range of dental care to the greatest number of patients regardless of disability, age or phobia. The objective is to ensure patients have a pain-free and healthy mouth, and any necessary treatment in the most appropriate setting related to their specific needs. A strictly individual and holistic approach is required when evaluating the risk versus benefit of proceeding with general anaesthesia for delivery of dental treatment particularly for children and special needs individuals. It is vitally important to consider and address all relevant factors specific to this particular group of patients including assessment of capacity, validity of consent, and any specific medical, social and behavioural issues. The other sedation modalities must be always taken into consideration.

This article emphasises the crucial decision-making role of dentists in the referral process for dental treatment under general anaesthesia and the need for multidisciplinary co-operation between dental practitioners, community and hospital services.

### Introduction

Despite the current trend of reducing the indications for general anaesthesia (GA) in dental patients, this approach has still a well-established place in dental care, and is particularly appropriate for patients with special and specific dental needs.<sup>1,2</sup> Community and other public sector dentists deliver specialist care to patients from priority groups and general anaesthesia remains an important

option for the provision of efficient and comprehensive dental care to individuals with special needs.

It should be emphasised that a general anaesthetic cannot be considered a technique of choice; for dental fear and anxiety control and the use of standard local anaesthesia with, when necessary, the adjunct of conscious sedation modalities ought to be the first-line means undertaken for all dental patients.<sup>3</sup> Alternative methods are often successful, too. An assessment of patients referred for GA with Oldham Community Dental Service demonstrated that only 25% of them were subsequently referred for GA and the rest of the patients accepted dental treatment with routine local anaesthesia or required inhalation sedation.<sup>4</sup> Moreover, the mean cost of dental care under general anaesthesia appears to be three times higher than for sedation.<sup>5</sup> However, in selected cases, dental treatment under general anaesthesia frequently seems to be the only option for these patients who are unable to cope with routine dental treatment by any other means.<sup>6</sup>

Such children and adults with various disabilities requiring dental treatment can be safely managed with minimal morbidity following valid consent for the proposed procedure under GA in a hospital setting, supported fully by anaesthetists who are registered specialists. According to de Sousa et al.<sup>7</sup> general anaesthesia provided for children with early childhood caries resulted in substantial improvements in parents' ratings of their child's oral health-related quality of life and the impact on their families. As recommended by National Clinical Guidelines in Paediatric Dentistry, UK<sup>8</sup>, for each healthy paediatric patient the first line approach to managing anxious children in dental office ought to involve individual behavioural management and the use of local anaesthetic, which can be supplemented with conscious sedation. Dental treatment under GA of the patient with special needs in a hospital setting has several essential benefits<sup>9</sup> that will frequently outweigh the well-known disadvantages (Table 1).

**Table 1. The main benefits and drawbacks of dental treatment provided under general anaesthesia in hospital settings.**

Advantages of GA	Disadvantages of GA
Secured airway control	High cost, approximately ten times higher than local anaesthesia
Constant monitoring, including ECG	More 'dangerous' than other options for patients with medical co-morbidities, higher risk of serious, general health complications
Appropriate critical care and recovery facilities	Specialised facilities and clinical support including post-operative supervision
Appropriately trained staff	Adult patient can be requested not to work for 24 hours after GA, children should not attend the school a day after.
Facilitates a planned programme of dental treatment under relatively controlled conditions during a single session	The experience may be potentially traumatic for very young patients
Highly suitable for unco-operative patients with special needs who require a deep sedation/deep anaesthesia	
Often, the only available option to make the patient 'dentally fit' and prevent from further odontogenic complications and health consequences	

**Table 2. Clinical indications and justifications for DGA (Royal College of Surgeons UK guidance, modified)**

Conditions suitable for DGA	Conditions rarely justifying DGA
<ul style="list-style-type: none"> <li>Failure to achieve adequate pain control with alternative methods such as local anaesthesia or sedation</li> <li>Essential dental treatment required to secure oral health to the well-being of the child as a part of a long term treatment plan</li> <li>Extraction of multiple deciduous teeth where there have been more than one episode of significant pain or infection/sepsis.</li> <li>Extraction of first permanent molars which have poor prognosis in the mixed dentition.</li> </ul>	<ul style="list-style-type: none"> <li>Carious, asymptomatic teeth with no clinical or radiological signs of infection</li> <li>Orthodontic extractions of sound permanent premolar teeth in a healthy child</li> <li>Patient/Carer preference, except where other techniques have already been tried</li> <li>Alternative methods of pain control have not been fully explored and excluded</li> </ul>

## Indications for dental general anaesthesia

If treatment cannot be given under local anaesthesia (LA), or local anaesthetic and conscious sedation, then the option is GA. Essentially the tooth requiring the most difficult treatment drives this decision. There are some compromises, though, e.g. teeth that could be restored under LA with the adjunct of conscious sedation may need to be extracted under GA.

The clinical indications for dental treatment under GA (DGA) in patients with special needs are limited to certain conditions and should be considered as the last method of choice after taking into account other available modalities of dental patient management<sup>10,11</sup> (Table 2). They include: lack of co-operation due to age or disability, dental cases in which other sedation techniques have been unsuccessful, severe dental phobia, including needle-phobic patients who are unable to accept routine dental treatment; a confirmed allergy (rarely) or hypersensitivity to the constituents in local anaesthetic preparations where the use of local anaesthesia is contraindicated.<sup>12,13</sup>

The vast majority of special needs patients referred for DGA require extractions of unrestorable and symptomatic teeth in order to resolve their dental problems associated with pain, infection, etc. Less commonly, dental procedures under GA may involve the restoration of teeth and scaling to prevent/treat periodontal problems. GA solely for the purpose of a thorough dental assessment can be occasionally justified if unco-operative patients with special needs display symptoms of odontogenic origin (pain/swelling) and are unable to assist diagnosis by indicating the origin or severity of their dental problem. Restorative treatment of teeth with poor long-term prognosis should not be carried out. Special needs patients with communication difficulties will typically provide sufficient information through various types of expression, for instance, by pointing, holding a hand, biting objects, refusing to eat, avoiding cold/hot stimuli, grinding or clenching. Some more complex dental procedures can also be potentially performed, if clinically justified and necessary to secure patient's oral health; they include: stainless steel crowns (Hall technique), impressions for immediate dentures (rarely), immediate denture fit, impressions or single stage RCT on an anterior tooth.

As a general rule, a repeat GA for dental purposes must be avoided and is undesirable due to serious risk of morbidity, potential mortality and the impact on a child<sup>13</sup>, and may reflect deficiencies in patient management and treatment planning. However, there are patients who are not compliant with either routine dental treatment with local anaesthesia or conscious sedation, and who

require periodically repeated DGA because of recurrent dental problems meaning this is the only option by which to provide them with comprehensive dental care. A study by Albadri et al. found an incidence of 6.4% of repeat GA for children.<sup>14</sup> With young children and the primary dentition, it is important to balance dental arches in case of multiple extractions of deciduous teeth, when possible. Hence, it is necessary to extract bilaterally deciduous first molars and deciduous canines to prevent centre line discrepancy.

Before prescribing DGA for older children or teenagers a dentist should also consider the suitability of the novel modified techniques of conscious sedation, including intranasal and intravenous sedation, and combined inhalation sedation with a mixture of nitrous oxide and sevoflurane<sup>15</sup>. Table 3 presents clinical indications for the use of pain and anxiety control measures in different groups of patients: general anaesthesia, inhalation sedation, oral sedation, transmucosal sedation and intravenous sedation.

General anaesthesia for dental patients with special needs can be combined with other procedures if required e.g. grommets operation, percutaneous endoscopic gastrostomy (PEG) tube placement/replacement, incision of operculum, Botox injection for muscle spasms (cerebral palsy), and cleft palate operation. Tonsillectomy is not generally recommended due to the risk of extensive bleeding. Dental radiographs can also be taken during GA, using mainly an extra-oral lateral oblique technique, especially in patients with complex maxillofacial malformations. Potentially, it may be possible to take intra-oral radiographs with a hand-held portable X-ray machine.<sup>16</sup>

The DGA session is usually arranged as a day-case anaesthesia for simple dental extractions of deciduous teeth, usually for children of age 4–10, minor oral surgeries or exodontia of carious permanent teeth for those with learning disabilities.

## Legislation and guidelines

According to current guidelines, GA should only be performed in a Hospital setting and requires a trained anaesthetist supported by a dedicated assistant.<sup>13</sup> The Intercollegiate Advisory Committee for Sedation in Dentistry (IACSD, UK) proposes that all children under the age of 8 who cannot cope with inhalation sedation/local anaesthesia must be managed in hospital with a consultant anaesthetist and a paediatric dentist-led team.<sup>17</sup> However, the necessity for, and the practicality of such a proposal is in dispute and the guidance remains under consideration. It is the responsibility of the referring dental practitioner to justify the

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**Table 3. Clinical indications (examples) for the use of pain and anxiety control measures depending on patient's co-operation, medical conditions and co-morbidities, age and other special needs**

General anaesthesia	Inhalation sedation	Oral sedation, transmucosal sedation, intravenous sedation
<b>children &lt; 12 years</b>		
healthy child, not compliant with routine local anaesthetic/inhalation sedation despite an attempt, multiple extractions of symptomatic unrestorable deciduous teeth	partially co-operative child above 5 years old, single extraction of symptomatic/asymptomatic unrestorable deciduous tooth	N/A
disabled child with special needs, lack of co-operation, extractions/restorations of symptomatic deciduous and permanent teeth	anxious, partially co-operative child above 5 years old who requires restorative care of symptomatic/asymptomatic deciduous teeth/permanent molars	
failed inhalation sedation		
<b>adolescents 12-16 years old</b>		
special needs child, lack of co-operation, extractions of retained deciduous teeth	mildly phobic teenager, extractions of carious, unrestorable permanent teeth also e.g. premolars due to orthodontic reasons	moderately phobic, fairly co-operative healthy or special needs teenager, balanced/compensation extractions of permanent molars (orthodontic reason),
severely phobic healthy adolescent, unsuccessful attempt with routine dental care	teenager with severe gag reflex	failed inhalation sedation
failed conscious sedation		
<b>adults</b>		
severely phobic and medically compromised adult with ASA I/II and carefully selected ASA III	adult with mild phobia, medically compromised who requires restorative or surgical treatment	adult with severe phobia or medically compromised requires extensive restorative or surgical treatment
special needs unco-operative adult with recurrent dental problem with unknown origin (EUA)	co-operative, special needs adult, able to understand and retain information regarding inhalation sedation, requires restorative or surgical treatment	partially co-operative and anxious, special needs adult, able to understand and retain the information about proposed treatment under intravenous sedation
failed conscious sedation		

indications for use of DGA in the referral letter. Table 4 presents the core considerations for paediatric DGA.

The referring dentist should provide the treatment under local anaesthesia and/or conscious sedation first and discuss possible risks related to GA. It is compulsory to carry out a detailed medical history check, and a copy of the referral letter must be retained in the patient's clinical record. All children requiring dental treatment should be assessed before the operation in order to determine the most appropriate form of pain and anxiety management.<sup>13</sup> The treating dentist will need to consider all the following questions before formulating a dental treatment plan that entails the use of deep sedation and general anaesthesia:

- Has the referring dentist fully explained all the risks of GA?
- Is the clinical case suitable for GA considering co-operation and general health status?
- Does the patient meet the criteria for dental treatment under GA?

- Can the patient be treated dentally under GA considering current guidelines?
- Does the patient have special requirements? (a hoist, transport, a wheelchair, etc.)
- Is there a need to proceed with capacity assessment and subsequently, a best interest meeting?
- Is it possible to offer alternative options for pain and anxiety control? (conscious sedation with IS, IV, TM)
- Are appropriate facilities for dental treatment under GA available?
- Are there appropriate recovery facilities and is there access to critical care facilities?
- Do an experienced anaesthetist and GA dental team offer support?
- Has a thorough pre-assessment been carried out during a separate appointment?
- Has valid and informed consent for dental treatment under GA been provided?

The special care dentist responsible for the patient's oral health must make a balanced decision regarding the treatment that suits the patient best, taking into account their behavioural capabilities, cognitive functions and medical condition. The best interest of the patient must remain at the forefront of decision-making processes<sup>18</sup>. The decision should be made together with the patient and the next of kin or a guardian (a special guardian) of the patient<sup>19</sup>. In cases where a patient lacks capacity and has no next of kin, formal local procedures must be followed. Capacity assessment comprises the first stage of capacity evaluation, followed by a best interest decision (meeting). In the UK, an independent mental care advocate (IMCA) must be appointed in accordance with the Mental Health Act if a person is 'un-befriended' and there is no known next of kin or relative<sup>20</sup>. Written consent must be completed on the proper form. Potential risks need to be written and explained to the parent, legal guardian or patient who should finally sign the consent form.

**Table 4. Main considerations for paediatric DGA (Royal College of Surgeons guidance, modified)**

- The co-operation and attitude of child
- The perceived anxiety of the child
- The complexity of the treatment plan
- The medical status of the child: ASA I and II, majority of ASA III
- Age, usually above 2 years old, weight exceeds 10 kg
- Additional and increased risk compared to non-GA sedation and analgesia techniques
- Treatment at hospital
- Starving, travel, time, cost for family and service
- Extent of caries: teeth cannot be saved, likely to cause a pain/infection, may potentially affect a permanent dentition
- Orthodontic considerations

## Preliminary assessment

A robust GA pre-assessment should be carried out during a separate appointment allowing sufficient time for discussion. The meeting should not be rushed as proper explanation, fully informed consent and careful treatment planning<sup>21</sup> are necessary. When it comes to routine medication, the general recommendation for the vast majority of patients is to take their usual drugs at the usual time and at the usual dose. Each patient should be treated as an individual and as a special case, bearing in mind all specific variations on the day in question. This is because health, condition, mood and general well-being of special needs patients may change significantly and will often vary from day to day. It is fundamental to consider each patient as a dynamic individual whose physical and mental state can change without notice.

When it is not possible to have a comprehensive examination or appropriate laboratory tests done prior to administering care, due to a patient's mental/learning disability, the dentist responsible for referring a patient should document the reasons preventing the recommended pre-operative management. Age is an important consideration when assessing children for GA. Healthy three-year-olds can be accepted for simple, quick DGA sessions. However, it is necessary to discuss the suitability of children under the age of three with an anaesthetist before agreeing to refer them for any

form of GA. Individual assessment using ASA scale (American Society of Anaesthetists) is recommended for GA.<sup>13</sup> Optionally, airways assessment using the PSA scale (1-4) can be considered for the use of laryngeal mask (supraglottic) or intubation.

The special precautions ('alarm bells') which need to be carefully considered before prescribing DGA may be related to<sup>22</sup>: BMI score > 40 (severely bariatric patient), chronic severe respiratory conditions (e.g. idiopathic sarcoidosis), polyaddiction to drugs, previous adverse reactions to any analgesics or anaesthetics, anticoagulation, congenital heart dysfunction (children), posture constitution: short neck including severe obesity, cervical spine injury/defect/deformation, possible airways problems, continuous home oxygen supply, transplants, polypharmacy, multiple allergies to eggs, soya, milk (propofol cross-reactivity?), sickle cell condition (additional tests needed). Table 5 presents the general rules for GA treatment planning.

**Table 5. General rules for DGA treatment planning in paediatric and special care dentistry (Solent NHS. Internal Guidelines for Extraction of Teeth under General Anaesthesia, 2015)**

- More radical approach than for LA – aim to not only make a child dentally fit but to prevent a repeat GA in future
- Not only to address current treatment needs but to plan ahead to ensure the child reaches adulthood with a healthy and functional dentition as well as a positive attitude towards dentistry
- Plan to extract all teeth which have poor long term prognosis or are questionable: heavily restored, worn, traumatised, structurally unsound. All restorative care completed prior to GA or at GA

## Limitations of general anaesthesia in persons with special needs

The clinical cases not suitable for DGA are: simple orthodontic extractions, asymptomatic dental problems, extraction of a single deciduous tooth where natural exfoliation is imminent, basic dental examination, scale and polish/debridement where no other treatment is planned and there is no evidence of odontogenic infection. Because of the 'complex nature' of the GA procedure and the increased risk of complications, there are obvious limitations for dental treatment under GA<sup>23</sup>.

General anaesthesia can be restricted in totally unco-operative patients with complex special needs and predicted difficulties with cannulation, multiple deformities and abnormalities, complex polypharmacy and severe adverse reactions to certain medications administered intravenously, e.g. muscle relaxants due to congenital susceptibility<sup>24,25</sup>. The restrictions and contraindications for dental treatment under GA are listed in Table 6.

## Medically compromised dental patient

The anaesthetist should be informed and made aware of all medications taken by the patient preparing for dental procedures under GA. For the vast majority of medications prescribed for

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**Table 6. Contra-indications for provision of dental care with the use of DGA.**

<p>Non-valid consent for GA procedure</p> <p>No clinical indication/justification for GA, e.g. GA only to be used for proper dental examination and/or oral hygiene in healthy phobic person</p> <p>Existing dental problem which is causing no obvious pain or discomfort, etc. (e.g. retained, asymptomatic roots)</p> <p>Lack of appropriate facilities or properly trained staff</p> <p>Single, dental problem which can be resolved successfully using other techniques: LA, RA, IV</p>	<p>History of severe side effects related to sedatives, including confirmed anaphylactic reaction to sedative medications</p> <p>Genetic disorders affecting metabolism, pharmacokinetics and effect of sedatives and/or muscles relaxants: malignant hyperthermia, acetylcholine esterase metabolism disorder, sickle cell anaemia</p>
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common medical conditions there are no specific restrictions and precautions and there is no need for dose adjustment either before or after the DGA session. Generally, anti-hypertensive drugs, bronchodilators, antiepileptic drugs and medications for cardiovascular diseases should be continued without alteration. Special attention should be paid to anxiolytic drugs and tranquilisers as they may interact with medications used for pre-anaesthesia sedation. The patient's physician, consultant or specialist must be consulted in all cases involving diabetic drugs and corticosteroid pharmacotherapy<sup>26</sup>. Additionally, patients can confirm an allergy to topical anaesthetic gel, e.g. EMLA used for cannulation procedures, perhaps during a previous experience of IV sedation or GA.

The main intra- and post-operative complications may include: non-fatal ventricular arrhythmia, fall in blood pressure or hypertension, laryngospasm, airway problems resulting in a desaturation of oxygen<sup>27</sup>. If current standards are strictly followed, complications during DGA sessions will most likely be multifactorial, including unpredictable reactions to intravenous sedatives or relaxant/myolytic drugs, compromised respiratory capacity, cardiac depression, etc. In addition to complications relating to the GA, the dental treatment provided under GA itself precipitates specific problems or circumstances that need to be resolved efficiently. Table 7 contains the list of challenges related to dental treatment under GA in children and special needs patients.

**Table 7. Challenging situations which can arise when considering dental treatment under GA**

<p>Uncertain parental responsibility or double parental responsibility, e.g. biological, adoptive, step and foster parents</p> <p>Different expectations of parents who cannot agree on their consent for dental treatment under GA for their child</p> <p>Parents happy to consent for a specific treatment or procedure, e.g. single extraction of one affected and symptomatic tooth under GA but are reluctant to or apprehensive about consenting to multiple balanced extractions</p> <p>Patients with special needs who have no next-of-kin family members</p> <p>Young patients who have had GA for a medical condition within the last 3 months</p> <p style="text-align: right;"><i>continued</i></p>
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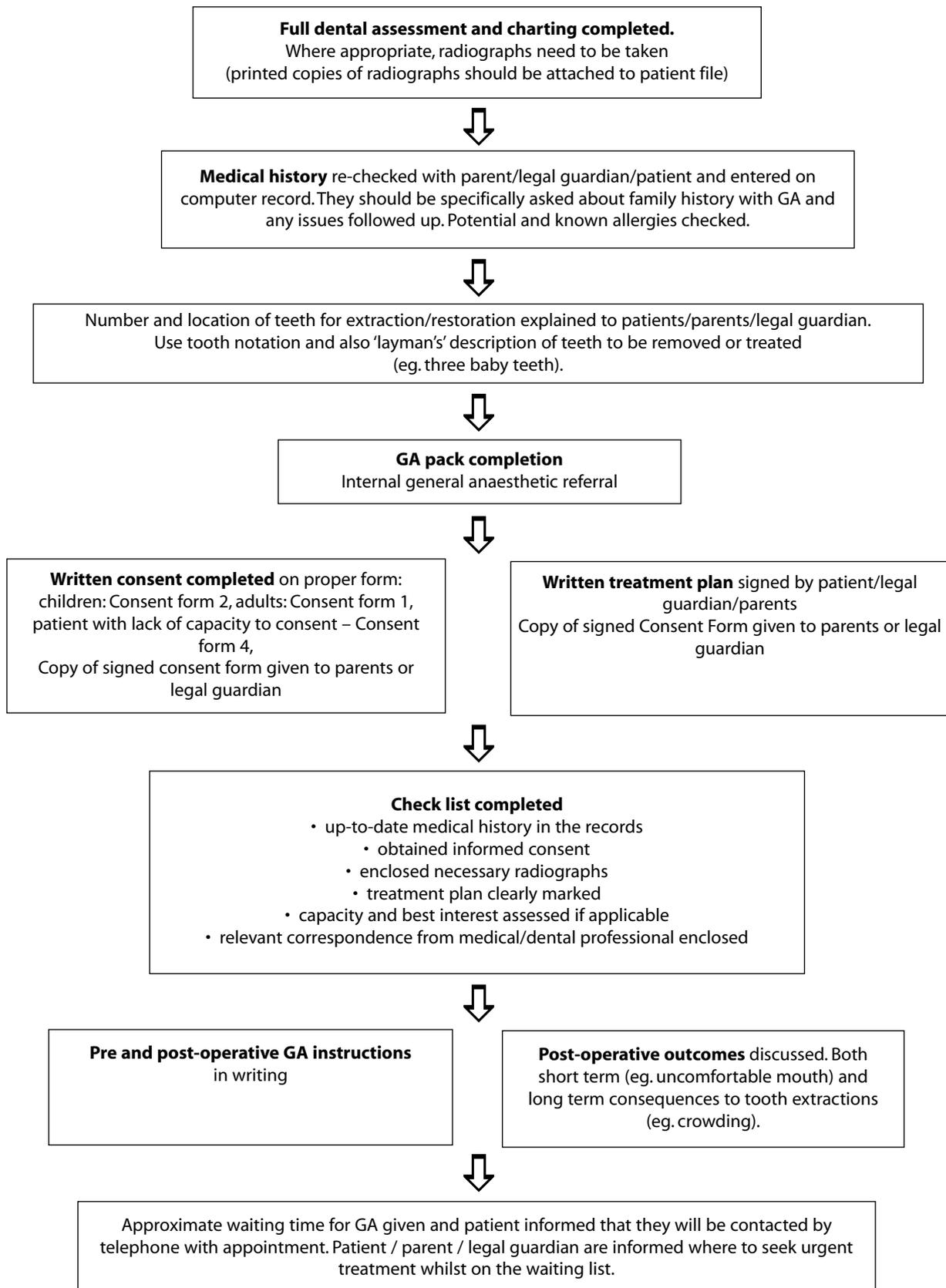
**Table 7 continued**

<p>Parents or legal guardians who request dental treatment under GA to be combined with other procedures due to medical reasons</p> <p>Severely medically compromised elderly patients</p> <p>Inherited medical conditions which are known to increase the risk of life-threatening complications following GA</p> <p>Is a single deciduous tooth extraction under GA in unco-operative child with periodontitis and/or an abscess justified? Are there other alternatives?</p> <p>Should an unco-operative patient in pain waiting for a second orthodontic opinion regarding extractions of carious permanent teeth be prioritised for GA referral?</p> <p>Is GA ever justified in order to advance purely orthodontic treatment?</p> <p>Are balanced, compensating multiple extractions under GA justified for non-orthodontic reasons, such as compromised first permanent molars (hypoplastic) in phobic patients?</p> <p>A family history of prolonged reaction to muscle relaxants (mepivacurium, pancuronium, etc.) may indicate a genetic predisposition to complications following GA which patients may describe as an 'allergy'</p> <p>Clinical holding of a young patient or patients with special needs may be necessary during cannulation</p> <p>Oblique lateral radiographs arranged during GA need to be considered in case of cranio-facial malformations</p>
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The referring dentist and secondary dental care operator, i.e. community dentist or special dental care consultant, must ensure that there is an accompanying adult with parental responsibility for any child seen (biological parents, adoptive parents, special guardians). Verbal information documented with written advice is imperative as the patient may have a varied number of carers who may need to refer to this information. Instructions for patients and carers (both verbal and written) must be provided. After a DGA session, patients must be properly assessed before discharging. Post-operative advice must be given in writing<sup>12,13</sup>. Figure 1 presents an example of internal protocol recommendations when referring a patient for dental treatment under GA.

# SAAD ESSAY PRIZE RUNNER UP

Figure 1. Flowchart representing an internal protocol for dental general anaesthetic referral.



# SAAD ESSAY PRIZE RUNNER UP

## Summary

In conclusion, all dentists providing dental care under GA must remember the following:

1. DGA should be avoided where possible and therefore the initial aim at the start of each treatment plan is to avoid the GA. Dentists should not assume that DGA is the only option because of the young age of the child or parent's preference.
2. Dental treatment under GA has to be limited to predictable, long-term successful outcomes and one-stage procedures.
3. Valid, fully informed consent is paramount and mandatory, obtained from an appropriate person: parents, legal guardians, foster parents with parental responsibility. Capacity assessment along with best interest meeting, with patient's next of kin, GP's, Consultant's or Mental Capacity Advisor's involvement if required.
4. Team work and close co-operation between all clinicians involved in the treatment and care of the patient is essential. This will include hospital staff, the dental team, the anaesthetic team, recovery staff, ward nurses, etc.

Despite the fact that general anaesthesia plays an important role in interdisciplinary dental care, dental treatment under general anaesthesia should never be undertaken as a first choice means of anxiety control. This option should only be considered as a last resort following behavioural management, cognitive behavioural therapy and conscious sedation for dental care. The decision to go ahead with DGA must be taken after carefully considering all aspects of the patient's needs based on rationale, valid consent and co-operation.

It is predicted that in the future there will be a likely increase in the demand for general anaesthetic sessions for patients with complex disabilities, creating an escalating hospital workload and significant cost to the community service.

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## Behaviour Management of Children Presenting in the Emergency Department with OMFS Problems

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### Abstract

#### Introduction:

This paper is a summary of three case reports of patients treated by Oral and Maxillofacial (OMFS) Dental Foundation Trainees (DF2s) at a busy London paediatric Accident and Emergency (A&E) department.

#### Discussion:

Behavioural management for paediatric patients is challenging. The authors discuss various non-pharmacological behavioural management methods as stand-alone techniques or as an adjunct to drugs (sedation or anaesthesia). They highlight three cases where a dedicated Play-Specialist is employed to assist treatment undertaken in an acute hospital setting. Here we discuss options available to clinicians for behaviour management as well as three case scenarios detailing the use of Play-Specialists alongside conventional pharmacological and non-pharmacological methods.

#### Conclusion:

Through implementing appropriate behavioural management methods (with or without drugs), optimal patient care can be achieved. The benefit of having a specialist solely trained in engaging with children, with respect to their behavioural tendencies, is demonstrated, highlighting their value in an acute setting.

### Introduction

The following paper is a summary of three case reports of patients treated by Oral and Maxillofacial (OMFS) Dental Foundation trainees (DF2s) during their duties at a busy London paediatric A&E department. The paper illustrates the patient demographics seen by the OMFS department and both the pattern of injuries and their immediate management.

Attending the local A&E department can be a potentially stressful, frightening and difficult experience for children and their family. Emergency service visits are generally unplanned and so the experience of the emergency department, simply by the unexpected nature of the need for a visit, is stressful.<sup>1</sup> In particular when maxillofacial injuries are involved, the very personal nature of injury related to the head and neck can be extremely distressing for the concerned parent.

There are many factors, which influence a child's behaviour in an acute setting, these include: personality traits, past medical experiences, family concerns and disease/pain.<sup>2,3</sup>

Guidance suggests that a relationship must be established and based upon trust with the child and accompanying adult.

A child patient can thus be categorised into one of three groups:<sup>4</sup>

- The co-operative child
- Potentially co-operative child
- Lacking co-operative ability: very young children or specific disabilities where a dialogue is not possible

The latter group are not always suited to non-pharmacological behavioural management methods but one should maintain appropriate non-verbal communication skills even in conjunction with pharmacological methods<sup>4</sup>.

### Behavioural Management

Behavioural Management is the means by which the health team effectively and efficiently performs treatment for a child with ultimate aim of instilling a positive attitude adapted from Wright (1975).<sup>5</sup>

Behaviour management can be categorized into:

1. Non-pharmacological behavioural management (NPBM)
2. Pharmacological behaviour management (PBM)

Some methods of NPBM aim to improve the communication process, others intend to eliminate inappropriate behaviour or reduce anxiety

### Communication

Selection of words, sounds, tone of voice and voice inflection are important. Language used should always be age appropriate, as should non-verbal communication. Language barrier and cultural differences must always be considered.

#### 1. Verbal communication and Voice control

The tone of voice is often more important than the content delivered, particularly with younger children.<sup>6</sup> The alteration of tone, volume and pace can influence compliance. Abrupt changes from soft to loud sounds can be an effective way of gaining the attention of a child, who is non-compliant.<sup>4</sup>

# SAAD ESSAY PRIZE RUNNER UP

**Figure 1: Behavioural Management methods**

Non-pharmacological behavioural management methods	Pharmacological behavioural management methods
<p>Communication</p> <ol style="list-style-type: none"> <li>1) Verbal (voice control)</li> <li>2) Non-verbal</li> <li>3) Combination of non-verbal and verbal methods</li> </ol> <p>Behavior shaping</p> <ol style="list-style-type: none"> <li>1) Tell Show Do</li> <li>2) Enhancing control</li> <li>3) Positive reinforcement</li> <li>4) Modeling</li> <li>5) Desensitisation</li> <li>6) Distraction</li> <li>7) Negative reinforcement</li> </ol>	<p>Premedication</p> <ol style="list-style-type: none"> <li>1. Sedatives and hypnotics</li> <li>2. Anti-anxiety drugs</li> <li>3. Anti-histamines</li> </ol> <p>Conscious sedation</p> <ol style="list-style-type: none"> <li>1. Inhalation sedation with Nitrous oxide</li> <li>2. Oral Midazolam</li> <li>3. Intranasal Midazolam</li> <li>4. Intravenous Midazolam</li> <li>5. Intravenous propofol</li> <li>6. Inhalation with sevoflurane</li> <li>7. Rectal Midazolam</li> <li>8. Rectal Diazepam</li> <li>9. Multiple intravenous drugs</li> <li>10. Ketamine</li> <li>11. Multiple inhalation drugs</li> <li>12. Fentanyl</li> </ol> <p>General anaesthesia</p>

## 2. Non-verbal communication

This encompasses environmental factors such as waiting room, child friendly set-up and smiling team members. It is happening continuously whether you are aware of it or not. It should act to reinforce verbal signals and has been shown to effectively minimise distress. Particular methods such as comforting pats and squeezes can be a useful adjunct.<sup>4</sup>

## Behaviour shaping

### 1. Tell show do (TSD)

The process of TSD is very useful where you have gained rapport with a potentially co-operative patient with whom you can communicate. The tell phase involves description with age appropriate terminology of the proposed procedure. The show phase includes demonstration with equipment and if appropriate allowing the patient to handle key pieces of equipment. The do-phase should be initiated without delay.<sup>4</sup> This process is particularly useful for the acute setting because if effectively delivered facilitates immediate treatment.

### 2. Enhancing control

Here the patient is given a degree of control over their dentist's behaviour through the use of a stop signal. Such signals have been shown to reduce pain in particular during injections and treatment.<sup>7</sup> This can help a child feel in control of the situation and is particularly effective when used in conjunction with other methods of behavioural management. It does however require the establishment of trust between practitioner and patient. In an acute setting this is difficult to gain where you have not the luxury of a calm setting in which to establish trust.

### 3. Positive reinforcement

This is defined as a series of steps towards the ideal behaviour achieved by various behavioural management techniques, with selective reinforcement of positive behaviour. Selective

reinforcement is the strengthening of a pattern of behaviour.<sup>8</sup> Anything that a child finds pleasant or gratifying can act as a positive reinforcer: stickers or badges are often used after a display of positive behaviour. This depends upon good non-verbal communication and TSD by which a series of steps can be taken to achieve the end gain. This is particularly suited to dental procedures where defined steps are used for particular procedures, however, it has been shown to be a key instrument for paediatric Play-Specialists.

### 4. Modelling

The use of other family members such as older siblings,<sup>9</sup> or parents can be used to quickly gain trust and instil confidence in a younger patient. Ideally the model should be the same or similar age and should exhibit the appropriate behaviour and be praised.<sup>4</sup> Psychological principles suggest that we learn about our environment by observation of others' behaviour.<sup>10</sup> The patient will frequently imitate the model's behaviour when placed in a similar situation.

### 5. Desensitisation

As an acute behavioural management method this is not particularly useful, however, in a planned setting the gradual acclimatisation of any healthcare related procedure can be achieved by calm orientation to the surrounding environment, sounds and sensations to ultimately facilitate the end gain. The patient needs to be able to identify and communicate their fears. This method requires patience from all parties.<sup>4</sup> By gradual introduction of stimuli working upward from the least distressing or disturbing stimulus to the most affecting the patient may become acclimatised. This hierarchical approach is often referred to as "systematic desensitisation".

### 6. Distraction

This can involve any age specific form of interaction prior to and during the procedure. This may include audio, visual and interactive methods. Typically, each individual clinician develops his or her own repertoire of distraction techniques.

## 7. Negative reinforcement

This can only be effective in those who can understand and communicate effectively. It will not be effective in very young patients. There has in the past been shown to be some benefit in specific cases for selective parent exclusion, however, you must obtain parental consent prior to attempting this technique. In an acute setting this may not be the most appropriate tool as the nature of the visit is distressing and traumatic.

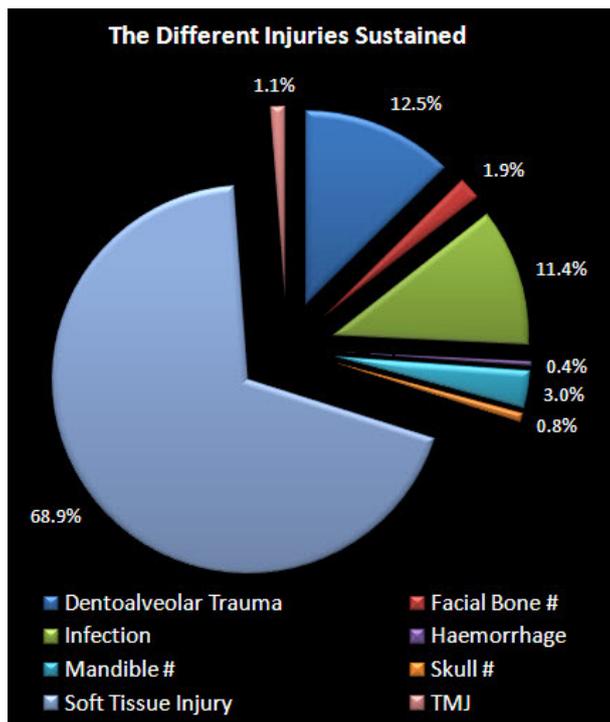
## Pharmacological Behaviour Management

A comprehensive review of pharmacological behavioural management is beyond the remit of this paper, however, the authors wish to highlight the necessary use of NPBM in conjunction with drugs.

Pharmacological methods of behavioural management are listed in Table 1. Conscious sedation in dentistry has undergone significant changes in the last 10 to 15 years. Conscious sedation is a technique for dealing with treatment-based phobias; it is not an alternative to effective local anaesthesia or good behavioural management.<sup>11</sup> Providing care alongside specialist medical professionals allows for use of pharmacological agents that would not be suitable in a general practice setting.

The use of Ketamine as an adjunct to NPBM is used effectively in some Paediatric emergency departments. Ketamine is optimal for sedation during brief procedures that are painful or emotionally disturbing for children, such as fracture reduction and laceration repair.<sup>12</sup> Joint care in these cases (conscious sedation with Ketamine) is typically provided by A&E Consultants, Paediatric Play-Specialists and the specialty operator.

**Figure 2: Pie chart showing reasons for admission of paediatric patients under OMFS team**



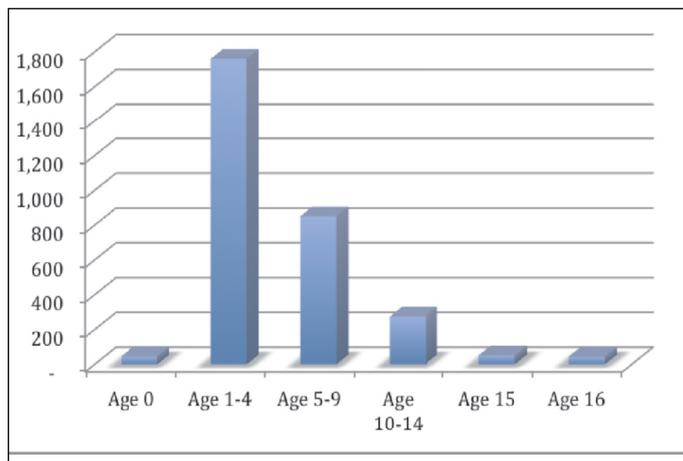
## Demographics of Paediatric patients attending an Accident and Emergency department with maxillofacial injuries

The presentation of children in the A&E setting to the OMFS team is not an unusual occurrence and forms a regular part of the OMFS team workload. When considering the incidence of such presentation at the unit in question, the authors were able to consult an analysis of the OMFS trauma database, maintained by the on-call junior doctors during 2010 (Fig. 2).

The most commonly sustained injury was soft tissue injury making up almost 70% injuries managed; often lacerations to the face or lips with the most commonly presenting age group is 3-6 year olds (Fig 3. *next page*). Dento-alveolar injuries were the next most frequently presenting injury (12.5%). Management of soft tissue injuries in 83% of cases was achieved in the A&E department with only 17% requiring admission for surgery under general anaesthetic.

Similarly, when considering national data based on data available from the Health and Social Care Information Centre (HSCIS),<sup>13</sup> it is clear to see that these patterns were comparable several years later. In the 3000 paediatric OMFS patients treated in 2012-13, the reported figures for 'Suture of skin of head or neck' show equivalent trends to those reported locally above, with the greatest majority of paediatric injuries treated in OMFS units occurring on those under the age of 4 (Fig4).

**Figure 4: HSCIC national level age data for patients attending for suture of skin of head or neck<sup>13</sup>.**

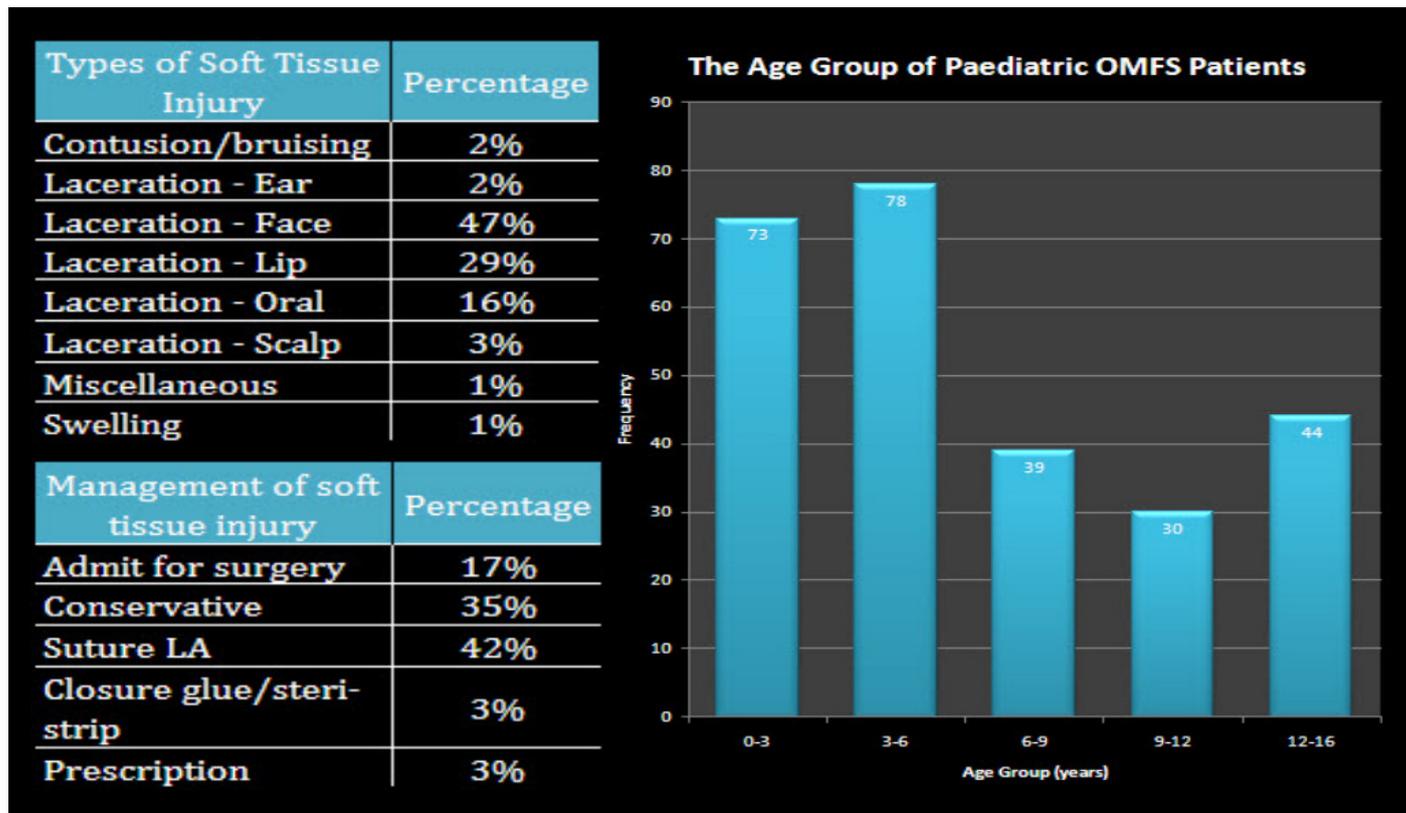


## Considering the role of the Paediatric Play-Specialist

Behavioural management for paediatric patients is challenging. Difficulties encountered may be amplified in junior clinicians whose limited experience may hinder their clinical management abilities. Hospital Play-Specialists (HPS) working within Paediatric A&E departments, support children, families and all staff members through play provisions to improve the quality of care received, aid assessment and diagnosis, as well as contributing to clinical judgments<sup>14</sup>.

# SAAD ESSAY PRIZE RUNNER UP

Figure 3: Summary of age range; type of soft tissue injury; course of management



The work of a HPS helps create an environment, which reduces stress and anxiety helping the child gain confidence and self-esteem as well as satisfy the child’s need for play. By using these Play-Specialists as an adjunct to the treatments performed (particularly on the injuries seen by maxillofacial doctors), it is possible to overcome limitations in behaviour management and improve the efficiency with which treatments are delivered.

HPSs use play preparation to enable patients to understand, at a developmentally appropriate level of the procedure they are to experience. Play preparation helps; reduce anxiety, supports effective pain management and encourages cooperative behaviour during the planned procedure. Distraction therapy and alternative focus activities are the skills used most regularly by the HPS within children’s A&E to help children cope with the medical treatment, procedures and investigations carried out in the emergency setting.

Through anecdotal reports the use of a HPS can significantly improve patient outcomes. Treatments initially felt to be beyond the scope of conventional NPBM and therefore planned for management under conscious sedation are achieved through play preparation and NPBM.

## Case series

Here we discuss cases where oral and maxillofacial injuries are managed with and without Ketamine sedation, along with support from the HPS.

### Case 1: Lip laceration managed under Ketamine with suturing under local anaesthesia.

A 2-year old boy presented to the A&E department accompanied by his mother following a mechanical fall at home. He sustained a traumatic injury to lower lip sustained on the corner of a coffee table.

Following a complete history and examination it was concluded that there was no head injury and the child was otherwise fit and well. The patient was subsequently referred to the maxillofacial team on-call for assessment and treatment along with a parallel referral made to the HPS in the department.

After a full examination it was concluded that his only presenting injuries were a contusion to the chin and 20mm laceration to the midline lower lip crossing the vermilion border, involving muscle. No hard tissue injuries were found. The OMFS junior doctor explained to the mother that this laceration would benefit from formal closure with sutures and the various treatment modalities available.

It was felt by both staff and parents that closure under local anaesthetic (LA) only would not be possible without causing significant distress to the child. The patient was described as a pre-cooperative patient and therefore was unlikely to understand or tolerate treatment under local anaesthesia. Options including closure under Ketamine conscious sedation and general anaesthesia were offered: There were no contra-indications (consistent with local guidelines) to treatment and the patient was appropriately starved.

The patient was consented for treatment under Ketamine by the Paediatric A&E Consultant. 'Ametop' topical anaesthetic was applied to the dorsum of both hands 1 hour prior to treatment. The HPS provided distraction therapy during cannulation and delivery of Ketamine. A 1.5mg/kg loading dose with incremental titration doses of 0.5mg/kg to maintain the dissociative effect.

The parent remained with the child during the procedure. The child played with toys and was engaged in games as a form of distraction therapy until appropriately sedated. The OMFS DF2 was able to deliver appropriate local anaesthesia in the form of a labial infiltration (2% Lidocaine and 1:80,000 adrenaline). The wound was irrigated and debrided using saline and wound closure was achieved with 2 single interrupted resorbable (braided, synthetic [vicryl rapide 5o]) sutures.

The patient was recovered under constant nursing supervision. Post-operative instructions were delivered to the parent.

### **Case 2: Forehead laceration sutured under local anesthesia**

A 4-year old girl presented to the A&E department following a mechanical fall at home into a wooden box corner. She sustained a forehead injury and was brought to the department without delay accompanied by her mother who reported that there had been no loss of consciousness or vomiting.

Following a complete history and examination it was concluded that there was no head injury and the child was otherwise fit and well with no predisposing medical factors. She was particularly distressed and hesitant to allow thorough examination of the wound. The patient was subsequently referred to the maxillofacial team on-call for assessment and treatment. After a full examination we concluded that her only presenting injury was a simple laceration to the superior aspect of the left forehead extending just into the scalp. It was approximately 20mm in length and involved skin only, with no tissue loss noted.

The DF2 explained to the mother that this laceration would benefit from formal closure with sutures and that there were various treatment modalities available. It was felt by both staff and parents that closure under LA only would not be possible without causing significant distress to the child, therefore options including closure under Ketamine conscious sedation and general anaesthesia were offered. The patient had eaten 2 hours previously and therefore was not sufficiently starved for immediate treatment therefore plans were made for her to return to the department the following day for treatment under Ketamine.

On her return the next day as per departmental protocol the patient was seen by the Play-Specialist who was able to assess the patient's understanding and potential compliance to treatment. In her experience she felt that the patient was suitable for treatment under LA and support from the HPS.

The HPS undertook play preparation for local anaesthesia, debridement and suturing. Through "tell show do" enhancing control and positive reinforcement methods of Behavioural management, the patient was fully informed and given appropriate coping strategies. Consent was taken from her mother

including possibilities of future scarring and failure of treatment. The option of using Ketamine sedation was included should she not cope with treatment under local anesthesia.

Treatment was carried out by the OMFS DF2 and completed successfully with support from the HPS. Local anaesthetic was administered (2% Lidocaine and 1:80,000 adrenaline) and the wound was cleaned with saline and debrided. Single interrupted sutures (resorbable, braided synthetic [vicryl rapide 5o] x5) were placed and wound closure achieved. The patient coped very well throughout. The HPS delivered positive reinforcement in the form of stickers and praise.

At a review 5 days later the wound was healing well, and most importantly the child was happy and showed no signs of anxiety towards medical staff or examination.

### **Case 3: Forehead laceration sutured under local anesthesia**

A 4 year-old girl, attended following trauma sustained to the head whilst playing at home: she had been jumping on a couch at home whilst playing, when she fell forwards and landed hitting her head on the corner of a table. The event was witnessed by her mother (with whom she attended), and they reported that there had been no loss of consciousness or vomiting and the child was not in any major distress following.

Following a complete history and examination it was concluded that there was no head injury and the child was otherwise fit and well. The only injury sustained as a result was a straight edged, simple laceration to the forehead, on the right hand side just above the right eye, approximately 1.5cm in length, and only into muscle and not to bone. The patient was subsequently referred to the maxillofacial team on-call for assessment and treatment, along with a parallel referral made to the HPS in the department.

Following examination and confirmation of history and previous exam, the decision was made that suturing of the wound was required. With input from the Play-Specialist, the conclusion to do proceed without sedation or GA was made and the appropriate elements of behaviour management were decided with support from the HPS. The two methods employed were preparation of the procedure and distraction (in the form of bubbles and an interactive DVD). The HPS informed the patient of what was going to happen using appropriate wording and descriptions. A note was made that she was in-fact nervous, but with further encouragement and reassurance this was dealt with amicably. The patient was given the choice of distractions she could engage with during the procedure too which surely helped in subduing the nervous disposition.

The patient was distracted during the administration of LA as before however there was some crying during. This was very quickly settled with help from the HPS. There was some reluctance to having the sutures placed however after showing the patient the equipment there was a positive change in cooperation. The wound was cleaned with saline and closure achieved by placement of single interrupted, resorbable sutures (Resorbable, monofilament [Monocryl 5o], x3). Post-operative instructions were imparted to the parents.

# SAAD ESSAY PRIZE RUNNER UP

The HPS delivered positive reinforcement in the form of colouring sheets, stickers and praise. The patient left feeling very comfortable and in good spirit.

## Discussion

The described case reports highlight multiple benefits of behaviour management of paediatric patients. Occasionally delaying treatment for particularly distressed patients as in the first case showed that the patient's demeanour and general behaviour were significantly different to that they demonstrated at the initial presentation. HPSs have significantly more time at their disposal to prepare patients for procedures and we should refer to their experienced assessments of a patient where in doubt.

In the second case, the pre-cooperative child was managed appropriately by the use of conscious sedation with specialist play therapy. This facilitated speedy treatment with minimal distress for both patient and parent, thus avoiding a general anaesthetic and its associated risks.

With recent reports published by Public Health England<sup>15</sup> raising public awareness of the volume of children receiving GAs for dental treatment, the public opinion and concern over the exposure of minors to unnecessary treatments has never been greater. With plenty of data available to support the use of relative analgesia and sedation,<sup>16</sup> it is crucial that these treatment adjuncts are considered more often as a regular treatment modality.

The use of HPS is an undervalued resource, particularly when considered from the junior doctors standpoint. In an environment driven by the frugality of the current healthcare economy, we must also consider the impact of various strategies on managing a health service and the provision of services to patients. Jameson et al in 2006<sup>17</sup> scrutinised the differences between the management of children receiving dental treatment under RA vs GA. It was found that the use of GA was approximately 46.6% more expensive than methods involving sedation. It was also observed that approximately 5% of these children were not deemed suitable for sedation services in any case, which is an unavoidable entity and is likely to be consistent with the findings in the cohort experienced in OMFS. The services must exist to cater for the broad spectrum of patient eventualities, but where possible the safety of the child is paramount.<sup>18</sup>

Critically, these differences did not necessarily take into account the environments of primary and secondary care. However, when one considers that admission of patients for GA requires both hospital bed space and nursing support staff, both of which may pose a greater drain on funding and resources, it can be assumed that there are direct benefits to managing these patients in the A&E setting. The time factors involved are also greatly reduced when it is realised that children admitted to these services are usually exposed to the unforgiving setting of CEPOD emergency theatre guidelines.<sup>19</sup>

When contemplating the prospective economics of workforce planning against the potential outgoings, based on the information stated above bearing in mind the 3000 or so children seen with OMFS injuries (although the exact breakdown of the

number of children treated under GA vs Sedation vs LA is not clear), the number of children that could potentially be treated with a decreased risk equates to potentially massive savings. These savings could easily support further adjunctive staff in the supportive roles required in A&E departments reducing the workload and improving patient outcomes for the patients they treat. These suggestions also follow guidance set out by the government in a bid to improve the Standards for Hospital Services with children.<sup>20,21,22</sup>

## Conclusion

Treating paediatric patients can be a daunting and challenging prospect, especially for junior colleagues. This is likely to be due to limited practical experience with paediatric patients in the undergraduate setting. Many young or newly qualified dentists and doctors have limited experience particularly with the management of paediatric patients in an acute setting. As a junior doctor in an Oral and Maxillofacial on-call team at a trauma centre in large cities, you are faced with varying presentations of trauma and infection. With respect to traumatic injuries these involve soft tissue, hard tissue and dento-alveolar tissues. The spectrum of soft tissue injury includes minor contusions, abrasions, simple lacerations and complex lacerations (including dog bites).

It is important to remember that soft tissue injuries can be extra-oral and intra-oral and are often seen in conjunction with dento-alveolar and hard tissue injuries.

There is a great deal of satisfaction to be gained from achieving what patient and parent think is unachievable. With patience and good use of behavioural management methods with or without adjunctive pharmacological methods much can be achieved in an acute setting.

There is a proven need for continued Hospital Play-Specialist support in the emergency setting. The loss of these valuable and trusted colleagues will have numerous impacts upon patient care, patient related outcomes, efficiency in the acute care setting and economic factors. Patients previously manageable with HPS and senior paediatric staff support may unfortunately have to be treated using more costly treatment modalities such as combination sedation or general anaesthesia.

It is important to consider what is taken away from the visit both physically and psychologically and act to "do no harm".

## Acknowledgements

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## Declaration of interests

There were no conflicts of interest in the preparation of this manuscript, which was completed free from any sponsor.

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## SAAD Symposium 2016

### Sedation is Alive and Well in General Dental Practice

Saturday 24 September 2016

The Royal Society of Medicine, London, UK

The 2016 SAAD Symposium attracted many familiar faces along with a good representation of younger colleagues, confirmation that sedation is indeed alive and well in general dental practice!

Our President, Francis Collier opened the meeting by welcoming colleagues, old and new alike. He addressed the younger members of the audience by pointing out "You may only be 20% of our audience, but are 100% of our future."

John Milne, a senior National Dental Advisor at the CQC was the first speaker of the day. He talked about the new regulation emerging in England, and the five pillars that should form an essential part of every practice - Safe, Effective, Caring, Responsive and Well led. Dr. Milne also outlined the changes the CQC had implemented in its own modus operandi, in an effort to reduce red tape and to promote best practice.

Simon Morrow, Clinical Director, Three Towns and Kilwinning Dental Care and Scottish Sedation Training was the next speaker. Dr. Morrow is involved with the SDCEP, and is part of a group tasked with producing their new guidelines. He explained that there would be new inspections in Scotland, and that the Scottish Government was keen to fund support and education with both new and previous inspectors.

Keith Hayes, Clinical Director of RightPath4 Ltd and a GDC appointed Clinical Supervisor, spoke about a simple and pragmatic system of clinical governance which encourages practice improvement.

SAAD Trustee, Kellie Boles introduced the next session, introducing Amita Peet, Dental Associate and Senior Dental Officer who gave an overview of what most sedation practices were like and discussed several cases where things could and had gone wrong.

The next speaker, General Dental Practitioner and Restorative Specialty Dentist, Shilpa Shah, described launching an IV sedation service and her personal experiences of setting up her practice from scratch. She pointed out how increases in demand for surgical dentistry have increased the need for conscious sedation.

Fiona Patterson, a Dental Therapist, and SAAD Trustee Paul Howlett, a General Dental Practitioner, both at Queensway Dental Clinic were the next speakers. They outlined the results of an audit of paediatric care and IHS conducted at their practice, which revealed success rates of up to 96% when therapists alone provided care under IHS.

The final speaker of this session was SAAD Course Director, David Craig who spoke about the new SAAD Assessed Sedationist scheme aimed at new practitioners starting their training through SAAD. He also gave details of how experienced practitioners would be able to enlist themselves to act as clinical supervisors.

Ahead of the SAAD AGM, SAAD President, Francis Collier presented the SAAD Essay Prizes. The Drummond Jackson Essay prize was awarded to Sarah Sacoor for her essay 'Anaesthesia and Sedation for the Austistic Patient'. The SAAD Dental Student Essay Prize was awarded to Cameron Warwicker for his essay 'Clinical Management of the Gagging Patient'. Both of these essays are published in this issue of the SAAD Digest. A further presentation was made to Dr. Andrew Wickenden who was standing down from his role as SAAD's Honorary Membership Secretary after seven years in post. Francis thanked Andrew for all his work and wished him well for the future

This year's symposium was well supported with poster presentations and the abstracts are included here for the interest of members.

The afternoon session was introduced by SAAD Trustee Yi Kwan Loo, and the first speaker was SAAD Trustee and General Dental Practitioner, Christopher Holden who outlined a number of tips on how to incorporate best practice, and the use of the SAAD Safe Sedation Practice Scheme.

Joanna May, a Consultant in Paediatric Dentistry was next, explaining how sedation outcomes can be improved. Dr May was keen to stress the use of individualised treatment plans, and thinking outside the box in order to achieve the best possible result for the patient.

SAAD Treasurer and Clinical Director of the Dental Service in Cumbria, Steve Jones was our last speaker. Dr. Jones provided a completely different perspective on pain management, gathered from his experiences as a member of the Cockermonth Mountain Rescue Team.

After a period of questions to the panel, Francis Collier closed the meeting by thanking Dave Pearson for putting such an excellent and enlightening programme together.

We look forward to next SAAD Annual Symposium on 23rd September 2017, at the same venue, The Royal Society of Medicine, London.

## SAAD Annual Symposium Abstracts

### The CQC: does it make a difference?

*John Milne BChD MBE  
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John Milne is a General Dental Practitioner working in Yorkshire. He was formerly a Dental Advisor to Wakefield PCT and has always had a keen interest in dental politics, being an LDC secretary for many years and currently is the Chair of Wakefield LDC. At national level John was Chair of General Practice at the BDA from 2009-2015 and now serves as National Professional Advisor to the CQC. When he has spare time John is a keen bridge player, a poor golfer and is the honorary dentist for Featherstone Rovers.

The Care Quality Commission has been inspecting dental practices using a new methodology since April 2015. Over 1000 practices have been visited since then, and the vast majority of them have been shown to be providing care that is safe, effective, caring, responsive and well led. Where there have been failings these have generally been in the areas of safety and leadership. Practices with these failings have usually been able to make changes that improve the quality of care. The main thrust of CQC regulation is to encourage improvement, and the process so far has demonstrated that improvement has taken place. The focus on improving care is continued with CQC's strategy for the next five years. The CQC is a responsive regulator, and within the field of dentistry it meets regularly with the dental profession and involves them in the way dental regulation evolves. CQC are actively involved in reducing duplication in regulation to reduce the stress that this might cause. Guidance for dentists changes frequently, and sedation practice is not immune from this. The CQC expect practices to deliver sedation safely with an appropriately trained and experienced team.

### Regulation and Practice Inspection: a view from Scotland

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Simon Morrow is Clinical Director of Three Towns and Kilwinning Dental Care, which are three practices situated on the Ayrshire Coast. He has been carrying out IS and IV conscious sedation as a GDP for over 15 years and has completed his post graduate diploma in Conscious Sedation from Newcastle University. Simon has been carrying out practice inspections since 2003 and more recently has taken on the role of Sedation Practice Inspector for a number of health boards in Scotland. Simon is also a vocational trainer and past Chair of the local health board Area Dental Professional Committee. He continues to be a member of this committee and is also a member of the National Dental Advisory Committee for Scotland.

The presentation began by listing much of the current UK sedation guidance and noted the large number of publications in the field in recent years. In light of the recent letter (April 2016) from the offices of the Chief Dental Officers of England, Northern Ireland, Scotland and Wales, the position of the IACSD – "Standards for Conscious Sedation in the Provision of Dental Care" (April 2015) is unclear at this time. This is, at least, unhelpful particularly for sedation teams operating in Primary Care.

Simon highlighted some of the many standards relevant to sedation from the GDC publication "Standards from the Dental Team" (September 2013) and also documented the significant heads of charge against a dental sedationist from a recent GDC hearing involving sedation, to reinforce the importance of being aware of current guidance. SDCEP, the Scottish Dental Clinical Effectiveness Programme, have been asked to review all current sedation guidance and produce "Conscious Sedation in Dentistry- 3rd Edition". This

document is due to have the widest possible consultation soon and Simon encouraged all sedation teams, particularly those active in Primary Care, to review the document to help ensure that the definitive guidance produced is clear, evidence-based and deliverable.

The presentation went on to discuss differences between Scotland and the rest of the UK. In Scotland, health is a devolved matter with rules set by Scottish Government. "Currently NHS Scotland does not support the use of alternative techniques within primary dental care."

In Scotland, local Health Boards monitor and inspect nearly all dental practices. Healthcare Improvement Scotland are soon to start inspecting wholly private dental practices. All sedation practices must be inspected at least every 3 years.

Simon discussed the coverage of the NHS sedation inspection document and then detailed some of the common inspection findings within the sections of the document which cover activity, facilities, protocols and procedures, record keeping, equipment, emergency equipment, drugs and staff.

In response to the SAAD theme for the Symposium "Is sedation alive and well in General Dental Practice?" he was pleased to report that the most up to date Scottish Government figures (to 31st March 2016) show that both the number of sedation dental practices, and the number of NHS sedation codes claimed in Primary Care in Scotland, continues to rise.

## Helping People with their Regulatory Engagement

*Keith Hayes BDS (Hons) (Lond)  
Clinical Director RightPath4 Ltd, and a GDC appointed  
Clinical Supervisor  
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Keith Hayes qualified as a dentist in 1977 from the London Hospital Medical College and spent 30 years in practice, as well as working as a part time Clinical Demonstrator at the London. He worked with the CQC in regulatory development and also as

the Clinical Director of a Dental Corporate.

In the last two years he has grown RightPath4, an organisation dedicated to optimisation of the Dental Team, to having a membership of over 500 practices.

Keith also helps colleagues on an individual basis to satisfy the CQC, GDC and NHS when they find themselves caught up in the branches of the Enforcement Tree.

The CQC has changed and is now more experienced and focused when assessing dental practices. CQC registration is not optional and Keith commented that since practitioners must spend valuable time and money to maintain this, it is sensible to do it well and get all the positives possible out of it. The CQC, The GDC and the NHS all seek to assess the quality of services dentists are delivering. It is necessary to provide Regulators, as well as patients, with confidence in the services provided. Keith demonstrated how, by having a really simple embedded system, we can build a Safe, Caring, Responsive, Effective and Well-led Team that makes for an even more successful practice.

## Sedation - what's the worst that can go wrong?!

*Amita Peet BDS FDS RCS (Edin) Dip Dental Sed  
Dental Associate, Senior Dental Officer  
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Amita Peet qualified from Newcastle-Upon-Tyne in 1993 and has provided dental care using basic sedation techniques for children and adults throughout her career. She completed her sedation diploma at GKT London in 2002 and has worked as a Senior Dental Officer in Northampton Salaried Services since 2001, mainly treating adults with special needs. Amita achieved motherhood in 2009, and claims to be STILL Training! She joined Cliftonville Dental (private practice) in 2010 as a part-time dental associate.

An overview was provided of the way midazolam sedation training was approached in a private practice setting for dental surgery assistants. Different learning styles of individuals and

presentation of information to account for different learning techniques was highlighted. Guidance on what needs to be covered, especially the dental nurses training syllabus, was available from many sources including the SAAD website. Documentation of training sessions, recording of cases and paperwork used for sedation was discussed. Equipment used for midazolam sedation provision was shown.

There is a need to involve the whole dental team when setting up sedation as colleagues not involved in treating anxious patients can be unaware of the limitations to provision of care under sedation, in an out-patient setting. The reception team needs to be alert to diary management, allowing adequate time for setting up, treatment, recovery and training. To provide safe sedation in multiple clinical environments the same clinical techniques, administrative tasks and location of equipment was used.

It is essential the patient is made aware of the number of appointments needed and what may be completed at each visit, this should be verbally discussed and given to the patient as an itemised written plan. Consent can be difficult to achieve in a patient with severe anxiety and a discussion away from the dental surgery may be required to obtain informed consent. Cases were presented to highlight the difficulty in providing care for patients who seemed to need basic midazolam sedation at assessment but then required additional care, either advanced sedation techniques or general anaesthesia, to complete their dental care.

## Sedation Services in Primary Care

*Shilpa Shah BDS (Bham) MJDF  
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Mobile Sedationist for Dental Sedation Solutions*



Shilpa Shah qualified from Birmingham University in 2010. She has worked in a range of Hospitals across Birmingham and Manchester as a maxillofacial House Officer. She also has

completed several post-graduate training posts based in Manchester Dental Hospital and in Community settings, gaining experience in restorative dentistry, special care and paediatric dentistry.

Currently she works as a private practitioner and mobile sedationist across the NW of England assisting practices to set up sedation services. Her role in Manchester Dental Hospital involves the management of phobic patients under conscious sedation. She is a Lecturer for the Msc in Restorative and Aesthetic Dentistry at the University of Manchester and is part-way through a clinical Msc in Prosthodontics.

Increasing numbers of patients are pursuing complex restorative and invasive implant/oral surgery procedures in the private sector. There is a role for the provision of sedation to assist in the delivery of such complex procedures. Levels of dental anxiety appear not to have reduced in the last 30 years. Shilpa's presentation described the journey of a newly-qualified dentist setting up a mobile IV sedation service in primary care and covered practical aspects and hurdles encountered with a description of service need, hints and tips for advertising, acquiring equipment, patient assessment through to provision of treatment and record keeping. It also touched upon medico-legal requirements, training needs, recent changes in pharmacy controls and compliance with current standards.

## Just the Therapy for Children's Anxiety

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Fiona Catterson is a dental therapist at Queensway Dental Clinic in Billingham, Teesside. She graduated as a dental therapist in 2012 from the University of the Highlands and Islands (UHI). Once qualified, she worked in general practice

and as part-time clinical tutor for the UHI in Dumfries. She moved to Queensway in 2014 where she joined a team of therapists carrying out their full scope of practice, focusing primarily on the management of children through prevention and treatment. Fiona completed a certificate in inhalation sedation through Queensway Dental Clinic at the beginning of 2015, which she is using frequently to manage anxiety in a primary care setting. In addition, she is currently working one day a week as a clinical supervisor at Teesside University

Paul Howlett is a General Dental Practitioner and Partner at Queensway Dental Clinic in Billingham, Teesside. His particular area of interest is the management of anxious patients and has experience of providing inhalation, intravenous and advanced conscious sedation techniques within the primary care setting. He is also interested in the use of the wider dental team to deliver modern, patient-centred dental care. Paul has been a member of the SAAD Board of Trustees since 2012, and was recently appointed to the role of Communications Secretary.

In 2009, Inhalation Sedation (IS) was added to the scope of practice of a Dental Therapist. This addition has meant that, with additional training, dental therapists have been able to carry out treatment within their scope of practice under IS, to manage dental anxiety.

A large part of a dental therapist's scope of practice is paediatric dentistry. At Queensway Dental Clinic in Billingham, there is a team of five dental therapists with an additional qualification in IS, and 4 dentists with a Diploma in Sedation. An audit was carried out to investigate the success rate of IS in the management of dental anxiety in children within primary dental care.

Treatments under IS on patients 18 years and younger were audited prospectively via a standardised data collection sheet measuring success, what treatment was carried out, treatment and sedation history of the child, the age of the child, the level of co-operation and any complications within the treatment. Our standard was to achieve a greater than 95% success rate. During the 2 cycles of the audit, the overall success rate was 91% in the first cycle and 96% in the second cycle.

Within the two audit cycles, a total of 198 children were treated ranging in age from 3 years to 18 years old. A varied mix of dental treatment was undertaken including restorative dentistry and extractions. The audit highlighted that approximately 20% of patients per cycle had previously only been treated with either advanced conscious sedation or a general anaesthetic. This is a valuable result as it demonstrates that the acclimatisation carried out by the multidisciplinary team has been effective.

The majority of treatment in the under 18 years group was carried out by a dental therapist, with the dentists only carrying out treatment on approximately 30% of the cohorts. This illustrates that IS is a welcome and significant addition to a dental therapist's scope of practice and allows their full scope to be utilised in management of dental anxiety in children.

## An Inspector Calls. Experience and Advice: SAAD Practice Evaluation

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Christopher Holden is a private general dental practitioner in Derbyshire with a practice dedicated to the care of the anxious and frightened patient. He has been a member of SAAD Board and previously SAAD Council since 1984. Christopher has been one of the authors of many of the national guidance documents on dental sedation in the last fifteen years. He regularly provides expert evidence in the UK, Europe and Worldwide. Christopher is a Past-President of SAAD and a Past-President of the International Federation of Dental Anaesthesiology Societies (IFDAS). His other interests include "anything that flies" particularly helicopters.

The SAAD evaluation scheme has existed in a number of iterations for a generation. "The Safe Sedation Practice Scheme" is a quality assurance programme implementing National standards in conscious sedation for dentistry in the UK. Practitioners, commissioners and corporate bodies are now increasingly using this programme to measure safe sedation practice against regulatory guidance and professional guidance. The scheme is directed towards the guidance of "Standards for Conscious Sedation and the Provision of Dental Care" (IACSD 2015) and "Safe Sedation Practice for Healthcare Procedures" the over-arching multi-

disciplinary guidance from the Academy of Medical Royal Colleges.

Christopher summarised his experience of assessing over fifty clinics last year within both the primary and secondary care sectors. He highlighted examples of outstanding practice, the average clinic and common areas of non-conformity. Chris provided tips for success and illustrated the benefits and the user-friendly nature of this increasingly popular programme.

## Improving your sedation outcomes: The use of adjuncts and distraction

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Joanna May recently completed her Post CCST training in Paediatric Dentistry in Birmingham. She completed the Diploma in Conscious Sedation at Newcastle University in 2008 and utilised the skills gained to treat adult and paediatric patients in the special care dental service in Warwickshire before undertaking speciality training in Paediatric Dentistry in Birmingham. Joanna entered the specialist list in Paediatric Dentistry in 2013 and then worked at the Royal Children's Hospital in Melbourne as a senior registrar for 8 months before returning to Birmingham to complete her paediatric dentistry training. She has a particular interest in alternatives to GA for children.

Conscious sedation is used in dentistry to reduce anxiety whilst maintaining protective reflexes and verbal contact to enable completion of dental treatment. However, it may not always be successful due to patient selection, patient preparation, medical contraindications, failure to control anxiety, inability to effectively anaesthetize the area or difficult

access. These issues can sometimes be overcome by thorough patient assessment and preparation for sedation, but on some occasions alternatives may need to be considered.

Cognitive behavioural therapy (CBT) has been shown to reduce the need for intravenous sedation in adults and its effects persist for up to 10 years. However, it is not widely available and can be quite time consuming and expensive in the short term. It may, therefore, be better suited to patients with severe dental anxiety. Recently the team in Sheffield have produced a 'self-help' CBT guide for 9-16 year olds which they can work through at home (<http://littf.com>).

Sensory distractions during dental treatment with and without sedation can also help to complete treatment. The scent of lavender and orange have been shown to reduce anxiety and could be used within the nasal hood during inhalation sedation. Listening to music also reduces the patient's heart rate, self-reported anxiety and the need for sedation in adults, but the effects are more equivocal in paediatric patients. Allowing the patient to choose their own music has more of an effect and all patients found music beneficial.

Audio-visual distraction has been found to reduce the need for analgesia and sedation in paediatric burns patients who require multiple dressing changes. When video glasses have been used for dental treatment in paediatric and adult patients they were found to improve behaviour but had no effect on perceived pain.

Many patients have needle phobias and the use of a computerised local anaesthetic system such as The Wand STA has been found to be more effective in allowing completion of dental treatment in anxious paediatric dental patients than CBT, desensitization, hypnosis and sedation and avoided the need for GA or sedation in 34% of patients.

In conclusion, thorough patient assessment and preparation includes discussion of all the available alternatives and adjuncts to sedation to create an individual treatment plan for the patient. This could lead to improved outcomes for very anxious patients and even reduce the requirement for sedation for some patients.

## Pain and Anxiety Control in the Mountain Rescue Service

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Stephen Jones is Clinical Director of the Trust-based dental service in Cumbria; he has a special interest in delivering conscious sedation to those who exhibit high levels of anxiety or dental phobia. He joined the Board of Trustees as Honorary Treasurer of SAAD in 2006. Residing in the western fringes of the Lake District National Park he has been an active member of Cockermouth Mountain Rescue Team since 1976 with involvement in numerous call-outs and mountain rescues. As a qualified Swift Water Rescue Technician he was involved in rescue activities during the floods of 2009 and 2015 in Cockermouth and in York when the city was flooded in December 2015.

The aim of his presentation was to describe how pain and anxiety, to those sustaining injury or experiencing a medical emergency, is managed in the mountain environment using examples of incidents, the range of medical and rescue equipment used and drugs administered.

The structure of the MR Service from national to local team level within the Lake District was described with particular reference to the Cockermouth MR Team. The initiation of a call-out and its operational management from the control room in the Base using contemporary communication equipment and systems was explained and illustrated. Working relationships with other agencies including helicopter and medical support from the Royal Air Force, Royal Navy, Air Ambulances and the Maritime Coastguard Agency was described.

The essential qualification, Casualty Care Certificate, and training requirements needed to administer drugs in the

mountain environment were elucidated. Drugs administered in order to achieve analgesia and reduce anxiety included Paracetamol, Ibuprofen, Aspirin, Diclofenac, Oxygen, Entonox, Adrenaline, Midazolam, Diamorphine, Ketamine and Fentanyl.

Examples of mountain incidents and casualty care packages were described including the nature of the accident or medical emergency, the interpretation of primary and secondary survey information and pain scores, the immobilisation of fractured limbs and the type and route of analgesia administered.

For cardiac pain and trauma injuries – particularly bone fractures - Diamorphine is the drug of choice; the frequency of the use of intra-nasal diamorphine using a mucosal atomising device has increased dramatically over latter years negating the need to cannulate in often sub-optimal 'clinical' environments. This technique is especially useful for personnel who do not undertake cannulation in their day-to-day work activities.

A useful role of Midazolam has been to facilitate the reduction of dislocated shoulders at the incident site, whilst oral administration of Fentanyl lozenges has been a recent introduction in pain management further to its extensive use during recent military campaigns in Iraq and Afghanistan.

The presentation concluded with a brief description of how rescue personnel may be assisted by qualified clinical psychologists to maintain or recover mental resilience following psychologically traumatic incidents experienced in rescue work.

## SAAD Symposium & AGM



## SAAD Diamond Jubilee: A Strong Foundation for a Bright Future

Saturday 23 September 2017

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[www.saad.org.uk](http://www.saad.org.uk)

## Poster Presentation Abstracts

### Impact and Modifications to Service Delivery of an Inhalation Sedation Service in General Practice since publication of new sedation guidelines

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This poster presents a description of an inhalation sedation service in practice before publication of new guidelines. The key changes, obstacles, and the impact to service delivery is presented as a visual timeline. A description of the modified inhalation sedation service currently being offered is provided at the end of the poster.

The Main obstacles highlighted on the poster are those related to:

Providing ILS and PILS training to existing staff members, until new guidelines were issued.

How to assess courses as equivalent to ILS/PILS

How to manage staff training for new nurses whose training requirements require experience in IV sedation when the service is in an inhalation sedation service only.

Management of the increased costs of service.

The key points to note were the need to:

1. Communicate obstacles to the IASCD Guideline Authors
2. Seek Advice from dental legal advisers
3. Work in Partnership with other local sedationists to share resources
4. Think outside of the box on how to seek resources that were not available

### An Audit to Assess the Consent Obtaining process for Patients having Dental Treatment under Intravenous Conscious Sedation.

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**Background:** I.V. conscious sedation is an effective treatment modality for dentally anxious patients. Obtaining valid consent prior to the proposed procedure is crucial and an obligation upon care providers.

**Method:** A prospective audit was carried out. A questionnaire was filled out by the patient pre-operatively on the procedure day. The results from the questionnaires were collated and analysed.

**Results:** 100% of patients felt they knew what treatment they were there for. However, 13.5% of patients went on to answer they did not feel they received enough information or did not know if they received enough information prior to their appointment. 25% of patients thought they would be asleep for the procedure. 17.3% did not know if they would be conscious or not for the procedure. 26.9% did not know if they required an injection for the procedure. Only 42.3% of patients received written pre-operative information.

**Conclusion:** Several key areas have been highlighted which potentially void valid consent. Patients do not receive written information regarding the procedure pre-operatively. It is imperative patients receive comprehensive information and the immediate need for the creation of a patient information leaflet has been identified.

### An audit to assess compliance with current standards for education and training in conscious sedation by Hospital staff involved in the provision of sedation services

*N Akuji BDS MFDS - Dental Core Trainee*

*S Shah BDS MJDF - Restorative Speciality Dentist*

*J Storey Restorative Dental Nurse*

*E Nichols Restorative Dental Nurse*

*Karelina Bull BA PGCE - Education & Development Manager*

*P Wood BDS (Hons) MFDS (Ed) DipSed MSnD (Ed)*

*Consultant in Special Care*

*University Dental Hospital of Manchester,*

*Higher Cambridge St, Manchester M15 6FH*

**Background:** The IASCD report recognises the need to develop and maintain skills in conscious sedation. Robust validated training and regular involvement in audit are important for all team members to ensure delivery of a high quality service.<sup>1</sup> The GDC requests members of the sedation team to complete 12 hours of sedation-related verifiable CPD in a 5 year cycle. All members of the sedation team are expected to be able to demonstrate training at the Intermediate Life Support level or equivalent. Sedation related medical emergencies must be practised regularly in the clinical environment.

**Aim:** The aim of this audit is to assess the compliance of UDHM staff who are involved in the provision of conscious sedation services with current standards relating to education and training as recommended in the IACSD guidance.

**Method:** All dental staff at the UDHM who are involved in the provision of conscious sedation were asked to participate in the audit by completing an anonymous questionnaire. This involved staff across three departments: oral surgery, restorative and Paediatrics.

**Results:** None of the criteria achieved 100%. These included having 12 hours CPD over a 5 year cycle, intermediate life support skills and regular participation in audit and clinical governance.

**Conclusion:** This audit highlights some of the challenges brought about by the new recommendations and the inability to achieve full compliance in a Dental Hospital one year on after introduction of the IACSD document. Increased demand posed to resus teams to provide ILS training to all dental staff exceeded capacity. A dental specific ILS equivalent course which focuses on sedation related medical emergencies was developed by Resus leads to provide the relevant training to all staff involved in the care of adult patients receiving conscious sedation. Dedicated sessions for medical emergency team training have been scheduled into clinic diaries. Logbooks have been introduced for staff members to record sedation experience, CPD record, audit participation, life support and medical emergency team training. Logbooks will be reviewed at annual appraisal. Revalidation for sedation related practice will be incorporated at annual appraisal for all sedation team members. Findings have been communicated at staff training events and efforts are being made to increase access to regular internal CPD training for all team members.

- 1 Standards for the Provision of Conscious Sedation in Dental Care [Internet].; [cited 30th August 2016]. Available from: <https://www.rcseng.ac.uk/fds/publications-clinical-guidelines/docs/standards-for-conscious-sedation-in-the-provision-of-dental-care-2015>

## Audit of inhalation and intravenous sedation in the Paediatric Dental Department at Eastman Dental Hospital

*A Aspinall BDS MFDS DipConSed MPaed Dent, Specialist Paediatric Dentist*

*N Lygidakis BDS MJDF, Postgraduate in Paediatric Dentistry,*

*I Holroyd BSc BDS FDSRCS (Eng) FDS Paed Dent, Consultant Paediatric Dentist*

*P Anand BDS IQE MMedSc FDSRCS MPaedDent FDS Paed Dent Cert Sedation, Clinical Lead and Consultant Paediatric Dentist*

*Eastman Dental Hospital, 256 Grays Inn Rd, London WC1X 8LD*

### Background

IACSD standards for conscious sedation in the provision of dental care 2015 state that:

"Each clinical team must maintain continuous and contemporaneous records of the number and types of sedation cases performed as well as the rate of any complications that may have arisen"

### Aim

- To audit how effectively we use the Inhalation (IHS) and Intra Venous (IV) sedation logbooks
  - To assess the outcomes of sedation appointments
- Standards
- 100% of patients treated under IHS and IV sedation are recorded in the logbook
  - 100% of sedation outcomes are recorded

### Method

This was a retrospective audit. All IHS and IV sedation clinics in July 2015 were analysed. IHS clinics were re audited in February 2016.

### Results

- 96% use of logbook for IV cases in July 2015
- 44% and 74% use of logbook for IHS cases in July 2015 and February 2016 respectively
- No adverse reactions were recorded

### Conclusion

- Use of the sedation logbook does not reach the gold standard
- Areas for improvement include;
  - o detailing types of treatment performed
  - o recording of failed sedations or cancelled appointments

### Action plan

- Presentation of findings at monthly governance meetings to all staff
- Re-audit in 6 months
- Designate filling in of logbook to specific staff member on the day including nursing staff

## Assessment of the quality of record keeping in conscious sedation at the University Dental Hospital of Manchester (UDHM)

H. Crane BMedSci BDS MFDS - Dental Core Trainee

S. Shah BDS MJDF - Restorative Speciality Dentist

H. Fox NVQ level 3 in dental nursing. Post qual in dental sedation nursing – Dental Nurse

J. Wissink Qualified Dental Nurse, Post qual in dental sedation nursing. Specialist Dental Nurse, Sedation and Special Care

P. Wood BDS Hons MFDS Ed DipSed MSnD (Ed)  
Consultant in Special Care

University Dental Hospital of Manchester,  
Higher Cambridge St, Manchester M15 6FH

**Background:** The recent introduction of the IACSD guidance has provided a national guideline which is to be followed by all practitioners when providing conscious sedation for dental care.<sup>1</sup> The aim was to assess current compliance with certain elements of the IACSD guidelines through a retrospective audit.

**Method:** The notes of 50 patients who had undergone conscious sedation in a UK Dental Hospital were retrospectively reviewed. The notes were analysed in respect to pre-defined criteria and results entered onto a computer spreadsheet.

**Results:** A number of criteria achieved 100%; including presence of written consent, dose and batch number of the midazolam, medical history, attendance of an escort and verbal/written post-operative instructions given. One patient did not have their last food and drink intake recorded, only 76% of patients had documentation of their medical history updated on the day of treatment and only 30% of patients had a recorded ASA grading. Monitoring did not meet the required standards, however, 100% compliance for oxygen saturation was recorded intra-operatively.

**Conclusion:** This audit highlights a number of areas of record keeping which are currently not in line with IACSD guidelines. Carefully designed pro-formas for conscious sedation may aid in improving the quality of record keeping.

- 1 Standards for the Provision of Conscious Sedation in Dental Care [Internet].; [cited 20th July 2016]. Available from: <https://www.rcseng.ac.uk/fds/publications-clinical-guidelines/docs/standards-for-conscious-sedation-in-the-provision-of-dental-care-2015>

## The comparative effects of common local anesthetics on human fibroblasts

Arkadiusz Dziedzic PhD.

Department of Conservative Dentistry with Endodontics, School of Medicine with the Division of Dentistry, Medical University of Silesia, Poland

Robert Kubina PhD.

Department and Institute of Pathology, School of Pharmacy and Division of Laboratory Medicine in Sosnowiec, Medical University of Silesia in Katowice, Poland

Magda Skonieczna PhD.

Department of Automatic Control - Biosystems Groups, Silesian University of Technology, Poland

**Background:** Local anaesthetics (LAs) are commonly used in dental practice to provide safe peri-operative pain control. However, their potential toxic effect on soft tissue still remains unclear. Some post-operative complications have been reported, including prolonged anaesthesia and/or healing which can be associated with induced sub-inflammatory reactions. The purpose of this study was to evaluate the effect of various local anaesthetics, lidocaine, articaine and mepivacaine on human fibroblast cells in vitro.

**Study Design:** Controlled laboratory study.

**Methods:** The culture of human fibroblasts cell line (NHDF-Neo) was performed in standard conditions. The fibroblasts were exposed to different concentrations of each LA, from 1.17 µg/ml to 150 µg/ml: 2% lidocaine with epinephrine 1:80000 (LID), 4% articaine with epinephrine 1:100000 (ARTforte), 4% articaine with epinephrine 1:200000 (ART) and plain 3% mepivacaine without vasoconstrictor (MEP). The cell apoptosis/necrosis ratio was measured by flow cytometry (annexin V-FITC and propidium iodide). Additionally, changes of intracellular levels of reactive oxygen species (ROS) and pro-inflammatory interleukins IL6 and IL8 (RT-qPCR) gene expressions were assessed.

**Results:** After 24h all LAs did not induce cell death via the apoptosis/necrosis pathway. MEP in concentration 112.5 µg/ml slightly decreased cell viability (MTS assay). What is more, a concentration-dependent manner was not observed for any of the tested LAs. Moreover, LID and ARTforte diminished the percentage of apoptotic cells, revealing a slightly 'protective' action and ARTforte seemed to increase cell viability. Apart from ARTforte in the highest concentration (150 µg/ml), no significant differences were noticed between LAs in terms of ROS production. ARTforte stimulated an intracellular ROS secretion (3300 a.u. fluorescence) compared to the control, untreated cells (2000 fluorescence a.u.). Interestingly, up-regulation of pro-inflammatory IL6 and IL8 was detected for mepivacaine (9.38-18.75 µg/ml) and articaine with epinephrine 1:200000 (150 µg/ml) respectively, compared with two other LAs (P < 0.05). For LID and ARTforte we observed an attenuation of both gene expressions.

**Conclusions:** Within the limitations of in vitro study, the investigated local anaesthetic agents appeared not to be cytotoxic towards human fibroblasts. The LAs with the highest concentration of epinephrine, Lidocaine and articaine(forte) could even potentially increase fibroblast cell viability in in vitro conditions, however, articaine(forte) triggered ROS secretion. None of the LAs was found to be significantly more toxic than the others and the tested LAs did not exhibit differences in toxicity compared with the control. Cell exposure to mepivacaine induced a significant increase in IL-6 level in culture supernatants.

**Clinical Relevance:** Fibroblast cells play a key role in healing following surgical procedures. This may have clinical implications when providing local anaesthesia in dental practice.

## A retrospective study of deep sedation with intravenous administration of multiple sedative agents in adults undergoing dental treatment

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Medical University of Silesia, Faculty of Dentistry, Poland*

**Background:** Dentists face challenges when anxious patients require complex dental care. General anaesthesia may be a burden to this type of patients due to fear and costs. The aim of this study was to evaluate clinical outcomes of multi-drug deep intravenous sedation in the outpatient setting as a comprehensive means of managing phobic patients who require a standard dental procedure.

**Methods:** Records of patients who had undergone dental procedures in the ambulatory Dental Clinic with the administration of multi-drugs as intravenous deep sedation were reviewed retrospectively. The sedation procedures were performed by a qualified specialist anaesthetist and were adherent to current national guidelines. Ten severely phobic patients (ASA 1 and 2, MDA scale 4-5, 3 males and 7 females) between 23 and 63 years of age (mean [ $\pm$  SD]  $45.9 \pm 13.0$ ) were studied, with a mean body weight of  $71.3 \pm 14.6$  kg (58 kg to 98 kg). Vital signs, sedation outcome, sedative drug dose, and sedation time were assessed.

**Results:** 'Deep sedation' was carried out by a single experienced specialist anaesthetist for patients who were unable to accept conscious sedation, or for whom standard conscious sedation technique had been unsuccessful, for restorative care, endodontic and dental extractions. The range of complete procedural time was 20-90 minutes, with a mean time of 51 minutes. Mean doses of  $12.4 \pm 3.8$  mg midazolam,  $164 \pm 68.5$  mg propofol and  $190 \pm 40$  mg of fentanyl were used for oral intravenous deep stage of sedation. No

significant side effects, including oxygen desaturation derived from intervention were observed. In all cases, the dental treatment was carried out successfully and uneventfully.

**Conclusion:** Taking into consideration the limited number of patients in this study, deep sedation facilitated with the use of combined sedative drugs administered by an experienced anaesthesiologist, was found to be adequately safe and appropriate for severely anxious adults requiring standard dental procedures. In carefully selected cases, it can be an alternative to general anaesthesia when administered and monitored properly.

## Service review of the paediatric inhalation sedation service at King's College Hospital

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**Background:** The Standards for Conscious Sedation in the Provision of Dental Care<sup>1</sup> guidelines recommend review of access to sedation services, capacity and quality of care to enhance patient safety and improve quality of care.

**Aim:** To investigate access to and capacity of the paediatric inhalation sedation service by reviewing the length of wait from patient assessment to start of treatment. Safety of care was reviewed through evaluating the end titrated nitrous oxide: oxygen concentration and auditing the occurrence of any adverse incidents.

**Design:** A retrospective audit was completed for all patients who attended for inhalation sedation in May 2016. The gold standard was for there to be no adverse incidents.

**Results:** 91 records were assessed with a mean patient age of 6.5 years. The average wait was 25 days. This mean was increased by a few outliers who had chosen to defer elective treatment. Mean flow was 7.69 litres per minute with an average nitrous oxide:oxygen percentage ratio of 35:65. No adverse incidents were encountered.

**Conclusion:** The current service provides safe sedation within acceptable waiting times. Repeat re-assessment and evaluation must be carried out to ensure that the service continues to be provide safe, good quality of care.

1. Report of the Intercollegiate Advisory Committee for Sedation in Dentistry, April 2015

## Zahra Shehabi

*New SAAD Trustee*



I was born in the heart of the City of London in 1981. Being the second of seven siblings was not always easy, and I often felt pressures to succeed in order to be a positive role model for my younger siblings. Coming from a family where human rights was central to daily life, respect for equity and justice formed an integral part of my values from a young age and was a key motivator for my interest in Special Care Dentistry (SCD).

Dentistry was not my burning aspiration as a child- I knew nothing about the subject until the day before the application deadlines for university. In fact, most of my career choices have been based on non-calculated spontaneous decisions. I graduated from Queen Mary University of London in 2005 with a Distinction and managed to get a VT position in London thereafter.

After working in OMFS, the community and general dental services, I was informed about an opportunity to be one of the first five UK trainees in Special Care Dentistry - the day before the submission deadline for applications. To my surprise (..and minimal preparation!), I was successful in being selected. The training period as an StR was full of challenges that I embraced to further my clinical and personal skills. This turbulent time was a test of my resilience and I was able to showcase how my academic achievements (MSc in Sedation & Special Care Dentistry, KCL) were a reflection of my diligence, and how my motivation enabled me to learn from mistakes. In 2013, I finally passed my MSCD exams and

gained entry to the specialist list in SCD. Recognising that a 3 year training programme did not automatically prepare me for a consultant position, I completed an MSc in Strategic Leadership & Healthcare Management at City University in 2015.

Early on in my training, my vision was to transform special care and sedation services at The Royal London Dental Hospital in London. Developing a service and seeing it grow exponentially has been a valuable experience. Gaining a credible reputation as a Consultant in SCD across East London has been highly rewarding, and has been key to improving our sedation service.

I am devoted to teaching, and I am currently the only StR Educational Supervisor in London who has undergone official training through a specialist pathway in SCD. Many undergraduates and postgraduates have benefitted from my sedation experience and knowledge through training and mentoring and it is extremely rewarding to see sedation skills flourish in all my trainees. In 2015, I was invited to join the SAAD teaching faculty.

Accepting challenges has been the foundation of my life experiences and something I do with interest. I am a highly motivated individual, who has a drive to innovate in sedation practice at home and abroad. In the spare time that I do have, I like to socialise with friends, engage in charitable contributions and travel the world.

## Dr Thomas Boulton OBE, TD, MD, FRCA, FDSRCS



Tom Boulton, who died on 1st July 2016 aged 90, was a firm supporter of SAAD from its very early days and served as its President in 1980.

Dr Boulton first lectured to SAAD in 1967; at that time SAAD held regular meetings at the Royal Society of Medicine, open to members and any doctor or dentist with an interest in anaesthesia for dental procedures. He contributed to the 4th edition of *Intravenous Analgesia and Anaesthesia* published in 1970. In 1980, when elected President of SAAD, Tom took the Chair at a time of great change for SAAD. Stanley Drummond-Jackson, DJ, had died in 1975 and a new group, led by Peter Hunter, the Secretary, had taken over the management of the Society. This was also a time of political change. Tom supported trained dentists administering general anaesthesia but spoke out against the operator anaesthetist. He actively supported the training of young dentists in anaesthetic service posts attached to University departments of anaesthesia, convinced that this would raise standards in peripatetic and dental surgery general anaesthesia.

Tom was very keen to see reconciliation between SAAD and the Association of Dental Anaesthetists, ADA. For many years there had been mistrust bordering on animosity between the two organisations that Tom thought was nonsense. In the late 1980s SAAD's membership grew quickly as did that of the ADA. As SAAD began to provide guidance for general anaesthesia and conscious sedation, particularly related to intra-operative and peri-operative monitoring, Tom seized on the opportunity of shared values. In 1988 he set up a working party of representatives from both groups

with the view to union. While amalgamation did not result it was agreed that peace and reconciliation should rule and to that end each would send a representative to the other's Council to promote goodwill and understanding. It was a very considerable achievement.

Thomas Babington Boulton was a Yorkshireman who, after schooling, read medicine at Cambridge and undertook his clinical training at Bart's. He had a lifelong interest in anaesthesia for dentistry and made a significant contribution to field and military anaesthetics particularly during his time in Malaysia after the Second World War, and in the Vietnam War. Tom's understated approach to life belied a powerful and experienced military anaesthetist. His published papers included *"Anaesthesia and resuscitation in difficult environments"*, a customarily indirect approach to his experiences of battlefield anaesthesia. He was a Fulbright Scholar studying at the University of Michigan.

Tom was involved with the creation of the Royal College of Anaesthetists, which was granted its charter in 1992. In 1972 he was appointed Editor of *Anaesthesia* and elected President of the Association of Anaesthetists of Great Britain and Northern Ireland which position he held from 1984 to 1986. Tom helped to form the History of Anaesthesia Society in the UK and became its President in 1988. He was appointed OBE in 1991.

Tom Boulton was the most distinguished anaesthetist of his generation. He was a true friend of SAAD and his Presidency was an honour for our Society.

Ian Brett and Christopher Holden

## Dr James Keith Grainger



Dr James Keith Grainger graduated from the University of Sydney in 1956 – being one of the youngest students to graduate from that University with a dental degree. After a two-year stint at the United Dental Hospital of Sydney, he gravitated back to Canberra (his home town) before making the common move, made by many an Australian dentist – to work in the National Health Service in the UK.

The trip to the UK proved eventful: the ship that carried him around the world, was hit by a cyclone and only just managed to stay afloat, despite heavy damage! Nevertheless, his time in the UK was fruitful, as he bought a practice in Earls Court and married an English girl, Muriel. His two older children Jocelyn and Nigel were both born in the UK.

His return to Canberra in 1968 not only saw a clinician who had honed his technical skills, but an enthusiast and competent operator in the field of sedation in dentistry as a modality for treating dentally phobic patients.

He continued with his study, achieving a Masters Degree for his work on sedation & anaesthesia and a Fellowship of the Royal Australasian College of Dental Surgeons. He was inspired by Dr Neils Jorgensen, from Loma Linda, California and his involvement in the field of sedation, anxiety and pain management, went on from strength to strength.

He was a founding member of the Australian Society for the Advancement of Anaesthesia and Sedation in Dentistry (ASAASD) and subsequent President. He became President of the International Federation of Dental Anaesthesia and was the principal organiser of the international congress for that group, when the congress was held in Canberra. In 1996, he subsequently became Secretary-General of IFDAS.

He was awarded the John Bellisario Award, the Horace Wells Award and Yasuya Kubota Award. He was a Fellow of the International College of Dentists and the Academy of Dentistry International, as well as the Pierre Fauchard Academy. He lectured extensively both in Australia and internationally and tutored at Sydney at Griffith Universities. He was active within the Australian Dental Association (ADA) and Australian Society of Dental Anaesthesiology (being

made an Honorary Life Member of ASDA in 2014) and his final gift to that group was a self funded written history of the development of that organisation titled The Road to Recognition. The History of ASDA - ASAASD.

Jim was not only active within the Canberra dental community, but also at the NSW State level where he spent a period as Treasurer and First Vice President. He was heavily involved with the Canberra Rotary circle and the Order of St Lazarus: both organisations creating charitable opportunities for him to repay both the local and international communities.

My association with Jim started in 1989, when I started working with him in Corinna Chambers in Woden, in the Australian Capital Territory. The practice was a credit to Jim: a five-surgery practice that offered dental care for the whole family, with a reputation for sedation, pain management and quality dental care. A practice that had moved from its original inception in the Canberra suburb of Lyons to Bonner House in Woden, before making the final move into the newly built, multi-medical facility, that was Corinna Chambers.

“Retirement” proved to be something very different for Jim. Upon leaving the nation’s capital, he travelled around the country doing some 30 locum jobs – which I think he found quite a revelation. And then, rather than hang up his mirror and probe, decided he needed a new challenge and established a new dental practice for himself in Kingscliff, NSW! Perhaps the commanding view of the Pacific Ocean and the opportunity to continue to offer anxiety free dentistry for his client base, was reward enough for a hard working and highly acclaimed career.

It was only with the onset of his final illness that he was unable to fulfil his professional duties as a clinician and tutor.

To this day, I still care for those anxious, phobic patients who started out their dental phobic history, with a young James Grainger. He is remembered by many of those patients, as someone who cared for their dental needs in a caring, empathic manner. He had strength of character and was never afraid to stand by his principles, irrespective of any prevailing fad. He was an innovator, motivator and example to many, of a commitment to provide the best in care.

He has left a legacy of experience and a multitude of grateful patients. He has guided younger less experienced dentists along their professional pathways and been a colleague to his peers, in a true sense. He was a trailblazer in creating groups to promote what he believed in. A group able to live up to what our dental ancestors aspired to: to provide dentistry in a pain free, anxiety free environment.

The legacy created by Dr James Grainger, will continue on. The history he was part of, has been recorded and that can never be changed.

Jim leaves behind his family, Muriel, Jocelyn, Nigel and Mandy, his five grandchildren and his partner in recent years, Virginia, who cared for him, until his death.

Chris Hardwicke  
BDS(Lond) LDS RCS(Eng) MSc.Med(Syd) MRACDS  
Dip.Clin.Dent(Syd) Dip.Dent.Sleep Med(UWA)

## Secretary's Correspondence

Sadie Hughes BDS MFDSRCPS(Glas) MSc  
SAAD Honorary Secretary

The Royal College of Surgeons (RCS) continues to update its Frequently Asked Questions (FAQ) section, with regard to the Intercollegiate Advisory Committee for Sedation in Dentistry (IACSD) Standards, and I would advise those involved in sedation provision to familiarize themselves with this information <https://www.rcseng.ac.uk/dental-faculties/fds/publications-guidelines/standards-for-conscious-sedation-in-the-provision-of-dental-care/faq/> The RCS website also has application forms for sedation course accreditation and for approval as a clinical supervisor for dental sedation, if sedation teaching is one of your New Year resolutions!

The Scottish Dental Clinical Effectiveness Programme (SDCEP) has recently updated the Conscious Sedation in Dentistry guidance. The draft document was recently circulated for consultation and the final document is expected in the Spring.

Hopefully you will have received a link to the SAAD Diamond Jubilee Survey. Please take a moment to complete the short survey, tell us your views and help us to ensure SAAD continues to serve its members effectively for the next 60 years. If you haven't received the link please email Fiona ([fiona@saad.org.uk](mailto:fiona@saad.org.uk)) to make sure that we have your current email address.

The following is a selection of the more commonly asked questions I have received as secretary over the last year:

**Q: Please can you tell me whether I can continue to provide oral Temazepam?**

A: Temazepam can still be used for dental sedation, however, a distinction needs to be made between pre-medication and oral sedation. Temazepam given as oral sedation (which the patient takes at the practice in your presence) requires cannulation and the same additional electromechanical monitoring needed for IV sedation such as a pulse oximeter etc. You would also need to ensure your sedation team has the appropriate theoretical knowledge, skills training and experience in sedation. Temazepam pre-medication is typically a lower dose, taken by the patient at home usually one hour prior to their dental appointment and requires no additional monitoring or cannulation.

**Q: How should size E oxygen and nitrous oxide cylinders be stored?**

A: Previously it was recommended that E sized cylinders should be stored horizontally because of their shape. The cylinders have a round bottom and therefore are more stable when stored on their side. In addition, it is a recommendation that some cylinders e.g. Entonox cylinders, are inverted before administration to thoroughly remix the gases in case of any separation during storage.

E size cylinder holders are available commercially which store the cylinders vertically. Vertical storage is helpful for surgeries with limited space. The cylinders should be fixed appropriately (ideally in an external brick built housing but failing this internal storage with cylinders caged / chained to an external wall) with the appropriate gas signage.

**Q: Does my practice need a Sedation Standard Operating Procedure (SOP)?**

A: Yes. UK Medicines Information has produced a document, updated in May 2016, which states:  
All practices holding controlled drugs e.g. midazolam, are

legally required to have Standard Operating Procedures (SOPs) to ensure they are safely managed. The Area Team Accountable Officer is required by law to ensure that these SOPs are adequate and up to date.

Also discussed is how dentists should prescribe, store, order and dispose of controlled drugs. I would recommend sedation teams familiarise themselves with this document.  
<https://www.sps.nhs.uk/wp-content/uploads/2016/06/NWQA178.4-Controlled-drugs-for-dentists-.pdf>

**Q: How often should pulse oximeters and blood pressure machines be serviced?**

A: It is recommended that electromechanical sedation monitoring equipment is serviced annually. Often local hospitals (e.g. medical devices departments) are willing to help with servicing equipment. Also there are several commercial companies who service medical equipment including some of the main inhalation sedation equipment providers.

**Q: Do I need to order Midazolam on an FP10CDF?**

A: If you are practising sedation in England then it is now a legal requirement for all Schedule 2 and 3 controlled drugs to be ordered using the official requisition form FP10CDF (Wales: WP10CDF, Scotland: CDRF - private, GP10A -NHS). These forms can be obtained from the local NHS Area Team, (irrespective of whether the dentist has an NHS contract with the Area Team) or downloaded via the NHSBSA website.

Usually Schedule 2 and 3 controlled drugs are requisitioned from a community pharmacy or a dental wholesaler. The official controlled drug requisition form, which must be signed by the dentist, should be submitted to the wholesaler even in the case of electronic ordering. Only licensed medicines can be requisitioned from a community pharmacist.  
<https://www.sps.nhs.uk/wp-content/uploads/2016/06/NWQA178.4-Controlled-drugs-for-dentists-.pdf>



# Annual Symposium and AGM



## **SAAD Diamond Jubilee: a Strong Foundation for a Bright Future**

**Saturday 23 September 2017**

*The Royal Society of Medicine,  
1 Wimpole Street, London W1G 0AE*

**Online registration is now open at  
[www.saad.org.uk](http://www.saad.org.uk)**

Details will be posted on the SAAD website  
and included in the SAAD Newsletter Email

# NATIONAL COURSE IN CONSCIOUS SEDATION FOR DENTISTS AND DENTAL NURSES DENTAL HYGIENISTS AND THERAPISTS

**Patients appreciate being offered** sedation for their dental treatment, whether they are fearful, phobic or simply have a long and tedious procedure in prospect.

**The SAAD course provides** underpinning knowledge and training in the clinical skills required to provide the Standard sedation techniques. Advanced sedation techniques are introduced and discussed.

**It is designed both as an introduction and as an update** for more experienced sedationists. Guidance is given regarding further training and the acquisition of clinical experience. 'New starters' in conscious sedation are advised to refer to the SAAD Assessed Sedationist Scheme for information on how to obtain the necessary clinical experience.

**Dentists are encouraged** to enrol their dental nurses on the parallel course as successful sedation depends on effective team work.

**SAAD's teaching is provided** by a faculty that includes some of the best-known names in conscious sedation in the UK. The courses are 'busy' but fun with many opportunities for hands-on sessions.

**Quotes** from recent evaluation forms:

'A lively weekend with friendly and approachable lectures.'

'I am now confident that I can provide a better service to my patients.'

The course is held at

**Mile End Road Campus, Queen Mary, University of London.**

## ENQUIRIES:

**Fiona Trimingham** (Executive Secretary)

Course payments, cancellations and deferrals, hygienist & therapist course logbooks  
**01302 846 149** [fiona@saad.org.uk](mailto:fiona@saad.org.uk)

**Toni Richman** (Course Administrator) Course content and course weekend logistics  
**07583 039 309 (text)** [toni@saad.org.uk](mailto:toni@saad.org.uk)

Details for the SAAD Assessed Sedationist and SAAD Assessed Sedation Nurse scheme are on pages 79 & 80

## FORTHCOMING COURSES:

4/5 March 2017	3/4 March 2018
17/18 June 2017	16/17 June 2018
4/5 Nov 2017	3/4 Nov 2018

## DETAILS AND ONLINE REGISTRATION

[www.saad.org.uk](http://www.saad.org.uk)

## **SAAD Assessed Sedationist (SAS) scheme**

Under current IACSD guidance, any practitioner who was not practising sedation independently prior to April 2015, is designated a 'New Starter' and will need to undergo a period of supervised clinical practice before being able to practice sedation independently.

Following on from the SAAD National course, the new, IACSD accredited, SAAD Assessed Sedationist scheme (SAS scheme) facilitates acquisition of the required supervised clinical experience (see IACSD Standards, Table 1)

The new SAS scheme includes approval of a proposed supervisor(s), verification of a Clinical Logbook, Direct Observation of Practice (DOP) forms and the Practice Evaluation checklist.

Successful practitioners will receive a SAAD certificate confirming 'SAAD Assessed Sedationist' status which will enable them to practise independently.

Enrolment in the SAS scheme is by invitation and is only available for 'New Starters'.

Once registered for the SAAD National course 'New Starters' will be contacted and invited to enroll for the SAS scheme.

The total fee for enrolment on the SAS scheme is £965.  
(includes the National Course fee of £665)

Further details are available at <http://www.saad.org.uk/index.php/saad-assessed-sedationist-scheme-sas-scheme>

Enquiries to [fiona@saad.org.uk](mailto:fiona@saad.org.uk)

NB: Practitioners who have already attended SAAD (or other sedation courses) are not eligible.

# **SAAD Assessed Sedation Nurse (SASN) scheme**

Under the IACSD standards anyone who was not practising sedation before April 2015 must attend a university, deanery or IACSD accredited sedation course that includes the provision of knowledge, skills and supervised clinical practice.

The SAAD Assessed Sedation Nurse (SASN) scheme is IACSD accredited and provides the skills, knowledge and supervised clinical practice required to assist in the provision of sedation before a final assessment of competence.

## **What is involved**

The first stage of the SASN scheme is the two day SAAD Dental Nurse Course in Conscious Sedation for Dentistry, (SAAD National Course) this is when you will acquire the underpinning knowledge and skills. This course is a stand alone course that can be also attended as a refresher.

## **How to enrol**

If you would like to enrol for the SASN scheme please complete the online registration for the first stage, SAAD Dental Nurse Course in Conscious Sedation for Dentistry, the fee for the first stage is £380.

Then enrol for the second stage, SAAD Assessed Sedation Nurse scheme, via the SAAD website ([www.saad.org.uk](http://www.saad.org.uk)) the fee for this stage is £470.

The SASN scheme will run from the date you attend the SAAD National course

The total fee to become a SAAD Assessed Sedation Nurse is £850.

## **Any questions?**

Further details are available at  
<http://www.saad.org.uk/index.php/sasnscheme>

If you have any questions please contact [fiona@saad.org.uk](mailto:fiona@saad.org.uk)  
in the first instance.



# ESSAY PRIZES

## DRUMMOND-JACKSON ESSAY PRIZE

**£500**

**DCPs**

**£300**

## DENTAL STUDENTS

**£300**

To celebrate the last 60 years of advancement in pain and anxiety control for dentistry, the SAAD Trustees invite essay authors to envision the future and write an essay entitled

### 'Anxiety Management and Sedation in Dentistry; the next 60 years?'

- Write an essay in **ENGLISH** in A4 format with double spacing, as a Microsoft Word document. Drummond-Jackson not exceeding **5,000** words, DCPs not exceeding **2,500** words, Dental Students not exceeding **3,000** words.
- Entries must be received and acknowledged by **31st March 2017**.
- Essays must be written in accordance to SAAD's Guidelines for Authors available from the SAAD website and on page 84 of this Digest.
- The decision of the panel of assessors appointed by SAAD will be final.
- Entries, accompanied by name, address and telephone number, should be emailed to [fiona@saad.org.uk](mailto:fiona@saad.org.uk)

# SAAD Supplies

	Members	Non members	Postage & Packaging
<b>CBT Toolkit</b>	£22.50	£30.00	£3.00
<b>A History of SAAD by Peter Sykes</b>	£5.00	£5.00	£3.00

**Order online at <http://www.saad.org.uk/index.php/eshop>**

The SAAD record cards and leaflets are no longer available. These have become largely outdated with the more widespread use of electronic records. SAAD are currently working on some examples of electronic patient record templates and look forward to sharing these with our members in due course. We would encourage clinicians and service providers to refer to Appendix 3 in the IACSD 2015 document Standards for Conscious Sedation in the Provision of Dental Care for examples of patient leaflets/information.

Enquiries to [orders@saad.org.uk](mailto:orders@saad.org.uk) or 01302 846 149

# SAAD Subscriptions

**Please renew online by logging onto the SAAD website using your email address as your username or by contacting [fiona@saad.org.uk](mailto:fiona@saad.org.uk) to pay by direct debit.**

**We would ask you to renew by direct debit since this will enable us to keep administration costs to a minimum for the Society.**

# **WEBSITE**

## **www.saad.org.uk**

- **Online CPD**

Log-on the membership area and follow the link 'Online CPD'  
Answer multiple choice questions related to the refereed papers in this issue of the Digest.  
Download your CPD certificate

- **Latest news relating to conscious sedation**

- **SAAD courses**

details, dates and application forms – *online registration*

- **Sedation related documents for downloading**

- **Membership details and subscribe online facility**

- **Download back issues of the Digest and Newsletter**

- **Details of RA machine loan scheme, research grants and essay prizes**

- **Online registration for the symposium**

- **SAAD contact numbers and email addresses**

## **IN THE MEMBERSHIP AREA**

- **Media page – members of SAAD may use the SAAD logo on their literature.**

The logo is available in PDF or JPEG format to download from the website.

- **Documents – course handbook**

- **Pay subscriptions online**

- **Forum for adverts**

(equipment, positions vacant, positions sought etc)

- **Complimentary access to the online CPD**

# Guidelines for Authors

## SAAD Digest: Guidelines for Authors

SAAD Digest is the Journal of the Society for the Advancement of Anaesthesia in Dentistry and has been published regularly in London UK, since 1970. It has been produced in its current format since 2006. One edition is published each year in January. Copies of all editions produced since then are available online at <http://www.saad.org.uk/saad-digest/>

The Digest has become a unique and invaluable international forum for all interested in advancement of knowledge in pain and anxiety control for dentistry. The Editorial Board invites contributions from all active in the field. Since only one edition is produced each year, potential Authors should be aware of the following details and schedule to avoid excessive publication delay and disappointment.

### Contribution formats

The Board welcomes Research articles, Reports of Randomised controlled trials, articles derived from Diploma Dissertations, Practice-related articles, Education, Professional Opinion, Case Reports and General articles. If in any doubt about the format or content of a proposed article please contact the Secretary before submission. It should be noted that articles are now only accepted in digital format and via email. It is a condition of acceptance of manuscripts that they are the work solely of the author or authors stated and that they have not been previously published elsewhere (either in print or electronic format) nor are they under consideration by any other periodical. Manuscripts should meet the following criteria: they should be original, clearly written, relevant to dentistry, reader-orientated (in other words written to appeal to the readership of any interested in pain and anxiety control in Dentistry) and designed to inform, add to discussion or debate, or entertain. Research papers should also have appropriate study methods, valid data and conclusions that are supported by the data.

### Publication Schedule

The following annual publication schedule is provided for guidance only and assumes a Digest publication date of January Year 01.

August Year -1 > July 31st Year 00: Articles may be submitted for Jan 01 Edition

August 1st 00: Submission for Jan 01 edition closed. (Articles submitted after 31st July will be considered for Year 02 Edition)

### Submission and review

Manuscripts may only be submitted by email to the Secretary at [fiona@saad.org.uk](mailto:fiona@saad.org.uk). Manuscripts will generally be processed as they are received and it is expected that submission will be acknowledged by the Secretary soon after they are received, with a reference number allotted for future correspondence.

Authors should note that submitted papers not fully conforming to these 'Authors Guidelines', **especially in terms of length and manuscript format**, will be returned for correction without consideration or peer review, and in such cases publication might well be delayed or subsequently declined.

Peer review is carried out by at least two anonymous referees, and the Chairman of the Editorial Board. Additional statistical advice may be sought if required.

Authors will be advised as soon as possible, that either their Paper....

1. is suitable for publication without amendment,
2. is suitable for publication with some amendments,
3. may be suitable but requires major rewriting,
4. is rejected.

In any case, Authors will receive the anonymous structured feedback of the reviewers from the Secretary advising them of the decision level as above, and the action (if any) to be taken before resubmission. Delays in action on such advice may cause publication delay or even rejection if the publication deadlines are missed.

Once a manuscript is accepted for publication, authors will be advised whether their paper is to be published in the next issue or is, at the discretion of the Board, to be held for the following issue in order to obtain the appropriate balance for each edition. For similar reasons, in some cases the final decision on acceptance may be delayed. All decisions to publish are at the discretion of the Board alone whose decision is final.

The principal author of a manuscript accepted for publication will later be e-mailed a pdf version of their article for proofing. Any errors identified and requiring correction must be notified by email without delay, and at the latest within 1 week. No revision of the wording or other change, other than correction of proofing errors, will be allowed at this stage.

### Manuscript Format

Manuscripts should be word-processed in Microsoft Word format and double-spaced with a margin of at least 4 cm on the left-hand side. The pages should be numbered consecutively with the numbers centred at the bottom of each page. The first page of the manuscript should give only the title of the article, and the author's/authors' name(s), qualifications and address(es) including email address(es).

### Length of contributions

Contributions should be of no more than 3,000 words, to include tables and figures. Each table and figure will count as 100 words. Case reports are welcomed, but should be of no more than 750 words in length.

Titles must be descriptive of the contents of the article, but yet concise. Papers should be introduced with a short abstract which should be able to stand alone. The abstract should not contain references or abbreviations, and should be no longer than 200 words. The abstract will not contribute to the 3000 word limit.

Data or tables may be submitted in Microsoft Excel format or embedded in the text of the Word document.

Figures or images should be submitted as separately attached and clearly labelled files in JPEG format at a high resolution of 300 dpi. Colour illustrations are preferred where possible. If the illustration is of a subject's face, written consent for its publication must be obtained from the subject and attached with the article. Illustrations obtained from other sources such as books, or from colleagues, must again be accompanied by appropriate documentation indicating approval for their publication as part of the article from the copyright holder, or individual concerned.

Units used in the manuscript must conform to the *Système Internationale d'Unités* (SI).

**References** must be in the Vancouver style. They should be numbered in the order in which they appear in the text. The numbers should be inserted as superscripts each time the author is cited (Robb<sup>3,5</sup> reported similar findings). Other references to the paper should be given in the same way after punctuation (Other studies have shown this to be true.<sup>4,5</sup> Drummond-Jackson et al.<sup>6</sup> demonstrated...). At the end of the article the full list of references should give the names and initials of all authors unless there are more than six, in which case only the first three should be given followed by et al. The authors' names must be followed by the title of the article; the title of the journal abbreviated according to *Index Medicus* and *Index to Dental Literature* style; year of publication; volume number; and the first and last page numbers in full. Titles of **books** should be followed by the place of publication, publisher, and the year. If this reference citation style is not followed exactly, **especially in relation to punctuation and spacing**, the manuscript will be returned without review.

### Examples of reference styles

Reference to an article

1. Molar L R, Fang-Jones Q, Jaw U. Are Teeth biting back?. *Br Dent J* 2006; 200: 144-146.

Reference to a book

2. Craig D C, Skelly A M. *Practical Conscious Sedation*. 1st ed. London: Quintessence, 2004.

Reference to a book chapter

3. Robb N D. Conscious sedation in Dentistry. In Heasman PA (ed) *Master Dentistry*. Vol. 2; Restorative Dentistry, Paediatric Dentistry and Orthodontics. pp 149-168. Edinburgh: Churchill Livingstone, 2003.

Reference to a report

4. Re-accreditation and re-certification for the dental profession. London: General Dental Council, 1997.

Reference to a webpage

3. General Dental Council. Scope of practice. 2009. Online information available at [www.gdc-uk.org/Newsandpublications/Publications/Publications/ScopeofpracticeApril2009\[1\].pdf](http://www.gdc-uk.org/Newsandpublications/Publications/Publications/ScopeofpracticeApril2009[1].pdf) (accessed April 2012).

The author/principal author is responsible for the accuracy of the reference list.

Acknowledgements should be grouped in a paragraph at the end of the text before the references. Permission and approval of the wording must be obtained from the person(s) thanked. Where any research project was supported by industry, this should be acknowledged in a covering letter to the Editor on submission of the manuscript.

**Declaration of interests:** Author(s) must ensure that they declare any possible conflicts of interest in their paper. This includes matters such as: direct funding from an organisation or company for the research; funding received (or payment in kind) for any related work carried out from an organisation or company that could be linked to the research; consultation or advisory positions held in an organisation or company involved in the research or an organisation involved in similar research; any other situation that could be construed as a conflict of interest.

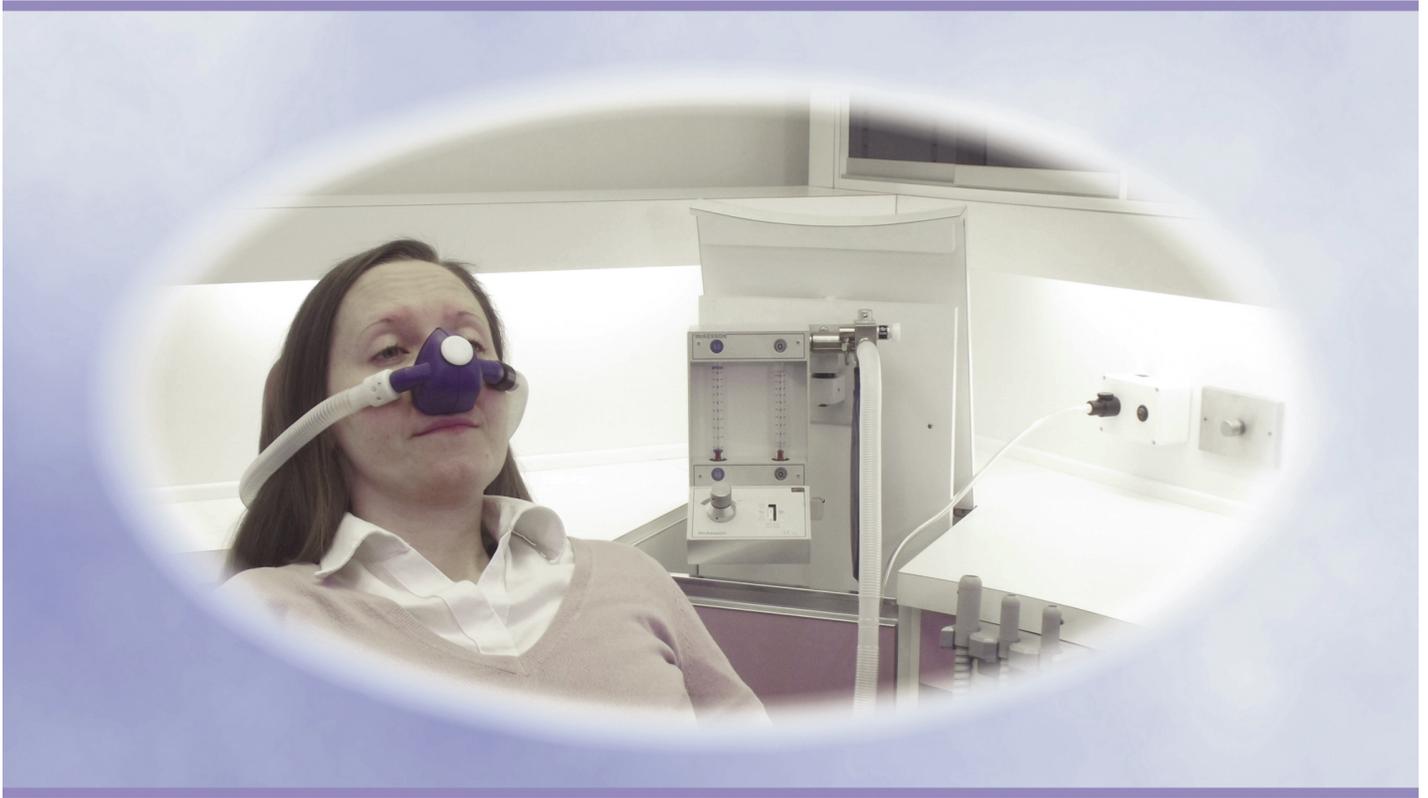
### Ethics

Articles reporting clinical research must include a statement indicating that appropriate Ethical Committee approval has been granted.

### Copyright

Upon acceptance for publication in SAAD Digest, it is assumed that the author(s) assign(s) copyright of the article to the Society for the Advancement of Anaesthesia in Dentistry. Single copies of the published article for personal study may be made free of charge but multiple copies will require permission of the Editor prior to production.

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# Dental

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# DIARY SCAN

Compiled by Dr C E Mercer

2017	DATE	ORGANISATION	THEME/TITLE	VENUE	CONTACT
JANUARY					
	11-13	AAGBI	Winter Scientific Meeting	London	<a href="http://www.wsmlondon.org/">www.wsmlondon.org/</a>
FEBRUARY					
	17-18	ADSA	Las Vegas Meeting	USA	<a href="http://www.wsmlondon.org/">www.wsmlondon.org/</a>
MARCH					
	4-5	SAAD	National Course in Conscious Sedation for Dentistry	London	<a href="http://www.saad.org.uk/index.php/coursesbyrole/view-all-courses">www.saad.org.uk/index.php/coursesbyrole/view-all-courses</a>
	25	SAAD / BSDH	General Anaesthesia for Special Care Dentistry Study Day	London	<a href="http://www.saad.org.uk">www.saad.org.uk</a>
APRIL					
	20-22	ADSA	Annual Session	USA	<a href="http://www.adsahome.org/annual-session">www.adsahome.org/annual-session</a>
MAY					
	3-5	British Pain Society	Annual Scientific Meeting	Birmingham	<a href="http://www.britishpainsociety.org/2017-asm-birmingham/">www.britishpainsociety.org/2017-asm-birmingham/</a>
	16	DSTG	Annual Symposium & AGM	Birmingham	<a href="http://www.dstgsymposium.co.uk">www.dstgsymposium.co.uk</a>
	22-24	Society for Paediatric Sedation	Conference	USA	<a href="http://www.pedsedation.org/upcoming">www.pedsedation.org/upcoming</a>
JUNE					
	3-5	ESA	Euroanaesthesia 2017	Geneva	<a href="http://www.esahg.org/event-overview/2017-06-03-euroanaesthesia-2017">www.esahg.org/event-overview/2017-06-03-euroanaesthesia-2017</a>
	17-18	SAAD	National Course in Conscious Sedation for Dentistry	London	<a href="http://www.saad.org.uk/index.php/coursesbyrole/view-all-courses">www.saad.org.uk/index.php/coursesbyrole/view-all-courses</a>
JULY					
	5-7	GAT	Annual Scientific Meeting	Cardiff	<a href="http://www.gatasm.org">www.gatasm.org</a>
SEPTEMBER					
	13-16	ESRA	36th ESRA Conference	Switzerland	<a href="http://www.esraeurope.org/meetings/esra-annual-congress/">www.esraeurope.org/meetings/esra-annual-congress/</a>
	23	SAAD	Annual Symposium & AGM	London	<a href="http://www.saad.org.uk">www.saad.org.uk</a>
	27-28	AAGBI	Annual Congress	Birmingham	<a href="http://www.aagbi.org/education/events/conference">www.aagbi.org/education/events/conference</a>
	28-30	European Resuscitation Council	ERC Congress	Germany	<a href="http://www.erc.edu/events">www.erc.edu/events</a>
	28-29	ESPA	9th European Congress on Paediatric Anaesthesia	Glasgow	<a href="http://www.euroespa.com/annual-congress/">www.euroespa.com/annual-congress/</a>
OCTOBER					
	19-23	ADA 2017	Annual Conference	Atlanta, USA	<a href="http://www.ada.org/en/eeting/attendee-information/future-meetings/">www.ada.org/en/eeting/attendee-information/future-meetings/</a>
NOVEMBER					
	4-5	SAAD	National Course in Conscious Sedation for Dentistry	London	<a href="http://www.saad.org.uk/index.php/coursesbyrole/view-all-courses">www.saad.org.uk/index.php/coursesbyrole/view-all-courses</a>
	TBA	SIVA	Annual Scientific Meeting		<a href="http://www.siva.ac.uk/">www.siva.ac.uk/</a>